WOODHOUSE SOLAR 2 PV FACILITY, NORTH WEST PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

DEA REFERENCE: 14/12/16/3/3/2/865

June 2016

Prepared for

Genesis Woodhouse Solar 2 (Pty) Ltd
Unit B10,
C/o Century Plaza & Heron Crescent,
Century City
Cape Town

Prepared by

FLOOR, BLOCK 2
5 WOODLANDS DRIVE OFFICE PARK,
CORNER WOODLANDS DRIVE & WESTERN
SERVICE ROAD, WOODMEAD, GAUTENG
PO BOX 148, SUNNINGHILL, 2157
TEL: +27 (0)11 656 3237
FAX: +27 (0)86 684 0547
E-MAIL: INFO@SAVANNAHSA.COM
WWW.SAVANNAHSA.COM

PROJECT DETAILS

DEA Reference No.	:	14/12/16/3/3/2/865
Title	:	Woodhouse Solar 2 PV Facility, North West Province: Environmental Management Programme
Authors	:	Savannah Environmental (Pty) Ltd Jared Padavattan Lisa Opperman Karen Jodas
Specialists	:	Candice Hunter of Savannah Environmental Gerhard Botha of Eco-Care Consultancy Blair Zoghby and Simon Todd of Simon Todd Consulting Jaco van der Walt of Heritage Contracts and Archaeological Consulting Elize Butler of the Bloemfontein National Museum Jon Marshall of Afzelia Environmental Consultants
Developer	:	Genesis Woodhouse Solar 2 (Pty) Ltd
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DEFINITIONS AND TERMINOLOGY

Alien species: A species that is not indigenous to the area or out of its natural distribution range.

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Assessment: The process of collecting, organising, analysing, interpreting and communicating information which is relevant.

Biological diversity: The variables among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes they belong to.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity as per Regulations GNR 983, 984 and 985 of December 2014. Construction begins with any activity which requires Environmental Authorisation.

Cumulative impacts: The impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation, or maintenance of an activity and are generally obvious and quantifiable.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Ecosystem: A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

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

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

Environmental assessment practitioner: An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

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

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

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

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

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

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

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

Incident: An unplanned occurrence that has caused, or has the potential to cause, environmental damage.

Indirect impacts: Indirect or induced changes that may occur because of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place because of the activity.

Interested and affected party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.

Photovoltaic effect: Electricity can be generated using photovoltaic panels (semiconductors) which are comprised of individual photovoltaic cells that absorb solar energy to produce electricity. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the Photovoltaic Effect.

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

Project development property: The project development areas considered through the EIA process in defining the area for the PV facility project include, and are defined as follows:

» **Project area:** The project area refers to the total extent of the Farm Woodhouse 729 which is 2264 ha in extent. The entire 2264 ha of the project area was subjected to the scoping level assessment in order to provide the option of identifying more suitable positions for development of the PV facility, should any of the areas be found to be technically or environmentally constrained.

- **Development site:** The site of the proposed PV Project, situated in the northern portion on the remaining extent of Farm Woodhouse 729 (project area), and is 300ha in extent.
- **Facility development footprint:** The total development footprint on the development site for the PV facility, including associated infrastructure is ~ 240ha in extent.

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to the Waste Amendment Act (as amended on June 2014); or any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the *Gazette*,

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INTRODUCTION CHAPTER 1

Genesis Woodhouse Solar 2 (Pty) Ltd propose the development of a commercial photovoltaic (PV) solar energy facility (known as the Woodhouse Solar 2 PV Facility) on the Remaining Extent of the farm Woodhouse 729 (refer to **Figure 2.1**). The proposed project site[1] is located approximately 10km south east of the town of Vryburg and falls under the jurisdiction of the Naledi Local Municipality and within the greater Dr Ruth Segomotsi Mompati District Municipality in the North West Province.

The EMPr has been developed on the basis of the findings of the EIA, and must be implemented to protect sensitive on-site and off-site features through controlling construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. This EMPr is applicable to all Genesis Woodhouse Solar 2 (Pty) Ltd employees and contractors working on the pre-construction, construction, and operation and maintenance phases of this project. The document will be adhered to, updated as relevant throughout the project life cycle. This document fulfils the requirement of the EIA Regulations and forms part of the EIA Report for the project.

[1] Project site is defined as the Remaining Extent of the farm Woodhouse 729.

PROJECT DETAILS CHAPTER 2

The proposed project entails the development of the Woodhouse Solar 2 PV Facility on a project site located approximately 10km south east of Vryburg which is situated within the Naledi Local Municipality and the greater Dr Ruth Segomotsi Mompati District Municipality. The PV facility will be located on the Remaining Extent of the farm Woodhouse 729. The full extent of the project site (i.e. 2264ha) has been considered through a feasibility level assessment as well as the Scoping Phase of the EIA process, within which the development area[2] for the PV facility (approximately 300ha in extent) has been appropriately located. Based on the specialist studies and limited field survey undertaken in the Scoping phase, sensitivities were identified within the project site which could potentially be impacted on by the development of the Woodhouse Solar 2 PV Facility.

The development area (~300ha) is situated in the south western corner of the project site and is traversed by the unsurfaced Amaila main road (refer to **Figure 2.2**). The development area will house the development footprint of the PV facility which will include the PV panels, on-site substation, inverters, buildings, septic tank etc. but does not include the full extent of the projects linear components – that is the grid connection power line and the main access roads to the facility.

Table 2.1 below provides details of the proposed project, including the main infrastructure and services.

Table 2.1: Details of the proposed project

Component	Description/ Dimensions
Location of the project site	Remaining Extent of the farm Woodhouse 729
Municipal Jurisdiction	» Naledi Local Municipality » Dr Ruth Segomotsi Mompati District Municipality
SG Code	T0IN00000000072900000
Extent of the project site	2264ha (extent of the affected property)
Extent of the facility development area	Up to 300ha
Extent of the facility development footprint	Up to 240ha
Contracted capacity of	Up to 100MW

[2] The Development Area (300 ha in extent) is a smaller focus area within the project site which has been selected as the best practicable option for the facility, considering technical preference and environmental constraints identified in the Scoping Phase. The development area has been subject to detailed assessment in the EIA phase, and provides the boundary within which the development footprint (~240 ha) of the PV facility will be located, so as to be able to avoid the sensitive areas identified.

Component	Description/ Dimensions
facility	
Technology	Static or tracking photovoltaic PV System
Internal access	Gravel roads of ~7km in extent and 4m in width
Site access	Direct access to the site is possible via a secondary main road, known as the Amalia Road, which is located along the western boundary of the project site; or alternatively via the regional road (R34) which traverses the north eastern portion of the project site. .
Details of the PV panels	» Type: Single axis PV solar tracking system » Height: ~5m from ground level
PV Panel Area	Up to 186ha
On-site substation	150m x 150m = 22 500m^2
Power line	» Capacity – 132kV » Servitude width – 32m » Length: up to 8100m, depending on the final grid connection alternative. » Height of the towers – 28-32m
Grid connection options	» *Alternative 1*: A direct connection to the authorised Eskom Bophirima Substation to be constructed within the northern portion of the affected property (i.e. the Remaining Extent of the farm Woodhouse 729); » *Alternative 2*: A direct connection to the existing Woodhouse 88/22kV Substation located north of the boundary of the affected property; » *Alternative 3*: A turn-in turn-out connection to the existing Delareyville Munic / Vryburg 1 88kV Feeder located along the northern boundary of the affected property; and » *Alternative 4*: A turn-in turn-out connection to the authorised 132kV Eskom Bophirima–Mookodi power line to be constructed by Eskom.
Number of inverters required.	Up to 40 inverters
Area occupied by buildings and associated infrastructure	12m x 4m = 48m^2
Services required	» Refuse material disposal - all refuse material generated from the proposed development will be collected by a contractor and will be disposed of at a licensed waste disposal site off site. This service will be arranged with the municipality when required. » Sanitation – all sewage waste will be stored on site within a septic tank which will be emptied by the municipality for disposal. » Water - on site boreholes to supply the PV facility during the construction and operation phase. » Electricity supply - electricity will be supplied to the facility via the Delareyville Munic/Vryburg 1 88kV Feeder traversing the

Component	Description/ Dimensions
	northern boundary of the project site.
Temporary infrastructure required during the construction phase (which is estimated to be 12-18 months)	» Construction camps; » Construction yard; and » Storage areas. Total area to be occupied: up to 500 x 100m within the development area.

The development footprint of the Woodhouse Solar 2 PV Facility (PV facility, including associated infrastructure, up to 240ha in extent) is proposed to accommodate the PV panels and the following associated infrastructure:

» Arrays of single axis PV tracking panels or fixed tilt PV with a capacity of up to 100MW.
» Mounting structures to support the PV panels.
» A new 132kV power line between the on-site substation and the Eskom grid connection point.
» Cabling between the projects components, to be laid underground where practical.
» Offices and workshop areas for maintenance and storage.
» Temporary laydown areas.
» Internal access roads and fencing around the development area

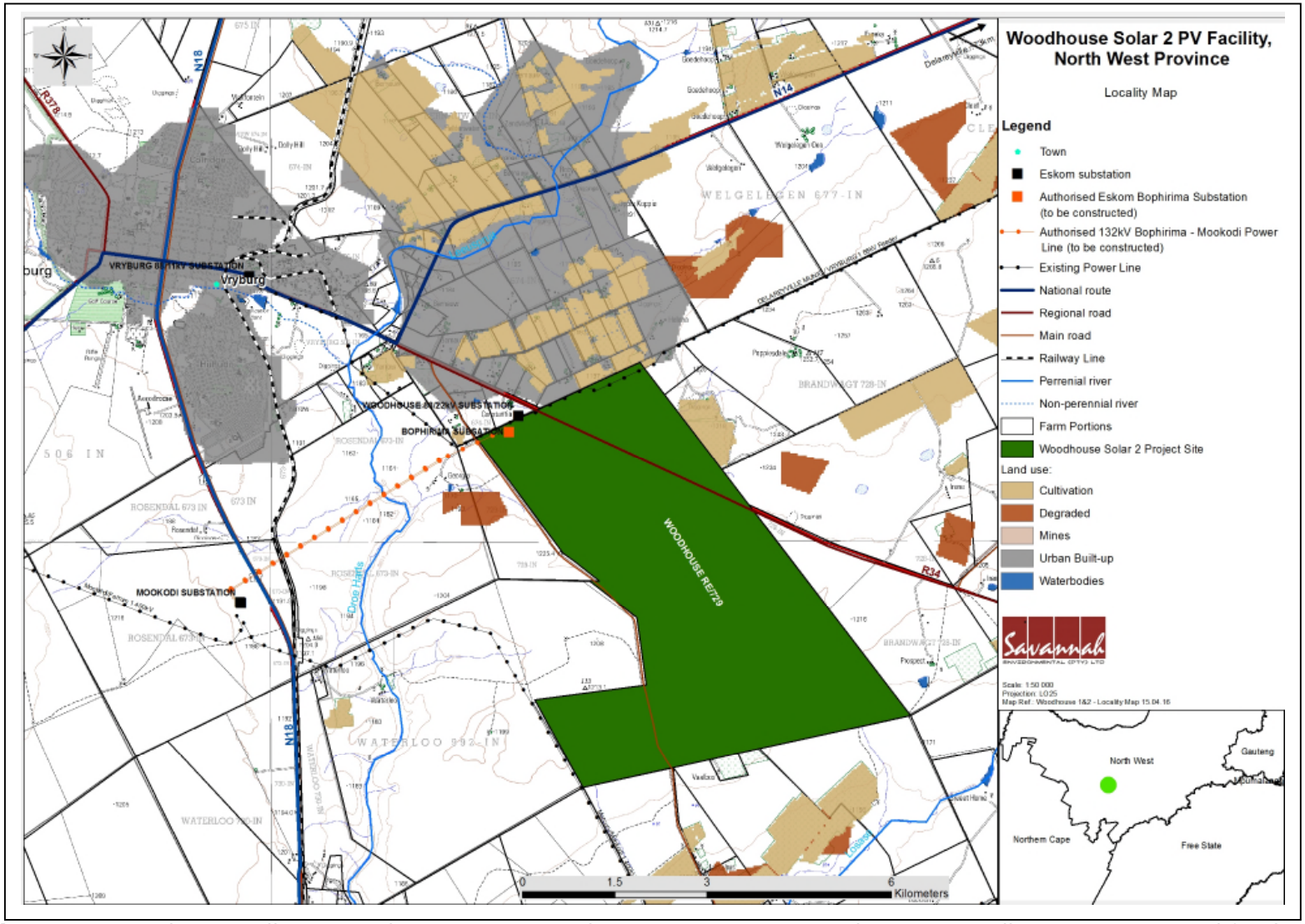

Figure 2.1: Locality map illustrating the project site on the Remaining Extent on the Farm Woodhouse 729 proposed for the Woodhouse Solar 2 PV Facility.

2.1. Findings of the Environmental Impact Assessment

2.1.1 Impacts on Ecology

There are no highly sensitive features impacted by the development footprint, however, the facility layout, specifically the facility fence, infringes on buffers associated with sensitive features in the development area. Any impact to these areas of high sensitivity can be mitigated through the micro-siting of the facility layout in these areas. The abundance of species of concern within the development area is low and while there are some protected species present, such as *Acacia erioloba* and *Boscia albitrunca*, there are no species of high conservation concern present and no significant impacts on the local populations of the protected species present can be expected. The CBA corridor areas within the development area are, as a result of historical and current anthropogenic activities and disturbance, no longer considered to be significant for ecological functioning. The site is considered appropriate for the development of a PV facility, which does not warrant whole-scale clearing of the development footprint and still allows for the functioning of areas as movement corridors. Therefore, the development of the facility within the transformed CBAs which overlap with the project development footprint is considered acceptable in terms of the loss of the area to development. Overall and with the suggested mitigation measures implemented, the **ecological** impacts of the development are likely to be of **moderate to low significance** and no impacts of high significance are likely. As a result, there are no ecological fatal flaws or impacts that cannot be mitigated that should prevent the development from being approved.

2.1.2 Impacts on Avifauna

The development of the PV facility is likely to have little, if any, significant long-term impact on the avifauna of the wider area, especially after mitigation, and is considered to have acceptable levels of impact overall. The location of the project site and more specifically the preferred site proposed for the development are not considered unique habitats in the landscape and are already subject to varying degrees of transformation and degradation. Although two threatened and/or priority species were recorded within the broader study area outside of the project site – White-backed Vulture and Greater Flamingo respectively – these are widespread species, the area is not considered critical for their conservation and the extent of habitat loss for these species would be considered low. In terms of the direct impacts of the development in isolation, the site (developable area) is considered optimal for the development due to the homogenous nature of the vegetation, the level of degradation already present and the lower bird species diversity and abundance recorded in this area. The impacts of the development on avifauna are likely to be of **moderate to low significance** and no impacts of high significance are expected, with the implementation of mitigation measures.

2.1.3 Impacts on Heritage and Palaeontological Resources

In terms of the built environment, no structures were recorded in the Woodhouse Solar 2 Site Alternative 1 and 2 development footprints. In terms of the archaeological component, Early Stone Age (ESA), Middle Stone Age (MSA) and Later Stone Age (LSA) artefacts were recorded scattered in varying densities. These sites are associated with the large quantities of raw material available in the area and where the apedal soils are eroded away exposing glacial gravels and basaltic lava that was exploited in antiquity. Almost the entire Stone Age sequence was recorded here apart from the Oldowan. Artefacts associated with Fauresmith up to LSA were recorded in Site Alternative 1. Mostly MSA and some LSA material were recorded in Site Alternative 2. Graves can be expected anywhere on the landscape although none were recorded in either site alternative. No significant cultural landscape elements were noted. The impact of the development of the Woodhouse Solar 2 PV Facility on these recorded sites, with the implementation of the appropriate and recommended and appropriate mitigation measures is considered to be of a **low significance**.

The development area is underlain by the Vryburg Formation of the Ghaap Group, and the Dwyka Group of the Karoo Supergroup. The Dwyka Group (Karoo Supergroup) is represented by small outcrops in the north of the development area. Although trace fossils and plants could be present in the Dwyka Group the likelihood of significant fossil heritage in the Vryburg area is considered to be low. Site Alternative 2 consists of the Vryburg Formation, while a small outcrop of the Schmidtsdrif Subgroup is present in the south western area of Site Alternative 1. Stromatolite assemblages are recorded within the Schmidtsdrif Subgroup and Vryburg Formation. The Boomplaas Formation stromatolites represent some of the oldest examples of these microbial fossils in South Africa. Detailed descriptions of these fossils have yet to be documented and their stratigraphic and geographical distributions are poorly understood.

There is a scarcity of fossil heritage and a lack of appropriate exposure to confirm the presence of fossiliferous material. However, the small outcrop of the Schmidtsdrif Subgroup present in the south western area of Site Alternative 1 would not be impacted by any deep excavations or foundations (the substation footprint would be outside of this Formation). Therefore, there are no areas located within the development area considered as sensitive, and as such the impact of the development with the implementation of appropriate mitigation measures is considered as being of **low significance**.

2.1.4 Impacts on Visual Quality of the area

The area that is likely to be affected by visual impacts associated with the proposed Woodhouse Solar 2 PV Facility will be limited to the area immediately to the south of the urban area of Vryburg, with an approximate 5km extent of visibility from the PV Facility. This area is predominately urban and urban fringe development. Due to the ridgeline to the south of the proposed development area, this facility will not impact visually on areas to the south that are more natural in character and where the landscape character is not influenced by development. The area of visual influence is therefore to the west and north west of the facility. Impact **significance** was assessed and it was found that the visual significance is likely to be **low** with the implementation of appropriate mitigation measures.

2.1.5 Social and Economic Impacts

The overall **social** impact is likely to be of a **medium significance** in terms of **positive** impacts, and a **low significance** in terms of the **negative** impacts (with the implementation of mitigation measures). From a social perspective it is concluded that the project is supported, but that mitigation measures should be implemented and adhered to. Positive and negative social impacts have been identified. The assessment of the key issues indicated that there are no negative impacts that can be classified as fatal flaws and which are of such significance that they cannot be successfully mitigated. Positive impacts could be enhanced by implementing appropriate enhancement measures and through careful planning.

Based on the social assessment the potential negative social impacts associated with the construction phase are temporary and typical of construction related projects and not just focussed on the construction of the proposed PV facility (these relate to influx of non-local workforce and jobseekers, intrusion and disturbance impacts, safety and security) and could be reduced with the implementation of the mitigation measures proposed. Employment opportunities will be created in the construction and operation phase and the impact is rated as positive even if only a small number of individuals benefit in this regard. The proposed project could assist the local economy in creating entrepreneurial development, especially if local business could be involved in the provision of general material and services during the construction and operational phases. Capacity building and skills training among employees are critical and would be highly beneficial to those involved, especially if they receive portable skills to enable them to also find work elsewhere and in other sectors.

The proposed PV facility also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the increased awareness of climate change, represents a positive social benefit for society as a whole.

2.2. Final Layout

In response to the identified need to adequately manage impacts within sensitive areas identified on the site development footprint, and in order to demonstrate the commitment of the project to adhere to recommended mitigation measures, the project developer has developed a best practice mitigation strategy with regards to the facility layout.

The EIA recommendations have been taken into account by the project developer, and the facility layout has been refined to avoid the areas identified as being of high sensitivity (or no-go areas to be avoided). This refinement of the layout has resulted in the repositioning of facility fence outside of the identified high sensitivity areas and the associated buffers in the south west corner of the development footprint.

The ephemeral tributary and the associated 35m buffer has been avoided by the optimised layout/development footprint in order to ensure that the features will not be impacted on by the development. .

This optimised layout considering the implemented mitigation measures is illustrated in **Figure 2.2** and represents a positive outcome in terms of impact reduction and mitigation and the optimal layout for the facility. The optimised layout map superimposing the environmental sensitivities identified within the development area is included as **Figure 2.3** and **Figure 2.4**.

The final layout/optimised layout for the Woodhouse Solar 2 PV Facility is based on the most environmentally appropriate and technically feasible design. This final layout avoids features of a high sensitivity located within the development area (i.e. ephemeral tributary) and is considered as the most appropriate layout for the Woodhouse Solar 2 PV Facility.

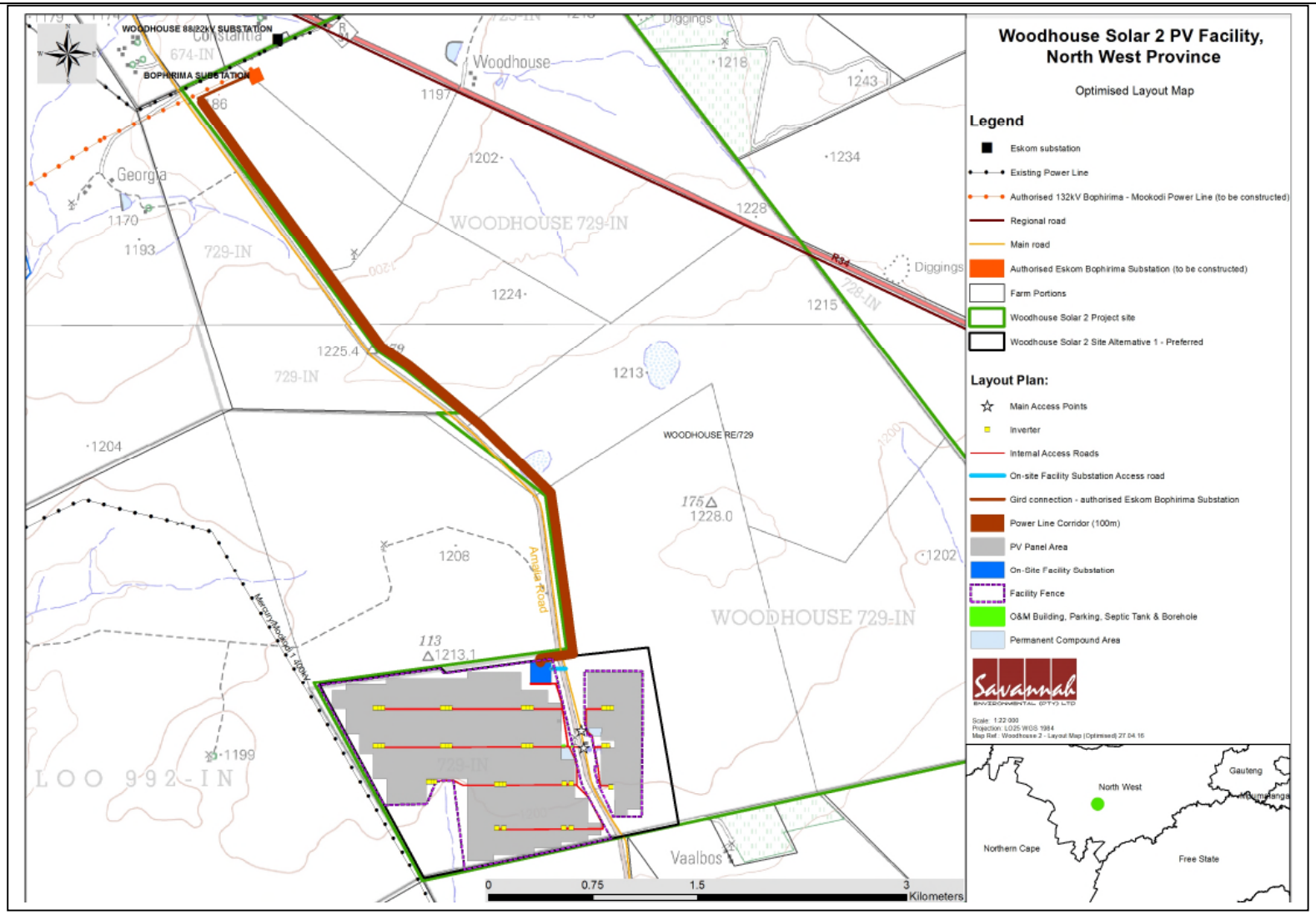

Figure 2.2: Final layout map for the Woodhouse Solar 2 PV Facility.

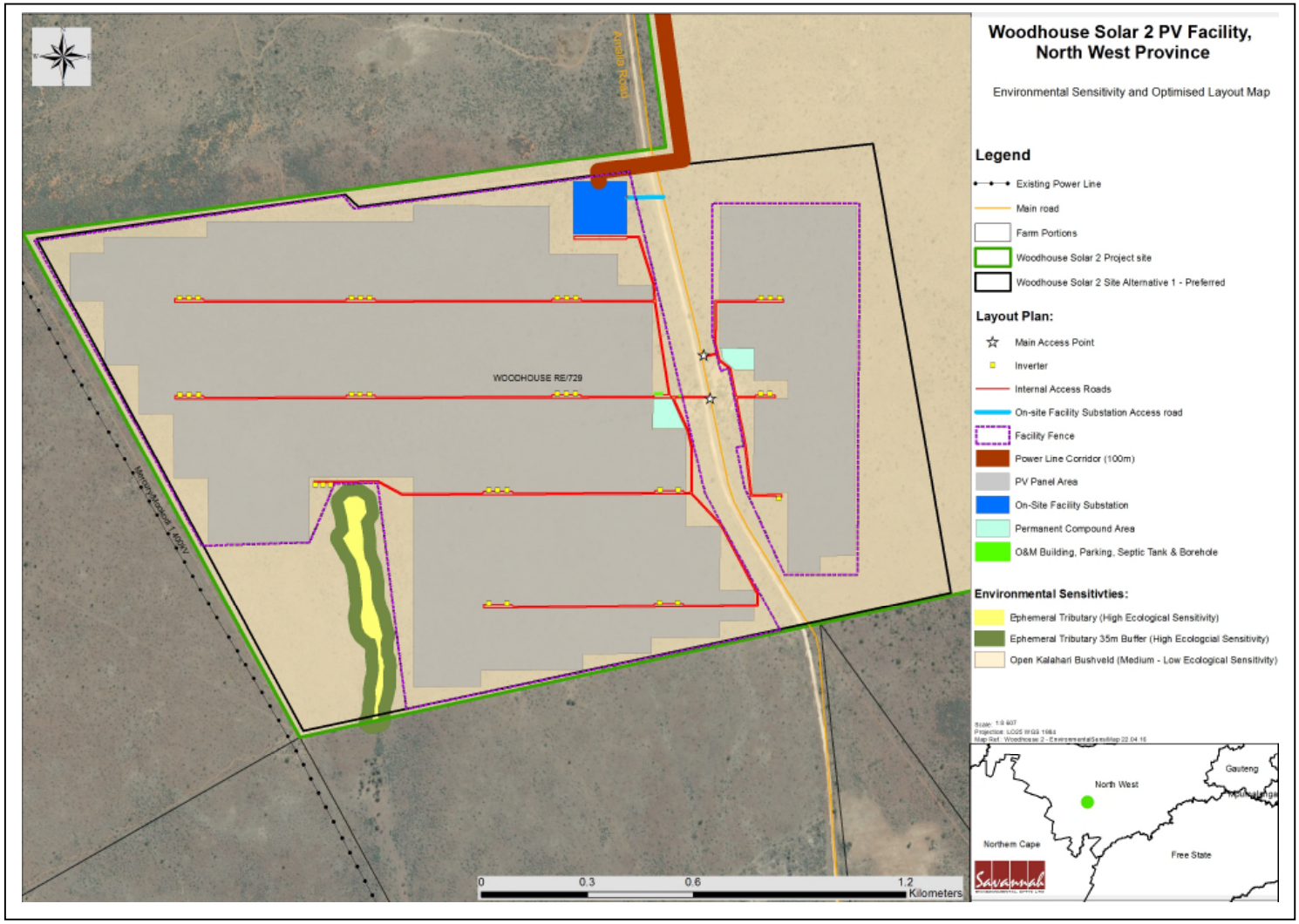

Figure 2.3 Final layout map (optimised layout) overlain with the environmental sensitivities associated with the Woodhouse Solar 2 PV Facility.

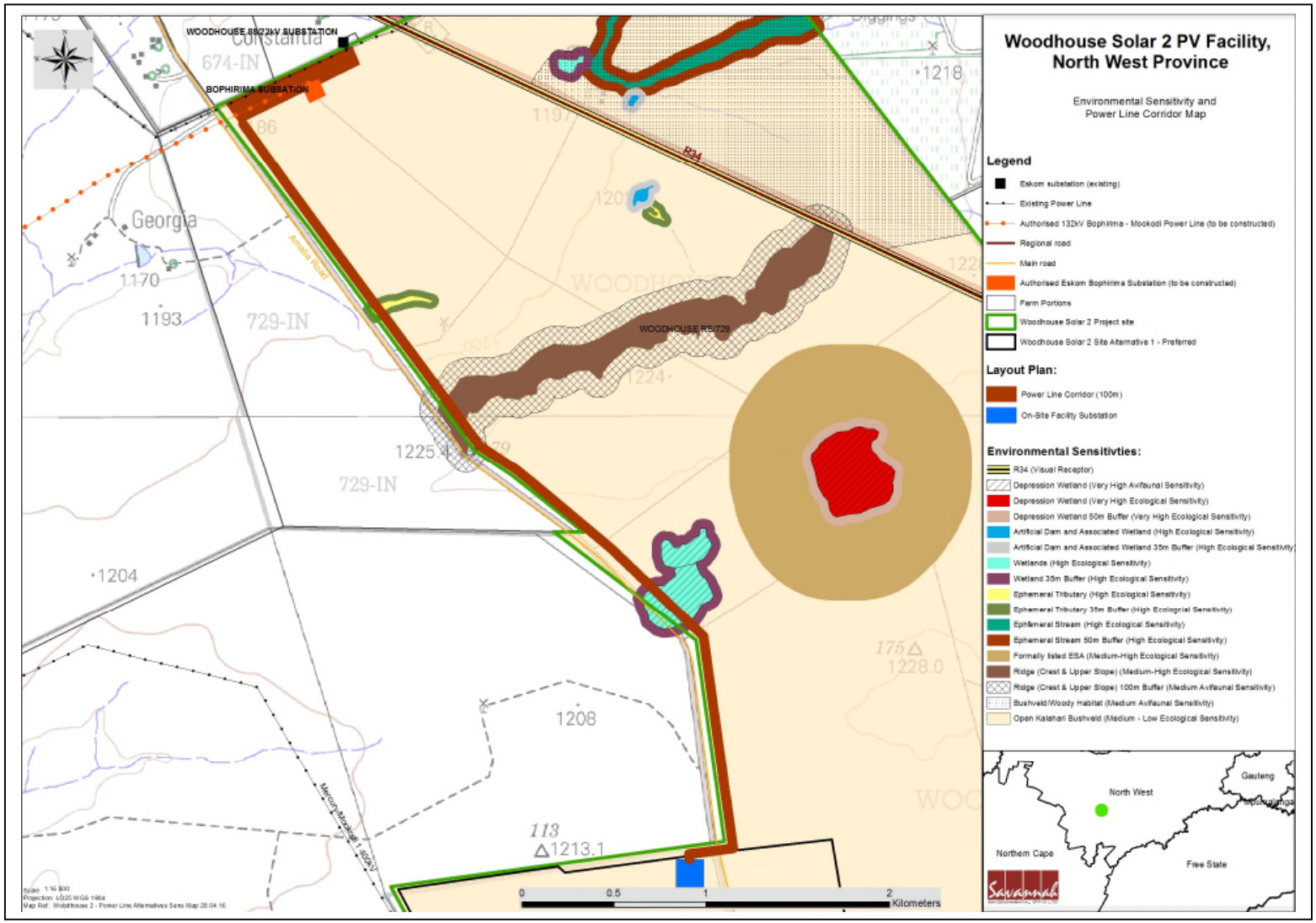

Figure 2.4: Power line corridor overlain with the environmental sensitivities associated with the Woodhouse Solar 2 PV Facility.

2.3. Activities and Components associated with the PV Facility

The main activities/components associated with the proposed facility are detailed in the tables which follow.

Table 2.1: Activities to be undertaken during the pre-construction and construction phase

PRE-CONSTRUCTION AND CONSTRUCTION
» *Environmental Permits*: Obtain any additional environmental permits required (e.g. water use license, and protected plant permits, etc.) Before the commencement of construction. Copies of permits/licenses must be submitted to the Director: Environmental Impact Evaluation at the DEA.
» *Staff requirements* – on average an estimated labour force of 300 - 400 will be used on-site during the construction phase. These positions will be comprised of low skilled (60%), semi-skilled (25%), and skilled workers (15%), the latter of which will most likely be sourced from Vryburg, Delareyville, Stella and Schweizer-Reneke, and neighbouring communities (i.e. as these skills are unlikely to be available within the local community). The specialists / foreigners forming part of the construction team are likely to make use of the local establishments for accommodation facilities. It is expected that most of the construction (i.e. civil works) will be done by local South African companies. The use of local contractors such as Small, Medium, and Micro Enterprises (SMMEs) operating in the area will be considered by the EPC partner, and will be driven largely by what skills and services could be sourced from local SMMEs (i.e. as part of a competitive tendering process). The EPC partner will determine the standards which all workers need to comply to and this will be in line with South African standards and laws applicable to the construction industry.
» *Construction materials and equipment requirements* **-** around 30 - 40% of the construction material and equipment may be sourced locally (i.e. within South Africa), depending on technical capabilities and prices of local industry. The materials and equipment will be transported to site by road.
» *Water requirements* - The water required for the project is approximately ~15 200 m^3 for the construction phase over 12-18 months and 5050 m^3 during operation of the PV facility over the 20 year lifetime of the project..
» *Length of the construction phase* - commencement of the construction phase is dependent on the project being approved by DEA, a generating license being issued by NERSA, and a Power Purchase Agreement being secured with Eskom/ Treasury or the designated buyer of renewable energy electricity and successfully reaching financial close. Construction is estimated to extend over a period of 12-18 months.

Activity	***Detailed description***
Pre-construction surveys	Prior to initiating construction, a number of detailed surveys will be required including, but not limited to: » *Geotechnical survey* – A detailed geotechnical study will be undertaken for the site in order to inform the final design. The geotechnical study will consider flood potential, foundation conditions, potential for excavations, and the availability of natural construction materials. This study will serve to inform the type of foundations required to be built (i.e. for the substation), and the extent of earthworks and compaction required in the establishment of the internal access roads. » *Site survey* - in order to finalise the design layout of the solar field, and the other associated infrastructure. The finalisation will need to be confirmed in line with the Environmental Authorisation issued for the facility. » *Power line servitude survey* – once the placement of the power line towers has been finalised, a walk through survey will be undertaken for archaeology and heritage resources which may necessitate certain towers to be moved to avoid sensitivities.
Undertake site preparation	» Search Rescue and relocation of species of special concern » Site preparation activities will include: * Clearance of vegetation at the footprint of the area infrastructure (i.e. solar field and associated infrastructure). * Levelling of site (as necessary) * Clearance of vegetation at the footprint of the linear component (i.e. internal access roads). * The development of stormwater control management systems which may include drainage channels which will collect all rain water and lead it to the natural stormwater drainage system. » These activities will require the stripping of topsoil which will need to be backfilled as construction progresses and stockpiled for future rehabilitation.
Establishment of access roads	» The project site proposed for the development is accessible through the use of the R34 which is located within the northern portion of the project site or alternatively via a secondary unsurfaced road, known as the Amalia Road, which is located along the western boundary of the project site. Within the site itself, access will be required from new/existing roads for construction purposes (and limited access for maintenance during operation). Internal access roads of up to 4m in width will be required.

Activity	***Detailed description***
Transport of components to site	» The components for the proposed facility will be transported to site by road. For the proposed PV facility, transport of components would occur via the R34. Some of the components (i.e. substation transformer) may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989) by virtue of the dimensional limitations. Typical civil engineering construction equipment will need to be brought to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the mounting of the PV support structures, construction of the substation and site preparation. » Some of the battery storage components may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989) by virtue of dimensional limitations (i.e. weight).
Establishment of construction equipment camps, storage facilities and laydown areas	» Once the required equipment has been transported to site, dedicated construction camp(s), storage facilities, and laydown area/s will need to be established. These areas serve to confine activities to a designated area to limit potential site disturbance. The laydown area will be used as a logistical area for the contractors and as a prefabrication area. » The fuel required for on-site construction vehicles and equipment will need to be secured in a temporary bunded facility within the construction camp to prevent leakages and soil contamination.
Establishment of substation and power line	» A new 132kV power line between the on-site substation and the Eskom grid connection point. » Cabling between the projects components, to be laid underground where practical. » A power line is constructed by surveying the power line route, construction of foundations for the towers, installation of the towers, stringing of conductors and finally the rehabilitation of disturbed area and protection of erosion sensitive areas. » The position of the inverters within the footprint will be informed by the final positioning of the PV components. » The construction of a substation would require a survey of the site, site clearing and levelling and construction of access road/s (where required), construction of a level terrace and foundations, assembly, erection, installation and connection of equipment, and rehabilitation of any disturbed areas and protection of erosion sensitive areas.
Establishment of PV panels	» The PV panels will be arranged in arrays, the mounting structure will be preferably fixed onto the ground with the use of rammed or screw anchor foundations.

Activity	*Detailed description*
	» Trenching would occur within each array to accommodate the electrical cables. The trenches would be up to ~ 1.8m in width and 2m deep, for a total combined length of approximately 10 km. Minimal ground disturbance may occur within the trenched corridors to restore them after soil has been replaced in the trenches, so that the corridor can conform to the existing surface contours.
Undertake site rehabilitation and establishment of the stormwater management plan	» Areas requiring rehabilitation will include those areas disturbed during the construction phase and are not required for operation and maintenance operations. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area. » Where relevant disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved. » All temporary facilities, temporary equipment, and waste materials must be removed from site. » Erosion control measures (i.e. drainage works and anti-erosion measures) should be used in sensitive areas (i.e. steep slopes, hills, and drainage lines), to minimise loss of topsoil and control erosion. » Any access points and/or access roads which are not required during the operational phase must be closed as part of the post-construction rehabilitation.

Table 2.2: Activities to be undertaken during the operation phase

OPERATION
» *Staff requirements* - approximately 25 -30 staff members are expected to be required on-site during the operational phase of the project. » *Length of the operation phase* – the facility is expected to be operational for 20 years, where after it could be decommissioned or its lifespan extended depending on the power generation requirements at the time.

Activity	*Detailed description*
Sourcing, treatment and use of water	» Approximately 5050 m^3 per annum of water will be required during operation which will be sourced from boreholes within the property.
Treatment and disposal of waste water	» Any water from ablution facilities will be collected in a septic tank. This tank will be emptied as required and sewage disposed of at the nearest municipal sewage waste facility.
Operation of the PV panels and the associated electrical infrastructure	» The PV panels will convert the light energy from the incoming radiation into electrical energy (i.e. as direct current).

Activity	***Detailed description***
	» The inverters will convert the power from direct to alternating current. » A new 132kV power line between the on-site substation and the Eskom grid connection point » Occasional cleaning of the panels will be required throughout the life cycle of the facility when necessary.
Site operation and maintenance	» Full-time security, maintenance, and control room staff will be required on site. » Each component within the solar energy facility will be operational except under circumstances of mechanical breakdown, unfavourable weather conditions, or routine maintenance activities. » The access to the site and the internal access roads will be maintained during the operational phase. » Vegetation maintenance and weed control measures will be undertaken as required.

Table 2.3: Activities to be undertaken during the decommissioning phase

DECOMMISSIONING	
» *Length of the decommissioning phase* – following the operational phase the facility could be decommissioned or its lifespan extended depending on the power generation requirements at the time. » *Activities during the decommissioning phase* - it is most likely that decommissioning would comprise the disassembly and removal of components from the site.	
Activity	***Detailed description***
Site preparation	» Site preparation activities similar to those undertaken in the construction phase will be required during the decommissioning phase. This will include confirming the integrity of site access to the site in order to accommodate the required equipment (e.g. laydown areas and decommissioning camp) and the mobilisation of decommissioning equipment.
Disassemble and remove existing components	» The components would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements.

PURPOSE AND OBJECTIVES OF THE EMPR CHAPTER 3

An Environmental Management Programme (EMPr) is defined as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts associated with the planning, construction, operation and decommissioning of a project are avoided or mitigated, and that the positive benefits of the projects are enhanced". The objective of this EMPr is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMPr is to ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the facility. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

The EMPr provides specific environmental guidance for the construction and operation phases of a project, and is intended to manage and mitigate construction and operation activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (i.e. site clearing and site establishment), during the construction activities themselves (i.e. erosion, noise, dust, and visual impacts), during site rehabilitation (i.e. soil stabilisation, re-vegetation), during operation and during decommissioning (i.e. similar to construction phase activities).

This Construction and Operational Environmental Management Programme (CEMPr and OEMPr) has been compiled for the Woodhouse Solar 2 PV facility. This EMPr is applicable to all employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the project. The document will be adhered to, updated as relevant throughout the project life cycle.

This EMPr has been compiled in accordance with Appendix 4 of the EIA Regulations of December 2014. This document is a dynamic document and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project (if required) and/or as the project develops. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools).

This EMPr has the following objectives:

» Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and

decommissioning phases of the project in order to manage and minimise the extent of potential environmental impacts associated with the facility.

» Ensure that all the phases of the project do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
» Identify entities responsible for the implementation of the measures and outline functions and responsibilities.
» Propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation.
» Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the EIA process.

The management and mitigation measures identified within the Environmental Impact Assessment (EIA) process are systematically addressed in this EMPr, and ensure the minimisation of adverse environmental impacts to an acceptable level.

Genesis Woodhouse Solar 2 (Pty) Ltd must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMPr and through its integration into the contract documentation. Since this EMPr is part of the EIA process for the proposed Woodhouse Solar 2 PV facility, it is important that this document be read in conjunction with the EIA Report compiled for this project. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the environmental authorisation (once issued), the stipulations in the environmental authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

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

STRUCTURE OF THIS EMPR CHAPTER 4

The first three chapters provide background to the EMPr and the proposed project, while the chapters which follow consider the following:

» Planning and design activities;
» Construction activities;
» Operation activities; and
» Decommissioning activities.

These chapters set out the procedures necessary for Genesis Woodhouse Solar 2 (Pty) Ltd as the project owner, to minimise environmental impacts and achieve environmental compliance. For each of the phases of implementation, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The EMPr has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions, monitoring requirements and performance indicators. A specific EMPr table has been established for each environmental objective. The information provided within the EMPr table for each objective is illustrated below:

OBJECTIVE: Description of the objective, which is necessary to meet the overall goals; which take into account the findings of the EIA specialist studies

Project Component/s	» List of project components affecting the objective.
Potential Impact	» Description of potential environmental impact if objective is not met.
Activity/Risk Source	» Description of activities which could affect achieving objective.
Mitigation: Target/Objective	» Description of the target and/or desired outcomes of mitigation.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
List specific action(s) required to meet the mitigation target/objective described above.	Who is responsible for the measures?	Periods for implementation.

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the EMPr.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods, and reporting.

The objectives and EMPr tables are required to be reviewed and possibly modified whenever changes, such as the following, occur:

» Planned activities change (i.e. in terms of the components and/or layout of the facility);
» Modification to or addition to environmental objectives and targets;
» Relevant legal or other requirements are changed or introduced; and
» Significant progress has been made on achieving an objective or target such that it should be re-examined to determine if it is still relevant, should be modified, etc.

Table 4.1 specifies plans required for the project as specified by the DEA in the acceptance of the scoping report.

Table 4.1: Management plans for the Woodhouse Solar 2 PV facility project

Plans required	Location in report
Grievance Mechanism for Public Complaints and Issues	Appendix C
Waste Management Plan	Appendix D
Alien Invasive Species and Open Management Plan	Appendix E
Re-Vegetation and Habitat Rehabilitation Plan	Appendix F
Plant Rescue and Protection Plan	Appendix G
Traffic and Transportation Management Plan	Appendix H
Stormwater Management Plan	Appendix I
Erosion Management Plan	Appendix J
Fire Management Plan	Appendix K
Environmental Awareness and Competence Plan	EMPr Section 6.4
Monitoring Programme	EMPr Section 6.5

4.1 Project Team

This EMPr was compiled by:

	Name	Company
EMPr Compilers:	Jared Padavattan Lisa Opperman Karen Jodas	Savannah Environmental
Specialists:		
	Gerhard Botha	Eco-Care Consultancy (Ecology)
	Jaco van der Walt	Heritage Contracts and Archaeological Consulting cc (HCAC) (Archaeology)
	Elize Butler	Bloemfontein National Museum (Palaeontology)
	Blair Zoghby and Simon Todd	Simon Todd Consulting (Avifauna)
	John Marshall	Afzeilia Environmental Consultant &

	Name	Company
		Environmental Planning and Design (Visual)
	Candice Hunter and Neville Bews	Savannah Environmental and Neville Bews and Associates (Social)

The Savannah Environmental team have extensive knowledge and experience in EIAs and environmental management, having been involved in EIA processes over the past years. They have managed and drafted EMPr for other power generation projects throughout South Africa, including numerous wind and solar energy facilities. Refer to **Appendix L** for CVs of project team.

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

» Ensures that the design of the facility responds to the identified environmental constraints and opportunities.
» Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements
» Ensures that adequate regard has been taken of identified environmental sensitivities, as well as any landowner and community concerns and that these are appropriately addressed through design and planning (where appropriate).
» Enables the construction activities to be undertaken without significant disruption to other land uses and activities in the area.

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

5.1 Objectives

OBJECTIVE 1: Ensure the facility design responds to identified environmental constraints and opportunities

No absolute *'no go'* areas were identified by the specialists during the EIA Phase within the development site. However, a number of potentially sensitive areas and *no go areas* were identified to be associated with the project area, which included:

» *Areas of ecological sensitivity* – ephemeral tributary located within the south western corner of the site. This high ecological sensitive features have each received a 35m buffer to ensure that the PV facility does not impact and disturb these areas. The facility development footprint avoids this area and its associated buffer area. The power line corridor will span over a wetland, a ridge and an ephemeral tributary. It has been indicated that the power line towers may be placed within the 35m buffer area of the wetland, however it may not be placed within the wetland feature.
» Geotechnical survey – foundation conditions, potential for excavations, and the availability of natural construction materials. This study will serve to inform the type of foundations required to be constructed (i.e. for the solar field), and the extent of earthworks and compaction required in the establishment of the internal access roads.

Project Component/s	» PV Facility » Access roads. » Contractors' camps » Laydown areas.
Potential Impact	» Impact on identified sensitive areas.
Activities/Risk Sources	» Positioning of the facility components (i.e. including the infrastructure within the development site and across the project area to include the access road and the power line towers).
Mitigation: Target/Objective	» The design of the facility responds to the identified environmental constraints and opportunities. » Site sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts.

Mitigation: Action/Control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally acceptable manner	Developer/Owner EPC Contractor	Pre-construction
Undertake a detailed geotechnical pre-construction survey.	Developer/Owner Geotechnical specialist	Pre-construction
Obtain any additional environmental permits required (e.g. water use license, and protected plant permits, etc.). Copies of permits/licenses must be submitted to the Director: Environmental Impact Evaluation at the DEA.	Developer/Owner	Project planning
Consider and incorporate design level mitigation measures recommended by the specialists as detailed within the EIA Report and relevant appendices.	Engineering design consultant, solar component supplier, and Developer	Design review
External access point and internal access road to be carefully planned to maximise road user safety and limit any intrusion on the neighbouring property owners and road users.	Developer/Owner EPC Contractor	Design
Compile a comprehensive stormwater management plan for hard surfaces as part of the final design of the project. This must include appropriate means for the handling of stormwater within the site, e.g. separate clean and dirty water streams around the plant, install stilling basins to capture large volumes of run-off, trapping sediments, and reduce flow velocities (i.e. water used when washing the mirrors), as well as appropriate drainage around the site.	Developer/Owner EPC Contractor	Design
Plan and placement of light fixtures for the plant and the ancillary infrastructure in such a manner as to minimise glare and impacts on the surrounding area.	Developer/Owner EPC Contractor	Planning.

Mitigation: Action/Control	Responsibility	Timeframe
Reduce the construction period as far as possible through careful planning and productive implementation of resources.	Developer/Owner EPC Contractor	Planning
Plan the placement of laydown areas and construction equipment camps in order to minimise vegetation clearing and impacts on identified sensitive areas.	Developer/Owner EPC Contractor	Planning
Submit a revised layout plan for the entire PV facility for approval to the DEA prior to commencement of construction.	Developer/Owner	Pre-construction
Fourteen (14) days written notice must be given to the Department that the activity will commence. The notification must include a date on which the activity will commence as well as the reference number.	Developer/Owner	Pre-construction
ECO to be appointed prior to the commencement of any authorised activities. Once appointed the name and contact details of the ECO must be submitted to the Director: Compliance Monitoring at the DEA.	Developer/Owner	Pre-construction
The terms of this EMPr and the Environmental Authorisation must be included in all tender documentation and Contractors contracts	Developer/Owner EPC Contractor	Tender process
The procurement and design strategy of the project is required to implement technically feasible and cost-effective measures of reducing resource consumption and greenhouse gases, the measures of which should be communicated to all relevant staff members.	Developer/Owner EPC Contractor	Planning & Design phase Duration of project life cycle
Undertake pre-construction walk-through footprint investigations for protected flora and burrowing terrestrial vertebrates: The final footprint investigation (walkthrough) is aimed to fully inform the developer, responsible conservation authority (that will issue the relevant permits and authorisations), contractors, EO and ECO about: » Protected and red data species that will be affected by the development o indicating the red-data and protection status of each species observed (what red-data classification, which legislation) » Location of protected plant species within	Develop/ Specialist	Design review phase

Mitigation: Action/Control	Responsibility	Timeframe
the footprint area – either individually mapped or approximate areas of occurrence (alternatively, for linear structures, between which structures or other markers) » Identification of the affected species by providing a representative photo record that enables ECOs and contractors to identify such plants » How many specimens per species will be affected – relatively accurate estimate to the nearest 50, more accurate if less than 50 » Which species can be successfully relocated, which and how many will have to be destroyed » Location and nature of any nesting sites or active burrows of vertebrate species (birds, amphibians, reptiles and mammals), mapped by GPS, that will have to be inspected and cleared/relocated prior to construction by the contractor or duly appointed person(s) » Location and nature of any alien invasive species that will have to be cleared by the contractor » Location and nature of any other significant environmental concerns, e.g. gully erosion, that will need to be addressed by the contractor to prevent any unnecessary (further) degradation of the development footprint » Note: should more than 1000 specimens of any critically endangered or endangered species be affected, as risk assessment report for that species must be prepared according to Section 15 of the NEMA: BA Draft Threatened or Protected Species Regulations, Gazetted General Notice 388 of 2013.		
The above pre-construction footprint investigations will be used together with results from the ecological specialist report to draft the following: » A comprehensive search and rescue program for plants and possible burrowing animals	Developer/ Specialist	Design review phase

Mitigation: Action/Control	Responsibility	Timeframe
» A comprehensive alien invasive species eradication and management plan o Basic requirements of these EMPs are listed under the Construction and operational Phase EMP		

Performance Indicator	» The design meets the objectives and does not degrade the environment. » Design and layouts respond to the mitigation measures and recommendations in the EIA Report.
Monitoring	» Review of the design by the Project Manager and Environmental specialist prior to the commencement of construction.

OBJECTIVE 2: Minimise stormwater runoff and subsequent alteration of the local hydrological regime

Project Component/s	» Stormwater management components » All hard engineered surfaces (i.e. access roads).
Potential Impact	» Poor stormwater management and alteration of the hydrological regime.
Activities/Risk Sources	» Construction of the facility (i.e. placement of hard engineered surfaces).
Mitigation: Target/Objective	» Appropriate management of stormwater to minimise impacts on the environment.

Mitigation: Action/Control	Responsibility	Timeframe
Appropriately plan hard-engineered erosion protection structures.	Developer/Owner EPC Contractor	Planning and design
Design an appropriate stormwater management plan to ensure the suitable handling of stormwater within the site (i.e. clean and dirty water streams around the plant and install stilling basins to capture large volumes of run-off, trapping sediments and reduce flow velocities).	Developer/Owner EPC Contractor	Planning
Construction must include appropriate design measures that allow surface and sub-surface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of stormwater runoff.	Developer/Owner EPC Contractor	Planning and design

Performance Indicator	» Appropriate stormwater management measures included within the facility design.

Monitoring	» Surface water quality monitoring plan.

OBJECTIVE 3: To ensure effective communication mechanisms

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

Project component/s	» Solar PV facility » Power line
Potential Impact	» Impacts on affected and surrounding landowners and land uses
Activity/risk source	» Activities associated with solar PV facility construction » Activities associated with solar PV facility operation
Mitigation: Target/Objective	» Effective communication with affected and surrounding landowners » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible

Mitigation: Action/control	Responsibility	Timeframe
Compile and implement a grievance mechanism procedure for the public (following the guidelines of the grievance mechanism in **Appendix C**) to be implemented during both the construction and operational phases of the facility. This procedure should include details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues.	Developer/Owner EPC Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operational and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Developer/Owner EPC Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Liaison with landowners is to be undertaken prior to the commencement of construction in order to provide sufficient time for them to plan grazing activities.	Developer/Owner EPC Contractor	Pre-construction
Before construction commences, representatives from the local municipality, community leaders, community-based organisations and the surrounding property	Owner EPC Contractor	Pre-construction and construction

Mitigation: Action/control	Responsibility	Timeframe
owners (of the larger area), should be informed of the details of the contractors, size of the workforce and construction schedules.		

Performance Indicator	» Effective communication procedures in place.
Monitoring	» A Public Complaints register must be maintained, by the Contractor and monitored by the ECO, to record all complaints and queries relating to the project and the action taken to resolve the issue. » All correspondence should be in writing. » The developer and EPC contractor must keep a record of local recruitments and information on local labour to be shared with the ECO for reporting purposes.

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

» Ensures that construction activities are properly managed in respect of environmental aspects and impacts.
» Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, grazing practices, traffic and road use, and effects on local residents.
» Minimises the impact on the indigenous natural vegetation, species of conservation concern, and habitats of ecological value
» Minimises impacts on fauna using the site.
» Minimises the impact on heritage site should they be uncovered.
» Establishes an environmental baseline during construction activities on the site, where possible.

6.1. Institutional Arrangements: Roles and Responsibilities for the Construction Phase

As the proponent, Genesis Woodhouse Solar 2 (Pty) Ltd must ensure that the implementation of the facility complies with the requirements of all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation. Genesis Woodhouse Solar 2 (Pty) Ltd will retain various key roles and responsibilities during the construction of the facility.

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to overall implementation of environmental management programme during construction

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Technical Director/Manager; Site Manager; Safety, Health and Environment Representative; Environmental Control Officer (ECO) and Contractor for the construction phase of this project are as detailed below. Formal responsibilities are necessary to ensure that key procedures are executed. **Figure 6.1** provides an organogram indicating the organisational structure for the implementation of the EMPr.

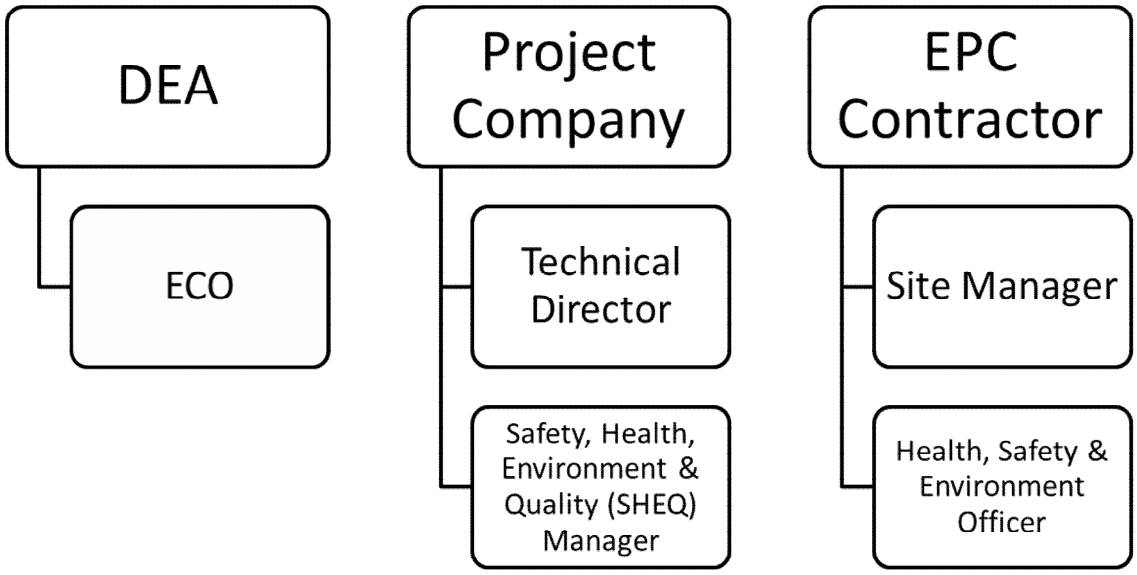

Figure 6.1: Organisational structure for the implementation of the EMPr

Technical Director will:

» Ensure all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
» Ensure that Genesis Woodhouse solar 2 (Pty) Ltd and its Contractor(s) are made aware of all stipulations within the EMPr.
» Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
» Be fully conversant with the EIA for the project, the EMPr, the conditions of the Environmental Authorisation (once issued), and all relevant environmental legislation.
» Be fully knowledgeable with the contents of all relevant licences and permits.

Site Manager (EPC Contractor's on-site Representative) will:

» Be fully knowledgeable with the contents of the EIA and risk management
» Be fully knowledgeable with the contents and conditions of the Environmental Authorisation (once issued)
» Be fully knowledgeable with the contents of the EMPr
» Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these
» Have overall responsibility of the EMPr and its implementation
» Conduct audits to ensure compliance to the EMPr

» Ensure there is communication with the Technical Director, the ECO, and relevant discipline engineers on matters concerning the environment.
» Be fully knowledgeable with the contents of all relevant licences and permits.
» Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site
» Confine activities to the demarcated construction site

An independent **Environmental Control Officer (ECO)** must be appointed by the project proponent prior to the commencement of any authorised activities and will be responsible for monitoring, reviewing and verifying compliance by the EPC Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

» Be fully knowledgeable with the contents with the EIA.
» Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation (once issued).
» Be fully knowledgeable with the contents with the EMPr.
» Be fully knowledgeable of all the licences and permits issued to the site.
» Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them.
» Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
» Ensure that the compliance of the EMPr, EA and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.
» Ensure that if the EMPr, EA and/or the legislation conditions, regulations or specifications are not followed then appropriate measures are undertaken to address any non-compliances (for example an ECO may cease construction or an activity to prevent a non-compliance from continuing).
» Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
» Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
» Ensure that activities on site comply with all relevant environmental legislation.
» Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMPr.
» Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
» Ensure that the compilation of progress reports for submission to the Technical Director, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
» Ensure that there is communication with the Site Manager regarding the monitoring of the site.

» Ensure that any non-compliance or remedial measures that need to be applied are reported.
» Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
» Submit independent reports to the DEA and other regulating authorities regarding compliance with the requirements of the EMPr, EA and other environmental permits.

The Environmental Control Officer (ECO) should be present for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, facilitate environmental induction with construction staff and supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. to be full-time on-site, as a minimum, during site establishment, and excavation of foundations). In the absence of the ECO there should be a designated environmental officer present to deal with any environmental issues that may arise such as fuel or oil spills. The ECO shall remain employed and undertake audits until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

Contractors and Service Providers: It is important that contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. The contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The contractor's obligations in this regard include the following:

» Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
» A copy of the EMPr must be easily accessible to all on-site staff members.
» Employees must be familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the proposed facility.
» Prior to commencing any site works, all employees and sub-contractors must have attended an environmental awareness training course which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
» Staff will be informed of environmental issues as deemed necessary by the ECO.

All contractors (including sub-contractors and staff) and service providers are ultimately responsible for:

» Ensuring adherence to the environmental management specifications
» Ensuring that Method Statements are submitted to the Site Manager (and ECO) for approval before any work is undertaken

- Any lack of adherence to the above will be considered as non-compliance to the specifications of the EMPr
- Ensuring that any instructions issued by the Site Manager on the advice of the ECO are adhered to
- Ensuring that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting
- Ensuring that a register is kept in the site office, which lists all transgressions issued by the ECO
- Ensuring that a register of all public complaints is maintained
- Ensuring that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMPr (i.e. ensure their staff are appropriately trained as to the environmental obligations)

Contractor's Safety, Health and Environment Representative: The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

The Contractor's Safety, Health and Environment Representative should:

- Be well versed in environmental matters.
- Understand the relevant environmental legislation and processes.
- Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- Know the background of the project and understand the implementation programme.
- Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
- Keep accurate and detailed records of all EMPr-related activities on site.

6.2. Objectives

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

OBJECTIVE 1: Minimise impacts related to inappropriate site establishment

Project Component/s	» PV Facility » Linear infrastructure (i.e. power line, access road).
Potential Impact	» Hazards to landowners and public. » Damage to indigenous natural vegetation due largely to ignorance of where such areas are located. » Loss of threatened plant species.
Activities/Risk Sources	» Open excavations (foundations and cable trenches). » Movement of construction vehicles in the area and on-site.
Mitigation: Target/Objective	» To secure the site against unauthorised entry. » To protect members of the public/landowners/residents. » No loss of or damage to sensitive vegetation in areas outside the immediate development footprint.

Mitigation: Action/Control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner, as agreed with the Site Manager.	EPC Contractor	Site establishment, and duration of construction
Where necessary control access, fence, and secure area.	EPC Contractor	Site establishment, and duration of construction
The developer and engineering, procurement and construction (EPC) contractors must ensure that there is a dedicated access and an access control point at the entrance gate off the Amalia road (western boundary).	EPC Contractor	Site establishment, and duration of construction
Develop an efficient access control system which allows for the identification of all people on site.	EPC Contractor	Site establishment and duration of contract
The contractor must take all reasonable measures to ensure the safety of the public in the surrounding area. Where the public could be exposed to danger by any of the works or site activities, the contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English, Afrikaans and any other relevant local languages, all to the approval of the Site Manager.	EPC Contractor	Duration of contract
All unattended open excavations must be adequately demarcated and/or fenced. Adequate protective measures must be implemented to prevent unauthorised access to the working area and the		Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
internal access/haul routes.		
Minimise vegetation clearance or removal associated with site establishment activities, trim trees under supervision. Compile a method statement specific to vegetation clearance.	EPC Contractor	Site establishment
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (at least one sanitary facility for each sex and for every 30 workers as per the 2014 Construction Regulations; Section 30(1) (b)) at appropriate locations on site).	EPC Contractor	Site establishment, and duration of construction
Ablution or sanitation facilities should not be located within 100 m from a watercourse or within the 1:100 year flood line.	EPC Contractor	Site establishment, and duration of construction
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shade cloth) at site where construction is being undertaken. Separate bins should be provided for general and hazardous waste. As far as possible, provision should be made for separation of waste for recycling.	EPC Contractor	Site establishment, and duration of construction

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured. » Appropriate and adequate waste management and sanitation facilities provided at construction site.
Monitoring	» An incident reporting system will be used to record non-conformances to the EMPr. » ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances will be immediately reported to the site manager.

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

In order to minimise impacts on the surrounding environment, contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation, the EIA Report, and this EMPr, as well as the requirements of all relevant environmental legislation.

Project Component/s	» PV facility. » Contractors' camp. » Laydown areas. » Access roads.
Potential Impact	» Damage to indigenous natural vegetation and sensitive areas. » Damage to and/or loss of topsoil (i.e. pollution, compaction etc.). » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Pollution/contamination of the environment.
Activities/Risk Sources	» Vegetation clearing and levelling of equipment storage area/s. » Access to and from the equipment storage area/s. » Ablution facilities. » Accommodation facilities. » Contractors not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	» Limit equipment storage within demarcated designated areas. » Ensure adequate sanitation facilities and waste management practices. » Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
The siting of the construction laydown areas must take cognisance of any sensitive areas identified by the EIA studies and reflected on the site layout plan included within this EMPr.	EPC Contractor	Pre-construction
As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	EPC Contractor	Site establishment, and during construction
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. A fire management plan (refer to **Appendix K**) to be developed with emergency procedures in the event of a fire.	EPC Contractor	Erection: during site establishment Maintenance: duration of contract
No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works. Proof of disposal to be retained as proof of responsible disposal	EPC Contractor	Maintenance: duration of contract within a particular area
Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials.	EPC Contractor O&M Contractor Owner	During and post construction.
Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous	Contractor O&M contractor	During and post construction.

Mitigation: Action/Control	Responsibility	Timeframe
waste.	Owner	
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site. Ablutions must be removed from site when construction is completed.	EPC Contractor	Site establishment, and duration of construction
Cooking/meals must take place in a designated area. No firewood or kindling may be gathered from the site or surrounds.	EPC Contractor and sub-contractor/s	Duration of contract
No open fires are permitted on site and construction personnel must be made aware of the consequences of starting a fire on site to avoid damage to neighbouring farms.	EPC Contractor and sub-contractor/s	Duration of contract
Fire-fighting equipment and training must be provided before the construction phase commences.	EPC Contractor and sub-contractor/s	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	EPC Contractor and sub-contractor/s	Duration of contract
Ensure waste containers are maintained and emptied as and when required.	EPC Contractor	Site establishment, and duration of construction
A Method Statement should be compiled for the management of pests and vermin within the site, specifically relating to the canteen area if applicable. .	EPC Contractor	Construction
No one may disturb flora or fauna outside of the demarcated construction area/s.	EPC Contractor and sub-contractor/s	Duration of contract
Contractors appointed by the Contractor must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent properties.	EPC Contractor and sub-contractor/s	Construction

Performance Indicator	» The construction camps have avoided sensitive areas. » Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » All areas are rehabilitated promptly after construction in an area is complete. » Excess vegetation clearing and levelling is not reported. » No complaints regarding contractor behaviour or habits. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » Code of Conduct drafted before commencement of construction

	phase.
Monitoring	» Regular monitoring of the construction camps and areas of construction on site by the Contractor's SHE officer and the ECO. » Proof of disposal of sewage at an appropriate waste water treatment works. » A non-conformance register should be used to record non-conformances to the EMPr. » An incident reporting system should implemented and be used to record incidents relating to unplanned occurrences that has caused, or has the potential to cause, environmental damage. i.e. run-away fires » Observation and supervision of Contractor practices throughout construction phase by the ECO. » Complaints must be investigated and, if appropriate, acted upon.

OBJECTIVE 3: Facilitate local employment and skills opportunities associated with the construction phase

Project component/s	» Construction of the proposed project and associated infrastructure
Potential Impact	» The opportunities and benefits associated with the creation of local employment and skills development to be maximised.
Activity/risk source	» Construction procurement practice employed by the EPC contractor » Developers investment plan
Enhancement: Target/Objective	» The developer should aim to employ as many low-skilled and semi-skilled workers from the local area as possible. This should also be made a requirement for all contractors.

Enhancement: Action/control	Responsibility	Timeframe
If possible, employ local contractors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria	The Developer & EPC Contractor	Pre-construction & construction phase
It is recommended that a local employment policy is adopted to maximise the opportunities made available to the local labour force (sourced from nearest towns/settlements)	The Developer & EPC Contractor	Pre-construction & construction/ Operation
The recruitment selection process should seek to promote gender equality and the employment of women wherever possible	EPC Contractor	Pre-construction & construction phase
Where feasible, training and skills development programmes are to be initiated prior to the commencement of the construction phase	The Developer	Pre-construction & construction phase
A method of communication should be implemented whereby procedures to lodge complaints are set out in	EPC Contractor	Pre-construction & construction

Enhancement: Action/control	Responsibility	Timeframe
order for the local community to express any complaints or grievances with the construction process. The EPC contractor should appoint a designated staff member to implement grievance procedures and address issues and complaints. A Public Complaints register must be maintained, by the Contractor to record all complaints and queries relating to the project and the action taken to resolve the issue.		phase
Establish vocational training programs for the local labour force to promote the development of skills	The Developer	Construction/ Operation phase

Performance Indicator	» Employment policy document that sets out local employment and targets completed before construction phase commences; » Employ as many local semi and unskilled labour as possible. » Training and skills development programme undertaken prior to the commencement of construction phase.
Monitoring	» The developer and EPC contractor must keep a record of local recruitments and information on local labour to be shared with the ECO for reporting purposes.

OBJECTIVE 4: Reduce the pressure on economic and social infrastructure and social conflicts from an influx of jobseekers during the construction phase

Project component/s	Construction of the proposed solar energy facility and associated infrastructure
Potential Impact	Decline on local economic and social infrastructure and services as well as a rise in social conflicts from an influx of jobseekers
Activity/risk source	Influx of jobseekers
Mitigation: Target/Objective	To avoid or minimise the potential impact on local infrastructure, services and communities and their livelihoods

Mitigation: Action/control	Responsibility	Timeframe
A 'locals first' policy should be advertised for construction employment opportunities, especially for semi and low-skilled job categories.	The Developer & EPC contractor	Pre-construction & construction phase
Tender document should stipulate the use of local labour as far as possible	EPC contractor	Pre-construction & construction phase
Prior to construction commencing representatives from the local community (e.g. ward councillor,	The Developer & EPC contractor	Pre-construction & construction

Mitigation: Action/control	Responsibility	Timeframe
surrounding landowners) should be informed of details of the construction schedule and exact size of the workforce.		phase
Recruitment of temporary workers at the gates of the development should not be allowed. A recruitment office should be established by the contractor in a nearby town to deal with jobseekers.	EPC contractor	Pre-construction & construction phase
Have clear rules and regulations for access to the proposed site.	EPC contractor	Pre-construction & construction phase
Local community organisations and policing forums / neighbourhood watches must be informed of construction times and the duration of the construction phase. Also establish procedures for the control and removal of loiters at the construction site	The Developer & EPC contractor	Pre-construction phase & Construction phase
Security company to be appointed and appropriate security procedures to be implemented	The Developer & EPC contractor	Pre-construction phase & Construction phase

Performance Indicator	» Ensure 'locals first' policy is adopted/advertised » Ensure no recruitment takes place on site » Control/removal of loiters
Monitoring	» The developer must keep a record of local recruitments and information on local labour to be shared with the ECO for reporting purposes

OBJECTIVE 5: Facilitate the local economic multiplier effect during construction phase

Project component/s	» Construction of the proposed solar energy facility and associated infrastructure
Potential Impact	» Potential local economic benefits
Activity/risk source	» Developers procurement plan
Enhancement: Target/Objective	» Increase the procurement of goods and services especially within the local economy

Enhancement: Action/control	Responsibility	Timeframe
It is recommended that a local procurement policy is to be adopted to maximise the benefits to the local economy	The Developer & EPC Contractor	Pre-construction & construction phase

Where feasible, develop a database of local companies, specifically Historically Disadvantaged (HD) which qualify as potential service providers (e.g. construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) prior to the tender process and invite them to bid for project-related work where applicable	The Developer & EPC Contractor	Pre-construction & construction phase
Where feasible, source as much goods and services as possible from the local area. Engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers	The Developer	Pre-construction & construction phase

Performance Indicator	» Local procurement policy is adopted » Local goods and services are purchased from local suppliers where feasible
Monitoring	» The developer must monitor indicators listed above to ensure that they have been met for the construction phase

OBJECTIVE 6: Minimise impacts related to traffic management and transportation of equipment and materials to site

Increased traffic would include heavy and light vehicles transporting goods and building materials. At this stage it is not clear how many vehicles would make use of this road on a daily basis but it is expected that it would increase the traffic volume on the unsurfaced Amalia road (western boundary) and the R34. An increased risk of accidents is a concern, especially if vehicles overtake on the sections of the road where passing is not allowed.

Project Component/s	» R34, Amalia Road and temporary access roads.
Potential Impact	» Impact of heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals. » Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted » Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads.
Activities/Risk Sources	» Construction vehicle movement. » Speeding on local roads. » Degradation of local road conditions. » Site preparation and earthworks. » Foundations or plant equipment installation.

	» The use of ready mix cement trucks as an alternative source to the on-site batching plant. » Mobile construction equipment movement on-site. » Substation construction activities.
Mitigation: Target/Objective	» Minimise impact of traffic associated with the construction of the facility on local traffic volume, existing infrastructure, property owners, animals, and road users. » To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility construction » To ensure all vehicles are roadworthy and all materials/equipment are transported appropriately and within any imposed permit/licence conditions

Mitigation: Action/Control	Responsibility	Timeframe
Compile and implement a traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted (refer to **Appendix H**).	Developer/Owner EPC Contractor	Pre-construction
Appropriate dust suppression must be implemented on gravel roads to limit dust creation.	Developer/Owner EPC Contractor	Construction
Construction vehicles and those transporting materials and goods should be inspected by the contractor or a sub-contractor to ensure that these are in good working order and not overloaded.	EPC Contractor/ transport contractor	Construction
Strict vehicle safety standards should be implemented and monitored.	EPC Contractors/ transport contractor	Construction
All relevant permits for abnormal loads must be applied for from the relevant authority.	EPC Contractor (or appointed transportation contractor)	Pre-construction
No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the contractor.	EPC Contractor	Duration of contract
Appropriate road management strategies must be implemented on external and internal roads with all employees and contractors required to abide by standard road and safety procedures.	EPC Contractor (or appointed transportation contractor)	Pre-construction
Any traffic delays because of construction traffic must be co-ordinated with the appropriate authorities.	EPC Contractor	Duration of contract
The movement of all vehicles within the site must be on designated roadways.	EPC Contractor	Duration of contract
Signage must be established at appropriate points warning of turning traffic and the construction site (all signage to be in accordance with prescribed standards). Signage must be appropriately	EPC Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
maintained for the duration of the construction period.		
Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. Signage must be appropriately maintained for the duration of the construction period.	EPC Contractor	Duration of contract
Appropriate maintenance of all vehicles of the contractor must be ensured.	EPC Contractor	Duration of contract
All vehicles of the contractor travelling on public roads must adhere to the specified speed limits and all drivers must be in possession of an appropriate valid driver's license.	EPC Contractor	Duration of contract
To minimise impacts on local communities, consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.	EPC Contractor	Duration of contract
Source general construction material and goods locally where available to limit transportation over long distances.	EPC Contractor	Construction

Performance Indicator	» Vehicles keeping to the speed limits. » Vehicles are in good working order and safety standards are implemented. » Local residents and road users are aware of vehicle movements and schedules. » No construction traffic related accidents are experienced. » Local road conditions and road surfaces are up to standard. » Complaints of residents are not received (e.g. concerning the speeding of heavy vehicles).
Monitoring	» The Owner and appointed ECO must monitor indicators listed above to ensure that they have been implemented.

OBJECTIVE 7: Minimise the potential impact on health, safety and security

An inflow of workers could, as a worst case scenario and irrespective of the size of the workforce, pose some security risks. Criminals could also use the opportunity due to "outsiders" being in the area to undertake their criminal activities. The actual safety of construction workers is also of concern. Further health and safety issues associated with the actual construction site include unauthorised entry to the site and construction areas, the usage of large equipment on site, the risks associated with the storage of equipment

and material on site, as well as the increased risk of accidents due to the increased movement of construction vehicles on the local roads.

Other concerns relate to littering, unwanted behaviour of construction workers, transmission of Sexually Transmitted Diseases (STDs), environmental pollution, an increase risk in fires and so forth. Although such perceptions cannot be substantiated or be changed it should be sensitively dealt with.

Project Component/s	» Solar field. » Contractors' camps. » R34, Amalia Road and district roads. » Laydown areas. » Inflow of workers could result in increased safety and security risks.
Potential Impact	» Outside workers are involved in criminal activities and/or fires occur.
Activities/Risk Sources	» Safety of individuals and animals are at risk. » Theft of livestock. » Theft of construction material. » On-site accidents. » Littering and environmental pollution.
Mitigation: Target/Objective	» Employment of local labour should be maximised and strict security measures should be implemented at the construction site.

Mitigation: Action/Control	Responsibility	Timeframe
Employing local community members could minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce.	EPC Contractor	Pre-construction
Screening of applicants could lessen perceived negative perceptions about the outside workforce.	EPC Contractor	Pre- construction
On-site security should be active prior to the construction phase.	EPC Contractor	Pre- construction
All staff should undergo a general Health and Safety induction and simplified environmental awareness training session	EPC Contractor (and sub-contractor/s)	Duration of contract
Local community members and property owners should be informed of the presence of the outside workforce, the construction schedule, and movement of workers.	Owner and EPC Contractor	Construction
Property owners, their workers, and local communities should be motivated to be involved in crime prevention and by reporting crimes.	Developer/Owner and Local communities	All phases of project
The construction site should be fenced and access to the area controlled.	EPC Contractor	All phases of project
Informal vending stations should not be allowed on or near the construction site. Construction workers	EPC Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
should preferably receive daily meals and beverages to avoid the need for a vending station.		
Procedures and measures to prevent, and in worst cases, attend to fires should be developed in consultation with the surrounding property owners and the Local Municipality	Owner, Local Municipality, and local communities	Pre- construction and when required
Contact details of emergency services should be prominently displayed on site.	EPC Contractor	Construction
Appropriate fire-fighting equipment must be present on site and members of the workforce should be appropriately trained in using this equipment in the fighting of veld fires	EPC Contractor	Construction
The construction site and accommodation facility should be properly managed to avoid any environmental pollution (due to inadequate water, sanitation and waste infrastructure and services) and littering.	EPC Contractor	Construction
Construction activities should not interfere with the activities on surrounding properties.	EPC Contractor	Construction

Performance Indicator	» No criminal activities and theft of livestock attributable to the construction workforce are reported.' » Limited intrusions on surrounding property owners. » No reports from property owners regarding problems with construction activities and workforce. » No fires or on-site accidents occur.
Monitoring	» The Owner, and appointed ECO must monitor indicators listed above to ensure that they have been implemented.

OBJECTIVE 8: Management of dust and air emissions

During the construction phase, limited gaseous or particulate emissions are anticipated from exhaust emissions from construction vehicles and equipment on-site, as well as vehicle entrained dust from the movement of vehicles on the main and internal access roads.

Project Component/s	» Solar field. » Temporary access roads. » Batching plant. » Vegetation clearing.
Potential Impact	» Dust and particulates from vehicle movement to and on-site,

	foundation excavation, road construction activities, road maintenance activities, temporary stockpiles, and vegetation clearing affecting the surrounding residents and visibility. » Release of minor amounts of air pollutants (for example NO_2, CO and SO_2) from vehicles and construction equipment
Activities/Risk Sources	» Clearing of vegetation and topsoil. » Excavation, grading, scraping, levelling, digging, drilling. » Transport of materials, equipment, and components on internal access roads. » Re-entrainment of deposited dust by vehicle movements. » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces. » Fuel burning vehicle and construction engines.
Mitigation: Target/Objective	» To ensure emissions from all vehicles and construction engines are minimised, where possible, for the duration of the construction phase » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase

Mitigation: Action/Control	Responsibility	Timeframe
Areas to be cleared in a progressive manner. Road surfaces and other infrastructure to be constructed as soon as possible after vegetation clearing in order to minimise exposed ground surfaces, specifically roads which carry traffic.	EPC Contractor	Duration of contract
Roads must be maintained to a manner that will ensure that nuisance to the community from dust emissions from road or vehicle sources is not visibly excessive	EPC Contractor	Site establishment and construction
Appropriate dust suppressant must be applied on all gravel roads associated, exposed areas and stockpiles associated to the project as required to minimise/control airborne dust.	EPC Contractor	Duration of contract
Height of spoil/subsoil/overburden (not topsoil) stockpiles to be limited to 3m. Spoil and subsoil to be compacted and watered down as necessary	EPC Contractor	Duration of contract
Haul vehicles moving outside the construction site carrying material that can be wind-blown will be covered with suitable material tarpaulins shade cloth.	EPC Contractor	Duration of contract
Speed of construction vehicles must be restricted, as defined by the Health and Safety Manager.	EPC Contractor	Duration of contract
Dust-generating activities or earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased during periods of high winds if visible dust is blowing toward nearby residences outside the site.	EPC Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Disturbed areas must be re-vegetated as soon as practicable in line with the progression of construction activities.	EPC Contractor	Completion of construction
Vehicles and equipment must be maintained in a road-worthy condition at all times.	EPC Contractor	Duration of contract
All vehicles and containers used for moving waste must encapsulate the waste, which prevents the waste from causing odours and from escaping or blowing around the site. This will also prevent leachate material from spilling out of the containers, which is hazardous.	EPC Contractor	Duration of contract
The batching plant must be enclosed with shade cloth to reduce the amount of cement particulates/ particles released into the environment.	EPC Contractor	Duration of contract
Roads must be maintained to a manner that will ensure that nuisance to the neighbouring farmers from dust is not visibly excessive.	Owner EPC Contractor	Site establishment and construction

Performance Indicator	» No complaints from affected residents or community regarding dust or vehicle emissions. » Dust does not cause health (inhaling, eye irritation) and safety risks (low visibility). » Dust suppression measures implemented for all heavy vehicles that require such measures during the construction phase commences. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed. » All heavy vehicles equipped with speed monitors before they are used in the construction phase in accordance with South African vehicle legislation. » Road worthy certificates in place for all heavy vehicles at outset of construction phase and up-dated on a monthly basis. » A complaints register must be maintained, in which any complaints from neighbouring farmers will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon.
Monitoring	Monitoring must be undertaken to ensure emissions are not exceeding the prescribed levels via the following methods: » Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager. » A complaints register must be maintained, in which any complaints from residents/the community will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon. » An incident register and non-conformance must be used to record incidents and non-conformances to the EMPr. » A complaints register must be used to record grievances by the public.

OBJECTIVE 9: Minimisation of development footprint and disturbance to topsoil

In order to minimise impacts on flora, fauna, and ecological processes, the development footprint should be limited.

Project Component/s	» PV facility. » Offices and workshops. » Access roads.
Potential Impact	» Impacts on natural vegetation. » Impacts on soil. » Loss of topsoil.
Activity/Risk Source	» Site preparation and earthworks. » Trenching activities. » Excavation of foundations. » Construction of site access road. » Site preparation (e.g. compaction). » Foundations or plant equipment installation. » Stockpiling of topsoil, subsoil and spoil material.
Mitigation: Target/Objective	» To retain natural vegetation, where possible. » To minimise footprints of disturbance of vegetation/habitats on-site » Remove and store all topsoil on areas that are to be excavated; and use this topsoil in subsequent rehabilitation of disturbed areas. » Minimise spoil material.

Mitigation: Action/Control	Responsibility	Timeframe
Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing.	EPC Contractor in consultation with Specialist	Pre-construction
The extent of clearing and disturbance to the natural vegetation must be kept to a minimum so that impact on flora and fauna is restricted.	EPC Contractor	Site establishment & duration of contract
Construction activities must be restricted to demarcated areas so that impact on flora and fauna is restricted.	EPC Contractor	Site establishment & duration of contract
All fill material must be sourced from a commercial off-site suitable/permitted source, quarry or borrow pit. Where possible, material from foundation excavations must be used as fill on-site.	EPC Contractor	Duration of contract
Topsoil must be stockpiled and managed in terms of the erosion management plan (refer to **Appendix J**).	EPC Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Excavated topsoil must be stockpiled in designated areas separate from base material and covered until replaced during rehabilitation. As far as possible, topsoil must not be stored for longer than 3 months.	EPC Contractor	Site establishment & duration of contract
Topsoil must not be stripped or stockpiled when it is raining or when the soil is wet as compaction will occur.	EPC Contractor	Site establishment Maintenance: for duration of contract
The maximum topsoil stockpile height must not exceed 2 m in order to preserve micro-organisms within the topsoil, which can be lost due to compaction and lack of oxygen.	EPC Contractor	Duration of contract
Topsoil recovered from site, must only be used for rehabilitation and not be used for any construction related activities, including that of bedding for underground cabling.	EPC Contractor	Duration of contract

Performance Indicator	» Zero disturbance outside of designated work areas. » Minimise clearing of existing vegetation. » Topsoil appropriately stored.
Monitoring	» Observation of vegetation clearing and soil management activities by the Contractor's SHE officer and the ECO throughout construction phase. » Supervision of all clearing and earthworks. » An incident and non-conformance register will be used to record incidents and non-conformances to the EMPr.

OBJECTIVE 10: Minimise the impacts on and loss of indigenous vegetation

The vegetation is consistent with the vegetation classification provided by Mucina & Rutherford (2006) (Ghaap Plateau Vaalbosveld). Small variations especially in terms of the dominant grass species occur throughout the site. Geology and the soil features that the specific geology gives rise to, appear to be the driving force between the variations found between the different units. Most of the area tends to have the same species composition with the differences being the dominant species, especially within the grasses (as mentioned). An exception to this is the siliciclastic rock outcropping which have a unique species composition.

Five major vegetation units have been identified namely:

1. *Schimdtia pappophoroides – Grewia flava* open sandy dry bushveld.

2. *Aristida diffusa – Tragonanthus* grassy outcroppings
3. *Enneapogon cenchroides – Boscia albitrunca* shrubby ridge
4. *Echinochloa holubii – Panicum schinzii* grassy pans/ephemeral streams
5. *Cymbopogon plurinodis – Grewia flava* open dolomite dry bushveld

A total of eight conservation worthy species were noted within the development footprint, across the five major vegetation types, namely:

» *Aloe grandidentata* (TNCO & BNCA),
» *Ammocharis coranica* (TNCO & BNCA),
» *Acacaia erioloba* (NFA),
» *Boophone disticha* (Declining),
» *Boscia albirtrunca* (NFA),
» *Brachystelma spp*. (TNO),
» *Focckea angustifolia* (TNO),
» *Shizoglossum spp*. (TNO),

Project Component/s	» Solar field. » Temporary access roads. » Laydown areas. » Subcontractors' camps.
Potential Impact	» Loss of indigenous natural vegetation due to construction activities, or poor behaviour on the part of the construction team.
Activity/Risk Source	» Vegetation clearing. » Construction of access roads. » Chemical contamination of the soil by vehicles and machinery. » Operation of construction camps. » Storage of materials required for construction.
Mitigation: Target/Objective	» Retain natural vegetation in the highly sensitive areas of the site. » Minimise footprints of disturbance of vegetation/habitats on-site. » Minimise loss of indigenous vegetation. » Minimise loss of species of conservation concern.

Mitigation: Action/Control	Responsibility	Timeframe
All development footprints within areas of natural vegetation should be surveyed and protected species identified and marked.	EPC Contractor	Duration of construction
Search and Rescue (S&R) of all protected plants that will be affected by the development, especially species occurring in long term and permanent, hard surface development footprints (i.e. all buildings, new roads and tracks, laydown areas, and panel positions) should take place. The necessary permits must be in place » All development footprints must be surveyed and pegged out as soon as possible, after which a local	EPC Contractor	Duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
horticulturist with Search and Rescue experience should be appointed to undertake the S&R. » All rescued species should be transplanted immediately to a suitable habitat. b. Replanting should occur in spring to early summer once sufficient rains have fallen, in order to facilitate establishment		
Obtain permits for protected plant removal and relocation prior to commencement of any activity related to this development » As a minimum, permits will be required to remove all or some of the following species: o *Ammocharis coranica* o *Boophone disticha* o *Acacia erioloba* o *Aloe grandidentata* o *Boscia albitrunca* o *Fockea angustifolia* o *Shizoglossum spp.* o *Brachystelma spp.*	Developer	Pre-construction
There is to be no disturbance or clearing outside demarcated areas.	EPC Contractor	Duration of construction
Minimise large-scale clearance of natural vegetation and disturbance to the proposed site.	EPC Contractor	Duration of construction
A site rehabilitation programme must be implemented (refer to **Appendix F**).	EPC Contractor in consultation with Specialist	Duration of contract
Monitor and control declared weeds and invader species. Continually monitor the re-emergence of these species and manage according to the invasive species management plan.	EPC Contractor	Duration of construction

Performance Indicator	» No disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation. » Limited impacts on areas of identified and demarcated sensitive habitats/vegetation » Ecosystem fragmentation is kept to a minimum. » Ecosystem functionality is retained and any degradation prevented. » Re-establishment of rescued species.
Monitoring	» Observation of vegetation clearing activities by SHE Officer and ECO throughout construction phase. » Monitoring of vegetation clearing activities in terms of permit conditions. » Supervision of all clearing and earthworks. » An incident reporting system will be used to record non-conformances to the EMPr.

	» It may be possible that geophytic species may emerge during construction that were not accounted for in the original S&R plan – once observed the ECO should consult the botanists on the identification and possible S&R for those plant species

OBJECTIVE 11: Minimise the establishment and spread of alien invasive plants

Although a few alien invasive plants and weeds were noted during the survey these species were sparsely distributed throughout the site and never formed dominant stands. These species were mostly present where the soil has been disturbed (trampling by livestock) or along farm roads or where other forms of disturbances have occurred.
Alien Invasive Plants confirmed, includes:

» *Prosopis glandulosa* (Category 1b – only one species noted at the small gravel dam located to the south-east of the site),
» *Flaveria bidentis* (Category 1b),
» *Xanthium strumarium* (Category 1b),
» *Datura stramonium* (Category 1b),

Other weeds and exotics confirmed during the survey:

» *Chloris virgata, Tragus berteronianus, Tribulus terrestris, Conyza bonariensis, Schkuhria pinnata* and *Alternanthera pungens*

Project Component/s	» Solar field. » Subcontractor's camps. » Laydown areas. » Temporary access roads.
Potential Impact	» Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species. » Impacts on soil. » Impact on faunal habitats. » Degradation and loss of agricultural potential.
Activities/Risk Sources	» Transport of construction materials to site » Movement of construction machinery and personnel » Site preparation and earthworks causing disturbance to indigenous vegetation » Construction of site access road » Stockpiling of topsoil, subsoil and spoil material » Routine maintenance work – especially vehicle movement
Mitigation: Target/Objective	» To significantly reduce the presence of weeds and eradicate alien invasive species » To avoid the introduction of additional alien invasive plants to the

	project control area » To avoid further distribution and thickening of existing alien plants on the project area » To complement existing alien plant eradication programs in gradually causing a significant reduction of alien plant species throughout the project control area

Mitigation: Action/Control	Responsibility	Timeframe
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum. » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants.	EPC Contractor Owner	Construction and operation
Establish an ongoing monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act and Biodiversity Act) (refer to **Appendix E**).	EPC Contractor Owner	Construction and operation
Immediately control any alien plants that become established using registered control methods.	EPC Contractor Owner	Construction and operation
The use of herbicides and pesticides and other related horticultural chemicals should be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides. It must be ensured that WHO Recommended Classification of Pesticides by Hazard Class 1a (extremely hazardous) or 1b (highly hazardous) are not purchased, stored or used on site along with any other nationally or internationally similarly restricted/banned products.	EPC Contractor	Construction and rehabilitation

Performance Indicator	» For each alien species: number of plants and aerial cover of plants within project area and immediate surroundings.
Monitoring	» Ongoing monitoring of area by the Contractor's SHE officer and ECO during construction. » Ongoing monitoring of area by environmental manager during operation. » If any alien invasive species are detected then the distribution of these should be mapped (GPS co-ordinates of plants or concentrations of plants), number of individuals (whole site or per unit area), age and/or size classes of plants and aerial cover of plants. » The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area. » The environmental manager should be responsible for driving this process. » Reporting frequency depends on legal compliance framework.

OBJECTIVE 12: Minimise the impacts on fauna using the site

Although the potential diversity of mammals within the study area is high with as many as 55 terrestrial mammals and 9 bat species present, there are several factors which will reduce the actual number of species present. This includes the proximity to Vryburg and vehicle movements along the roads in the area.

Listed mammals which may occur in the area include the White-tailed Mouse *Mystromys albicaudatus* (Endangered), Brown Hyaena *brunnea* (Near Threatened), Black-footed Cat *Felis nigripes* (Vulnerable), Honey badger *Mellivora capensis* (IUCN LC, SA RDB EN), South African hedgehog *Atelerix frontalis* (SA RDB NT) and Ground Pangolin *Smutsia temminckii* (VU).

Of the 27 reptilian species that have been recorded with the 2624 and 2724 degree grids, eight species have been recorded within the quarter degree grids (2624DD, 2724BB). None of these species are listed as Red Data species. 15 Amphibian species have been recorded within the degree grids and of these 15 species eight species were recorded for the quarter degree grids (QDG) within which the study area is located. One near threatened species (Pyxicephalus adspersus, Giant Bull Frog) has been recorded for the quarter degree grid square (QDGS). Although this species was not recorded for the QDGS, it is still likely for this species to occur within the study area as potential suitable habitat (pans and drainage lines) is available.

Project Component/s	» Solar field. » Contractor's camp and laydown area.
Potential Impact	» Vegetation clearance and associated impacts on faunal habitats. » Traffic to and from site.
Activity/Risk Source	» Site preparation and earthworks. » Construction-related traffic. » Foundations or plant equipment installation. » Mobile construction equipment.
Mitigation: Target/Objective	» To minimise footprints of habitat destruction » To minimise disturbance to (and death of) resident and visitor faunal and avifaunal species

Mitigation: Action/Control	Responsibility	Timeframe
Areas to be cleared must be clearly marked in the field to eliminate unnecessary clearing/disturbance.	EPC Contractor	Pre-construction
The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that impact	EPC Contractor	Site establishment &

Mitigation: Action/Control	Responsibility	Timeframe
on fauna and their habitats is restricted.		duration of contract
Animals that cannot flee from the affected areas by themselves (e.g. tortoises, amphibians, small mammals) must be removed from the affected areas before the start of site clearing/construction and relocated to safe areas.	Suitably qualified person	Pre-construction
Ensure storage water reservoirs are covered, or bird deterrent measures are used.	EPC Contractor	Construction
A site rehabilitation programme should be implemented (refer to **Appendix F**).	EPC Contractor in consultation with Specialist	Duration of contract
Implement a faunal removal plan/ rescue plan with designated/ trained personnel and contact numbers.	EPC Contractor	Duration of contract
All cable trenches, excavations, etc., through sensitive areas should be excavated carefully in order to minimise damage to surrounding areas and biodiversity. » The trenches must be checked on a daily basis for the presence of trapped animals. » Any animals found must be removed by a suitably qualified person in a safe manner, unharmed, and placed in an area where the animal will be comfortable. All mammal, large reptiles and avifauna species found injured during construction must be taken to a suitably qualified veterinarian or rehabilitation centre to either be euthanized in a humane manner or cared for until it can be released again.	EPC Contractor	Duration of construction

Performance Indicator	» No disturbance outside of designated work areas » Minimised clearing of existing/natural vegetation and habitats for fauna » Limited impacts on faunal species (i.e. noted/recorded fatalities)
Monitoring	» Observation of vegetation clearing activities by ECO throughout construction phase » Supervision of all clearing and earthworks » Recording faunal fatalities to monitor success of relocation efforts » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 13: Minimise the impacts on avifauna

Up to 177 bird species are known to occur within the study area and broader impact zone of the development, including 17 red-listed or threatened species, 12 endemic species and 28 near-endemic species. Of these, 35 species were recorded during the site visit, most notable of which, despite being recorded outside of the study area (but included due to their transient nature which could bring them into contact with the development), being the sightings of White-backed Vulture *Gyps africanus* and Greater Flamingo *Phoenicopterus roseus*.

The birds of greatest potential relevance and importance in terms of the possible impacts of the PV facility and its associated power infrastructure are likely to be local populations of threatened or endemic passerines (Ant-eating Chat *Myrmecocichla formicivora* and Cape Longclaw *Macronyx capensis*), shy ground-nesting species (Burchell's Courser *Cursorius rufus* and Double-banded Courser *Rhinoptilus africanus*), resident or visiting large terrestrial birds (Secretarybird *Sagittarius serpentarius*, Abdim's Stork *Ciconia abdimii*, Black Stork *Ciconia nigra* and Blue Crane *Anthropoides paradieus*), resident or passing raptors (Martial Eagle *Polemaetus bellicosus,* Tawny Eagle *Aquila rapax,* Lanner Falcon *Falco biarmicus* and Red-footed Falcon *Falco vespertinus* and White-back Vulture) and transient waterbirds (Greater Flamingo*,* Lesser Flamingo *Phoenicopterus minor,* South African Shelduck *Tadorna cana* and Yellow-billed Stork *Mycteria ibis*).

Project Component/s	» PV panels. » Overhead power line. » Associated electrical infrastructure.
Potential Impact	» Decrease in avifaunal populations. » Decrease in avifaunal species diversity. » Loss of specially protected species.
Activity/Risk Source	» Installation of PV panels. » Clearance of vegetation with established nests. » Erection of powerlines and stringing of earth wires.
Mitigation: Target/Objective	» To minimise injury and death to avifaunal species. » To minimise loss of avifaunal populations. » To minimise loss of species diversity.

Mitigation: Action/Control	Responsibility	Timeframe
Maintain buffer zones around the sensitive microhabitats such as the ephemeral pans and drainage lines to minimise disturbance to avifauna.	EPC Contractor	Site establishment & duration of contract
Areas to be cleared must be clearly marked in the field	EPC Contractor	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
to eliminate unnecessary clearing/disturbance.		
Any bird nests or priority species (as per the report compiled by the avifaunal specialist) that are found during the construction phase must be reported to the ECO.	EPC Contractor	Construction
If avifauna become an operational risk to the facility, effective control methods should be used to prevent them from nesting/ roosting i.e. mesh, bird deterrent devices etc. Birds already with eggs and chicks should be allowed to fledge their chicks before nests are removed.	EPC Contractor/ Owner	Construction/ Operation
An avifaunal register must be maintained on site, detailing incidents or mortalities within the facility.	EPC Contractor/ Owner	Construction/ Operation
A "Bird Friendly" structure, with a bird perch (as per standard Eskom guidelines) should be used for the tower infrastructure.	EPC Contractor	Construction
All relevant perching surfaces should be fitted with bird guards and perch guards as deterrents.	EPC Contractor	Construction
Installation of artificial bird space perches and nesting platforms, at a safe distance from energised components.	EPC Contractor	Construction
High sensitivity sections of the power line should be marked with Bird Flight Diverters (BFDs), on the earth wire of the line, 5 metres apart, alternating black and white to increase the visibility of the power line and reduce the likelihood of collisions.	EPC Contractor	Construction
The power line route should be scanned at least twice a month for the first year after construction to identify and locations of high impact. All mortalities along the power line route should be recorded and if there are any sites where repeated mortalities have occurred, an avifaunal specialist should be consulted for advice on additional mitigation measures to be implemented.	EPC Contractor	Construction

Performance Indicator	» Limited impacts on avifaunal species (i.e. noted/recorded fatalities) and populations.
Monitoring	» Recording avifaunal fatalities to monitor success of mitigation measures. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 14: Minimise soil degradation and erosion

The soil on site may be impacted in terms of:

» Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern across the entire site which is underlain by fine grained soil which can be mobilised when disturbed, even on relatively low slope gradients (accelerated erosion).
» Degradation of the natural soil profile due to excavation, stockpiling, compaction, pollution and other construction activities will affect soil forming processes and associated ecosystems. Degradation of parent rock is considered low as there are no deep excavations envisaged.

Project Component/s	» PV Facility. » Offices and workshops. » Access roads.
Potential Impact	» Soil and rock degradation. » Soil erosion. » Increased deposition of soil into drainage systems. » Increased run-off over the site.
Activities/Risk Sources	» Removal of vegetation, excavation, stockpiling, compaction, and pollution of soil. » Rainfall - water erosion of disturbed areas. » Wind erosion of disturbed areas. » Concentrated discharge of water from construction activity.
Mitigation: Target/Objective	» Minimise extent of disturbance areas. » Minimise activity within disturbance areas. » Minimise soil degradation (mixing, wetting, compaction, etc). » Minimise soil erosion. » Minimise deposition of soil into drainage lines. » Minimise instability of embankments/excavations.

Mitigation: Action/Control	Responsibility	Timeframe
Identify disturbance areas and restrict construction activity to these areas.	EPC Contractor	Before and during construction
Rehabilitate disturbance areas as soon as practicable when construction in an area is complete.	EPC Contractor	Construction
Access roads to be carefully constructed to minimise the impacted area and prevent unnecessary excavation, placement, and compaction of soil.	EPC Contractor	Design and construction
Minimise removal of vegetation which is essential	EPC Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
for soil stability.		
Ensure practises for the reduction in topsoil removal/topsoil conservation are followed. Stockpile topsoil for re-use in rehabilitation phase must be protected from erosion.	EPC Contractor	Construction
Implement erosion control measures in denuded areas as required.	EPC Contractor	Construction
Control depth of excavations and stability of cut faces/sidewalls.	EPC Contractor	Construction
Salvaging topsoil: » Topsoil must always be salvaged and stored separately from subsoil and lower-lying parent rock or other spoil material. o Topsoil stripping removes up to 30 cm or less of the upper soils. » Prior to salvaging topsoil the depth, quality and characteristics of topsoil should be known for every management area. * This will give an indication of total volumes of topsoil that need to be stored to enable the proper planning and placement of topsoil storage. * Different types of topsoil – rocky soils and sands or loams must be stored separately » Topsoil should be removed (and stored) under dry conditions to avoid excessive compaction whenever topsoil will have to be stored for longer than one year.	EPC Contractor	Pre-construction/ Construction
Storing topsoil: » Viability of stored topsoil depends on moisture, temperature, oxygen, nutrients and time stored. » Rapid decomposition of organic material in warm, moist topsoil rapidly decreases microbial activity necessary for nutrient cycling, and reduces the amount of beneficial micro-organisms in the soil. » Stockpile location if not adjacent to a linear development: * At least 50 m from any wetland or watering point * Ideally a disturbed but weed-free area » Topsoil is typically stored in berms with a width of 150 – 200 cm, and a maximum height of 100 cm, preferably lower * Place berms along contours or perpendicular to the prevailing wind direction	Contractor	Pre-construction/ Construction

Mitigation: Action/Control	Responsibility	Timeframe
∗ Adhere to the following general rule: the larger the pile of topsoil storage needs to be, the shorter should be the time it is stored » Topsoil handling should be reduced to stripping, piling (once), and re-application. Between the stockpiling and reapplication, stored topsoil should not undergo any further handling except control of erosion and (alien) invasive vegetation » Where topsoil can be reapplied within six months to one year after excavation, it will be useful to store the topsoil as close as possible to the area of excavation and re-application, e.g. next to cabling trenches ∗ In such case, use one side of the linear development for machinery and access only ∗ Place topsoil on the other/far side of this development, followed by the subsoil (also on geotextile) ∗ If there will be a need for long-term storage of topsoil in specified stockpiles, this must be indicated in the design phase already and accompanied by a detailed topsoil stockpile management plan » In cases where topsoil has to be stored longer than 6 months or during the rainy season, soils should be kept as dry as possible and protected from erosion and degradation by: ∗ Preventing ponding on or between heaps of topsoil ∗ Or covering topsoil berms ∗ Preventing all forms of contamination or pollution ∗ Preventing any form of compaction ∗ Monitoring establishment of all invasive vegetation and removing such if it appears ∗ Keeping heights of topsoil at 2m to prevent wind erosion ∗ Keeping slopes of topsoil at a maximal 2:1 ratio ∗ Monitoring and mitigating erosion where it appears ∗ Where topsoil needs to be stored in excess of one year, it is recommended to either cover the topsoil or allow an indigenous grass cover to grow on it – if this does not happen spontaneously, seeding should be considered		

Mitigation: Action/Control	Responsibility	Timeframe
Reapplying topsoil: » Spoil materials and subsoil must be back-filled first, then covered with topsoil » Generally, topsoil should be re-applied to a depth equal to slightly greater than the topsoil horizon of a pre-selected undisturbed reference site » The minimum depth of topsoil needed for re-vegetation to be successful is approximately 20cm » If the amount of topsoil available is limited, a strategy must be worked to out to optimise re-vegetation efforts with the topsoil available » Reapplied topsoil should be landscaped in a way that creates a variable microtopography of small ridges and valleys that run parallel to existing contours of the landscape. The valleys become catch-basins for seeds and act as run-on zones for rainfall, increasing moisture levels where the seeds are likely to be more concentrated. This greatly improves the success rate of re-vegetation efforts. » To stabilise reapplied topsoil and minimise raindrop impact and erosion: o Use organic material from cleared and shredded woody vegetation where possible o Alternatively, suitable geotextiles or organic erosion mats can be used as necessary o Re-vegetate the area as soon a possible. » Continued monitoring will be necessary to detect any sign of erosion early enough to allow timeous mitigation	EPC Contractor	Construction and rehabilitation
General erosion control measures: » Runoff control and attenuation can be achieved by using any or a combination of sand bags, logs, silt fences, stormwater channels and catch-pits, shade nets, geofabrics, seeding or mulching as needed on and around cleared and disturbed areas o Ensure that all soil surfaces are protected by vegetation or a covering to avoid the surface being eroded by wind or water. » Ensure that heavy machinery does not compact areas that are not meant to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area.	EPC Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
» Prevent the concentration or flow of surface water or stormwater down cut or fill slopes or along roads and ensure measures to prevent erosion are in place prior to construction. » Stormwater and any runoff generated by hard impervious surfaces should be discharged into retention swales or areas with rock rip-rap. These areas should be grassed with indigenous vegetation. These energy dissipation structures should be placed in a manner that flows are managed prior to being discharged back into the natural water courses, thus not only preventing erosion, but also supporting the maintenance of natural base flows within these systems, i.e. hydrological regime (water quantity and quality) is maintained. » Minimise and restrict site clearing to areas required for construction purposes only and restrict disturbance to adjacent undisturbed natural vegetation. » Vegetation clearing should occur in parallel with the construction progress to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. » If implementing dust control measures, prevent over-wetting, saturation, and run-off that may cause erosion and sedimentation.		

Performance Indicator	» No activity outside demarcated development areas. » Limited level of soil erosion around site due to construction activities. » Limited level of increased siltation in drainage lines. » No activity in restricted areas.
Monitoring	» Monthly inspections of sediment control devices. » Monthly inspections of surroundings, including drainage lines. » Immediate reporting of ineffective sediment control systems. » An incident reporting system will record non-conformances.

OBJECTIVE 15: Protection of heritage and paleontological resources

The development area is underlain by the Vryburg Formation of the Ghaap Group, and the Dwyka Group of the Karoo Supergroup. The Dwyka Group (Karoo Supergroup) is

represented by small outcrops in the north of the development area. Although trace fossils and plants could be present in the Dwyka Group the likelihood of significant fossil heritage in the Vryburg area is considered to be low. A small outcrop of the Schmidtsdrif Subgroup is present in the south western area. Stromatolite assemblages are recorded within the Schmidtsdrif Subgroup and Vryburg Formation. The Boomplaas Formation stromatolites represent some of the oldest examples of these microbial fossils in South Africa. Detailed descriptions of these fossils have yet to be documented and their stratigraphic and geographical distributions are poorly understood.

Middle Stone Age (MSA) and Later Stone Age (LSA) artefacts were recorded scattered in varying densities across the proposed footprint. Most of these artefacts are scattered too sparsely to be of any significance. .

Graves can be expected anywhere on the landscape. Several stone cairns were noted close to the recorded farm labourer ruins that could indicate graves. It is recommended that the cairns should be preserved *in situ*, if this is not possible it is recommended that through the social consultation process it should be confirmed whether the cairns represent graves.

Project Component/s	» PV Facility » Offices and workshops. » Access roads.
Potential Impact	» Heritage objects or artefacts found on site are inappropriately managed or destroyed
Activity/Risk Source	» Site preparation and earthworks » Foundations or plant equipment installation » Mobile construction equipment movement on site
Mitigation: Target/Objective	» To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation

Mitigation: Action/control	Responsibility	Timeframe
Areas required to be cleared during construction must be clearly marked in the field to avoid unnecessary disturbance of adjacent areas.	EPC Contractor in consultation with Specialist	Site establishment
Familiarise all staff and contractors with procedures for dealing with heritage objects/sites.	EPC Contractor in consultation with a Specialist	Pre-construction
Project employees and any contract staff must maintain, at all times, a high level of awareness of the possibility of discovering heritage sites.	Owner / EPC Contractor	Duration of contract
If a heritage object is found, work in the area must be stopped and cordoned off immediately and the ECO and site manager must be notified. Appropriate specialists must be brought in to assess the site, the administering authority (SAHRA) must be notified of the item/site,	EPC Contractor in consultation with Specialist	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
and due/required processes undertaken.		
All site personnel must be made aware of the possible encounters with human graves in the development site and be aware of the procedure to follow if any are found.	EPC Contractor	Duration of contract
Apply for sampling permits from SAHRA for work on any archaeological sites identified as needing intervention.	Specialist	Pre-construction
Trace fossils and plant could be present (Low likelihood) on the northern portion (Dwyka formation) of the development site and brief inspections should be undertaken after initial vegetation clearing.	Specialist/ EPC Contractor	Construction
Stone Age site, finds - If the site cannot be preserved *in-situ* it is recommended that a surface sample is collected and that the site is dated (possibly the calcrete matrix in which the tools are found) prior to applying for a destruction permit from the SAHRA.	Specialist/ EPC Contractor	Construction
It is recommended that Stone Cairns should be demarcated and excluded from the development if possible. If this is not possible social consultation should confirm the presence of graves prior to construction. If graves are present they should be relocated following the correct procedures	EPC Contractor	Pre-construction
Chance find procedure: The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction personnel must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below. • If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or rock engraving, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager. • It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area. • The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a	EPC Contractor/ Developer	Construction

Mitigation: Action/control	Responsibility	Timeframe
professional archaeologist for an assessment of the finds who will notify the SAHRA.		

Performance Indicator	» No disturbance outside of designated work areas » All heritage items located are dealt with as per the legislative guidelines
Monitoring	» Observation of excavation activities by Contractor's SHE Officer throughout construction phase » Supervision of all clearing and earthworks » Due care taken during earthworks and disturbance of land by all staff and any heritage objects found reported. » Appropriate permits obtained from SAHRA prior to the disturbance or destruction of heritage sites » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 16: Minimisation of visual impacts associated with construction

During the construction phase, heavy vehicles, components, equipment and construction crews will frequent the area and may cause, at the very least, a visual nuisance to landowners and residents in the area as well as road users. The placement of lay-down areas and temporary construction camps should be carefully considered in order to not negatively influence the future perception of the facility. Secondary visual impacts associated with the construction phase, such as the sight of construction vehicles, dust and construction litter must be managed to reduce visual impacts. The use of dust-suppression techniques on the access roads (where required), timely removal of rubble and litter, and the erection of temporary screening will assist in doing this.

Development of Woodhouse Solar 2 PV is likely to be visible largely to the N18 and the relatively natural rural area to the south.

Other possible visual receptors include:

» 3 km stretch of the N14;
» 5-6 km stretch of the R34;
» 9 km stretch of the N18;
» The Vryburg airstrip west of the development; and
» Small holdings and homesteads to the north of the development.

In addition to the impact associated with the proposed array and infrastructure internal to the site, it is possible that impacts associated with the development could include a new 132kV overhead power line that may be required to be constructed between the northern edge of the proposed site and the existing Mookodi Substation. This power line will impact a similar area as the array in that urban fringes of Vryburg will be affected and natural areas to the south will not. Other grid connection alternatives involve the use of or upgrading of existing infrastructure this is likely to have minimal visual impact.

Project Component/s	» PV panels. » Laydown areas. » Contractors' camps. » Electrical infrastructure.
Potential Impact	» Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing.
Activity/Risk Source	» The viewing of the above mentioned by observers on or near the site.
Mitigation: Target/Objective	» Minimal visual intrusion by construction activities and construction accommodation and intact vegetation cover outside of immediate works areas.

Mitigation: Action/Control	Responsibility	Timeframe
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	EPC Contractor	Construction
Ensure that rubble, litter, and disused construction materials are managed and removed regularly.	EPC Contractor	Construction
Ensure a designated area is selected for waste management and that the area is maintained daily.	EPC Contractor	Construction
Ensure that all infrastructure and the site and general surrounds are maintained in a neat a manner.	EPC Contractor	Construction
Reduce and control construction dust using approved dust suppression techniques.	EPC Contractor	Construction
As far as possible, restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.	EPC Contractor	Construction
Rehabilitate all disturbed areas, construction areas, roads, and servitudes to acceptable visual standards.	EPC Contractor	Construction
Retain natural buffer areas adjacent to the R34.	EPC Contractor	Construction
Use non-reflective finishes and coatings to the	EPC Contractor	Construction/

Mitigation: Action/Control	Responsibility	Timeframe
surface of PV panels to reduce glint and glare.		Operation
Should glint and glare effect the flightpath near the Vryburg airstrip then a general notice should be issued to the pilots and airport.	EPC Contractor	Construction/ Operation
Utilise infra-red security systems or motion sensor triggered lighting.	EPC Contractor	Construction/ Operation
Ensure that lighting is focused on the development with no light spillage outside the site.	EPC Contractor	Construction/ Operation

Performance Indicator	» Vegetation cover on and near the site is intact with no evidence of degradation or erosion. » Construction site is kept in a neat and tidy state. » Minimal light spillage from PV facility during the night. » No complaints of glint and glare from neighbouring residents or the nearby airstrip.
Monitoring	» Monitoring of glint and glare from possible impacted areas once PV panels have been erected. » Monitoring of rehabilitated areas post construction. » Monitoring of light pollution of areas adjacent to the site footprint

OBJECTIVE 17: Appropriate handling and management of waste

The construction of the PV facility will involve the generation of various wastes. In order to manage the wastes effectively, guidelines for the assessment, classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented. The main wastes expected to be generated by the construction of the solar energy facility will include:

» general solid waste
» hazardous waste
» inert waste (rock and soil)
» liquid waste (including grey water and sewage)

Project Component/s	» PV Facility. » Offices and workshops. » Access roads.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation » Litter or contamination of the site or water through poor waste management practices

Activity/Risk Source	» Packaging » Other construction wastes » Hydrocarbon use and storage » Spoil material from excavation, earthworks and site preparation
Mitigation: Target/Objective	» To comply with waste management legislation » To minimise production of waste » To ensure appropriate waste storage and disposal » To avoid environmental harm from waste disposal. » A waste manifests should be developed for the ablutions showing proof of disposal of sewage at appropriate water treatment works.

Mitigation: Action/Control	Responsibility	Timeframe
Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.	EPC Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	EPC Contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap), and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.	EPC Contractor	Duration of contract
Where practically possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).	EPC Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	EPC Contractor	Duration of contract
Uncontaminated waste will be removed at least weekly for disposal; other wastes will be removed for recycling/ disposal at an appropriate frequency.	EPC Contractor	Duration of contract
Disposal of waste will be in accordance with relevant legislative requirements, including the use of licensed contractors.	EPC Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area and clearly labelled.	EPC Contractor	Duration of contract
Waste must be kept to a minimum and must be transported by approved waste transporters to	EPC Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
sites designated for their disposal.		
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	EPC Contractor	Duration of contract
SABS approved spill kits to be available and easily accessible.	EPC Contractor	Duration of contract
Regularly serviced chemical toilets facilities and/or septic tank must be used to ensure appropriate control of sewage. At least one sanitary facility for each sex and for every 30 workers as per the 2014 Construction Regulations; Section 30(1) (b)) at appropriate locations on site.	EPC Contractor	Duration of contract
Daily inspection of all portable toilets and septic tanks must be performed by SHE/ environmental representatives on site.	EPC Contractor	Duration of construction
Dispose of all solid waste collected at an appropriately registered waste disposal site. Waste disposal shall be in accordance with all relevant legislation and under no circumstances may waste be burnt on site.	EPC Contractor	Duration of construction
Implement an integrated waste management approach that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate.	EPC Contractor	Duration of construction
Discharge of sewage into the environment must be prevented. Immediate attention must be given to rectifying of leaking sewage systems/ facilities.	EPC Contractor	Duration of construction
In the event where sewage is discharged into the environment, all contaminated vegetation/ rock and soil must be removed immediately and treated as hazardous waste.	EPC Contractor	Duration of construction
Ensure that the below ground storage of the septic tank can withstand the external forces of the surrounding pressure. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from driving around the tank.	EPC Contractor	Duration of construction
Waste manifests must be provided for all waste streams generated on site, and must be kept on site.	EPC Contractor	Duration of Construction/ Operation
All waste facilities and waste transportation contractors must be licensed and registered where necessary.	EPC Contractor	Duration of Construction
Upon the completion of construction, the area must be cleared of potentially polluting materials.	EPC Contractor	Completion of construction

Mitigation: Action/Control	Responsibility	Timeframe
Spoil stockpiles must also be removed and appropriately disposed of or the material re-used for an appropriate purpose.		

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests for all waste streams.
Monitoring	» Observation and supervision of waste management practices throughout construction phase. » Waste collection will be monitored on a regular basis. » Waste documentation completed. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 18: Appropriate handling and storage of chemicals, hazardous substances and dangerous goods/ substances

The construction phase will involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents.

Project Component/s	» Laydown areas. » Subcontractors' camps. » Temporary hydrocarbon and chemical storage areas.
Potential Impact	» Release of contaminated water from contact with spilled chemicals » Generation of contaminated wastes from used chemical containers
Activity/Risk Source	» Vehicles associated with site preparation and earthworks. » Construction activities of area and linear infrastructure. » Hydrocarbon use and storage.
Mitigation: Target/Objective	» To ensure that the storage and handling of chemicals, hydrocarbons and dangerous goods on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an emergency preparedness plan (refer to **Appendix K** in the Fire Management Plan) during the	EPC Contractor	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
construction phase.		and implement for duration of Contract
Any liquids stored on site, including admixtures, fuels and lubricants, should be stored in accordance with applicable legislation.	EPC Contractor	Construction phase
Establish an appropriate Hazardous Stores which is in accordance with the Hazardous Substance Amendment Act, No. 53 of 1992. This should include but not limited to: » Designated area; » All applicable safety signage; » Fire fighting equipment; » Enclosed by an impermeable bund; » Protected from the elements, » Lockable; » Ventilated; and » Has adequate capacity to contain 110% of the largest container contents.	EPC Contractor	Pre-construction and implement for duration of Contract
Spilled cement must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	EPC Contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	EPC Contractor	Duration of contract
Routine servicing and maintenance of vehicles must not to take place on-site (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils.	EPC Contractor	Duration of contract
All stored fuels to be maintained within a bund and on a sealed surface as per the requirements of SABS 089:1999 Part 1.	EPC Contractor	Duration of contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.	EPC Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	EPC Contractor	Duration of contract
No chemicals must be stored or vehicle maintenance undertaken within 350m of the temporal zone of wetlands or a drainage line.	EPC Contractor	Duration of contract
Oily water from bunds at the substation must be removed from site by licensed contractors.	EPC Contractor	Duration of contract
The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files and applicable	EPC Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
regulations and safety instructions.		
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be compiled with.	EPC Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations	EPC Contractor	Duration of contract
The sediment control and water quality structures used on-site must be monitored and maintained in an operational state at all times.	EPC Contractor	Duration of contract
An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.	EPC Contractor	Construction
Precautions must be in place to limit the possibility of oil and other toxic liquids from entering the soil or clean stormwater system.	EPC Contractor	Construction
Upon the completion of construction, the area must be cleared of potentially polluting materials.	EPC Contractor	Completion of construction
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.	EPC Contractor	Duration of contract
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents. Where required, a NEMA Section 30 report must be submitted to DEA within 14 days of the incident.	EPC Contractor	Duration of contract

Performance Indicator	» No chemical spills outside of designated storage areas. » No unattended water or soil contamination by spills. » No complaints received regarding waste on site or indiscriminate dumping.
Monitoring	» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. » A complaints register must be maintained, in which any complaints from the community will be logged. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 19: Effective management of concrete batching plants

A considerable amount of concrete is required during the construction of the PV Facility. In this regard there could be a need to establish a batching plant within the site. Turbid and highly alkaline wastewater, dust emissions and noise are the key potential impacts associated with concrete batching plants. Concrete batching plants, cement, sand and aggregates can produce dust. Potential pollutants in batching plant wastewater and stormwater include cement, sand, aggregates, chemical additive mixtures, fuels and lubricants.

Project component/s	» Batching plant. » Contaminated stormwater system.
Potential Impact	» Dust emissions » Release of contaminated water » Generation of contaminated wastes from used chemical containers » Inefficient use of resources resulting in excessive waste generation
Activity/risk source	» Operation of the batching plant » Packaging and other construction wastes » Hydrocarbon use and storage
Mitigation: Target/Objective	» To ensure that the operation of the batching plant does not cause pollution to the environment or harm to persons

Mitigation: Action/control	Responsibility	Timeframe
Concrete batching plants should be sited such that impacts on the environment or the amenity of the local community from noise, odour or polluting emissions are minimised	EPC Contractor	Construction phase
Where there is a regular movement of vehicles, access and exit routes for heavy transport vehicles should be planned to minimise noise and dust impacts on the environment	EPC Contractor	Construction phase
Good maintenance practices must be implemented, including regular sweeping to prevent dust build-up	EPC Contractor	Construction phase
The prevailing wind direction should be considered to ensure that bunkers and conveyors are sited in a sheltered position to minimise the effects of the wind.	EPC Contractor	Construction phase
Aggregate material should be delivered in a damp condition, and water sprays or a dust suppression agent should be correctly applied to reduce dust emissions and reduce water usage	EPC Contractor	Construction phase

Mitigation: Action/control	Responsibility	Timeframe
Process wastewater collected from the entire batching plant area should be diverted to an impervious settling tank or pond. Water should be reused in the concrete batching process, where possible.	EPC Contractor	Construction phase
A contaminated stormwater system must be specifically designed for the batching plant to ensure effective control of contaminated stormwater originating from the batching plant and prevent contamination to the surrounding environment.	EPC Contractor	Construction phase
Where possible, waste concrete should be used for construction purposes at the batching plant or project site.	EPC Contractor	Construction phase
Artificial wind barriers must be installed around the batching plant to minimise air, land and water pollution. Wind barriers must enclose the entire batching plant and be at least 2.5m from the NGL and not allow fly ash and other dusts from moving through the barrier. The artificial barrier must be maintained daily for any defects and corrected when necessary.	EPC Contractor	Pre-construction/ construction
The concrete wash bay structure must be constructed in a double brick arrangement or be reinforced to maintain its integrity throughout operation.	EPC Contractor	Construction phase

Performance Indicator	» No complaints on dust » No water or soil contamination by chemical spills » No complaints received regarding waste on site or indiscriminate dumping
Monitoring	» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident and non-conformance register will be used to record incidents and non-conformances to the EMPr. » The appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase

6.3. Detailing Method Statements

OBJECTIVE: Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMPr will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager and ECO.

A Method Statement is defined as "a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications". The Method Statement must cover applicable details with regard to:

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

Method Statements must be compiled for all activities which affect any aspect of the environment and should be applied consistently to all activities. Specific areas to be addressed in the method statement: pre, during and post construction include:

» Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc. Including a site camp plan indicating all of these).
» Preparation of the site (i.e. clearing vegetation, compacting soils and removing existing infrastructure and waste).
» Soil management/stockpiling and erosion control.

- Excavations and backfilling procedure.
- Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions)
- Stormwater method statement.
- Ablution facilities (placement, maintenance, management and servicing)
- Solid Waste Management:
  - Description of the waste storage facilities (on site and accumulative).
  - Placement of waste stored (on site and accumulative).
  - Management and collection of waste process.
  - Recycle, re-use and removal process and procedure.
- Liquid waste management:
- The design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into the surrounding environment Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into an existing facilities where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no seepage into the surrounding environment occurs. Dust and noise pollution
  - Describe necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
  - Procedure to control dust at all times on the site, access roads, borrow pits and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.
- Hazardous substance storage (Ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).
  - Lists of all potentially hazardous substances to be used.
  - Appropriate handling, storage and disposal procedures.
  - Prevention protocol of accidental contamination of soil at storage and handling areas.
  - All storage areas, (i.e.: for harmful substances appropriately bunded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).
- Fire prevention and management measures on site.
- Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).
  - Rehabilitation, re-vegetation process and bush clearing.
- Incident and accident reporting protocol.
- General administration
- Designate access road and the protocol on while roads are in use.
- Requirements on gate control protocols.

The Contractor may not commence the activity covered by the Method Statement until it has been reviewed by the Site Manager and ECO, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

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

6.4. Awareness and Competence: Construction Phase of the PV Facility

OBJECTIVE 1: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractors obligations in this regard include the following:

- All Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment. This includes the discussion/explanation of site environmental matters during toolbox talks.
- The content and requirements of Method Statements are to be clearly explained to all plant operators and general workers. All staff acting in a supervisory capacity is to have copies of the relevant Method Statements and be aware of the content thereof.
- Ensuring that a copy of the EMPr is readily available on-site, and that all senior site staff is aware of the location and have access to the document. Senior site staff will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
- Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training session. The training session must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
    - Records must be kept of those that have completed the relevant training.
    - Training should be done either in a written or verbal format but must be appropriate for the receiving audience.

    - Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.
- All sub-contractors must have a copy of the EMPr and sign a declaration/ acknowledgement that they are aware and familiar with the contents and requirements of the EMPr and that they will conduct work in such a manner as to ensure compliance with the requirements of the EMPr.
- Contractors and main sub-contractors should have a basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.
- Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the site.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

6.4.1 Environmental Awareness Training

Environmental Awareness Training must be undertaken by the EPC Contractor and must take the form of an on-site talk and demonstration by the Contractor's SHE Officer and/or the ECO before the commencement of site establishment and construction on site. The education/awareness programme should be aimed at all levels of management and construction workers within the contractor team. A record of attendance of this training must be maintained by the Contractor's SHE Officer on site.

6.4.2 Induction Training

Environmental induction training must be presented to all persons who are to work on the site – be it for short or long durations; Contractor's or Engineer's staff; administrative or site staff; sub-contractors or visitors to site.

This induction training should be undertaken by the Contractor's SHE Officer and should include discussing the developer's environmental policy and values, the function of the EMPr and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight overall do's and don'ts on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE Officer on site.

6.4.3 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least once a week) where foremen, environmental and safety representatives of different components of the Works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

6.5. Monitoring Programme: Construction Phase of the PV Facility

OBJECTIVE 1: To monitor the performance of the control strategies employed against environmental objectives and standards.

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation (once issued). Where this is not clearly dictated, Genesis Woodhouse Solar 2 (Pty) Ltd will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Technical Director/Manager will ensure that the monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications
- Ensure adequate and appropriate interventions to address non-compliance
- Ensure adequate and appropriate interventions to address environmental degradation
- Provide a mechanism for the lodging and resolution of public complaints
- Ensure appropriate and adequate record keeping related to environmental compliance
- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site
- Aid communication and feedback to authorities and stakeholders

6.5.1. Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, and the ECO must be provided the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority within 48 (forty eight) hours.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Site Manager and ECO.

6.5.2. Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis and must be submitted to the Director: Compliance Monitoring at DEA for their records. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out. The EPC contractor must ensure that all waste manifests are provided to the ECO on a monthly basis in order to inform and update the DEA regarding waste related activities.

6.5.3. Final Audit Report

A final environmental audit report must be compiled by an independent external auditor and be submitted to DEA upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase (i.e. within 30 days of site handover) and within 30 days of completion of rehabilitation activities). This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr.

Overall Goal: Undertake the rehabilitation measures in a way that:

» Ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed

7.1. Objectives

In order to meet this goal, the following objective, actions and monitoring requirements are relevant:

OBJECTIVE 1: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for regular operation and maintenance operations. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area.

Project Component/s	» Construction camps. » Laydown areas. » Temporary access roads. » Site offices. » Powerline servitude.
Potential Impact	» Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion and increased runoff, and the requirement for on-going management intervention.
Activity/Risk Source	» Temporary construction areas. » Temporary access roads/tracks. » Other disturbed areas/footprints.
Mitigation: Target/Objective	» Ensure and encourage site rehabilitation of disturbed areas. » Ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed.

Mitigation: Action/Control	Responsibility	Timeframe
Implement revegetation and rehabilitation plan (refer to **Appendix F**).	EPC Contractor	Following execution of the works
Rehabilitation must be undertaken as soon as possible	EPC Contractor	Following

Mitigation: Action/Control	Responsibility	Timeframe
after completion of construction activities to reduce the area of habitat converted at any one time and to speed up recovery of natural habitats.		execution of the works
All temporary facilities, equipment, and waste materials must be removed from site.	EPC Contractor	Following execution of the works
All rehabilitated areas must be demarcated and movement in this area minimised, in order to prevent damage by construction vehicles and activities. Demarcation must remain in place until acceptable rehabilitation has been achieved.	EPC Contractor	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been completed.	EPC Contractor	Following completion of construction activities in an area
The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up.	EPC Contractor	Following completion of construction activities in an area
All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and re-vegetated.	EPC Contractor	Following completion of construction activities in an area
Temporary roads must be closed and access across these blocked	EPC Contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	EPC Contractor	Following completion of construction activities in an area
Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-use of native/indigenous plant species removed from disturbance areas in the rehabilitation phase to be determined by a botanist as applicable.	EPC Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Owner in consultation with rehabilitation specialist	Post-rehabilitation
Erosion control measures should be used in sensitive areas	Owner in	Post-

Mitigation: Action/Control	Responsibility	Timeframe
such as steep slopes, hills, and drainage lines is necessary.	consultation with rehabilitation specialist	rehabilitation
On-going alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis.	Owner in consultation with rehabilitation specialist	Post-rehabilitation
Weeding: It can be anticipated that invasive species and weeds will germinate on rehabilitated soils o These need to be hand-pulled before they are fully established and/or reaching a mature stage where they can regenerate o Where invasive shrubs re-grow, they will have to be eradicated according to the Working for Water specifications	Contractor/ Owner	Construction/ Operation

Performance Indicator	» All portions of site, including construction equipment camp and working areas, cleared of equipment and temporary facilities. » Topsoil replaced on all areas and stabilised where practicable or required after construction and temporally utilised areas. » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites. » Completed site free of erosion and alien invasive plants.
Monitoring	» On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented during the operational lifespan of the facility. » On-going alien plant monitoring and removal should be undertaken on an annual basis.

OPERATION MANAGEMENT PROGRAMME CHAPTER 8

Overall Goal: To ensure that the operation of the solar energy facility does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to operate the solar energy facility in a way that:

» Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
» Enables the solar energy facility operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents.
» Minimises impacts on fauna using the site.
» Establishes an environmental baseline for solar energy facility sites in South Africa.

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

8.1. Objectives

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

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to overall implementation of environmental management programme during operation

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Operations Manager, and Environmental Manager for the operation phase of this project are detailed below.

The **Operations Manager** will:
» Ensure that adequate resources (human, financial, technology) are made available and appropriately managed for the successful implementation of the operational EMPr.
» Conduct annual basis reviews of the EMPr to evaluate its effectiveness.
» Take appropriate action as a result of findings and recommendations in management reviews and audits.
» Provide forums to communicate matters regarding environmental management.

The **Technical/SHEQ Manager** will:

» Develop and Implement an Environmental Management System (EMS) for the solar energy facility and associated infrastructure.
» Manage and report on the facility's environmental performance.
» Maintain a register of all known environmental impacts and manage the monitoring thereof.
» Conduct internal environmental audits and co-ordinate external environmental audits.
» Liaise with statutory bodies such as the National and Provincial Department of Environmental Affairs (DEA) on environmental performance and other issues.
» Conduct environmental training and awareness for the employees who operate and maintain PV facility.
» Compile environmental policies and procedures.
» Liaise with interested and affected parties on environmental issues of common concern.
» Track and control the lodging of any complaints regarding environmental matters.

The Technical/SHEQ Manager must provide fourteen (14) days written notification to the DEA that the activity operational phase will commence.

OBJECTIVE 2: Protection of indigenous natural vegetation, fauna and maintenance of rehabilitation

Indirect impacts on vegetation and terrestrial fauna during operation could result from maintenance activities and the movement of people and vehicles on site. In order to ensure the long-term environmental integrity of the site following construction, maintenance of the areas rehabilitated post-construction must be undertaken until these areas have successfully re-established.

Project component/s	» Rehabilitated areas. » Areas along the perimeter fence. » Topsoil stockpile areas.
Potential Impact	» Disturbance to or loss of vegetation and/or habitat. » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activity/Risk Source	» Movement of employee vehicles within and around site.
Mitigation: Target/Objective	» Maintain minimised footprints of disturbance of vegetation/habitats on-site. » Ensure and encourage plant regrowth in non-operational areas of

	post-construction rehabilitation.

Mitigation: Action/Control	Responsibility	Timeframe
Vehicle movements must be restricted to designated roadways.	Owner O&M Operator	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	Owner O&M Operator	Operation
An on-going alien plant monitoring and eradication programme must be implemented, where necessary.	Owner O&M Operator	Operation
A botanist familiar with the vegetation of the area should monitor the rehabilitation success and alien plant removal on an annual basis.	Owner in consultation with Specialist	Annual monitoring until successful re-establishment of vegetation in an area
Monitor avifaunal movement along the power line and within the solar field, to assess the integrity of mitigation measures in place. Further relevant mitigation measures must be implemented if carcases and/ or injuries are being recorded.	Owner O&M Operator	Operation
A faunal/ avifauna incident register must be maintained on site.	Owner O&M Operator SHEQ Manager	Operation
Implement an animal removal plan to ensure safety of workers and fauna.	Owner O&M Operator	Operation

Performance Indicator	» No further disturbance to vegetation or terrestrial faunal habitats. » Continued improvement of rehabilitation efforts.
Monitoring	» Observation of vegetation on-site by SHEQ Manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas. » Faunal/ avifauna incident register maintained on site.

OBJECTIVE 3: Minimisation of visual impacts associated with operation

The primary visual impact of the facility and its ancillary infrastructure, including the power line, is not possible to mitigate. The functional design of the structures cannot be changed in order to reduce visual impacts.

Project Component/s	» Power line. » PV facility.

	» Offices and workshops. » Access roads.
Potential Impact	» Visual impact of facility degradation and vegetation rehabilitation failure. » Lighting influences from the facility on surrounding areas.
Activity/Risk Source	» PV facility. » Power lines.
Mitigation: Target/Objective	» To minimise potential for visual impact. » To ensure a well maintained and neat facility.

Mitigation: Action/Control	Responsibility	Timeframe
Maintain the general appearance of the facility in an aesthetically pleasing way.	Owner O&M Operator	Operation
Monitor rehabilitated areas, and implement remedial action as and when required.	Owner O&M Operator	Operation
Use of light fixtures and the fitment of covers and shields will be designed to contain rather than spread light.	Owner O&M Operator	Operation
Maintain natural buffer areas adjacent to the R34.	Owner O&M Operator	Operation

Performance Indicator	» Well maintained and neat facility with intact vegetation on and near the facility. » Lighting impact and visual intrusion is minimal and no complaints received from settlements or homesteads.
Monitoring	» Monitoring of rehabilitated areas.

OBJECTIVE 4: Ensure the implementation of an appropriate fire management plan during the operation phase

The vegetation in the study area may be at risk of fire, including the photovoltaic panels which are situated closer to the ground. The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

Project Component/s	» PV panels. » Rehabilitated areas.
Potential Impact	» Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences. In addition, fire can pose a risk to the PV facility infrastructure.
Activities/Risk Sources	» The presence of operation and maintenance personnel and their activities on the site can increase the risk of veld fires.
Mitigation:	» To avoid and or minimise the potential risk of veld fires on local

Target/Objective	communities and their livelihoods.

Mitigation: Action/Control	Responsibility	Timeframe
Provide adequate fire fighting equipment on site and establish a fire fighting management plan during operation (refer to **Appendix K**).	Owner O&M Operator	Operation
Provide fire-fighting training to selected operation and maintenance staff.	Owner O&M Operator	
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	Owner O&M Operator	Operation
Fire breaks should be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.).	Owner O&M Operator	Operation
Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.	Owner O&M Operator	Operation
Contact details of emergency services should be prominently displayed on site.	Owner O&M Operator	Operation

Performance Indicator	» Fire fighting equipment and training provided before the construction phase commences. » Appropriate fire breaks in place.
Monitoring	» The project developer must monitor indicators listed above to ensure that they have been met.

OBJECTIVE 5: Facilitate benefits for local communities associated with socio-economic development plans and community trust

Project component/s	» Operation and maintenance of the proposed solar energy facility and associated infrastructure
Potential Impact	» Loss of socio-economic opportunities for local area
Activity/risk source	» Operation of the PV facility and associated infrastructure
Mitigation: Target/Objective	» Maximise local community benefits in the local economy

Mitigation: Action/control	Responsibility	Timeframe
An in-depth community needs assessment (CNA) will need to be carried out to make sure that the real needs of communities are addressed (in line with the	The Developer	Pre-Operation phase

local government) and the correct representatives of the community are appointed to run the community trust		
Engagement and involvement of the local municipality with regards to social responsibility plans	The Developer	Pre-Operation phase

Performance Indicator	» Community needs assessment » Engage and involvement of the local municipality
Monitoring	» The developer must keep a record of key stakeholders consultations that took place with the local municipality and key community members

OBJECTIVE 6: Minimise the potential impact on activities and on the surrounding landowners

Once operational, the impact on the daily living and movement patterns of neighbouring residents is expected to be minimal and intermittent (i.e. the increase in traffic to and from site, possible dust creation of vehicle movement on gravel roads on site and possible increase in criminal activities). The number of workers on site on a daily basis is anticipated to have minimal negative social impacts in this regard.

Employing outsiders on the other hand and accommodating them at the planned accommodation facility on site could also affect the community's social dealings with each other as well as the traditional character of the area. In worst cases it could result in social conflict between the various groupings. The recruitment and employment process would thus have to be sensitively dealt with to limit any possible negative impacts on the daily living patterns of the existing farming community and other community members.

The operations at the facility, however is not anticipated to have severe negative impacts on the neighbouring farmers' living and movement patterns, apart from a limited increase in the movement of people to and from the site, as well as the presence of these employees on-site on a permanent basis. Concerns about rental agreements should be considered.

Vehicle movement to and from the site (e.g. transportation of workers and goods) could influence road users' daily movement patterns, although it is anticipated that this impact would only materialise intermittently.

Project Component/s	» R34 and Amalia Road.

Potential Impact	» Possible limited intrusion impact on surrounding landowners. » Possible phasing out of cattle farming.
Activities/Risk Sources	» Increase in traffic to and from site could affect daily living and movement patterns of surrounding residents.
Mitigation: Target/Objective	» Effective management of the facility. » Mitigation of intrusion impacts on property owners. » Mitigation of impact on farming activities.

Mitigation: Action/Control	Responsibility	Timeframe
Effective management of the facility to avoid any environmental pollution focusing on water, waste and sanitation infrastructure and services.	Owner O&M Operator	Operation
Vehicle movement to and from the site should be minimised as far as possible.	Owner Employees	Operation
The developer and engineering, procurement and construction (EPC) contractors must ensure that there is a dedicated access and an access control point at the entrance gate off the R34 on Farm Woodhouse RE/729.	Owner/ EPC Contractor	Operation
Infrastructure such as fencing and/or gates along access route must be maintained in the present condition or repaired if disturbed due to project activities	Owner/ EPC Contractor	Operation

Performance Indicator	» No environmental pollution occurs (i.e. waste, water, and sanitation). » No intrusion on private properties and on the activities undertaken on the surrounding properties.
Monitoring	» The Owner should be able to demonstrate that facility is well managed without environmental pollution and that the above requirements have been met.

OBJECTIVE 7: Appropriate handling and management of hazardous substances, waste and dangerous goods

The operation of the PV facility will involve the storage of chemicals and hazardous substances, as well as the generation of limited waste products. The main wastes expected to be generated by the operation activities includes general solid waste, hazardous waste and sewage waste.

Project Component/s	» Substation. » PV facility. » Operation and maintenance staff. » Workshop.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation.

	» Litter or contamination of the site or water through poor waste management practices. » Contamination of water or soil because of poor materials management.
Activity/Risk Source	» Transformers and switchgear – substation. » Maintenance building.
Mitigation: Target/Objective	» Comply with waste management legislation. » Minimise production of waste. » Ensure appropriate waste disposal. » Avoid environmental harm from waste disposal. » Ensure appropriate storage of chemicals and hazardous substances.

Mitigation: Action/Control	Responsibility	Timeframe
Hazardous substances (such as used/new transformer oils, etc) must be stored in sealed containers within a clearly demarcated designated area.	Owner O&M Operator	Operation
Storage areas for hazardous substances must be appropriately sealed and bunded.	Owner O&M Operator	Operation
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	Owner O&M Operator	Operation
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	Owner O&M Operator	Operation and maintenance
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Owner O&M Operator	Operation and maintenance
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Owner/ waste management contractor	Operation
Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor.	Owner/ waste management contractor	Operation
Used oils and chemicals: » Appropriate disposal must be arranged with a licensed facility in consultation with the administering authority » Waste must be stored and handled according to the relevant legislation and regulations	Owner	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	Owner	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	Owner	Operation
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Owner	Operation
On-site hazardous chemicals and hazardous waste storage facilities must not exceed the design limits for liquid waste containment as stipulated in the relevant regulations and SANS codes.	Owner	Operation

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests. » No contamination of soil or water.
Monitoring	» Waste collection must be monitored on a regular basis. » Waste documentation must be completed and available for inspection » An incidents register must be maintained, in which any complaints from the community must be logged. » A complaints register must be maintained, in which any complaints from the community must be logged. » Complaints must be investigated and, if appropriate, acted upon. » Regular reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor. » All appropriate waste disposal certificates with the monthly reports.

The solar infrastructure which will be utilised for the proposed solar energy facility is expected to have a lifespan of 20 years and eventual extensions (i.e. with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and replacement of the solar infrastructure 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***
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.

» ***Disassemble and Remove Infrastructure***
Disassembled components will be reused, recycled, or disposed of in accordance with regulatory requirements.

9.1. Objectives

In decommissioning the facility, Genesis Woodhouse Solar 2 (Pty) Ltd must ensure that:

» Prior to decommissioning, objectives and mitigation measures will need to be updated to ensure legal compliance with the relevant legislation.
» All sites not already vegetated are vegetated as soon as possible after operation ceases with species appropriate to the area.
» Any fauna encountered during decommissioning should be removed to safety by a suitably qualified person,
» All structures, foundations and sealed areas are demolished, removed and waste material disposed of at an appropriately licensed waste disposal site or as requirement by the relevant legislation.
» All access/service roads not required to be retained by landowners are closed and fully rehabilitated.
» All vehicles to adhere to low speed limits (i.e. 30km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust.
» All disturbed areas are compacted, sloped and contoured to ensure drainage and runoff and to minimise the risk of erosion.
» All rehabilitated areas are monitored for erosion. Components of the facility are removed from the site and disposed of appropriately.

» Retrenchments should comply with South African Labour legislation of the day.

The general specifications of Chapter 6 (Construction) and Chapter 7 (Rehabilitation) are also relevant to the proposed project and must be adhered to.

APPENDIX A:
FINAL LAYOUT AND SENSITIVITY MAPS

Woodhouse Solar 2 PV Facility, North West Province

Optimised Layout Map

Legend

- Eskom substation
- Existing Power Line
- Authorised 132kV Bophirima - Mookodi Power Line (to be constructed)
- Regional road
- Main road
- Authorised Eskom Bophirima Substation (to be constructed)
- Farm Portions
- Woodhouse Solar 2 Project site
- Woodhouse Solar 2 Site Alternative 1 - Preferred

Layout Plan:

- Main Access Points
- Inverter
- Internal Access Roads
- On-site Facility Substation Access road
- Gird connection - authorised Eskom Bophirima Substation
- Power Line Corridor (100m)
- PV Panel Area
- On-Site Facility Substation
- Facility Fence
- O&M Building, Parking, Septic Tank & Borehole
- Permanent Compound Area

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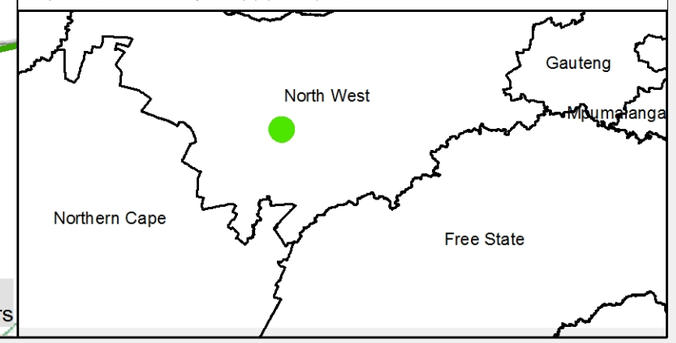
Scale: 1:22 000
Projection: LO25 WGS 1984
Map Ref.: Woodhouse 2 - Layout Map (Optimised) 27.04.16



WOODHOUSE 88/22kV SUBSTATION
BOPHIRIMA SUBSTATION
Constantia
Woodhouse
Diggings
Georgia
WOODHOUSE 729-IN
WOODHOUSE RE/729
LOO 992-IN
Amalia Road
Mercury/Mookodi 1 400kV
R34
0 0.75 1.5 3 Kilometers

Woodhouse Solar 2 PV Facility, North West Province

Environmental Sensitivity and Optimised Layout Map

Legend

- Existing Power Line
- Main road
- Farm Portions
- Woodhouse Solar 2 Project site
- Woodhouse Solar 2 Site Alternative 1 - Preferred

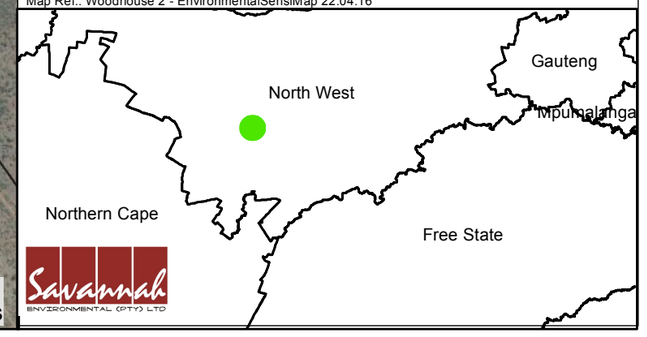
Layout Plan:

- Main Access Point
- Inverter
- Internal Access Roads
- On-site Facility Substation Access road
- Facility Fence
- Power Line Corridor (100m)
- PV Panel Area
- On-Site Facility Substation
- Permanent Compound Area
- O&M Building, Parking, Septic Tank & Borehole

Environmental Sensitivties:

- Ephemeral Tributary (High Ecological Sensitivity)
- Ephemeral Tributary 35m Buffer (High Ecologcial Sensitivity)
- Open Kalahari Bushveld (Medium - Low Ecological Sensitivity)

Scale: 1:8 607
Projection: LO25 WGS 1984
Map Ref.: Woodhouse 2 - EnvironmentalSensiMap 22.04.16



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Amalia Road

WOODHOUSE RE/729

Mercury/Mookodi 1 400kV

0 0.3 0.6 1.2 Kilometers

Woodhouse Solar 2 PV Facility, North West Province

Environmental Sensitivity and
Power Line Corridor Map

WOODHOUSE 88/22kV SUBSTATION

BOPHIRIMA SUBSTATION

R34

Amalia Road

WOODHOUSE PE/729

Mercury/Mookodi 1 400kV

Georgia

Constantia

Diggings

674-IN

729-IN

1170

1193

1197

1201

1218

1224

1225

1204

1208

175
1228.0

113
1213.1

0 0.5 1 2 Kilometers

Scale: 1:16 800
Projection: LO25 WGS 1984
Map Ref.: Woodhouse 2 - Power Line Alternatives Sens Map 28.04.16

Legend

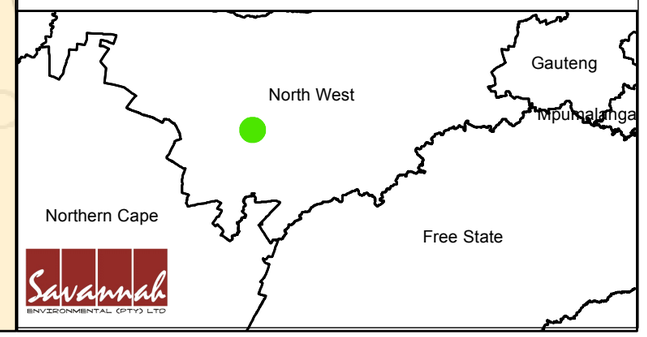
- Eskom substation (existing)
- Existing Power Line
- Authorised 132kV Bophirima - Mookodi Power Line (to be constructed)
- Regional road
- Main road
- Authorised Eskom Bophirima Substation (to be constructed)
- Farm Portions
- Woodhouse Solar 2 Project site
- Woodhouse Solar 2 Site Alternative 1 - Preferred

Layout Plan:

- Power Line Corridor (100m)
- On-Site Facility Substation

Environmental Sensitivties:

- R34 (Visual Receptor)
- Depression Wetland (Very High Avifaunal Sensitivity)
- Depression Wetland (Very High Ecological Sensitivity)
- Depression Wetland 50m Buffer (Very High Ecological Sensitivity)
- Artificial Dam and Associated Wetland (High Ecological Sensitivity)
- Artificial Dam and Associated Wetland 35m Buffer (High Ecological Sensitivity)
- Wetlands (High Ecological Sensitivity)
- Wetland 35m Buffer (High Ecological Sensitivity)
- Ephemeral Tributary (High Ecological Sensitivity)
- Ephemeral Tributary 35m Buffer (High Ecologcial Sensitivity)
- Ephemeral Stream (High Ecological Sensitivity)
- Ephemeral Stream 50m Buffer (High Ecological Sensitivity)
- Formally listed ESA (Medium-High Ecological Sensitivity)
- Ridge (Crest & Upper Slope) (Medium-High Ecological Sensitivity)
- Ridge (Crest & Upper Slope) 100m Buffer (Medium Avifaunal Sensitivity)
- Bushveld/Woody Habitat (Medium Avifaunal Sensitivity)
- Open Kalahari Bushveld (Medium - Low Ecological Sensitivity)



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APPENDIX B:
KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT

KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT

The following legislation and guidelines have informed the scope and content of this EMP Report:

- National Environmental Management Act (Act No 107 of 1998)
- EIA Regulations, published under Chapter 5 of the NEMA (GNR 982, appendix 4 in Government Gazette 38282 of 4 December 2014)
- Guidelines published in terms of the NEMA EIA Regulations, in particular:
- Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014
- Public Participation in the EIA Process (DEA, 2014)
- Integrated Environmental Management Information Series (published by DEA)
- International guidelines – the Equator Principles and the International Finance Corporation and World Bank Guidelines.

Several other Acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the EIA Report. A review of legislative requirements applicable to the proposed project is provided in the table that follows.

Table 1: Relevant legislative and permitting requirements applicable to the establishment of Woodhouse Solar 2 PV facility.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
National Legislation			
National Environmental Management Act (Act No 107 of 1998)	The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations. In terms of section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. In terms of GN R982, R983, R984 and R985 of December 2014, a Scoping and EIA Process is required to be undertaken for the proposed project.	» National Department of Environmental Affairs (DEA) – competent authority. » North West Department of Rural, Environment and Agricultural Development (READ) - commenting authority.	The listed activities triggered by the proposed Woodhouse Solar 2 PV Facility have been identified and assessed in the EIA process being undertaken. The EIA report is to be submitted to the competent and commenting authority in support of the application for authorisation.
National Environmental Management Act (Act No 107 of 1998)	In terms of the Duty of Care Provision in section 28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised.	» National Department of Environmental Affairs (DEA) - as regulator of NEMA.	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section is applicable during the EIA phase (currently in process) and will continue to apply throughout the life cycle of the project.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.		
Environment Conservation Act (Act No 73 of 1989)	In terms of section 25 of the ECA, the national noise-control regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) were promulgated. The NCRs were revised under Government Notice Number R55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. Subsequently, in terms of Schedule 5 of the Constitution of South Africa of 1996, legislative responsibility for administering the noise control regulations was devolved to provincial and local authorities. Provincial Noise Control Regulations exist in the Free State, Western Cape and Gauteng provinces, but the Northern Cape province have not yet adopted provincial regulations in this regard. Allows the Minister of Environmental Affairs to make regulations regarding noise, among other concerns.	» National Department of Environmental Affairs (DEA). » North West Department of Rural, Environment and Agricultural Development (READ). » Naledi Local Municipality.	Noise impacts are expected to be associated with the construction phase of the PV facility and are not likely to present a significant intrusion to the local community. There is no requirement for a noise permit in terms of the legislation
National Water Act (Act No	Water uses under S21 of the Act must be	» Department of Water and	A water use license (WUL) is required

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
36 of 1998)	licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under general authorisation in terms of S39 and GN 1191 of GG 20526 October 1999. In terms of Section 19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing or recurring.	Sanitation (DWS).	in terms of sections 21(c) and 21 (i) of the National Water Act, if wetlands or drainage lines are impacted on, or the regulated area of a watercourse (being the riparian zone or the 1:100yr floodline whichever is greatest). Should water be extracted from groundwater/a borehole on site for use within the facility, a water use license will be required in terms of sections 21(a) and 21 (b) of the National Water Act.
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	According to section 27 of the act, any person who wishes to apply to the Minister for a mining permit must simultaneously apply for an environmental authorisation and must lodge the application (repealed by section 23 (b) of Act 49 of 2008). Requirements for Environmental Management Programmes and Environmental Management Plans are set out in section 39 of the Act (repealed by section 33 of Act 49 of 2008) Section 53 - Department of Mineral	» Department of Mineral Resources (DMR).	Should material not be sourced from a commercial source and a borrow pit(s) be considered necessary, the Contractor shall source and apply for the relevant permit from the DMR.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002). Section 42 of Act 49 of 2008 (Repealed of section of S53) states that the Minister may cause an investigation to be conducted if it is alleged that a person intends to use the surface of any land in any way that could result in the mining of mineral resources being detrimentally affected.		
National Environmental Management: Air Quality Act (Act No 39 of 2004)	Measures in respect of dust control (section 32) and National Dust Control Regulations of November 2013. Measures to control noise (section 34) - no regulations promulgated yet.	» National Department of Environmental Affairs (DEA). » Naledi Local Municipality.	No permitting or licensing requirements arise from this legislation The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act. The air quality officer may require a dust monitoring programme as per the Regulations for dust control. The EMPr however makes provision for managing and mitigating potential dust impacts.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
National Heritage Resources Act (Act No 25 of 1999)	Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including » the construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; and » any development or other activity which will change the character of a site exceeding 5000m^2 in extent. The relevant Heritage Resources Authority must be notified of developments such as linear developments (such as roads and power lines), bridges exceeding 50m, or any development or other activity which will change the character of a site exceeding 5000m^2; or the re-zoning of a site exceeding 10 000m^2 in extent. This notification must be provided in the early stages of initiating the development, and details regarding the location, nature and extent of the proposed development must be provided. Standalone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of section 38. In such cases only	» National Department of Environmental Affairs (DEA) – where a heritage assessment is a component of the EIA. » SAHRA – National heritage sites (grade 1 sites) as well as all historic graves and human remains. » North West Provincial Heritage Resources Agency (NWPHRA)	An Archaeological and Palaeontological Impact Assessment (together forming the Heritage Impact Assessment of the PV Facility) was undertaken as part of the EIA process to identify heritage sites (refer to **Appendix F and G** of the final EIA report). The overall project site is considered as having a low-medium archaeological and palaeontological significance (with the implementation of appropriate mitigation measures) as there is a lack of heritage resources located within the project site and the surrounding areas. The relevant mitigation measures for the protection of heritage resources are included in the EMPr.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	those components not addressed by the EIA should be covered by the heritage component.		
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (section 53). A list of threatened and protected species has been published in terms of section 56(1) - Government Gazette 29657. Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations). Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed	» National Department of Environmental Affairs (DEA). » North West Department of Rural, Environment and Agricultural Development (READ).	Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species. An ecological study has been undertaken as part of the EIA Phase (refer **to Appendix D** of the final EIA Report). As such the potential occurrence of critically endangered, endangered, vulnerable, and protected species and the potential for them to be affected has been considered. A permit may be required should any listed plant species be disturbed or destroyed as a result of the proposed PV facility.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN R1002), 9 December 2011). Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species. The Act also regulates alien and invader species. The Proponent has a responsibility for: » The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations). » Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity.		

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	Limit further loss of biodiversity and conserve endangered ecosystems.		
Conservation of Agricultural Resources Act (CARA) (Act No 43 of 1983)	Regulation 15 of GN R1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GN R1048. Declared Weeds and Invaders in South Africa are categorised according to one of the following categories: » Category 1 plants: are prohibited and must be controlled. » Category 2 plants: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread. » Category 3 plants: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the floodline of watercourses and wetlands. These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.	» Department of Agriculture, Forestry and Fisheries (DAFF).	While no permitting or licensing requirements arise from this legislation, this Act is applicable during the EIA phase and will continue to apply throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented. The EMPr provides mitigation for soil erosion and weed control and management. The permission of agricultural authorities will be required if the development of the PV facility requires the draining of vleis, marshes or water sponges on land outside urban areas.
National Forests Act (Act	Protected trees: According to this act, the	» Department of Agriculture,	A permit or license is required for the

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
No. 84 of 1998)	Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'. Forests: Prohibits the destruction of indigenous trees in any natural forest without a licence.	Forestry and Fisheries (DAFF). » North West Department of Rural, Environment and Agricultural Development (READ).	destruction of protected tree species and/or indigenous tree species within a natural forest. A permit will be required for the destruction, removal or relocation of the *Acacia erioloba* and *Boscia albitrunca* species present within the project site.
National Veld and Forest Fire Act (Act 101 of 1998)	In terms of section 12 the landowner would be required to burn firebreaks to ensure that should a veldfire occur on the property, that it does not spread to adjoining land. In terms of section 12 the landowner must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material. In terms of section 17, the applicant must have such equipment, protective clothing, and	» Department of Agriculture, Forestry and Fisheries (DAFF).	While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction and operational phase of the PV facility. The relevant management and mitigation measures have been included in the EMPr.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	trained personnel for extinguishing fires.		
Hazardous Substances Act (Act No 15 of 1973)	This Act regulates the control of substances that may cause injury, or ill health, or death by reason of their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. » Group I and II: any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared to be Group I or Group II hazardous substance; » Group IV: any electronic product; » Group V: any radioactive material. The use, conveyance or storage of any	» Department of Health.	It is necessary to identify and list all the Group I, II, III and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
National Road Traffic Act (Act No 93 of 1996)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other	» North West Department of Community Safety and Transport Management - Provincial Roads. » South African National Roads Agency Limited (SANRAL) - National Roads.	An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include: » Route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. » Transport vehicles exceeding the dimensional limitations (length) of 22m. » Depending on the trailer configuration and height when loaded, some of the project components may not meet specified dimensional limitations (height and width).

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		
National Environmental Management: Waste Act (Act No. 59 of 2008)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of this Act (GN R921 of November 2013), a Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is	» National Department of Environmental Affairs (DEA) - Hazardous Waste. » North West Department of Rural, Environment and Agricultural Development (READ) – General Waste.	No waste disposal site is to be associated with the PV facility. In terms of GN R921, no permit is required. Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, (GN R926, of November 2013) and as detailed in this EMPr.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	stored, are intact and not corroded or in any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented.		
Astronomy Geographic Advantage Act (Act No. 21 of 2007)	The Astronomy Geographic Advantage Act (No. 21 of 2007) provides for the preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy; for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas and for matters connected thereto. Chapter 2 of the Act allows for the declaration of astronomy advantage areas whilst Chapter 3 pertains to the management and control of astronomy advantage areas. Management and control of astronomy advantage areas include, amongst others, the following: * Restrictions on use of radio frequency	» Department of Science and Technology	Approval and input from the Square Kilometer Array South Africa project office is required in order to confirm that SKA infrastructure is not significantly impacted on by the development of the PV facility. The site falls outside of the Northern Cape and the area governed by the AGA.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	spectrum in astronomy advantage areas * Declared activities in core or central astronomy advantage area * Identified activities in coordinated astronomy advantage area; and * Authorisation to undertake identified activities.		
Development Facilitation Act (Act No 67 of 1995)	Provides for the overall framework and administrative structures for planning throughout the Republic. Section 2 to 4 provide general principles for land development and conflict resolution.	» North West Department of Rural, Environment and Agricultural Development (READ).	The applicant must submit a land development application in the prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish a land development area must comply with procedures set out in the DFA (Development Facilitation Act).
Subdivision of Agricultural Land Act (SALA) (Act No 70 of 1970)	Details the subdivision of agricultural land and provisions under which the act is triggered. It also provides for the approval of such division by the Minister of Agriculture. Applies for subdivision of all agricultural land and long-term leasing of portions of agricultural land.	» Department of Agriculture, Forestry and Fisheries (DAFF). » North West Department of Rural, Environment and Agricultural Development (READ). » Naledi Local Municipality.	Long-term leases on portions or subdivision of the site properties will require an approval of the Minister of Agriculture. An application to DAFF will need to be submitted detailing the areas to be subdivided or leased for the purposes of the proposed development. An application in terms of SALA will need to be undertaken and submitted following the issuing of

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
			an environmental authorisation for the proposed project.
Provincial Legislation			
Transvaal Nature Conservation Ordinance (No. 12 of 1983)	The Nature Conservation Ordinance accompanied by all amendments is regarded by the North West Department of Rural, Environment and Agricultural Development as the legal binding, provincial documents, providing regulations, guidelines and procedures with the aim of protecting game and fish, the conservation of flora and fauna and the destruction of problematic species. In its entirety, with special reference to: » Schedule 2: Protected Game » Schedule 3: Specially Protected Game » Schedule 4: Protected Wild Animals » Schedule 5: Wild Animals » Schedule 7: Invertebrates » Schedule 11: Protected Plants » Schedule 12: Specially Protected Plants	» North West Department of Rural, Environment and Agricultural Development (READ).	Approval from READ will be required in terms of the protection and conservation of fauna and flora in the North West Province.
Bophuthatswana Nature Conservation Act (Act 3 of 1973)	The Nature Conservation Ordinance accompanied by all amendments is regarded by the North West Department of Rural, Environment and Agricultural Development as the legal binding, provincial documents, providing regulations, guidelines and	» North West Department of Rural, Environment and Agricultural Development (READ).	Approval from READ will be required in terms of the protection and conservation of fauna and flora in the North West Province.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	procedures with the aim of protecting game and fish, the conservation of flora and fauna and the destruction of problematic species. In its entirety, with special reference to: » Schedule 1: Protected Game » Schedule 1A: Specially Protected Game » Schedule 2: Ordinary Game » Schedule 3: Wild Animals In Respect Of Which The Provision Of Section 3 (a) (ii) Apply » Schedule 4: Wild Animals To Which The Provisions Of Section 4 (1) (b) Do Not Apply » Schedule 7: Protected Plants » Schedule 7: Specially Protected Plants		
North West Biodiversity Sector Plan	The Biodiversity Sector Plan informs land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. This is done by providing information of biodiversity priority areas, referred to as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), with accompanying land use planning and decision making guidelines.	» North West Department of Rural, Environment and Agricultural Development (READ).	Approval from READ will be required for the development of the Woodhouse Solar 1 PV Facility.

Table 2: Standards applicable to the Woodhouse Solar 2 PV facility.

Theme	Standard	Summary
Air	South African National Standard (SANS) 69	Framework for setting and implementing national ambient air quality standards
	SANS 1929: Ambient Air Quality	Sets limits for common pollutants
Noise	SANS 10328:2003: Methods for Environmental Noise Impact Assessments	General procedure used to determine the noise impact
	SANS 10103:2008: The Measurement and Rating of Environmental Noise with Respect to Land Use, Health, Annoyance and Speech Communication	Provides noise impact criteria
	National Noise Control Regulations	Provides noise impact criteria
	SANS 10210: Calculating and Predicting Road Traffic Noise	Provides guidelines for traffic noise levels
Waste	DWAF (1998) Waste Management Series. Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste	DWAF Minimum Requirements
	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) – National norms and standard for the storage of waste.	» Provides uniform national approach relating the management of waste facilities » Ensure best practice in management of waste storage » Provides minimum standards for the design and operation of new and existing waste storage
Water	Best Practise Guideline (G1) Stormwater Management DWS2006	Provides guidelines to the management of stormwater
	South African Water Quality Guidelines	Provides water quality guidelines

APPENDIX C:
GRIEVANCE MECHANISM FOR PUBLIC COMPLAINTS AND ISSUES

GRIEVANCE MECHANISM / PROCESS

PURPOSE

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

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

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

PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES

» Local landowners, communities and authorities must be informed in writing by the Proponent of the grievance mechanism and the process by which grievances can be brought to the attention of the Proponent through its designated representative.
» A company representative must be appointed as the contact person for grievances to be addressed to. The name and contact details of the contact person must be provided to local landowners, communities and authorities.
» Project related grievances relating to the construction, operational and or decommissioning phase must be addressed in writing to the contact person. The contact person should assist local landowners and or communities who may lack resources to submit/prepare written grievances.
» The grievance must be registered with the contact person who, within 2 working days of receipt of the grievance, must contact the Complainant to discuss the grievance and agree on suitable date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within 2 weeks of receipt of the grievance.
» The contact person must draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed).
» Prior to the meeting being held the contact person must contact the Complainant to discuss and agree on the parties who should attend the

meeting. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or proponent are entitled to invite their legal representatives to attend the meeting/s, it should be made clear that to all the parties involved in the process that the grievance mechanism process is not a legal process. It is therefore recommended that the involvement of legal representatives be limited.

» The meeting should be chaired by the Proponent's representative appointed to address grievances. The Proponent must provide a person to take minutes of and record the meeting/s. Any costs associated with hiring venues must be covered by the Proponent.

» Draft copies of the minutes must be made available to the Complainant and the Proponent within 4 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days of receipt of the draft minutes.

» In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome must recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.

» In the event of a dispute between the Complainant and the Proponent regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s must note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned.

» In the event that the parties agree to appoint a mediator, the Proponent will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the Proponent, must identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator must be borne by the Proponent. The Proponent must provide a person to take minutes of and record the meeting/s.

» In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.

» In the event of the dispute not being resolved, the mediator must prepare a draft report that summaries the nature of the grievance and the dispute. The

report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.

» The draft report must be made available to the Complainant and the Proponent for comment before being finalised and signed by all parties. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days. The way forward will be informed by the recommendations of the mediator and the nature of the grievance.

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

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

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

APPENDIX D:
WASTE MANAGEMENT PLAN

WASTE MANAGEMENT PLAN

1. PURPOSE

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

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

2. RELEVANT ASPECTS OF THE SITE

It is expected that the development of the Woodhouse Solar 2 PV facility will generate construction solid waste, general waste, contaminated water and soil.

Waste generated on site, originates from various sources including but not limited to:

- Concrete waste generated from removal foundations, spoil and excess concrete.
- Contaminated water, soil, rocks and vegetation due to hydrocarbon spills.
- Hazardous waste from vehicle, equipment and machinery parts (oil cans, filters, rags etc), and servicing, flouresent tubes, used hydrocarbon containers, waste ink carteridges and PV panels.
- Recycable waste in the form of paper, glass, steel, aluminium, wood/ wood pallets, plastic (PET bottles, PVC, LDPE) and cardboard.
- Organic waste from food waste and alien and endemic vegetation removal.
- Sewage from portable toilets and septic tanks.
- Inert waste from spoil material from site clearence and trenching works.

3. LEGISLATIVE REQUIREMENTS

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

» National Environmental Management: Waste Act (NEM:WA), 2008 (Act 59 of 2008)
» National Environmental Management: Waste Amendment Act, 2014 (Act 26 of 2014)
» The South African Constitution (Act 108 of 1996)
» Hazardous Substances Act (Act 5 of 1973)
» Health Act (Act 63 of 1977)
» Environment Conservation Act (Act 73 of 1989)
» Occupational Health and Safety Act (Act 85 of 1993)
» National Water Act (Act 36 of 1998)
» The National Environmental Management Act (Act 107 of 1998) (as amended)
» Municipal Structures Act (Act 117 of 1998)
» Municipal Systems Act (Act 32 of 2000)
» Mineral and Petroleum Resources Development Act (Act 28 of 2002)
» Air Quality Act (Act 39 of 2004)

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

4. WASTE MANAGEMENT PRINCIPLES

An integrated approach to waste management on site is needed. Such an approach is illustrated in the Figure 1.

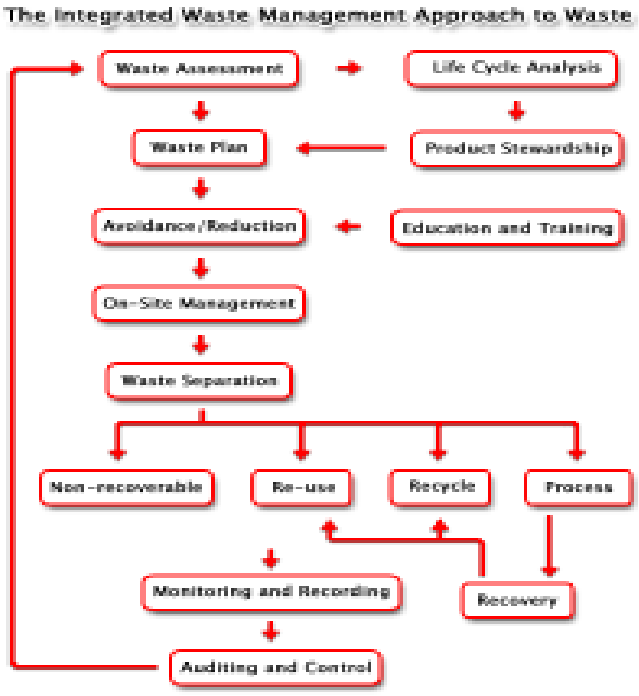

Figure 1: Integrated Waste Management Flow Diagram
(Source: http://www.enviroserv.co.za/pages/content.asp?SectionId=496)

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

» Reducing volumes of waste is a priority;
» If reduction is not feasible, the maximum amount of waste is to be recycled; and
» Waste that cannot be recycled is to be disposed of in the most environmentally responsible manner as possible.

4.1. Construction phase

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

4.1.1. Waste Assessment / Inventory

» The Environmental Officer (EO), or designated staff member, must develop, implement and maintain a waste inventory reflecting all waste generated during construction for both general and hazardous waste streams.
» Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.
» Once a waste inventory has been established, targets for recovery of waste (minimisation, re-use, recycling) should be set.
» The EO must conduct waste classification and rating in terms of SANS 10288 and Government Notice 634 published under the NEM: WA.

4.1.2. Waste collection, handling and storage

» It is the responsibility of the EO to ensure that each subcontractor implements their own waste recycling system, i.e. separate bins for food waste, plastics, paper, wood, glass cardboard, metals, etc.
» Waste manifests and waste acceptance approvals from designated waste facilities must be kept on hand in order to prove compliance.
» Septic tanks and portable toilets must be monitored and maintained daily. Below ground storage of septic tanks must withstand the external forces of the surrounding environment. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from driving around the area.
» Waste collection bins and hazardous waste containers must be provided by the principal contractor and subcontractors and placed at various areas around site for the storage of organic, recyclable and hazardous waste.
» A dedicated waste area must be established on site for the storage of all waste streams, before removal from site. The storage period must not trigger listed waste activities as per the NEMWA, GN 921 of November 2013.
» Signage/ colour coding must be used to differentiate disposal areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass etc.).
» Hazardous waste must be stored within a bunded area constructed according to SABS requirements. The volume of waste stored in the bunds must not exceed 110% of the bund capacity.
» The location of all temporary waste storage areas must aim to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.
» Waste storage shall be in accordance with all Regulations and best-practice guidelines and under no circumstances may waste be burnt on site.
» If possible a dedicated waste management team must be appointed by the principal contractors' EO, whom will be responsible for ensuring the continuous sorting of waste and maintenance of the area. The waste management team must be trained in all areas of waste management and monitored by the EO.

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

4.1.3. Management of waste storage areas

» The position of all waste storage areas must be located at least 32m away from water courses and ensure minimal degradation to the environment. The main waste storage area must have a suitable storm water system separating clean and dirty storm water.
» Collection bins placed around site and at subcontractors' camps (if at a different location than the main site camp) must be maintained and emptied on a regular basis by the principal contractor.
» Inspections and maintenance of the main waste storage area must be undertaken daily. Skips and storage containers must be clearly marked or colour coded and well-maintained, not allowing access to vermin or other rodents. A Tarp or Shade cloth should ideally be used to ensure avifauna does not have access to waste.
» Waste must be stored in designated containers and not on the ground.
» Inspections and maintenance of bunds must be undertaken daily. Bunds must be inspected for leaks or cracks in the foundation and walls.
» It is assumed that any rainwater collected inside the bund is contaminated and must be removed and stored as hazardous waste, and not released into the environment. If any leaks occur in the bund, these must be removed immediately.

4.1.4. Disposal

» Waste generated on site must be removed on a regular basis, as determined by the EO and ECO. This frequency may change during construction depending on waste volumes generated at different stages of the construction process.
» Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor to the EO and ECO.

4.1.5. Record keeping

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

» Documentation (waste manifest, certificate of issue or safe disposal) must be kept detailing the quantity, nature, and fate of any regulated waste for audit purposes.
» Waste management must form part of the monthly reporting requirements in terms of volumes generated, types, storage and final disposal.

4.1.6. Training

Training and awareness regarding waste management shall be provided to all employees and contractors as part of the toolbox talks or on-site awareness sessions with the EO and at the frequency as set out by the ECO.

5. Operational phase

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

The following waste management principles apply during the operational phase:

» The SHE Manager must develop, implement and maintain a waste inventory reflecting all waste generated during operation for both general and hazardous waste streams.
» Adequate waste collection bins at site must be supplied. Separate bins should be provided for general and hazardous waste.
» Recyclable waste must be removed from the waste stream and stored separately.
» All waste must be stored in appropriate temporary storage containers (separated between different construction wastes, and contaminated or wet waste).
» Waste storage shall be in accordance with all best-practice guidelines and under no circumstances may waste be burnt on site.
» Waste generated on site must be removed on a regular basis throughout the operational phase.
» Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor and kept on site.

6. Monitoring of Waste Management Activities

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

- Monthly volumes/ mass of the different waste streams collected;
- Monthly volumes/ mass of the waste that is disposed of at a landfill site;
- Monthly volumes/ mass of the waste that is recycled;
- Data illustrating progress compared to previous months.

This report will aid in monitoring the progress and relevance of the waste management procedures that are in place. If it is found that the implemented procedures are not as effective as required, this WMP is to be reviewed and amended accordingly. This report must from part of the EO's reports to the ECO on a monthly basis.

APPENDIX E:
ALIEN INVASIVE AND OPEN SPACE MANAGEMENT PLAN

ALIEN PLANT AND OPEN SPACE MANAGEMENT PLAN

1. PURPOSE

Invasive alien species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Plant Management Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the Woodhouse Solar 2 PV Facility. The broad objectives of the plan includes the following:

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

2. RELEVANT ASPECTS OF THE SITE

Although a few alien invasive plants and weeds were noted during the survey these species were sparsely distributed throughout the unit and never formed dominant stands. These species were mostly present were the soil have been disturbed (trampling by livestock) or along farm roads or were other forms of disturbances have occurred.
Alien Invasive Plants confirmed, includes:

» *Prosopis glandulosa* (Category 1b – only one species noted at the small gravel dam located to the south-east of the site),
» *Flaveria bidentis* (Category 1b),
» *Xanthium strumarium* (Category 1b),
» *Datura stramonium* (Category 1b),

Other weeds and exotics confirmed during the survey:
» *Chloris virgata, Tragus berteronianus, Tribulus terrestris, Conyza bonariensis, Schkuhria pinnata* and *Alternanthera pungens*

3. LEGISLATIVE CONTEXT

Conservation of Agricultural Resources Act (Act No. 43 of 1983)

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act (Act No. 43 of 1983), all declared aliens must be effectively controlled. Landowners are legally responsible for the control of invasive alien plants on their

properties. In terms of this Act alien invasive plant species are ascribed to one of the following categories:

» Category 1: Prohibited and must be controlled.
» Category 2 (commercially used plants): May be grown in demarcated areas provided that there is a permit and that steps are taken to prevent their spread.
» Category 3 (ornamentally used plants): May no longer be planted. Existing plants may be retained as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004)

The National Environmental Management: Biodiversity Act (NEM:BA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations have been published in Government Notices R.506, R.507, R.508 and R.509 of 2013 under NEMBA. According to this Act and the regulations, any species designated under Section 70 cannot be propagated, grown, bought or sold without a permit. Below is an explanation of the three categories:

» **Category 1a:** Invasive species requiring compulsory control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
» **Category 1b:** Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
» **Category 2:** Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Cat 2 plants to exist in riparian zones.
» **Category 3:** Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Cat 3 plants to exist in riparian zones.

The following guide is a useful starting point for the identification of alien species: Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.

It is important to note that alien species that are regulated in terms of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) as weeds and invader plants are exempted from NEM:BA. This implies that the provisions of the CARA in respect of listed weed and invader plants supersede those of NEM: BA.

4. ALIEN PLANT MANAGEMENT PRINCIPLES

4.1. Prevention and early eradication

A prevention strategy should be considered and established, including regular surveys and monitoring for invasive alien plants, effective rehabilitation of disturbed areas and prevention of unnecessary disturbance of natural areas.

Monitoring plans should be developed which are designed to identify Invasive Alien Plant Species shortly after they arrive in the project area. Keeping up to date on which weeds are an immediate threat to the site is important, but efforts should be planned to update this information on a regular basis. When new Invasive Alien Plant Species are recorded on site, an immediate response of locating the site for future monitoring and either hand-pulling the weeds or an application of a suitable herbicide should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.

4.2. Containment and control

If any alien invasive plants are found to become established on site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Separate plans of control actions should be developed for each location and/or each species. Appropriate registered chemicals and other possible control agents should be considered in the action plans for each site/species. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least energy and resources are required to maintain this status over the long-term. This will also be an indicator that natural systems are impacted to the smallest degree possible.

4.3. General Clearing & Guiding Principles

Alien control programs are long-term management projects and should include a clearing plan which includes follow up actions for rehabilitation of the cleared area. The lighter infested areas should be cleared first to prevent the build-up of seed banks. Pre-existing dense mature stands ideally should be left for last, as they probably won't increase in density or pose a greater threat than they are currently. Collective management and planning with neighbours may be required in the case of large woody invaders as seeds of aliens are easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep records of which areas are due for follow-up clearing.

i. Clearing Methods

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

Fire should not be used for alien control or vegetation management at the site. The best-practice clearing method for each species identified should be used.

» **Mechanical control**

This entails damaging or removing the plant by physical action. Different techniques could be used, e.g. uprooting, felling, slashing, mowing, ringbarking or bark stripping. This control option is only really feasible in sparse infestations or on small scale, and for controlling species that do not coppice after cutting. Species that tend to coppice, need to have the cut stumps or coppice growth treated with herbicides following the mechanical treatment. Mechanical control is labour intensive and therefore expensive, and could cause severe soil disturbance and erosion.

» **Chemical Control**

Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which stimulates alien invasion and may also be ineffective for many woody species which resprout. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by observing the following:

* Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
* All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
* Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of in a suitable site.
* To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
* Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.
* The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.

For all herbicide applications, the following Regulations and guidelines should be followed:

- Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.
- Pesticide Management Policy for South Africa published in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) – GNR 1120 of 2010.
- South African Bureau of Standards, Standard SANS 10206 (2010)

According to Government Notice No. 13424 dated 26 July 1992, it is an offence to "*acquire, dispose, sell or use an agricultural or stock remedy for a purpose or in a manner other than that specified on the label on a container thereof or on such a container*".

Contractors using herbicides need to have a valid Pest Control Operators License (limited weeds controller) according to the Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947). This is regulated by the Department of Agriculture, forestry and Fisheries.

» **Biological control**

Biological weed control consists in the use of natural enemies to reduce the vigour or reproductive potential of an invasive alien plant. Biological control agents include insects, mites, and micro-organisms such as fungi or bacteria. They usually attack specific parts of the plant, either the reproductive organs directly (flower buds, flowers or fruit) or the seeds after they have dropped. The stress caused by the biological control agent may kill a plant outright or it might impact on the plants reproductive capacity. In certain instances, the reproductive capacity is reduced to zero and the population is effectively sterilised. All of these outcomes will help to reduce the spread of the species.

To obtain biocontrol agents, provincial representatives of the Working for Water Programme or the Directorate: Land Use and Soil Management (LUSM), Department of Agriculture, Forestry and Fisheries (DAFF) can be contacted.

4.4. General management practices

The following general management practices should be encouraged or strived for:

- » Establish an ongoing monitoring programme for construction phase to detect and quantify any alien species that may become established and identify the problem species.
- » Alien vegetation regrowth on areas disturbed by construction must be immediately controlled once recorded throughout the entire site during construction and operation.
- » Care must be taken to avoid the introduction of alien invasive plant species to the site. Particular attention must be paid to imported material such as building sand

or dirty earth-moving equipment. Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.

» Cleared areas that have become invaded by alien species can be sprayed with appropriate herbicides provided that these are such that break down on contact with the soil. Residual herbicides should not be used.
» The effectiveness of vegetation control varies seasonally and this is also likely to impact alien species. Control early in the wet season will allow species to re-grow and follow-up control is likely to be required. It is tempting to leave control until late in the wet season to avoid follow-up control. However, this may allow alien species to set seed before control and hence will not contribute towards reducing alien species abundance. Therefore, vegetation control should be aimed at the middle of the wet season, with a follow-up event towards the end of the wet season. There are no exact dates that can be specified here as each season is unique and management must therefore respond according to the state and progression of the vegetation.
» Alien management is an iterative process and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed banks. However, repeated control usually results in rapid decline once seed banks become depleted.
» Some alien species are best individually pulled by hand. Regular vegetation control to reduce plant biomass within the site should be conducted. This should be timed so as to coincide with the critical growth phases of the most important alien species on site. This will significantly reduce the cost of alien management as this should contribute towards the control of the dominant alien species and additional targeted control will be required only for a limited number of species.
» No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used
» During operation, surveys for alien species should be conducted regularly. It is recommended that this be undertaken every 6 months for the first two years after construction and annually thereafter. All aliens identified should be cleared using appropriate means.

4.5. Monitoring

In order to monitor the impact of clearing activities, follow-ups and rehabilitation efforts, monitoring must be undertaken. This section provides a description of a possible monitoring programme that will provide and assessment of the magnitude of alien invasion on site as well as an assessment of the success of the management programme.

In general, the following principles apply for monitoring:

» Photographic records must be kept of areas to be cleared prior to work starting and at regular intervals during initial clearing activities. Similarly, photographic records should be kept of the area from immediately before and after follow-up clearing activities. Rehabilitation processes must also be recorded.

» Simple records must be kept of daily operations, e.g. area/location cleared, labour units and, if ever used, the amount of herbicide used.
» It is important that, if monitoring results in detection of invasive alien plants, that this leads to immediate action.

The following monitoring should be implemented to ensure management of alien invasive plant species.

Construction Phase

Monitoring Action	Indicator	Timeframe
Document alien species present at the site	List of alien species	Preconstruction & monthly thereafter
Document alien plant distribution	Alien plant distribution map within priority areas	3 Monthly
Document & record alien control measures implemented	Record of clearing activities	3 Monthly
Review & evaluation of control success rate	Decline in documented alien abundance over time	Biannually

Operation Phase

Monitoring Action	Indicator	Timeframe
Document alien species distribution and abundance over time at the site	Alien plant distribution map	Biannually
Document alien plant control measures implemented & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Biannually
Document rehabilitation measures implemented and success achieved in problem areas	Decline in vulnerable bare areas over time	Biannually

APPENDIX F:
RE-VEGETATION AND REHABILITATION PLAN

REVEGETATION AND REHABILITATION PLAN

1. PURPOSE

The purpose of the rehabilitation plan is to ensure that areas cleared or impacted during construction activities of the Woodhouse Solar 2 PV Facility are rehabilitated with a plant cover that reduces the risk or erosion from these areas as well as restores some ecosystem function. The purpose of the rehabilitation plan for the site can be summarised as follows:

» Achieve long-term stabilisation of all disturbed areas to minimise erosion potential.
» Re-vegetate all disturbed areas with suitable local plant species.
» Minimise visual impact of disturbed areas.
» Ensure that disturbed areas are safe for future uses.

This Revegetation and Rehabilitation Plan should be closely aligned with other site-specific plans, including the Erosion Management Plan, Soil Management Plan, Alien Plant Management Plan, and Plant Rescue and Protection Plan. Prior to commencement of construction, a detailed Rehabilitation Plan and Method Statement for the site should be compiled with the aid of a Rehabilitation Specialist.

2. RELEVANT ASPECTS OF THE SITE

The study area is situated in the Savanna biome and Eastern Kalahari Bushveld Bioregion. The vegetation in and surrounding the study area is Ghaap Plateau Vaalbosveld (SVk 7).

The distribution of the vegetation type is spread across the Northern Cape and North West Province, from about Campbell in the south east of Danielskuil through Reivilo to around Vryburg in the north. This vegetation type has been described by Mucina and Rutherford (2006) as a flat plateau with well-developed shrub layer with *Tarchonanthus camphoratus* and *Acacia karroo*. Open tree layer has O*lea europaea subsp. africana, A. tortilis, Ziziphus mucronata* and *Searsia lanceae*. Olea is more important in the southern parts of the unit, while *A. tortilis, A. hebeclada* and *A. mellifera* are more important in the north and part of the west of the unit. Much of the south-central part of this unit has remarkably low cover of Acacia species for an arid savanna and is dominated by the non-thorny *T. camphoratus, R. lanceae* and *O. europaea subsp. africana.*

A total of 369 indigenous species have been recorded in the Vryburg region according to the SANBI database. It is highly unlikely that all of these species will occur within the project area. Alien invasive species (33) have also been recorded within the relevant quarter degree grids.

Five major vegetation units have been identified namely:

1. *Schimdtia pappophoroides – Grewia flava* open sandy dry bushveld.
2. *Aristida diffusa – Tragonanthus* grassy outcroppings
3. *Enneapogon cenchroides – Boscia albitrunca* shrubby ridge
4. *Echinochloa holubii – Panicum schinzii* grassy pans/ephemeral streams
5. *Cymbopogon plurinodis – Grewia flava* open dolomite dry bushveld

A total of eight conservation worthy species were noted within the development footprint, across the five major vegetation types, namely:

» *Aloe grandidentata* (TNCO & BNCA),

» *Ammocharis coranica* (TNCO & BNCA),

» *Acacaia erioloba* (NFA),

» *Boophone disticha* (Declining),

» *Boscia albirtrunca* (NFA),

» *Brachystelma* spp. (TNO),

» *Fockea angustifolia* (TNO),

» *Shizoglossum* spp. (TNO),

3. REHABILITATION METHODS

» Immediately after replacing topsoils in disturbed areas, the soil surface must be revegetated with a suitable plant cover.
» It is expected that soil seed banks of indigenous vegetation will be present to initiate initial vegetation cover. However, simply applying this topsoil to a well prepared rehabilitation site does not result in the same species richness and diversity as the surrounding areas. In some areas the natural regeneration of the vegetation may be poor and the application relevant of seed to enhance vegetation recovery may be required.
» Where possible, seed should be collected from plants present at the site during plant rescue oprerations. Indigenous seeds may also be harvested for purposes of re-vegetation in areas that are free of alien or invasive vegetation, either at the site prior to clearance or from suitable neighbouring sites.
» Seed collection should be undertaken by a suitably qualified specialist who is familiar with the various seed types associated with the plant species and rehabilitation in the area.
» Seed collection may be done throughout the year as seed ripens, but can also be restricted to summer, when a large amount of the perennial seed should have ripened. The collection of unripe seeds will reduce the percentage germination thereby reducing the effectiveness of the rehabilitation efforts. Seeds should be

stored in paper or canvas bags dusted with insecticide, and sown at the onset of the rainy season.

» Seed can be sown onto the soil, but should preferably be applied in conjunction with measures to improve seedling survival such as scarification of the soil surface or simultaneous application of mulch. Additional organic material may be added to the soil mix, if required, to assist with water retention during the early stages of seedling establishment.
» It should be ensured that the seed mix is as diverse as possible in the first season. After the first season, when pioneer plant communities have successfully established, attempts should be made to re-sow and replant the area with more perennial and woody species. It is a process that will require several follow-ups.
» Planting is dependent on species involved. Planting of species recommended for rehabilitation should be carried out as far as is practicable to coincide with the onset of the first significant rains. In general however, planting should commence as soon as possible after construction is completed in order to minimise the potential for erosion.
» The final vegetation cover should resemble the original (non-encroached and indigenous) vegetation composition and structure as far as practicably possible.
» Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible. Re-vegetation of disturbed surfaces must occur immediately after construction activities are completed.
» Once revegetated, areas should be protected to prevent trampling and erosion.
» No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been vegetated.
» Where rehabilitation sites are located within actively grazed areas, they should be fenced, this must be undertaken in consultation with the landowner.
» Fencing should be removed once a sound vegetative cover has been achieved.
» Any runnels, erosion channels or wash aways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.

4. MONITORING AND FOLLOW-UP ACTION

Throughout the lifecycle of the development, regular monitoring and adaptive management must be in place to detect any new degradation of rehabilitated areas. During the construction phase, the Environmental Officer (EO) and EPC Contractor will be responsible for initiating and maintaining a suitable monitoring system. Once the development is operational, the Proponent will need to identify a suitable entity that will be able to take over and maintain the monitoring cycle and initiate adaptive management as soon as it is required. Monitoring personnel must be adequately trained.

The following are the minimum criteria that should be monitored:

» Composition and density of replanted vegetation, distinguishing between species introduced for initial revegetation only and species that are part of the pre-determined desirable end state.
» Associated nature and stability of surface soils
» Re-emergence of alien and invasive plant species. If noted, remedial action must be taken immediately.

The initial revegetation period post construction is estimated to be over a period of 6 months (minimum) to 12 months (maximum), or a time period specified by the rehabilitation specialist, particularly if planting of trees and shrubs occurs. The rehabilitation phase (including post seeding maintenance) should be at least 12 months (depending on time of seeding and rainfall) to ensure establishment of an acceptable plant cover is achieved (excluding invasive plant species or weeds).

As rehabilitation success, monitoring and follow-up actions are important to achieve the desired cover and soil protection. The following monitoring protocol is recommended:

» Re-vegetated areas should be monitored every 4 months for the first 12 months following construction.
» Re-vegetated areas showing inadequate surface coverage (less than 20% within 12 months after re-vegetation) should be prepared and re-vegetated;
» Any areas showing erosion, should be re-contoured and seeded with indigenous grasses or other locally occurring species which grow quickly.

If the plants have not established and the acceptable plant cover is not achieved within the specified maintenance period, maintenance of these areas shall continue until an acceptable plant cover is achieved (excluding alien plant species or weeds). Additional seeding or planting may be necessary to achieve acceptable plant cover. Hand seeding may have to be considered as an option in this case.

Monitoring of rehabilitation success and follow-up adaptive management, together with clearing of emerging alien plant species should continue for as long as considered necessary.

APPENDIX G:
PLANT PROTECTION AND RESCUE PLAN

PLANT RESCUE AND PROTECTION PLAN

1. PURPOSE

The purpose of the plant rescue and protection plan is to implement avoidance and mitigation measures, in addition to the mitigations included in the Environmental Management Programme (EMPr) to reduce the impact of the development of the Woodhouse Solar 2 PV Facility on listed and protected plant species and their habitats and to provide guidance on search and rescue of species of conservation concern.

2. RELEVANT ASPECTS OF THE SITE

The vegetation is consistent with the vegetation classification provided by Mucina & Rutherford (2006) (Ghaap Plateau Vaalbosveld). Small variations especially in terms of the dominant grass species occur throughout the site. Geology and the soil features that the specific geology gives rise to, appear to be the driving force between the variations found between the different units. Most of the area tends to have the same species composition with the differences being the dominant species, especially within the grasses (as mentioned). An exception to this is the siliciclastic rock outcropping which have a unique species composition.

Five major vegetation units have been identified namely:

1. *Schimdtia pappophoroides – Grewia flava* open sandy dry bushveld.
2. *Aristida diffusa – Tragonanthus* grassy outcroppings
3. *Enneapogon cenchroides – Boscia albitrunca* shrubby ridge
4. *Echinochloa holubii – Panicum schinzii* grassy pans/ephemeral streams
5. *Cymbopogon plurinodis – Grewia flava* open dolomite dry bushveld

A total of eight conservation worthy species were noted within the development footprint, across the five major vegetation types, namely:

» *Aloe grandidentata* (TNCO & BNCA),
» *Ammocharis coranica* (TNCO & BNCA),
» *Acacaia erioloba* (NFA),
» *Boophone disticha* (Declining),
» *Boscia albitrunca* (NFA),
» *Brachystelma spp*. (TNO),
» *Fockea angustifolia* (TNO),
» *Shizoglossum spp*. (TNO),

3. PRINCIPLES FOR SEARCH AND RESCUE

Successful plant rescue can only be achieved if:

- Species can be removed from their original habitat with minimal damage to the plant, especially the roots.
- All plants removed are safely stored and treated according to their specific requirements prior to being transplanted again.
- They are relocated into a suitable habitat and protected from further damage and all disturbances to aid their re-establishment.
- Timing of planting activities is planned with the onset of the growing season.
- Steps are taken where necessary to aid the initial establishment of vegetation, including occasional watering.

The following principles apply in terms of plant rescue and protection:

- A permit is required from the Northern Cape Department of Environment and Nature Conservation to translocate or destroy any listed and protected species identified by the ecological walkthrough survey undertaken for the optimised final Woodhouse Solar 2 PV Facility layout, even if they do not leave the property. This permit should be obtained prior to any search and rescue operations being undertaken.
- Where suitable species are identified, a search and rescue operation of these species should be undertaken within the development footprint, where these species would be affected, and prior to the commencement of construction.
- As far as possible, timing of search and rescue activities should be planned with the onset of the growing season.
- Affected individuals should be translocated to a similar habitat outside of the development footprint and marked and recorded for monitoring purposes. For each individual plant that is rescued, the plant must be photographed before removal, tagged with a unique number or code and a latitude longitude position recorded using a hand-held GPS device.
- The rescued plants must be planted into a container to be housed within a temporary nursery on site or immediately planted into the target habitat.
- Rescued plants, if re-planted back in the wild, should be placed as close as possible to where they were originally removed. Re-planting into the wild must cause as little disturbance as possible to existing natural ecosystems. The position of the rescued individual/s must be recorded to aid in future monitoring of that plant as noted earlier.
- During construction, the Contractor's Environmental Officer (EO)/ Environmental Representative must monitor vegetation clearing at the site. Any deviations from the plans that may be required should first be checked for listed species by a suitably qualified specialist, and any listed species present which are able to survive translocation should be translocated to a safe site.
- Any listed species suitable for translocation observed within the development footprint, and that would be affected, that were not previously observed be translocated to a safe site.

» The collecting of plants of their parts should be strictly forbidden. Staff should be informed of the legal and conservation aspects of harvesting plants from the wild as part of the environmental induction training.
» Sensitive habitats and area outside project development should be clearly demarcated as no go areas during the construction and operational phase to avoid accidental impacts.

APPENDIX H:
TRAFFIC MANAGEMENT PLAN

PRINCIPLES FOR TRAFFIC AND TRANSPORTATION MANAGEMENT

1. PURPOSE

The purpose of this Traffic and Transportation Management Plan (TTMP) is to address regulatory compliance, traffic management practices, and protection measures to help reduce impacts related to transportation and the construction of temporary and long-term access within the vicinity of the Woodhouse Solar 2 PV Facility Project site. The objectives of this plan include the following:

» To ensure compliance with all legislation regulating traffic and transportation within South Africa (National, Provincial, Local & associated guidelines).
» To avoid incidents and accidents while vehicles are being driven and while transporting personnel, materials, and equipment to and from the project site.
» To raise greater safety awareness in each driver and to ensure the compliance of all safe driving provisions for all the vehicles.
» To raise awareness to ensure drivers respect and follow traffic regulations.
» To avoid the deterioration of access roads and the pollution that can be created due to noise and emissions produced by equipment, machinery, and vehicles.

2. RELEVANT ASPECTS OF THE PROJECT

The main access to the site will be directly from the unsurfaced Amalia main road which is located along the western boundary of the project site (i.e. the Remaining Extent of the farm Woodhouse 729). Internal access roads of up to 4 m wide will also be required.

3. TRAFFIC AND TRANSPORTATION MANAGEMENT PRINCIPLES

» Prior to the commencement of construction the contractor must develop their own detailed Transport Management Plan (TMP) based on the requirements laid out in this plan.
» The transport contractor must ensure that all required permits for the transportation of abnormal loads are in place prior to the transportation of equipment and project components to the site. Specific abnormal load routes must be developed with environmental factors taken into consideration.
» Before construction commences, authorised access routes must be clearly marked in the field with signs or flagging. The Construction Contractor must review the location of designated access and will be responsible for ensuring construction travel is limited to designated routes. The entrance of the main access road must not be constructed before a blind rise or on a bend of the public road.
» All employees must attend an environmental training program (e.g. toolbox talks) by the Environmental Officer (EO). Through this program, employees will be

instructed to use only approved access roads, drive within the delineated road limits, and obey jurisdictional and posted speed limits to minimise potential impacts to the environment and other road users.

» The contractor will be responsible for making sure that their suppliers, vendors, and subcontractors strictly comply with the principles of this TMP and the contractor's TMP.
» Adjacent landowners must be notified of the construction schedule.
» Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users.
» Signs must be posted in the project area to notify landowners and others of the construction activity.
» Flagging must be provided at access points to the site and must be maintained until construction is completed on the site.
» Speed limits must be established prior to commencement of construction and enforced over all construction traffic.
» Speed controls and implementation of appropriate dust suppression measures must be enforced to minimise dust pollution.
» Throughout construction the contractor will be responsible for monitoring the condition of roads used by project traffic and for ensuring that roads are maintained in a condition that is comparable to the condition they were in before the construction began.
» Drivers must have an appropriate valid driver's license and other operation licences required by applicable legislation.
» All vehicles must be maintained in good mechanical, electrical, and electronic condition, including but not limited to the brake systems, steering, tires, windshield wipers, side mirrors and rear view mirror, safety belts, signal indicators, and lenses.
» Any traffic delays attributable to construction traffic must be co-ordinated with the appropriate authorities.
» No deviation from approved transportation routes must be allowed, unless roads are closed for reasons outside the control of the contractor.
» Impacts on local communities must be minimised. Consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.

4. MONITORING

» The principal contractor must ensure that all vehicles adhere to the speed limits.
» A speeding register must be kept with details of the offending driver.
» Repeat offenders must be penalised.
» Where traffic signs are not being adhered to, engineering structures must be used to ensure speeds are reduced.

APPENDIX I:
STORMWATER MANAGEMENT PLAN

STORMWATER MANAGEMENT PLAN

1. PURPOSE

It is widely recognised that developments could impact negatively on drainage systems. By taking greater cognisance of natural hydrological patterns and processes it is possible to develop stormwater management systems in a manner that reduces these potentially negative impacts and mimic nature. The main risks associated with inappropriate stormwater management are increased erosion risk and risks associated with flooding. Therefore, this Stormwater Management Plan and the Erosion Management Plan are closely linked to one another and should be managed together.

This Stormwater Management Plan addresses the management of stormwater runoff from the development site and significant impacts relating to resultant impacts such as soil erosion and downstream sedimentation. The main factors influencing the planning of storm water management measures and infrastructure are:

» Topography and slope gradients;
» Placing of infrastructure and infrastructure design;
» Annual average rainfall;and
» Rainfall intensities.

The objective of the plan is therefore to provide measures to address runoff from disturbed portions of the site, such that they:

» do not result in concentrated flows into natural watercourses i.e. provision should be made for temporary or permanent measures that allow for attenuation, control of velocities and capturing of sediment upstream of natural watercourses.
» do not result in any necessity for concrete or other lining of natural watercourses to protect them from concentrated flows off the development if not necessary.
» do not divert flows out of their natural flow pathways, thus depriving downstream watercourses of water.

This Storm Water Management Plan must be updated and refined once the construction/ civil engineering plans have been finalised following detailed design.

2. RELEVANT ASPECTS OF THE SITE

The study area is situated in the catchment areas of the Losase River and the Droë Harts River. A number of non-perennial (most likely) or perennial drainage lines traverse the farm property most of which flow in a north to south and north-east to south-east direction. According to NFEPA wetland classification, two wetland depressions and two small wetland flats, as well as two channelled valley bottom wetlands can be found within the farm property. According to the NFEPA Map, no wetlands area present within or located in close proximity to the PV facility.

Following a desktop delineation and site visit, four depression wetlands, one valley bottom wetland which has been transformed by the presence of a small dam, one flat/depression wetland which also seems to have been dammed and two other artificially constructed dams, were identified within the farm property (these have also been confirmed during the site visit). The bulk of the catchment areas of these wetlands are located within the footprint area. From the desktop survey and fieldwork a small ephemeral tributary originating in the central southern portion of the PV facility was identified. This tributary also flows in a predominantly southern direction to join up with a larger ephemeral stream which also terminates into the Droë Harts River. Apart from the small ephemeral tributary no wetlands or water bodies were identified within the boundary of Woodhouse Solar 2 PV facility.

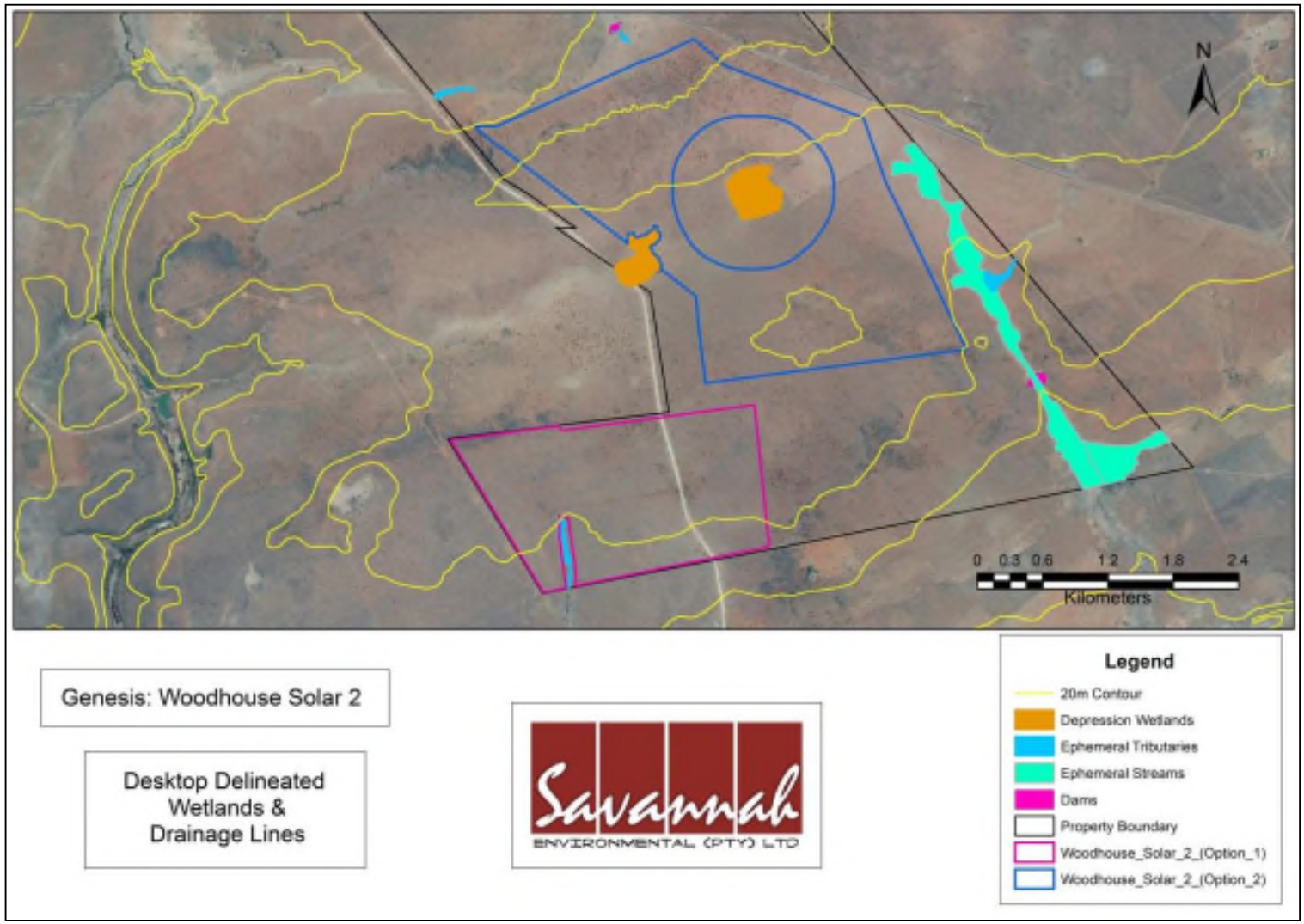

Figure 1: Desktop delineated wetlands and drainage lines (no buffers) (Woodhouse Solar 2 Option 1 is a.k.a. Woodhouse Solar 2 Site Alternative 1 and Woodhouse Solar 2 Option 2 is a.k.a. Woodhouse Solar 2 Site Alternative 2).

The climate associated with the study area has been derived from recorded and extrapolated climatic data (http://en.climate-data.org/location/10658/) for Vryburg. Rainfall occurs mainly in summer and autumn with very dry winters. Mean annual rainfall is about 477mm with January being the wettest month, averaging about 89mm, and July being the driest, with an average of only 4mm. The average annual temperature in Vryburg is 17.9°C with January being the warmest (Ave. 24.8°C) and July being the coldest (Ave 9.3°C). Frost is frequent to very frequent in winter (mean frost days: 40).

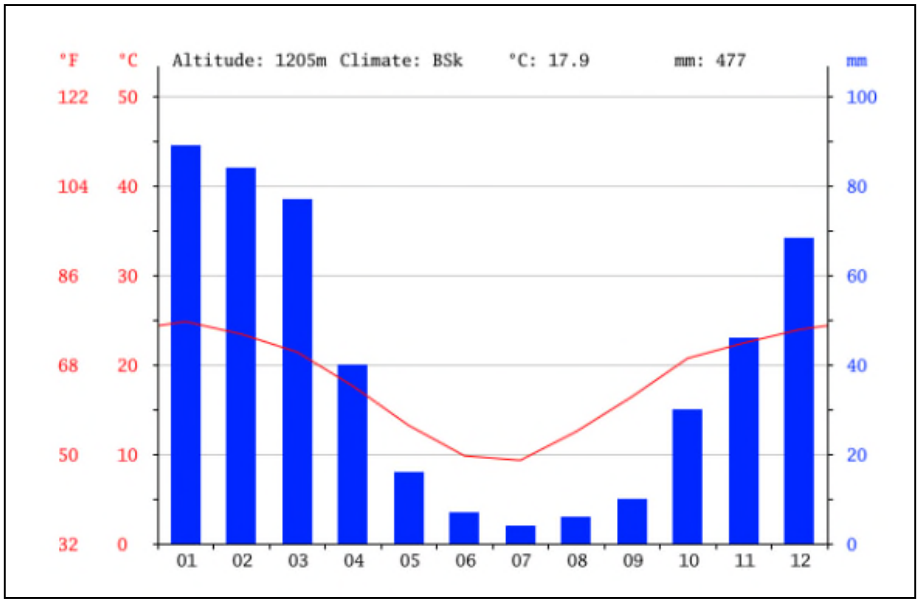

Figure 2: Climate graph of Vryburg (http://en.climate-data.org/location/10658/).

month	1	2	3	4	5	6	7	8	9	10	11	12
mm	89	84	77	40	16	7	4	6	10	30	46	68
°C	24.8	23.4	21.4	17.6	13.2	9.8	9.3	12.5	16.4	20.7	22.4	23.9
°C (min)	17.2	16.3	14.3	9.8	4.4	0.4	-0.3	2.6	7.0	12.0	14.3	16.1
°C (max)	32.4	30.5	28.5	25.5	22.1	19.3	19.0	22.5	25.9	29.5	30.5	31.8
°F	76.6	74.1	70.5	63.7	55.8	49.6	48.7	54.5	61.5	69.3	72.3	75.0
°F (min)	63.0	61.3	57.7	49.6	39.9	32.7	31.5	36.7	44.6	53.6	57.7	61.0
°F (max)	90.3	86.9	83.3	77.9	71.8	66.7	66.2	72.5	78.6	85.1	86.9	89.2

Figure 3: Climate table of Vryburg (http://en.climate-data.org/location/10658/).

3. STORMWATER MANAGEMENT PRINCIPLES

In the design phase, various stormwater management principles should be considered including:

- Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion.
- Reduce stormwater flows as far as possible by the effective use of attenuating devices (such as swales, berms, silt fences). As construction progresses, the stormwater control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.
- Minimse the area of exposure of bare soils to minimse the erosive forces of wind, water and all forms of traffic.
- Ensure that development does not increase the rate of stormwater flow above that which the natural ground can safely accommodate at any point in the sub-catchments.
- Ensure that all stormwater control works are constructed in a safe and aesthetic manner in keeping with the overall development.
- Plan and construct stormwater management systems to remove contaminants before they pollute surface waters or groundwater resources.
- Contain soil erosion, whether induced by wind or water forces, by constructing protective works to trap sediment at appropriate locations. This applies particularly during construction.
- Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process.
- Design and construct roads to avoid concentration of flow along and off the road. Where flow concentration is unavoidable, measures to incorporate the road into the pre-development stormwater flow should not exceed the capacity of the culvert. To assist with the stormwater run-off, gravel roads should typically be graded and shaped with a 2-3% crossfall back into the slope, allowing stormwater to be channelled in a controlled manor towards the, natural drainage lines and to assist with any sheet flow on the site.
- Design culvert inlet structures to ensure that the capacity of the culvert does not exceed the pre-development stormwater flow at that point. Provide detention storage on the road and/or upstream of the stormwater culvert.
- Design outlet culvert structures to dissipate flow energy. Any unlined downstream channel must be adequately protected against soil erosion.
- Where the construction of a building causes a change in the vegetative cover of the site that might result in soil erosion, the risk of soil erosion by stormwater must be minimised by the provision of appropriate artificial soil stabilisation mechanisms or re-vegetation of the area. Any inlet to a piped system should be fitted with a screen, or grating to prevent debris and refuse from entering the stormwater system.

» Preferably all drainage channels on site and contained within the larger area of the property (i.e. including buffer zone) should remain in the natural state so that the existing hydrology is not disturbed.

3.1. Engineering Specifications

A detailed engineering specifications Stormwater Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Civil Engineers during the detailed design phase and should be based on the underlying principles of this Storm-water Management Plan. This should include erosion control measures. Requirements for project design include:

» Erosion control measures to be implemented before and during the construction period, including the final stormwater control measures (post construction).
» All temporary and permanent water management structures or stabilisation methods must be indicated within the Final/Updated Stormwater Management Plan.
» The drainage system for the site should be designed to specifications that can adequately deal with a 1:50 year intensity rainfall event or more to ensure sufficient capacity for carrying storm waters around and away from infrastructure.
» Procedures for storm water flow through a project site need to take into consideration both normal operating practice and special circumstances. Special circumstances in this case typically include severe rainfall events.
» An onsite Engineer or Environmental Officer to be responsible for ensuring implementation of the erosion control measures on site during the construction period.
» The EPC Contractor holds ultimate responsibility for remedial action in the event that the approved stormwater plan is not correctly or appropriately implemented and damage to the environment is caused.

During the construction phase, the contractor must prepare a Stormwater Control Method Statement to ensure that all construction methods adopted on site do not cause, or precipitate soil erosion and shall take adequate steps to ensure that the requirements of the Stormwater Management Plan are met before, during and after construction. The designated responsible person on site, must be indicated in the Stormwater Control Method Statement and shall ensure that no construction work takes place before the relevant stormwater control measures are in place.

An operational phase Stormwater Management Plan should be designed and implemented if not already addressed by the mitigations implemented as part of construction, with a view to preventing the passage of concentrated flows off hardened surfaces and onto natural areas.

APPENDIX J:
EROSION MANAGEMENT PLAN

PRINCIPLES FOR EROSION MANAGEMENT

1. PURPOSE

Exposed and unprotected soils are the main cause of erosion in most situations. Therefore, this erosion management plan and the revegetation and rehabilitation plan are closely linked to one another and should not operate independently, but should rather be seen as complementary activities within the broader environmental management of the site and should therefore be managed together.

This Erosion Management Plan addresses the management and mitigation of potential impacts relating to soil erosion. The objective of the plan is to provide:

» A general framework for soil erosion and sediment control, which enables the contractor to identify areas where erosion can occur and is likely to be accelerated by construction related activities.
» An outline of general methods to monitor, manage and rehabilitate erosion prone areas, ensuring that all erosion resulting from all phases of the development is addressed.

2. RELEVANT ASPECTS OF THE SITE

According to Mucina and Rutherford (2006) the region can be described as a flat plateau and is consistent with the landtype classification (AGIS 2007) which classifies the landscape as Class A2 with an average slope of between 0% and 2%.

At a finer scale using a Google elevation profile for the study area and immediate surroundings the area can be described as a plateau.

The farm property is situated at elevations of between 1 197m and 1230m above sea level with an average slope of less than 1.5% and maximum south and north slopes of 5.8% -3.4%. The largest portion of the farm property is situated on a relatively flat plateau with gradual slopes towards lower lying areas to the north (area earmarked for the development of the relevant project), south and the north-west. The north and south facing slopes are relatively gradual (Ave northern slope: 2.1% and Ave southern slope: 3.4%), although the north facing slope contain areas (just below plateau edge) which are more steep (Max slope: 5.8 %). As mentioned the area earmarked as the development footprint area is located in a lower lying flat plain characterized by very low gradients.

Detailed soil information is not available for broad areas of the country. As a surrogate landtype data was used to provide a general description of soil in the study area (landtypes are areas with largely uniform soils, typography and climate). There are two landtypes present in the study area, i.e. the Ae36 and Ag10 landtypes (Land

Type Survey Staff, 1987). The northern half of the PV facility is covered by landtype Ae36 and the southern portion by landtype Ag10 (refer to Figure 7).

- The Ae group of landtypes refer to red-yellow apedal, freely drained soils. These soils are moderately deep (ave. 500mm – 1200mm) red, freely drained and apedal (structureless). These soils generally occur in areas associated with low to moderate rainfall (300mm – 700mm per annum) in the interior of South Africa and have a high fertility status. A wide range of texture occurs (usually sandy loam to sandy clay loam). Common soil forms are Mispah and Hutton and to a lesser extent, Clovely, Stertkspruit and Rensburg.
- The Ag group of landtypes refer to red-yellow apedal, freely drained soils. These soils are shallow (less than 300mm), red, freely-drained, apedal soils that occur in arid to semi-arid areas associated with low rainfall (less than 500mm per annum), as well as areas underlain by hard to weathered rock. A wide range of textures may occur (usually loamy sand to sandy loam). Stones or rocks are often present on the soil surface. Common soil forms are Mispah, Hutton and rock whilst soil forms such as Glenrosa and Shortlands are sparsely present.

The soils contained within land types Ae, Af and Ag can be soils of **high agricultural potential** if irrigation water is available. The low rainfall in the study area, however, inhibits dry-land crop production.

The soils in the study area are somewhat susceptible to wind erosion and are largely classified under category 2a where sands are strongly dominant. The measure as to how easy soil may erode by means of wind transportation is given below:

- Fine silt and clay (<0.01 mm) offer strong resistance to movement.
- Coarse silt and very fine sand (0.01-0.1 mm) are lost in suspension.
- Very fine to medium sand (0.1-0.5 mm) is subjected to saltation.
- Coarse sand (0.5-1.0 mm) moves as surface creep

Soils on the site generally have below 10% dominant clay in the top soils. The soils are moderately susceptibility to water erosion which varies across the site. The general assumption is that the erosion susceptibility increases with an increase in the slope angle and/if the slope length is constant.

3. EROSION AND SEDIMENT CONTROL PRINCIPLES

The goals of erosion control during and after construction at the site should be to:

» Protect the land surface from erosion;
» Intercept and safely direct run-off water from undisturbed upslope areas through the site without allowing it to cause erosion within the site or become contaminated with sediment; and
» Progressively revegetate or stabilise disturbed areas.

These goals can be achieved by applying the management practices outlined in the following sections.

3.1. On-Site Erosion Management

General factors to consider regarding erosion risk at the site includes the following:

» Due to the sandy nature of Soils in the study area, soil loss will be greater during dry periods as it is more prone to wind erosion. Therefore precautions to prevent erosion should be present throughout the year.
» Soils loss will be greater on steeper slopes. Ensure that steep slopes are not de-vegetated unnecessarily and subsequently become hydrophobic (i.e. have increased runoff and a decreased infiltration rate) increasing the erosion potential.
» Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilisation. Therefore the gap between construction activities and rehabilitation should be minimised. Phased construction and progressive rehabilitation, where practically possible, are therefore important elements of the erosion control strategy.
» The extent of disturbance will influence the risk and consequences of erosion. Therefore site clearing should be restricted to areas required for construction purposes only. As far as possible, large areas should not be cleared all at once, especially in areas where the risk of erosion is higher.
» Roads should be planned and constructed in a manner which minimises their erosion potential. Roads should therefore follow the natural contour as far as possible. Roads parallel to the slope direction should be avoided as far as possible.
» Where necessary, new roads constructed should include water diversion structures present with energy dissipation features present to slow and disperse the water into the receiving area.
» Roads and other disturbed areas should be regularly monitored for erosion. Any erosion problems recorded should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.

- Compacted areas should have adequate drainage systems to avoid pooling and surface flow. Heavy machinery should not compact those areas which are not intended to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. Where compaction does occur, the areas should be ripped.
- All bare areas should be revegetated with appropriate locally occurring species, to bind the soil and limit erosion potential.
- Silt fences should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- Gabions and other stabilisation features should be used on steep slopes and other areas vulnerable to erosion to minimise erosion risk as far as possible.
- Activity at the site after large rainfall events when the soils are wet and erosion risk is increased should be reduced.
- Topsoil should be removed and stored in a designated area separately from subsoil and away from construction activities (as per the recommendations in the EMPr). Topsoil should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation in cleared areas.
- Regular monitoring of the site for erosion problems during construction (ongoing) and operation (at least twice annually) is recommended, particularly after large summer thunderstorms have been experienced. The ECO will determine the frequency of monitoring based on the severity of the impacts in the erosion prone areas.

3.1.1. Erosion control mechanisms

The contractor may use the following mechanisms (whichever proves more appropriate/ effective) to combat erosion when necessary:

- Reno mattresses;
- Slope attenuation;
- Hessian material;
- Shade catch nets;
- Gabion baskets;
- Silt fences;
- Storm water channels and catch pits;
- Soil bindings;
- Geofabrics;
- Hydro-seeding and/or re-vegetating;
- Mulching over cleared areas;
- Boulders and size varied rocks; and
- Tilling.

3.2. Engineering Specifications

A detailed engineering specifications Storm-water Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Civil Engineers during the detailed design phase and should be based on the underlying principles of the Storm-water Management Plan (**Appendix H** of the EMPr) and this should include erosion control measures. Requirements for project design include:

» Erosion control measures to be implemented before and during the construction period, including the final stormwater control measures (post construction).
» All temporary and permanent water management structures or stabilisation methods must be indicated within the Stormwater Management Plan.
» An onsite Engineer or Environmental Officer (EO)/ SHE Representative to be responsible for ensuring implementation of the erosion control measures on site during the construction period. The ECO to monitor the effectiveness of these measures on the interval agreed upon with the Site Manager and EO.
» The EPC Contractor holds ultimate responsibility for remedial action in the event that the approved Storm-Water Plan is not correctly or appropriately implemented and damage to the environment is caused.

3.3. Monitoring

The site must be monitored continuously during construction and operation in order to determine any indications of erosion. If any erosion features are recorded as a result of the activities on site the Environmental Officer (EO)/ SHE Representative (during construction) or Environmental Manager (during operation) must:

» Assess the significance of the situation.
» Take photographs of the soil degradation.
» Determine the cause of the soil erosion.
» Inform the contractor/operator that rehabilitation must take place and that the contractor/operator is to implement a rehabilitation method statement and management plan to be approved by the Site/Environmental Manager in conjunction with the ECO.
» Monitor that the contractor/operator is taking action to stop the erosion and assist them where needed.
» Report and monitor the progress of the rehabilitation weekly and record all the findings in a site register (during construction).
» All actions with regards to the incidents must be reported on a monthly compliance report which should be kept on file for if/when the Competent Authority requests to see it (during construction) and kept on file for consideration during the annual audits (during construction and operation).

The Contractor (in consultation with an appropriate specialist, e.g. an engineer) must:

» Select a system/mechanism to treat the erosion.
» Design and implement the appropriate system/mechanism
» Monitor the area to ensure that the system functions like it should. If the system fails, the method must be adapted or adjusted to ensure the accelerated erosion is controlled.
» Continue monitoring until the area has been stabilised.

4. CONCLUSION

The Erosion Management Plan is a document to assist the Proponent/ EPC Contractor with guidelines on how to manage erosion during all phases of the project. The implementation of management measures is not only good practice to ensure minimisation of degradation, but also necessary to ensure compliance with legislative requirements. This document forms part of the EMPr, and is required to be considered and adhered to during the design, construction, operation and decommissioning phases of the project (if and where applicable).

5. REFERENCES

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APPENDIX K:
FIRE MANAGEMENT PLAN

EMERGENCY PREPAREDNESS AND RESPONSE PLAN

1. PURPOSE

The purpose of the Emergency Preparedness and Response Plan is:

- To assist contractor personnel to prepare for and respond quickly and safely to emergency incidents, and to establish a state of readiness which will enable prompt and effective response to possible events.
- To control or limit any effect that an emergency or potential emergency may have on site or on neighbouring areas;
- To facilitate emergency response and to provide such assistance on the site as is appropriate to the occasion;
- To ensure communication of all vital information as soon as possible;
- To facilitate the reorganisation and reconstruction activities so that normal operations can be resumed;
- To provide for training so that a high level of preparedness can be continually maintained.

This plan outlines response actions for potential incidents of any size. It details response procedures that will minimise potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to an emergency event. The plan will enable an effective, comprehensive response to prevent injury or damage to the construction personnel, public, and environment during the project. Contractors are expected to comply with all procedures described in this document. A Method Statement should be prepared at the commencement of construction detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation. The method statement must also reflect conditions of the IFC PS1 and include the following:

» Identification of areas where accidents and emergency situations may occur;
» Communities and individuals that may be impacted;
» Response procedure;
» Provisions of equipment and resources;
» Designation of responsibilities;
» Communication; and
» Periodic training to ensure effective response to potentially affected communities.

2. PROJECT-SPECIFIC DETAILS

Genesis Woodhouse Solar 2 (Pty) Ltd propose the development of a commercial photovoltaic (PV) solar energy facility (known as the Woodhouse Solar 2 PV Facility) on the Remaining Extent of the farm Woodhouse 729. The proposed project site is located approximately 10km south east of the town of Vryburg and falls under the jurisdiction of the Naledi Local Municipality and within the greater Dr Ruth Segomotsi Mompati District Municipality in the North West Province.

Due to the scale and nature of this development, it is anticipated that the following risks could potentially arises during the construction and operational phases:

» Fires;
» Leakage of hazardous substances;
» Storage of flammable materials and substances;
» Flood events and overflow of wastewater retention dam;
» Accidents; and
» Natural disasters.

3. EMERGENCY RESPONSE PLAN

There are three levels of emergency as follows:

» Local Emergency: An alert confined to a specific locality.
» Site Emergency: An alert that cannot be localised and which presents danger to other areas within the site boundary or outside the site boundary.
» Evacuation: An alert when all personnel are required to leave the affected area and assemble in a safe location.

If there is any doubt as the whether any hazardous situation constitutes an emergency, then it must be treated as an Evacuation.

Every effort must be made to control, reduce or stop the cause of any emergency provided it is safe to do so. For example, in the event of a fire, isolate the fuel supply and limit the propagation of the fire by cooling the adjacent areas. Then confine and extinguish the fire (where appropriate) making sure that re-ignition cannot occur; for a gas fire it is usually appropriate to isolate the fuel and let it burn itself out but keep everything around the fire cold.

3.1. Emergency Scenario Contingency Planning

3.1.1. Scenario: Spill which would result in the contamination of land, surface or groundwater

i. Spill Prevention Measures

Preventing spills must be the top priority at all operations which have the potential of endangering the environment. The responsibility to effectively prevent and mitigate any scenario lies with the Contractor and the ECO. In order to reduce the risk of spills and associated contamination, the following principles should be considered during construction and operation activities:

» All equipment refuelling, servicing and maintenance activities should only be undertaken within appropriately sealed designated areas.
» All maintenance materials, oils, grease, lubricants, etc. should be stored in a designated area in an appropriate storage container.
» No refuelling, storage, servicing, or maintenance of equipment should take place within 50m of drainage lines or sensitive environmental resources in order to reduce the risk of contamination by spills.
» No refuelling or servicing should be undertaken without absorbent material or drip pans properly placed to contain spilled fuel.
» Any fluids drained from the machinery during servicing should be collected in leak-proof containers and taken to an appropriate disposal or recycling facility.
» If these activities result in damage or accumulation of product on the soil, the contaminated soil must be disposed of as hazardous waste. Under no circumstances shall contaminated soil be added to a spoils pile and transported to a regular disposal site.
» Chemical toilets used during construction must be regularly cleaned. Chemicals used in toilets are also hazardous to the environment and must be controlled. Portable chemical toilets could overflow if not pumped regularly or they could spill if dropped or overturned during moving. Care and due diligence should be taken at all times.
» Contact details of emergency services and HazMat Response Contractors are to be clearly displayed on the site. All staff are to be made aware of these details and must be familiar with the procedures for notification in the event of an emergency.

ii. Procedures

The following action plan is proposed in the event of a spill:

1. Spill or release identified.
2. Assess person safety, safety of others and environment.
3. Stop the spill if safely possible.

4. Contain spill to limit entering water bodies and surrounding areas.
5. Identify substance spilled.
6. Quantify spill (under or over guideline/threshold levels).
7. Notify Site Manager and emergency response crew and authorities (in event of major spill).
8. Inform users (and downstream users) of potential risk.
9. Clean up of spill using spill kit or by HazMat team.
10. Record of spill incident on company database.

a) Procedures for containing and controlling the spill (i.e. on land or in water)

Measures can be taken to prepare for quick and effective containment of any potential spills. Each contractor must keep sufficient supplies of spill containment equipment at the construction sites, at all times during and after the construction phase. These should include specialised spill kits or spill containment equipment. Other spill containment measures include using drip pans underneath vehicles and equipment every time refuelling, servicing, or maintenance activities are undertaken.

Specific spill containment methods for land and water contamination are outlined below.

Containment of Spills on Land

Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil is a natural sorbent, and therefore spills on soil are generally less serious than spills on water as contaminated soil can be more easily recovered. It is important that all measures be undertaken to avoid spills reaching open water bodies. The following methods could be used:

» *Dykes*
Dykes can be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled substance. A dyke needs to be built up to a size that will ensure containment of the maximum quantity of contaminant that may reach it. A plastic tarp can be placed on and at the base of the dyke such that the contaminant can pool up and subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly, a dyke may not be necessary and sorbents can be used to soak up contaminants before they migrate away from the source of the spill.

» *Trenches*
Trenches can be dug out to contain spills. Spades, pick axes or a front-end loader can be used depending on the size of trench required. Spilled substances can then be recovered using a pump or sorbent materials.

Containment of Spills on Water

Spills in water can negatively impact water quality and aquatic life. All measures need to be undertaken to contain spills on open water. The following methods could be used:

» *Weirs*
Weirs can be used to contain spills in streams and to prevent further migration downstream. Plywood or other materials found on site can be placed into and across the width of the stream, such that water can still flow under the weir. Weirs are however only effective for spilled substances which float on the water surface.

» *Barriers*
In some situations barriers made of netting or fence material can be installed across a stream, and sorbent materials placed at the base to absorb spilled substance. Sorbents will need to be replaced as soon as they are saturated. Water will be allowed to flow through.

b) Procedures for transferring, storing, and managing spill related wastes

Used sorbent materials are to be placed in plastic bags for future disposal. All materials mentioned in this section are to be available in the spill kits. Following clean up, any tools or equipment used must be properly washed and decontaminated, or replaced if this is not possible.

Spilled substances and materials used for containment must be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

c) Procedures for restoring affected areas

Criteria that may be considered include natural biodegradation of oil, replacement of soil and revegetation. Once a spill of reportable size has been contained, the ECO and the relevant Authority must be consulted to confirm that the appropriate clean up levels are met.

3.1.2. Scenario: Fire (and fire water handling)

i. Action Plan

The following action plan is proposed in the event of a fire:

1. Quantify risk
2. Assess person safety, safety of others and environment
3. If safe – attempt to extinguish fire using appropriate equipment
4. If not safe to extinguish, contain fire
5. Notify Site Manager and emergency response crew and authorities
6. Inform users (and downstream users) of potential risk of fire
7. Record of incident on company database

ii. Procedures

Because large scale fires may spread very fast in the environment it is most advisable that the employee/contractor not put his/her life in danger in the case of an uncontrolled fire.

Portable firefighting equipment must be provided in line with the Building Code of South Africa and the relevant provincial building code. All emergency equipment including portable fire extinguisher, hose reels, hydrants must be maintained and inspected by a qualified contractor in accordance with the relevant legislation and National standards.

Current evacuation signs and diagrams for the building or site that are compliant to relevant state legislation must be provided in a conspicuous position, on each evacuation route. Contact details for the relevant emergency services should be clearly displayed on site and all employees should be aware of procedures to follow in the case of an emergency.

a) Procedures for initial actions

Persons should not fight the fire if any of the following conditions exist:

» They have not been trained or instructed in use of a fire extinguisher.
» They do not know what is burning.
» The fire is spreading rapidly.
» They do not have the proper equipment.
» They cannot do so without a means of escape.
» They may inhale toxic smoke.

b) Reporting procedures

» Report fire immediately to the site manager, who will determine if it is to be reported to the relevant emergency services and authorities.
» The site manager must have copies of the Report form to be completed.

3.1.3. Scenario: Flood events and overflow of wastewater retention dam

i. Action Plan

The following action plan is proposed in the event of a flood of overflow of wastewater retention dam:

1. Identify flood state or overflow
2. Assess personal safety, safety of others and environment
3. Identify source
4. Stop the source of water(waste) causing overflow if safely possible
5. Contain overflow water to limit it entering surrounding water bodies
6. Quantify overflow
7. Notify Site Manager and emergency response crew and authorities
8. Inform users (and downstream users) of potential risk
9. Record of incident on company database

ii. Flood/overflow Effect Prevention Measures

Preventing flood/ overflowing of wastewater retention dam must be a top priority. The responsibility to effectively prevent and mitigate any scenario lies with the Contractor and the Environmental Manager. All parties are expected to:

» Always conduct proper maintenance and inspections on the area and machinery/vehicles.
» Never allow for the risk of over flowing, especially in or near sensitive areas.
» Know the limits of the wastewater dam/s.
» Store all materials in protected areas.

Restrictions must be placed on amounts of wastewater to be pumped into the dam. All technical detail as to capacity and limitations of the facility must be made extremely clear to reduce the potential of contamination.

iii. Procedures

Although attempts can be made to minimise the effects of flooding, it is impossible to prevent floods altogether. Being prepared for flooding and having emergency plans must therefore be a priority.

a) Procedures for initial actions

» Ensure safety of all personnel.
» Assess hazards and risks.
» Stop the flood/overflow if safely and physically possible, e.g. shut off pump.
» No matter what the volume is, notify site manager.
» Contain the wastewater.

b) Reporting procedures

» Report immediately to the site manager, who will determine if it is to be reported to the relevant emergency services and authorities.
» The site manager, will have copies of the Report form to be completed.

c) Procedures for containing and controlling overflow of wastewater retention dam

Measures can be taken to prepare for quick and effective containment of any potential overflow.

» Initiate overflow containment by first determining what will be affected by the incident.
» Assess speed and direction of overflow and cause of movement (water, wind and slope).
» Determine best location for containing wastewater, avoiding any water bodies.
» Have a contingency plan ready in case event worsens beyond control or if the weather or topography impedes containment.

d) Procedures for transferring, storing, and management.

Following clean up, any tools or equipment used will be properly washed and decontaminated, or replaced if this is not possible. All materials used for containment of spilled wastewater must be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

SUMMARY: RESPONSE PROCEDURE

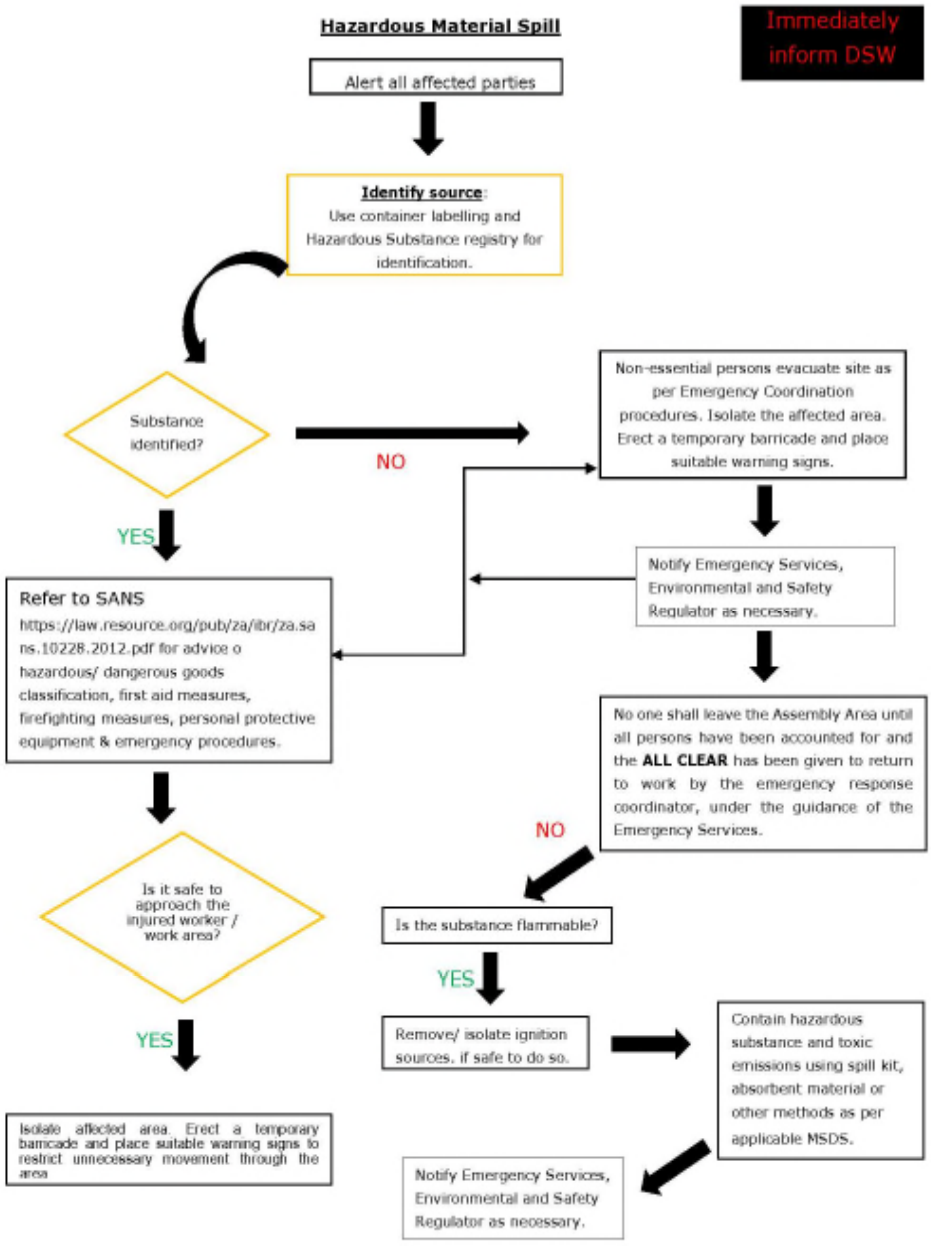


Figure 1: Hazardous Material Spill

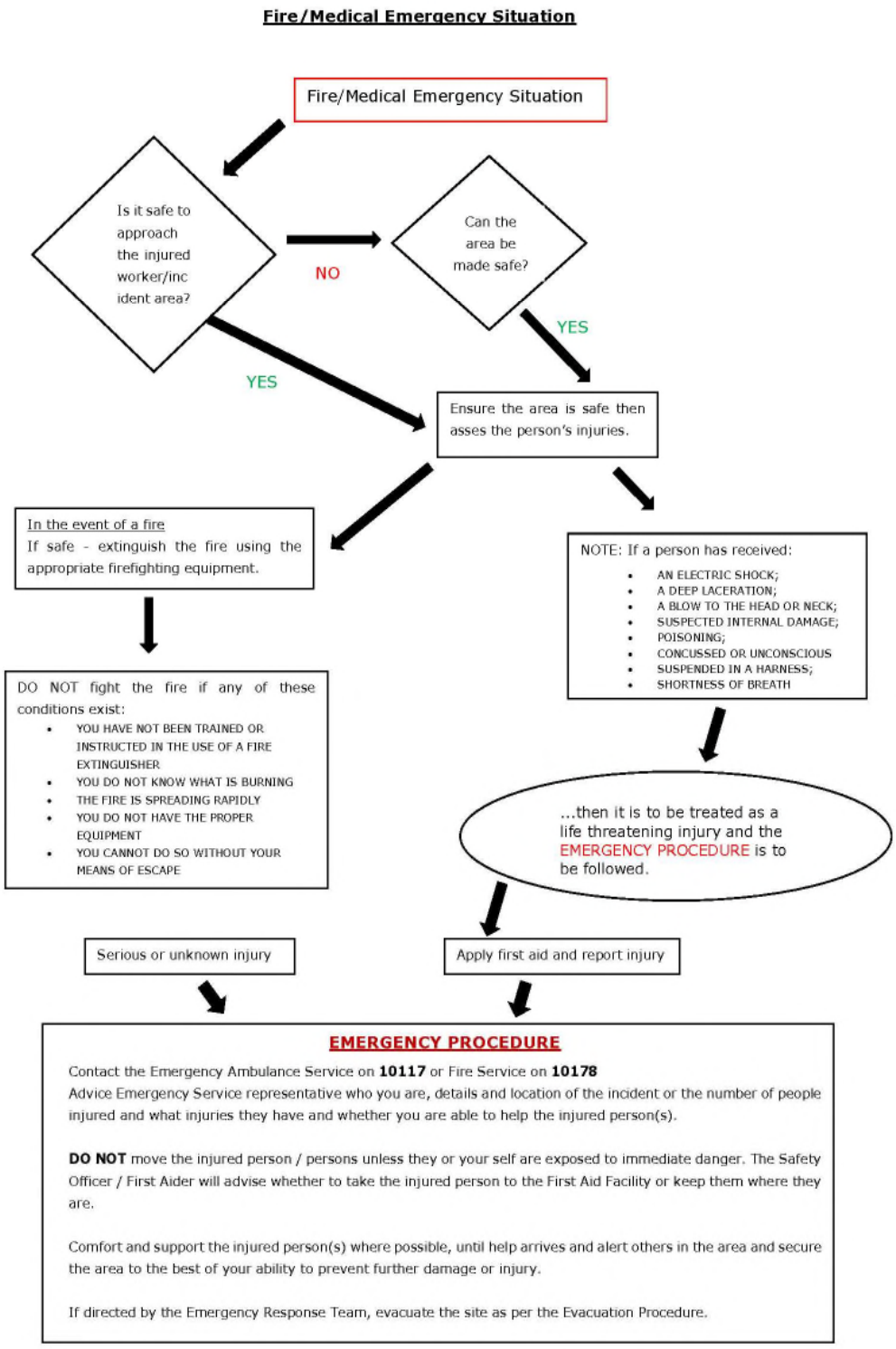


Figure 2: Emergency Fire/Medical

APPENDIX L:
CURRICULUM VITAE OF THE PROJECT TEAM

CURRICULUM VITAE
(Energy-related projects)

KAREN JODAS

SAVANNAH ENVIRONMENTAL (PTY) LTD

Profession	:	Environmental Management and Compliance Consultant ; Environmental Assessment Practitioner
Specialisation	:	Strategic environmental assessment and advice; project management and co-ordination of environmental projects; environmental compliance advise and monitoring; Environmental Impact Assessment; environmental management; peer review; policy, strategy and guideline formulation; renewable energy projects; water resources management
Work experience	:	Nineteen (19) years in the environmental assessment and management field

VOCATIONAL EXPERIENCE

Provide technical input for projects in the environmental management field, specialising in strategic evaluation, Environmental Impact Assessment studies, Environmental Management Plans, integrated environmental management, environmental compliance monitoring; peer review of EIA reports and processes, strategy and guideline development, and public participation. Key focus on overall Project Management, integration of environmental studies and environmental processes into larger engineering-based projects, strategic assessment, and the identification of environmental management solutions and mitigation/risk minimising measures.

Undertaking studies requiring all environmental-related disciplines has allowed for considerable experience to be gained in the environmental assessment and management fields. A specialist area of focus is on management and assessment of multi-faceted projects, including electricity generation and transmission projects (with a strong focus on the renewable energy sector), linear developments (roads and power lines), bulk infrastructure and supply (e.g. WTWs, pipelines, landfills), the mining industry, urban, rural and township developments, environmental aspects of IDPs, EMFs, SoERs, as well as environmental planning, development and management.

Working knowledge of environmental legislation, strategies, guidelines and policies. Compilation of the reports for environmental studies are in accordance with the all relevant environmental legislation under the National Environmental Management Act.

SKILLS BASE AND CORE COMPETENCIES

- Nineteen years of experience in the environmental management, impact assessment and compliance fields
- Seventeen years of experience in Project Management - Project management of large environmental assessment and management projects
- Strategic and compliance advise for all aspects of environmental assessment and management
- External and peer review of environmental assessment and compliance reporting as well as EIA processes
- Working knowledge of environmental planning policies, regulatory frameworks and legislation
- Identification and assessment of potential environmental impacts and benefits
- Development of practical and achievable mitigation measures and management plans and evaluation of risk to project execution

- Experienced in environmental compliance advise, monitoring and reporting for construction projects
- Compilation and review of the reports in accordance with all relevant environmental legislation
- Public participation/involvement and stakeholder consultation
- Environmental strategy, policy and guidelines development
- Experienced in assessments for both linear developments and nodal developments
- Key experience in the assessment of impacts associated with renewable energy projects
- Wide range of experience for public and private sector projects
- Completed projects in all nine Provinces of South Africa, as well as Zambia and Lesotho

EDUCATION AND PROFESSIONAL STATUS

Degrees:
- B.Sc Earth Sciences, majoring in Geography and Zoology, *Rhodes University, Grahamstown,* 1993
- B.Sc Honours in Geography (in Environmental Water Management), *Rhodes University, Grahamstown,* 1994. Major subjects included Water Resources Management, Streams Ecology, Fluvial Geomorphology and Geographic Information Systems.
- M.Sc in Geography (Geomorphology), *Rhodes University, Grahamstown,* 1996

Short Courses:
Water Quality Management, *Potchefstroom University,* 1998
Environmental Law Course, *Aldo Leopold Institute*, 2002
WindFarmer Wind Farm Design course, *Garrad Hassan*, 2009

Professional Society Affiliations:
Registered with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: *Environmental Scientist (400106/99)*

Other Relevant Skills:
Xtrack Extreme – Advanced Off-Road Driving Course (2003)

EMPLOYMENT

2006 - Current: Director of *Savannah Environmental (Pty) Ltd.* Independent specialist environmental consultant, Environmental Assessment Practitioner (EAP) and advisor. Primary focus on energy-sector projects.

1997 –2005: Associate of *Bohlweki Environmental (Pty) Ltd*. Environmental Management Unit: Manager; Principle Environmental Scientist focussing on Environmental Management and Project Management.

PROJECT EXPERIENCE

Experience includes projects associated with electricity generation and transmission, wastewater treatment facilities, mining and prospecting activities, property development, and national roads, as well as strategy and guidelines development. Selected projects in the energy and renewable energy sector include:

Strategic and Regional Assessments
- *Regional Assessment for wind energy developments within an identified area on the West Coast of the Western Cape Province (for Eskom Holdings Limited)*
- *Five Regional Assessment for wind energy developments within five identified area across South Africa (for Eskom Holdings Limited)*
- *Part of the Strategic Task Team for the identification of Eskom's future wind farm sites (Wind 1000) (for Eskom Holdings Limited)*
- *Regional Assessment for wind energy developments within an identified area in the De Aar Area of the Northern Cape Province (for juwi Wind)*
- *Strategic Regional Assessment for the Environmental Suitability of Wind Energy Facilities for the entire Western Cape Province (for DEA&DP)*

- *Regional Assessments for wind energy developments within identified areas in the Northern and Eastern Cape, including mapping (for Networx)*

Renewable power generation projects: Wind Energy Facilities

Environmental Impact Assessments and Environmental Management Plans

- *ABs Wind Energy Facility near Indwe, Eastern Cape (for Rainmaker Energy)*
- *Amakhala Emoyeni Wind Energy Facility near Cookhouse, Eastern Cape (for Windlab Developments)*
- *Castle Wind Energy Facility, in De Aar (for Juwi Renewable Energies)*
- *Cookhouse II Wind Energy Facility (for ACED & Tertia Waters)*
- *Dorper Wind Energy Facility near Molteno, Eastern Cape (for Rainmaker Energy)*
- *Elliot Wind Energy Facility (for Rainmaker Energy)*
- *Garob Wind Energy Facility, in Copperton (for Juwi Renewable Energies)*
- *Gouda Wind Energy Facility near Gouda, Western Cape (for VentuSA)*
- *Gunstfontein Wind Energy Facility (for Networx)*
- *Happy Valley Wind Energy Facility, Eastern Cape (for REISA)*
- *Hidden Valley Wind Energy Facility (for ACED)*
- *Hopefield Wind Energy Facility (for Umoya Energy)*
- *Karoo Renewable Wind and PV Solar Energy Facility near Victoria West, Northern & Western Cape (for SARGE)*
- *Pofadder 3x 140MW Wind Energy Facilities, Northern Cape (for Mainstream Renewable)*
- *Riverbank Wind Energy Facility near Wesley, Eastern Cape (for Just Energy)*
- *Sere Wind Energy Facility on the West Coast in the Western Cape (for Eskom Generation)*
- *Springfontein Wind Energy Facility (for Mainstream Renewable)*
- *Stormberg Wind Energy Facility (for Networx)*
- *West Coast One Wind Energy Facility (for Moyeng Energy (Pty) Ltd)*
- *West Coast Wind Energy Facility (for Exxaro)*
- *Wind Energy Facility at Cookhouse, Eastern Cape (for African Clean Energy Developments)*
- *Wind Energy Facility near Britannia Bay, Western Cape (for TerraPower Solutions)*
- *Zen Wind Energy Facility, near Gouda (for VentuSA Energy)*

Basic Assessments for wind monitoring masts

- *Caledon, Worcester, Tulbach Wind Energy Facilities (for SAGIT)*
- *Dorper, ABs, Dobos Wind Energy Facilities (for Rainmaker Energy)*

Compliance Advice

- *Amakhala Emoyeni Wind Energy Facility (for Amakhala Emoyeni)*
- *Amakhala Emoyeni Wind Energy Facility, Environment and Social Action Plan (for Cennergi)*
- *Cookhouse Wind Energy Facility site (for ACED Cookhouse Renewables)*
- *Cookhouse II Wind Energy Facility (for ACED)*
- *Dorper Phase 1 Wind Energy Facility (for Rainmaker Energy)*
- *Gouda Wind Farm (for Aveng / Acciona)*
- *Happy Valley Wind Energy Facility (for VentuSA Energy / EDPR)*
- *Loperberg Wind Farm (for Rainmaker Energy)*
- *Nobelsfontein Wind Energy Facility (for Coria / SARGE)*
- *Nojoli Wind Energy Facility (for ACED)*
- *Oyster Bay Wind Energy Facility (for RES)*

Due Diligence Reporting

- *ESG DD for Loeriesfontein, Khobab and Noupoort Wind Energy Facilities (for Actis)*

Renewable power generation projects: Solar Energy Facilities

Environmental Impact Assessments and Environmental Management Plans

- *5x CSP and 2x PV Solar Energy Facilities, Kenhardt, Northern Cape (for Kotulo Tsatsi)*
- *Blackwood PV Solar Energy Facility, near Kimberley/Boshoff (for VentuSA Energy)*
- *Bosjesmansberg PV Solar Energy Facility, Copperton (for Networx)*
- *Boundary PV Solar Energy Facility (for VentuSA Energy)*
- *De Aar CSP Energy Facility at De Aar, Northern Cape (for African Clean Energy Developments)*
- *De Aar PV Solar Energy Plant (for Solar Capital)*
- *Gihon and Kison PV Solar Energy Facilicies (for Networx)*

- *Grootdrink (Albany) PV Solar Energy Facility (for Africoast Engineers)*
- *Gunstfontein PV Solar Energy Facility (for Networx)*
- *Kabi Kimberley PV facility at DeBeers, Kimberley (Kabi Solar)*
- *Karoo Renewables PV Solar Energy Facility (for SARGE)*
- *KaXu CSP Facility near Pofadder, Northern Cape (for Abengoa Solar)*
- *Kheis Phase 1, 2 & 3 PV Solar Energy Facility (for GeStamp Solar)*
- *Khi CSP Facility near Upington, Northern Cape (for Abengoa Solar)*
- *Klipgat PV Solar Energy Facility (for Terra Solar)*
- *Loeriesfontein/Helios PV Solar Energy Plant (for Solar Capital)*
- *Naauwpoort PV Solar Energy Facility (for Terra Solar)*
- *Pofadder 75MW Solar Energy Facility, Northern Cape (for Mainstream Renewable)*
- *Prieska PV Solar Energy Facility, Prieska (for VentuSA Energy)*
- *PV Solar Energy Facility near De Aar, Northern Cape (for Solar Capital)*
- *Ritchie PV Solar Energy Facility (for Solar Capital)*
- *San Solar PV Solar Energy Facility, Kathu (for VentuSA Energy)*
- *Sirius (Tungston Lodge) x2 - PV Solar Energy Plants (for Aurora Power Solutions)*
- *Solar Plant in the Northern Cape Solar at Kathu (Wincanton) (for REISA)*
- *Solar Plant in the Northern Cape Solar at Sishen (Wincanton) (for VentuSA Energy)*
- *Stormberg Solar PV Solar Energy Facility (for Networx / Prana Energy)*
- *Tiger Kloof PV Solar Energy Facility (for Kabi Energy)*
- *Tiger Solar PV Solar Energy Facility, Northern Cape (for Kabi Energy)*
- *Upington 2 and 3 CSP Facilites near Upington, Northern Cape (for Abengoa Solar)*
- *Vaalkop and Witkop PV Solar Energy Facilities, North West (for Kabi Solar)*
- *Wagnbietjiespan PV Solar Energy Facility near Boshoff, Free State (for VentuSA)*
- *Wolmaransstad Municipality Solar PV Solar Energy Facility (for BlueWave)*
- *Xina CSP facility near Pofadder, Northern Cape (or Abengoa Solar)*
- *Zuurwater PV Solar Energy Facilities (x4) (for Solafrica / BlueWave)*

Basic Assessments
- *Amandla Welanga and Dida PV Solar Energy Facilities(for Terra Solar)*
- *Carolusberg PV Solar Energy Facility (for Ilio Energy (SARGE))*
- *Gosforth Park and Kynoch Rooftop PV Solar Energy (for Building Energy)*
- *Hibernia 5MW PV Solar Energy Facility (for EA Energy)*
- *Inkulukelo PV Solar Energy Facility (for Terra Solar)*
- *Kokerboom and Boabab PV Solar Energy Plants (for Brax Energy)*
- *Nigramoep PV Solar Energy Plant, Nababeep (for SARGE)*
- *Noupoort (Kleinfontein and Toitdale) CPV (for Terra Power)*
- *O'Kiep 1 PV Solar Energy Plant, Springbok (for Ilio Energy (SARGE))*
- *O'Kiep 2 PV Solar Energy Plant, Springbok (for BluePort Trade 118 (SARGE))*
- *O'Kiep 3 PV Solar Energy Plant (for Ilio Energy (SARGE))*
- *PV Solar Energy Plant - Kimberley (for Kabi Energy)*
- *Slurry PV Solar Energy Facility (for PPC)*
- *Small projects for PV Solar Energy Facilities (for BlueWave)*
- *Son Sitrus Rooftop PV Solar Energy (for Building Energy)*
- *Tollie PV Solar Energy Facility (for Terra Solar)*
- *x2 Southern Farms PV Solar Energy Plants, Augrabies (for Southern Farms)*

Compliance
- *Bokpoort PV Solar Energy Facility (for Solafrica)*
- *Kathu II Bid compliance (for Building Energy)*
- *Kathu PV Solar Energy Facility (for Building Energy / REISA)*
- *Pofadder and Upington CSP (for Abengoa Solar)*
- *Prieska PV Solar Energy Facility (for VentuSA)*
- *Sishen PV Solar Energy Facility phase 1, 75MW (for Aveng / Acciona)*
- *Xina compliance (for Abengoa Solar)*

Screening Studies
- *75MW facilities criteria-based analysis screenings (for BlueWave)*
- *Allemans, Wonderheuwel, Damfontein, Dida PV Solar Energy Facilities (for Terra Solar)*
- *Bobididi 5MW PV Solar Energy Facility (for Root 60Four Energy)*
- *Bosjesmansberg PV Solar Energy Facility, Copperton (for Networx)*
- *Lephalale PV Solar Energy Facility (for Exxaro)*
- *Northern Cape 5MW PV Solar Energy Facility, 2nd Stage One (for EDIP)*

- *Senekal 1 & 2, Pongola and Newcastle PV Solar Energy Facilities (for Building Energy)*
- *Small projects - PV Solar Energy Facility (x15) (for Building Energy)*
- *Small projects PV Solar Energy Facility (x3) (for GeoSolar)*
- *Small scale PV Solar Energy Facility - 2nd Stage One (for BlueWave)*
- *Small scale PV Solar Energy Facility - 2nd Stage One (for Building Energy)*
- *Various PV Solar Energy Facilities (for INCA Energy)*

Siting Study
- *CSP siting study (for Exxaro)*

Due Diligence Reporting
- *Equator Principles Due Diligence reporting - Kabi Kimberley PV plant (for Enertis Solar)*
- *Equator Principles Due Diligence reporting - Vaal River Solar 1 PV plant (for Enertis Solar)*

Power Generation Projects

Environmental Impact Assessments and Environmental Management Plans
- *Ankerlig OCGT to CCGT Conversion project, and the associated 400 kV transmission power line between Ankerlig and the Omega Substation, Western Cape (for Eskom Generation)*
- *Gourikwa OCGT to CCGT Conversion project, and the associated 400 kV transmission power line between Gourikwa and the Proteus Substation, Mossel Bay(for Eskom Generation)*

Basic Assessments
- *New raw water reservoir and pipeline for the Medupi Power Station, Limpopo Province (for Eskom Generation)*
- *Substation for Aggeneys PV facility (for BioTherm Energy)*

Screening
- *Indwe Power Station (for IPSA)*
- *IPP Baseload screening (coal) (for Exxaro)*

Siting Study
- *Siting study for a coal fired power station in the Bethal area (for ISS Global)*

Power line projects

Environmental Impact Assessments and Environmental Management Plans
- *Steelpoort Integration Project, Limpopo Province (for Eskom Transmission)*
- *Kyalami/Midrand Substation and 3 Transmission lines, Gauteng (for Eskom Transmission)*

Basic Assessments
- *Amakhala Emoyeni Power Line and Kopleegte substation (for Cennergi)*
- *Cuprum-Burchell; Burchell-Mooidraai power line BAR (Prieska) (for Eskom)*
- *Garob-Kronos Power Line (for Juwi Renewable Energies)*
- *Golden Valley Dx-Poseidon line and substation & Golden Valley-Kopleegte power line (for BioTherm Energy)*
- *Ilanga Lethemba-Hydra 132kV (for Solar Capital)*
- *Iziduli Emoyeni Substation, Power Line & LA18 (for Windlab)*
- *Kathu 132kV Power Line (for VentuSA Energy)*
- *Loeries 2 Power Line (for Mainstream Renewable)*
- *Loeriesfontein substation and power lines (for Mainstream Renewable)*
- *Nobelsfontein Wind Substation and Power line (for Coria / SARGE)*
- *Realignment of Dx lines at Hopefield Wind Energy Facility(for Umoya Energy)*
- *Rheboksfontein Power Line(for Moyeng Energy (Pty) Ltd)*
- *Sishen Solar PV Energy Facility 132kV Power line (for Aveng/Vexicom)*
- *Springfontein Power Line (for Mainstream Renewable)*
- *Wesley-Peddie / Riverbank Phase 2 Power Line 132 kV (for Just Energy)*

CURRICULUM VITAE

Lisa Opperman

Profession	:	Environmental Consultant at Savannah Environmental
Specialisation	:	Environmental Management and Geographical Information Systems (GIS)
Years experience	:	13 months

KEY RESPONSIBILITIES

- Execution of professional consulting services for a variety of projects
- Environmental Impact Assessment reporting
- GIS mapping
- Permitting reporting
- Public consultation
- Development of project proposals for procuring new work or projects

SKILLS BASE AND CORE COMPETENCIES

- GIS Mapping
- EIA Report Writing
- Conducting of public involvement processes.
- Administrative tasks
- Analysis and manipulation of geographical information and technical experience with the use of ArcGIS.

EDUCATION AND PROFESSIONAL STATUS

Degrees:

B.Sc. (Hons) Environmental Management (2014), North-West University, Potchefstroom.

B.A Psychology, Geography and Environmental Studies (2013), North-West University, Potchefstroom

Professional Society Affiliations:

IAIAsa (Membership number: 3719)

EMPLOYMENT

16 February 2015 – Current:

Savannah Environmental (Pty) Ltd: Environmental Assessment Practitioner and GIS consultant

PROJECT EXPERIENCE

Environmental Impacts Assessments

- Basic Assessment Reports for Harmony Gold 3x PV Facilities, Welkom (BBEntropie).
- Environmental Impact Assessment Reports for Buffels PV 1 & Buffels PV 2, near Orkney (Kabi Solar).
- Environmental Impact Assessment Reports for Woodhouse Solar 1 & Woodhouse Solar 2 PV Facilities, near Vryburg (Genesis Eco-Energy Developments).
- Environmental Impact Assessment Report for the Orkney Solar Farm (Genesis Eco-Energy Developments).
- Environmental Impact Assessment Report for the Metals Industrial Cluster near Kuruman (Northern Cape Department of Economic Development and Tourism).
- Environmental Management Programme for the Nxuba Wind Farm (ACED).
- Finalisation of the Final EIA Reports for the Tewa Isitha Solar 1 and Tewa Isitha Solar 2 PV facilities near Upington (AfriCoast Energy).
- Lamberts Bay Wind Farm Screening Assessment Report (Windy World).

GIS Mapping (ArcGIS 10.2)

- The Woodhouse Solar 1 & Woodhouse Solar 2 PV Facilities, near Vryburg, North West Province.
- The Orkney Solar Farm, North West Province.
- The Gunstfontein Wind Energy Facility, Northern Cape Province.
- The proposed Komsberg substation Expansion, Northern Cape.
- The proposed Soetwater switching station, 132kV double circuit overhead power line and ancillaries near Sutherland, Northern Cape.
- The Ilanga 7 and 9 facilities as well as associated infrastructure within the Karoshoek Solar Valley Development, Northern Cape.
- The construction of the Soetwater facility substation complex and ancillaries near Sutherland, Northern Cape.
- The Camco PV, Gauteng Province.
- The Sol Invictus Solar PV Development near Aggeneys, Northern Cape.
- The 132kV power line associated with the Perdekraal Wind Farm, Western Cape Province.
- The 132kV power line and substation associated with the Golden Valley Wind Farm, Eastern Cape Province.
- The Acciona Nxuba temporary concrete tower plant, Eastern Cape.
- The Bon Espirange substation and 132kV overhead power line for the authorised Roggeveld Wind Farm.
- The Gunstfontein switching station and 132kV overhead power line for the proposed Gunstfontein Wind Farm near Sutherland, Northern Cape Province.

CURRICULUM VITAE
CANDICE HUNTER

Profession	:	Social Consultant
Specialisation	:	Social Impact Assessments (SIA)
Years' experience	:	2 years and 2 months

KE RESPONSIBILITIES

Specific responsibilities as a Social Consultant involve conducting field research; socio-economic surveys; the management and analysis of data; undertaking stakeholder engagement and communication processes; socio-economic baseline data analyses and conducting general social research for a variety of projects. This includes managing and coordinating the Social Impact Assessment (SIA) processes and compiling SIA reports in line with the countries guidelines and legislation.

SKILLS BASE AND CORE COMPETENCIES

- Social Impact Assessments (SIA)
- EIA Legislation
- Data gathering and analysis
- Qualitative and quantitative social research
- Field research and socio-economic surveys
- Baseline socio-economic data analyses
- Stakeholder engagement
- Public participation process
- Communication and community facilitation
- Report writing and review
- Project administration

EDUCATION AND PROFESSIONAL STATUS

Degrees:

» M. A. Environmental Management: University of Johannesburg (2013)
» B.A. Honours Tourism Development (Cum Laude): University of Johannesburg (2010)

Courses:

» Advanced Certificate in Social Impact Assessment (SIA) (Cum Laude): University of Johannesburg (2013)
» Certificate in Global Reporting Initiative (GRI), Sustainability Reporting Process: Environmental & Sustainable Solutions CC (2012)

Publications:

Hunter, C. & Mearns, K. (2015). Assessing the sustainability reporting of selected tourism companies listed on the Johannesburg Stock Exchange (JSE). *African Journal of Hospitality, Tourism and Leisure, 4(1): 1-18.* Publication URL: http://www.ajhtl.com/uploads/7/1/6/3/7163688/article_51_vol.4__1__2015.pdf

EMPLOYMENT

» January 2014 – Current: Savannah Environmental (Pty) Ltd: Social Consultant

»

» February 2011 – January 2013: University of Johannesburg: Department of Geography, Environmental and Energy Studies & School of Tourism and Hospitality (STH): Student and Research Assistant.

PROJECT EXPERIENCE

Social Impact Assessment Reports:

» January 2014: Specialist SIA study for the proposed Gihon Solar Energy Facility & Associated Infrastructure Located near Bela-Bela, Limpopo Province (for Networx SA)

» March 2014: Specialist social scoping study for the proposed Exheredo Photovoltaic (PV) Solar Energy Facility and associated infrastructure located near Kenhardt, Northern Cape Province (for Kotulo Tsatsi Energy (Pty) Ltd)

» May 2014: Specialist social scoping study for the proposed Wolmaransstad Municipality Solar Energy Facility and associated infrastructure near Wolmaransstad, North West Province (for Bluewave Capital (Pty) Ltd)

» July 2014: Specialist SIA study for the proposed Newcastle Solar Energy Facility near Newcastle, KwaZulu Natal (for Building Energy SpA)

» July 2014: Specialist SIA study for the proposed Pongola Solar Energy Facility near Pongola, KwaZulu Natal (for Building Energy SpA)

» July 2014: Specialist SIA study for the proposed Senekal 1 Solar Energy Facility near Mkuze, KwaZulu Natal (for Building Energy SpA)

» July 2014: Specialist SIA study for the proposed Senekal 2 Solar Energy Facility near Mkuze, KwaZulu Natal (for Building Energy SpA)

» October 2014: Specialist SIA study for the proposed Kotulo Tsatsi Energy Concentrated Solar Power (CSP) Tower Plant 3 facility and associated infrastructure located near Kenhardt, Northern Cape Province (for Kotulo Tsatsi Energy (Pty) Ltd)

» November 2014: Specialist social scoping study for the proposed Lethabo Solar Energy Facility and associated infrastructure near Sasolburg, Free State Province (for Eskom Holdings (SOC) Limited)

» November 2014: Specialist social scoping study for the proposed Majuba Solar Energy Facility and associated infrastructure near Amesforort, Mpumalanga Province (for Eskom Holdings (SOC) Limited)

» November 2014: Specialist social scoping study for the proposed Tutuka Solar Energy Facility and associated infrastructure near Standerton, Mpumalanga Province (for Eskom Holdings (SOC) Limited)

» December 2014: Specialist social scoping study for the proposed 120MW CPV Facility and associated infrastructure near Upington, Northern Cape Province (for Lambrius Energy (Pty) Ltd)

» February 2015: Specialist SIA study for the proposed realignment of the N10 to facilitate access to the Ilanga CSP Facility site, east of Upington, Northern Cape Province (for SANRL)

» March 2015: Specialist social scoping study for the proposed Beaufort West Solar Power Plant 1 near Beaufort West, Western Cape Province (for Beaufort West Solar Company 1 (Pty) Ltd)

Social Impact Assessment Reports:

- March 2015: Specialist social scoping study for the proposed Beaufort West Solar Power Plant 2 near Beaufort West, Western Cape Province (for Beaufort West Solar Company 2 (Pty) Ltd)
- March 2015: Specialist social scoping study for the proposed Beaufort West Solar Power Plant 3 near Beaufort West, Western Cape Province (for Beaufort West Solar Company 3 (Pty) Ltd)
- June 2015: Specialist social scoping report for the proposed Buffels Solar 1 and Solar 2 Solar Energy Facilities, near Orkney, North West Province (for Kabi Solar (Pty) Ltd)
- July 2015: Specialist SIA study for the proposed Lethabo Solar Energy Facility and associated infrastructure near Sasolburg, Free State Province (for Eskom Holdings (SOC) Limited)
- July 2015: Specialist SIA study for the proposed Majuba Solar Energy Facility and associated infrastructure near Amesforort, Mpumalanga Province (for Eskom Holdings (SOC) Limited)
- July 2015: Specialist SIA study for the proposed Tutuka Solar Energy Facility and associated infrastructure near Standerton, Mpumalanga Province (for Eskom Holdings (SOC) Limited)
- August 2015: Specialist social scoping report for the proposed Paulputs CSP Tower Facility and associated infrastructure, near Pofadder, Northern Cape Province (for Abengoa Solar Power South Africa (Pty) Ltd)
- September 2015: Specialist SIA study for the proposed AEP Bloemsmond Solar 1 and Solar 2 PV Facilities, near Upington, Northern Cape Province (for AEP Bloemsmond Solar 1 (Pty) Ltd)
- October 2015: Specialist social scoping report for the proposed Woodhouse Solar 1 and Woodhouse Solar 2 PV Facilities, near Vryburg, North West Province (for Genesis Woodhouse Solar 1 (Pty) Ltd and Genesis Woodhouse Solar 2 (Pty) Ltd)
- October 2015: Specialist social scoping report for the proposed Saldanha Bay Netwrok Strengthening Project, Western Cape Province (for Eskom Holdings SOC Limited)
- October 2015: Specialist social scoping report for the proposed Karoshoek Solar Valley Park-Additional CSP Facilities, near Upington, Northern Cape Province (for FG Emvelo (Pty) Ltd)
- November 2015: Specialist social scoping report for the proposed Sol Invictus Solar Development and associated infrastructure near Aggeneys, Northern Cape Province (for Building Energy (Pty) Ltd)
- November 2015: Specialist social scoping report for the proposed Orkney Solar Development and associated infrastructure near Orkney, North West Province (for Genesis Orkney Solar (Pty) Ltd)
- November 2015: Specialist social scoping report for the proposed Gas to Power Plant on a site withnin the Richards Bay Industrial Development Zone, KwaZulu Natal Province (for Richards Bay Gas to Power 2 (Pty) Ltd)
- December 2015: Specialist social scoping report for the proposed Noupoort Concentrated Solar Power (CSP) Project and associated infrastructure near Noupoort, Northern Cape Province (for Cresco Energy (Pty) Ltd)
- December 2015: Specialist social scoping study for the proposed Beaufort West PV 1 and PV 2 and associated infrastructure near Beaufort West, Western Cape Province (for Turquoise Hive Solar (Pty) Ltd)
- December 2015: Specialist social scoping study for the proposed Metals Industrial Cluster and associated infrastructure near Kuruman, Northern Cape Province (for the Northern Cape Department of Economic Development and Tourism)
- December 2015: Specialist social scoping study for the proposed Karoshoek Solar Valley Development- Additional CSP Tower Plant, near Upington, Northern Cape Province (for FG Emvelo (Pty) Ltd)

» December 2015: Specialist social scoping study for the proposed Karoshoek Solar Valley Development- Additional CSP Trough Plant, near Upington, Northern Cape Province (for FG Emvelo (Pty) Ltd)
» December 2015: Specialist social scoping study for the proposed Ilanga CSP 7 and 8 facilities and associated infrastructure within the Karoshoek Solar Valley Development, near Upington, Northern Cape Province (for Emvelo Eco Projects (Pty) Ltd)
» December 2015: Specialist social scoping study for the proposed Ilanga CSP 9 facility and associated infrastructure within the Karoshoek Solar Valley Development, near Upington, Northern Cape Province (for Emvelo Eco Projects (Pty) Ltd)
» January 2016: Specialist social scoping study for the proposed Semonkong Wind Farm near Semonkong, Lesotho (for Sun Clean Energy Technologies (Pty) Ltd)

Other Projects:

» June 2014: Screening and pre-feasibility report- Site assessment for the proposed Wind Energy Facility near Van Reenen, KwaZulu Natal and Free State Provinces (for 4Green Development SA)
» October 2015: Environmental, Social and Governance (ESG) Due Diligence- Development of the Hilton Garden Inn by United African Group, Windhoek, Namibia (for Vantage Capital)
» September 2015 - February 2016: Preparation, Development and Gazetting of the Environmental Implementation Plan (EIP) 2015-2020. (for Gauteng Department of Agriculture and Rural Development)

Curriculum Vitae

GA Botha

Personal Information:

Full names and surname:	Gerhardus Alfred Botha
Date of birth:	11 April 1986
Identity number:	860411 5136 088
Postal address:	PO BOX 298 BLOEMFONTEIN 9300
Residential address:	Eunice House 3 Jock Meiring Street Park West BLOEMFONTEIN 9301
Cell phone number:	084 207 3454
Email address:	gabotha11@gmail.com
Gender:	Male
Nationality:	South African citizen
Health:	Excellent
Criminal offences:	None
Marital status:	Married
Bilingualism:	Very good – English and Afrikaans
Hobbies:	- Photography - Hiking and Camping - Sport and Physical Exercise - Reading

Educational Background:

1. Secondary Education:

Name of School: Marais Viljoen High School

Highest Standard Passed: National Senior Certificate – Grade 12 (Passed with merit)

Year: 2004

Subjects passed:		
	Afrikaans First Language	HG
	English Second Language	HG
	Mathematics	HG
	Physical Sciences	HG
	Biology	HG
	Technical Mechanics	HG

2. Tertiary Education:

Obtained the following degrees from the University of the Free State (UFS) (see Appendix A for copies of degrees):

- **Baccalaureus Scienteae [B.Sc]** degree majoring in Zoology and Botany.
- **B.Sc Honours degree** majoring in Botany (Vegetation Ecology) with the following thesis theme:
  " Phytosociological study of a section of the panhandle of the Okavango Delta, Botswana."
  Other subjects: Ecology, Limnology and Wildlife Management
- Currently completing a **M.Sc degree** in Botany (Vegetation Ecology) with the following thesis theme:
  " Phytosociological study of a fossil river (Nxamaseri) connected to the panhandle of the Okavango Delta, Botswana."

3. Short Courses:

- Attended the following UFS (University of the Free State) accredited courses (See Appendix B for copy of certificate):
  - **Wetland Management** (ecology, hydrology, biodiversity and dileation)
  - **Introduction to GIS & GPS** (Code: GISA 1500S).

Professional Society Affiliations:

- The South African Council for Natural Scientific Professions: Pr. Sci. Nat. Reg. No. 400502/14 (Botany and Ecology).

Employment

Position: Environmentalist and Vegetation Ecologist
Employer: Enviroworks
Duration: January 2010 – December 2012

Position: Environmentalist and Vegetation Ecologist
Employer: GreenMined (Pty) LTD
Duration: On contract basis: January 2012 – current date.

Position: Environmentalist and Vegetation Ecologist
Employer: Eco-Care Consultancy (Pty) LTD
Duration: On contract basis: January 2012 – current date.

Position: Ecologist
Employer: Savannah Environmental (Pty) LTD
Duration: On contract basis: January 2014 – current date.

The Performance Areas for Enviroworks were as follows:

1. Environmental Impact Management

RESPONSIBILITIES

- Conduct and coordinate Environmental Impact Assessments (EIA).
- Environmental Monitoring and Auditing.
- Compile Environmental Management Plans.
- Environmental Management during construction (ECO).
- Run Public Participation Processes.

2. Mining Impact Management

RESPONSIBILITIES

- Compile Environmental Management Impact Reports (EMPR).

3. Reclamation Ecology

RESPONSIBILITIES

- Compile Wetland Rehabilitation Reports.
- Compile Vegetation Rehabilitation/Reclamation Reports.
- Conduct alien vegetation species management and compile eradication plans.
- Conduct Search & Rescue of Flora and Fauna.
- Compile Fire Management Plans.
- Compile Conservation Management Plans.

4. Game and Veld Management

RESPONSIBILITIES

- Compile Business and Management Plans for the keeping of large predators.
- Determining of carrying capacity.
- Conduct and facilitate agricultural feasibility studies.

General Competencies & Experience:

1. Proven track record in project management

Worked as a Project Manager for a number of projects including the following:

- Agricultural Potential and Pre-Feasibility Study for Maluti FET College on a farm near Harrismith.
- ECO Manager for the laying of optic fiber cables within the road reserve of the N1 between Bloemfontein and Beaufort West.

2. Negotiation skills

As an environmental practitioner I had to continuously convince non-willing participants of environmental matters. In working with authorities verbal negotiation is also a necessary skill I have obtained.

3. Conflict Resolution

Almost on a daily basis, an environmental practitioner faces conflict. Sometimes as a part to the conflict or as a mediator. This has taught me to be able to handle different people with different interest and points of view.

4. Computer Skills

I am quite comfortable with most software packages and have a keen interest in learning future software packages.

5. Environmental work relating experiences.

- I have successfully compiled a number of EIA's, EMP's etc.
- I have conducted various Vegetation and Ecological Studies in various regions.
- I've managed a research team during an Agricultural Potential and Pre-Feasibility Study for Maluti FET College.
- I also took part in the research itself for the above mentioned project (my "leg" of the project comprised out of the vegetation study, carrying capacity study and veld management recommendations).
- I have a thorough experience of ECO work which include:
    - ECO work for the refurbishment of a 22kV line between Edenburg and Gariep.
    - ECO work for the laying of optic fiber cables within the road reserve of the N1 from Bloemfontein to Laingsburg.
    - ECO work for the construction of a 22kV line in the Vredefort Dome.

6. Experience in working in sensitive and unique areas.

I have conducted vegetation studies and other environmental projects in various sensitive habitats including vegetation sensitive areas such as:

- Agulhas National Park
- Magalies Mountain Region
- Beaufort West / Laingsburg Region – ECO work, Search and Rescue as well as a Vegetation Rehabilitation Plan,
- Daveyton Region - EIA and Vegetation Study in an area closely associated with the sensitive Blesbokspruit Wetland System,
- West Coast Region (Melkbosstrand, Yzerfontein, Darling & Atlantis) - Writing of EIA Report for the laying of optic fiber. I also accompanied Dr. David J. McDonald during the Vegetation Survey.
- Drakensberg Region - Vegetation study as well as Search and Rescue for a proposed resort development near the uKhahlamba Drakensberg Park.
- Vredefort Dome (UNESCO World Heritage Site) – ECO work for the construction of a 22kV Power Line (Work include basic Vegetation Study, Search and Rescue of conservation worthy species etc.),

- Ecological Survey for a proposed Eskom powerline located within a section of the Sekhukhuneland Centre of Plant Endemism,
- Kriel and Emalahleni Regions - Ecological Studies and Wetland Delineation within areas containing important and senstive wetlands,
- Scottburgh Region – Vegetation study within the Critically Endangered; Interior South Coast Grassland Ecosystem.
- Okavango Delta – See Tertiary Education (B.Sc Honours & M.Sc).

7. Other work relating experiences.

Excursions:

The following excursions were undertaken together with the faculties mentioned from the University of the Free State.

- De Hoop Nature Reserve together with die Department of Zoology in 2007, and the Department of Plant Sciences in 2008.
- Department of Entomology excursion to Hogsback in 2007.
- Excursion to the Okavango Delta in June/July 2006 and June and December of 2008 as part of a research team from the Department of Zoology.
- Wildlife management excursion to Twee Riviere together with Professor Nico Smit.
- Accompanied Professor Johan du Preez on numerous occasions to Namibia, Botswana and Zimbabwe during research conducted there.

Tutorial:

I am passionate about ecology and enthusiastic about sharing my knowledge with others. I have good people skills and the ability to communicate effectively in an educational environment of which the following serves as proof:

- Practical laboratory assistent in service of the Department of Zoology from 2007 to 2009.
- Practical laboratory assistent in service of the Department of Plant Sciences in 2008 and 2009.
- Presented interactive information sessions to Bloemfontein school learners on National Arbour Day.

Other (holiday jobs):

- Printing company: Invisible Card Company
Mr D Smart
Cell: 082 377 5010

- Vehicle service station: Supercraft Service Centre
Mr A Meyer
Cell: 083 307 1521

References:

1. Christine Fouché
   Manager: GreenMined (Pty) LTD
   Cell: 084 663 2399

2. Professor J du Preez
   Senior lecturer: Department of Plant Sciences
   University of the Free State
   Cell: 082 376 4404

APPENDIX A

COPIES OF DEGREES

UNIVERSITEIT VAN DIE VRYSTAAT

UNIVERSITY OF THE FREE STATE

HIERMEE WORD VERKLAAR DAT DIE GRAAD THIS IS TO CERTIFY THAT THE DEGREE

Baccalaureus Scientiae

TOEGEKEN IS AAN
HAS BEEN CONFERRED UPON

BOTHA, Gerhardus Alfred

NADAT AAN DIE STATUTE EN REGULASIES VAN DIE UNIVERSITEIT VOLDOEN IS. AS BEWYS DAARVAN PLAAS ONS ONS ONDERSKEIE HANDTEKENINGE EN DIE SEëL VAN DIE UNIVERSITEIT HIERONDER.

IN ACCORDANCE WITH THE STATUTES AND REGULATIONS OF THE UNIVERSITY. AS WITNESS OUR RESPECTIVE SIGNATURES AND THE SEAL OF THE UNIVERSITY BELOW.

ENDOSSEMENT: DIERKUNDE
ENDORSEMENT: ZOOLOGY

WAARNEMENDE VISEKANSELIER/
ACTING VICE-CHANCELLOR

DEKAAN/DEAN

REGISTRATEUR/REGISTRAR

BLOEMFONTEIN
2009-04-23
2005005364

UNIVERSITEIT VAN DIE VRYSTAAT

UNIVERSITY OF THE FREE STATE

HIERMEE WORD VERKLAAR DAT DIE THIS IS TO CERTIFY THAT THE

Baccalaureus Scientiae Honores

in PLANTKUNDE

in BOTANY

TOEGEKEN IS AAN
HAS BEEN CONFERRED UPON

BOTHA, Gerhardus Alfred

NADAT AAN DIE STATUTE EN REGULASIES VAN DIE UNIVERSITEIT VOLDOEN IS. AS BEWYS DAARVAN PLAAS ONS ONS ONDERSKEIE HANDTEKENINGE EN DIE SEËL VAN DIE UNIVERSITEIT HIERONDER.

IN ACCORDANCE WITH THE STATUTES AND REGULATIONS OF THE UNIVERSITY, AS WITNESS OUR RESPECTIVE SIGNATURES AND THE SEAL OF THE UNIVERSITY BELOW.

VISE-KANSELIER/VICE-CHANCELLOR

WAARNEMENDE DEKAAN/ACTING DEAN

BLOEMFONTEIN
2018-05-18
2019/05361

DIREKTEUR: AKADEMIESE STUDENTEDIENSTE
DIRECTOR: STUDENT ACADEMIC SERVICES

APPENDIX B

OTHER CERTIFICATES

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Gerhardus Alfred Botha

Registration number: 400502/14

is registered as a

Professional Natural Scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule I of the Act)

Ecological Science	**28 January 2015**
Botanical Science	**19 November 2014**

28 January 2015

Pretoria

President

Executive Director

UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
YUNIVESITHI YA
FREISTATA

UFS·UV
NATURAL AND
AGRICULTURAL SCIENCES
NATUUR- EN
LANDBOUWETENSKAPPE

This is to certify that

Gerhard Botha

has successfully completed a

Wetlands Management: Introduction and Delineation Short Course

4 – 8 November 2013

Course Presenter:
Mr. Piet-Louis Grundling

Prof. M.T. Seaman
Director: Centre for
Environmental Management

UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
YUNIVESITHI YA
FREISTATA

UFS·UV
NATURAL AND
AGRICULTURAL SCIENCES
NATUUR- EN
LANDBOUWETENSKAPPE

CERTIFICATE OF ATTENDANCE | BYWONINGSERTIFIKAAT

This is to certify that | Hiermee word gesertifiseer dat

GA Botha

attended a Short Learning Programme (five days) presented by the Centre for Environmental Management, University of the Free State, during the period 14 to 18 July 2014.

'n Kort Leerprogram (vyf dae), aangebied deur die Sentrum vir Omgewingsbestuur, Universiteit van die Vrystaat, vanaf 14 tot 18 Julie 2014 bygewoon het.

INTRODUCTION TO GIS & GPS | INLEIDING TOT GIS & GPS

Code | Kode

GISA1500S

CREDITS: 4* | KREDIETE: 4*
NQF LEVEL: 5 | NKR-VLAK: 5

CONTENT OF THE SHORT LEARNING PROGRAMME
History and theory of GIS and GPS
Spatial data structures
Spatial data symbolisation, analysis and interpretation
Map design

INHOUD VAN DIE KORT LEERPROGRAM
Geskiedenis en teorie van GIS en GPS
Ruimtelike datastrukture
Simbolisering, ontleding en interpretasie van ruimtelike data
Ontwerp van kaarte

LEARNING OUTCOMES
The attendee is able to:
Understand key terms, facts, principles and theories
Apply techniques to represent spatial data
Solve problems using relevant GIS and GPS technology
Access, process and manage spatial data sheets and present spatial data in the vorm of maps

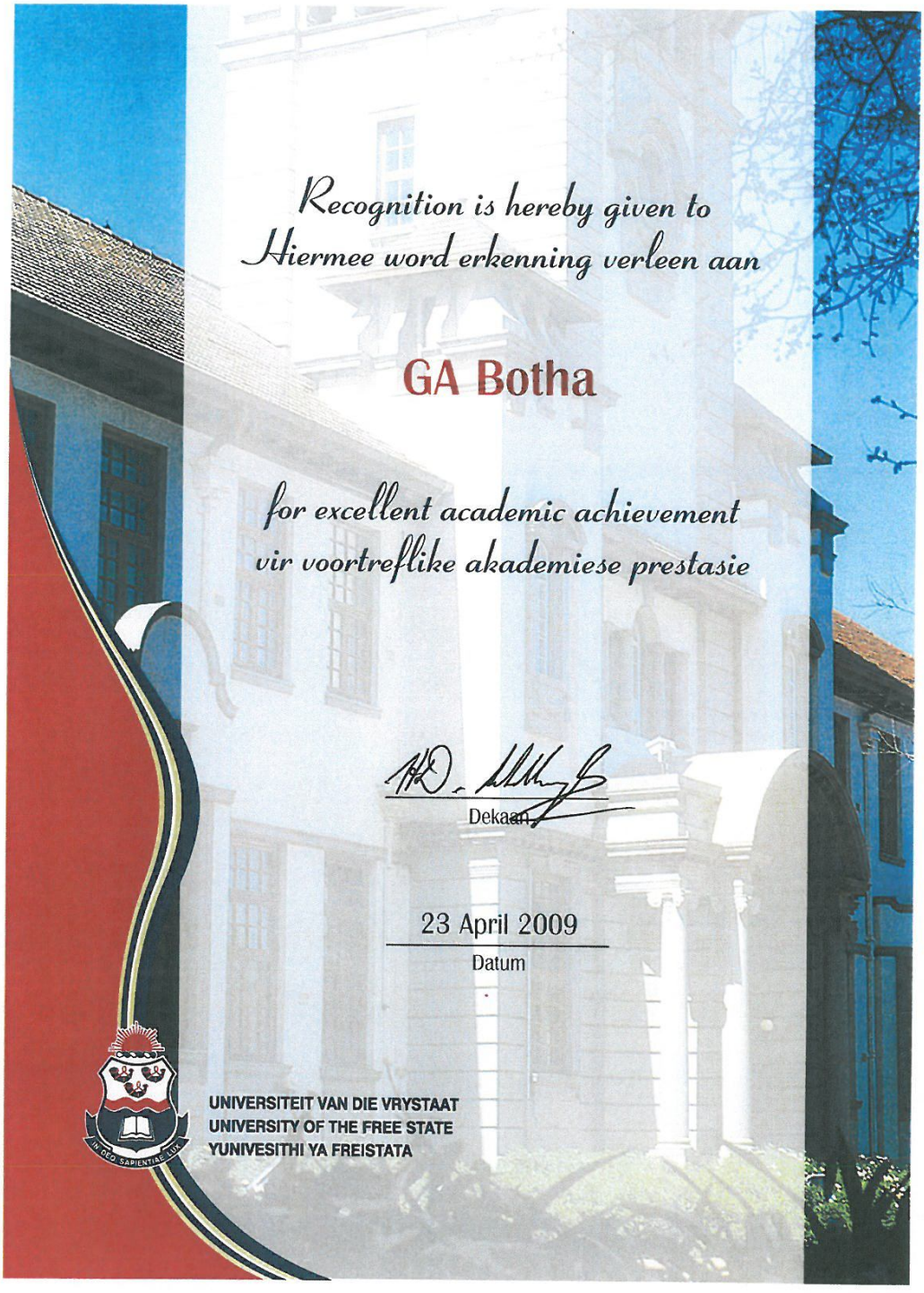
LEERUITKOMSTE
Die deelnemer is in staat om:
Sleutelterme, beginsels en teorieë te begryp
Tegnieke toe te pas om ruimtelike data voor te stel
Probleme op te los met behulp van toepaslike GIS en GPS tegnologie
Ruimtelike datavelle te bekom, verwerk en bestuur
en ruimtelike data in die vorm van kaarte voor te stel

Prof. NJL Heideman
Dean / Dekaan

Me. MF Avenant
Programme Director / Programdirekteur

23 July 2014
Bloemfontein

Certificate number/Sertifikaatnommer: GISA1500S013
*Not credit-bearing towards a UFS qualification/module/Nie-kredietdraend tot 'n UV-kwalifikasie/module nie



Recognition is hereby given to
Hiermee word erkenning verleen aan

GA Botha

for excellent academic achievement
vir voortreflike akademiese prestasie

Dekaan

23 April 2009
Datum

UNIVERSITEIT VAN DIE VRYSTAAT
UNIVERSITY OF THE FREE STATE
YUNIVESITHI YA FREISTATA

Simon Todd Consulting

P.O.Box 71
Nieuwoudtville
8180
Simon.Todd@uct.ac.za
Grazing.Guidelines@gmail.com

H: 027 218 1276
C: 082 3326 502

SUMMARY OF EXPERTISE:
SIMON TODD

- Profession: Ecological Consultant
- Specialisation: Plant & Animal Ecology
- Years of Experience: 15 Years

Skills & Primary Competencies

- Research & description of ecological patterns & processes in Fynbos, Succulent Karoo, Nama Karoo, Thicket, Arid Grassland and Savannah Ecosystems.
- Ecological Impacts of land use on biodiversity
- Vegetation surveys & degradation assessment & mapping
- Long-term vegetation monitoring
- Faunal surveys & assessment.
- GIS & remote sensing

Tertiary Education:

- 1992-1994 – BSc (Botany & Zoology), University of Cape Town
- 1995 – BSc Hons, Cum Laude (Zoology) University of Natal
- 1996-1997- MSc, Cum Laude (Conservation Biology) University of Cape Town

Employment History

- 1997 – 1999 – Research Scientist (Contract) – South African National Biodiversity Institute
- 2000-2004 – Specialist Scientist (Contract) - South African National Biodiversity Institute
- 2004-2007 – Senior Scientist (Contract) – Plant Conservation Unit, Department of Botany, University of Cape Town
- 2007 Present – Senior Scientist (Associate) – Plant Conservation Unit, Department of Botany, University of Cape Town.

Experience Specific to the Current Proposal

- Conducted a large number of specialist assessments of wind energy facilities, distributed widely across South Africa and including sites in similar environments to the current study including several sites along the Mossel Bay – Gouritz coastline.
- Provided more than 10 full EIA assessments of wind energy facilities ranging from small developments of less than 20 turbines to very large projects in excess of 500 turbines and 50 000 ha.
- Worked on several wind energy facilities in areas with highly endangered species such as Riverine Rabbits and van Zyl's Golden Mole, which have required specific and specialized attention.
- Extensive experience in renosterveld vegetation types, as occur at the site. Currently supervising a UCT PhD student working on Renosterveld management in the Overberg region.

General Experience & Expertise

- Conducted a large number of fauna and flora specialist assessments distributed widely across South Africa.
- Extensive experience in the field and exceptional level of technical expertise, particularly with regards to GIS capabilities which is essential with regards to producing high-quality sensitivity maps for use in the design of final project layouts.
- Strong research background which has proved invaluable when working on several ecologically sensitive and potentially controversial sites containing some of the most threatened fauna in South Africa.
- Published numerous research reports as well as two book chapters and a large number of papers in leading scientific journals dealing primarily with human impacts on the vegetation and ecology of South Africa.
- Maintain several long-term vegetation monitoring projects distributed across Namaqualand and the karoo.
- Guest lecturer at two universities and have also served as an external examiner.
- Reviewed papers for more than 10 international ecological journals.
- Past chairman and current committee member of the Arid Zone Ecological Forum.
- SACNASP registered as a Professional Natural Scientist, (Ecology) No. 400425/11.

A selection of recent work is as follows:

Specialist Assessments:

Bitterfontein Solar Plant - Fauna & Flora Specialist Assessment. Specialist Report for Cape EAPrac. 2012.

Beaufort West Solar Facility, Erf 7388 - Fauna & Flora Specialist Assessment. Specialist Report for Cape EAPrac. 2012.

Plant Sweeps on Portion 2 of the Farm Demaneng 546, Kuruman District, Northern Cape Province for SA Manganese. 2011.

Proposed Olyven Kolk Solar Power Plant, Northern Cape: Botanical and Faunal Specialist Assessment. Specialist Report for Environmental Resources Management (ERM). 2011.

Klawer Wind Farm: Ecological and Biodiversity Assessment: Terrestrial Vertebrate Fauna & Botanical Specialist Study. Specialist Report for Environmental Resources Management. 2011.

Witberg Wind Farm: Ecological and Biodiversity Assessment: Terrestrial Vertebrate Fauna & Botanical Specialist Study. Specialist Report for Environmental Resources Management. 2011.

Lambert's Bay Wind Farm: Ecological and Biodiversity Assessment: Terrestrial Vertebrate Fauna & Botanical Specialist Study. Specialist Report for Environmental Resources Management. 2011.

Environmental Impact Assessment: Terrestrial Ecology Specialist Study for the Proposed Establishment of a Renewable Energy Facility near Sutherland, Western and Northern Cape Provinces. Specialist Report for Environmental Resources Management. 2011.

Ecological Scoping & Baseline Study. Vleesbaai Wind Park Development. Vleesbaai Independent Power Producers, ERM 2011.

Environmental Impact Assessment: Terrestrial Ecology Specialist Study for the Proposed Establishment of a Renewable Energy Facility near Beaufort West, Western Cape Province. Specialist Report for Environmental Resources Management. 2010.

Environmental Impact Assessment: Terrestrial Ecology Specialist Study for the Proposed Establishment of a Renewable Energy at Konstabel, Western Cape Province. Specialist Report for Environmental Resources Management. 2010.

Environmental Impact Assessment: Terrestrial Ecology Specialist Study for the Proposed Establishment of a Renewable Energy Facility at Perdekraal, Western Cape Province. Specialist Report for Environmental Resources Management. 2010.

Environmental Impact Assessment: Terrestrial Ecology Specialist Study for the Proposed Establishment of a Renewable Energy Facility near Victoria West, Western and Northern Cape Provinces. Specialist Report for Environmental Resources Management. 2010.

Research Reports & Peer Reviewed Publications:

Todd, S.W. 2010. Vegetation and Plant Communities Associated with the Tillite and Dolerite Renosterveld Types of the Avontuur Conservation Area, Nieuwoudtville, South Africa. DRYNET.

Todd, S.W., Milton, S.J., Dean, W.R.J. Carrick, P.J. & Meyer, A. 2009. Ecological best Practice Guidelines for the Namakwa District. The Botanical Society of South Africa.

Todd, S.W. 2009. Field-Based Assessment of Degradation in the Namakwa District. Final Report. Mapping Degradation in the Arid Subregions of the BIOTA South Transect. SANBI.

Todd, S.W. 2009. A fence-line in time demonstrates grazing-induced vegetation shifts and dynamics in the semi-arid Succulent Karoo. *Ecological Applications*, 19: 1897–1908.

Todd, S.W. 2007. Characterisation of Riparian Ecosystems. D14 of The WADE Project. Floodwater Recharge of Alluvial Aquifers in Dryland Environments. *GOCE-CT-2003-506680- WADE.* Sixth Framework Programme Priority 1.1.6.3 Global Change and Ecosystems.

Todd, S.W. 2006. Gradients in vegetation cover, structure and species richness of Nama-Karoo shrublands in relation to distance from livestock watering points. *Journal of Applied Ecology* 43: 293-304.

Benito, G., Rohde, R., Seely, M., Külls, C., Dahan, O., Enzel, Y., **Todd, S**. Botero, B., Morin, E., Grodek, T., Roberts, C. 2010. Management of Alluvial Aquifers in Two Southern African Ephemeral Rivers: Implications for IWRM. *Water Resources Management*, 24:641–667.

Hahn, B.D., Richardson, F.D., Hoffman, M.T., Roberts, R., **Todd, S.W.** and Carrick, P.J. 2005. A simulation model of long-term climate, livestock and vegetation interactions on communal rangelands in the semi-arid Succulent Karoo, Namaqualand, South Africa*. Ecological Modelling* 183, 211–230.

Malgas, R.R., Potts, A.J., Oettlé, N.M., Koelle, B., **Todd, S.W.**, Verboom G.A. & Hoffman M.T.. 2010. Distribution, quantitative morphological variation and preliminary molecular analysis of different growth forms of wild rooibos (*Aspalathus linearis*) in the northern Cederberg and on the Bokkeveld Plateau. *South African Journal of Botany*, 76, 72-81.

Mills, A., Fey, M., Donaldson, J.D., **Todd, S.W**. & Theron, L.J. 2009. Soil infiltrability as a driver of plant cover and species richness in the semi-arid Karoo, South Africa. *Plant and Soil* 320: 321–332.

Rahlao, J.S., Hoffman M.T., **Todd, S.W**. & McGrath, K. 2008. Long-term vegetation change in the Succulent Karoo, South Africa following 67 years of rest from grazing. *Journal of Arid Environments*, 72, 808-819.

Hoffman, M.T. & **Todd, S.W.** 2010. Using Fixed-Point Photography, Field Surveys, And Gis To Monitor Environmental Change: An Example From Riemvasmaak, South Africa. Chapter In *Repeat Photography: Methods And Applications In The Natural Sciences.* R.H. Webb, Editor. Island Press. In Press.

RESUME
OF
BLAIR ANTHONY ZOGHBY

Personal details	
Name	Blair Anthony Zoghby
Date of birth	8 July 1988
Citizenship	South Africa and The Netherlands
Address	
Home	113 9th Street Linden Johannesburg 2195 South Africa
Contact details	
Mobile	+27 72 227 5191
Home	+27 11 782 4502
Fax	+27 11 388 8583
E-mail	blair.zoghby@gmail.com
Education and qualifications	
2006	De La Salle Holy Cross College (Matric)
2008 - 2010	University of the Witwatersrand School of Geography, Archaeology and Environmental Studies Bachelor of Arts (Earth Sciences) with majors in: • *Geography* o *Fundamentals of Conservation of Biogeography (81%)* o *GIS and Remote Sensing (80%)* o *Advanced Atmospheric Sciences (70%)* o *Climate and Environmental change (74%)* • *Archaeology III (66%)* Awards • *Archaeology: Best Student in Second Year* • *P D Tyson Climatology Award for Best Student in Third Year*
2011	University of the Witwatersrand School of Geography, Archaeology and Environmental Studies Bachelor of Science with Honours in Geography and Environmental Studies with the following subjects: • *Animal Behaviour and Ecology (85%)* • *Conservation of Biogeography (70%)* • *Advanced GIS and Remote Sensing (75%)* • *Climate Change (75%)* Honours Research Project "Avifaunal responses to vegetation characteristics around pans of the Makuleke Ramsar Wetland Site, Kruger National Park."
2012 - 2015	University of Cape Town Department of Zoology Percy FitzPatrick Institute of African Ornithology Master of Science in Zoology by dissertation Masters Research Project "Fine-scale movement and habitat use of the Southern Ground-Hornbill *Bucorvus leadbeateri"*

Other relevant courses and qualifications	
2004	Sappi Brett Bird Identification course
2008	Field Guides Association of Southern Africa (FGASA) Level 1 theory
2008	Wilderness First Aid level 1
2009	Field Guides Association of Southern Africa (FGASA) Level 1 practical assessment. Competent to guide in Sabi Sands and surrounding game reserves of the Greater Kruger National Park
2009	Advanced Rifle Handling theory and practical
2009	South African Marine Safety Association (SAMSA) inland waters watercraft skipper
2009	Registered as Nature Site Guide with DEAT
2011	Field Guides Association of Southern Africa (FGASA) Savanna Biome Specialist Bird Guide
Relevant experience	
2004 - 2015	SANParks Honorary Rangers Birding events in Kruger National Park at Lower Sabie, Shingwedzi, Olifants and Satara camps: *Responsibilities included:* • *Guest and activity logistics* • *Birding expert and guide: 2009 - 2015*
2008 & 2009	South African National Parks Scientific Services: Biodiversity surveys in the Kruger National Park (Skukuza) from 1 December 2008 to 31 January 2009. *Responsibilities included:* • *Birding surveys* • *Vegetation condition assessments* • *Capturing and gathering relevant data on rodents, snakes, small reptiles, insects, frogs etc.* • *Recording of data and storing of specimens*
2010 - 2015 (various times)	Savanna Private Game Reserve (Sabi Sands): Ranger / Guide. *Responsibilities included:* • *Leading game drives with guests* • *Leading game walks and acting as back-up rifle on trails* • *Sharing of knowledge with guests* • *Hosting dinners with guests* • *Vehicle, diesel, maintenance and general lodge activities*
2011	Kruger National Park (northern) Makuleke Concession on Limpopo / Luvuvhu floodplain *Honours research project fieldwork, data gathering and analysis including:* • *Birding transects* • *Fixed point birding sight and sound surveys* • *Vegetation diversity and structure assessments*

2011	Kgalagadi Transfrontier Park: *Participated in reconnaissance with SANParks staff and Honorary Rangers to map out an ecologically sensitive cycle route down the Nossob River for a future adventure cycle event.*
2011	University of Witwatersrand Tutor in the following subject: • *GIS for third year students*
2012 - 2014	Greater Kruger National Park Primarily in the Klaserie, Timbavati and surrounding game reserves *Masters research project fieldwork, data gathering and analysis:* *This study has the following overarching aims:* *1. To gain a scientific understanding of the fine-scale movement and habitat use patterns of Southern Ground-Hornbills.* *2. To use this knowledge to facilitate the reintroductions of ground-hornbills into areas previously occupied by the species.* *The data gathered includes group composition, nest parameters and reproductive performance as well as vegetation characteristics. Certain ground-hornbill groups carry satellite transmitters, transmitting positional data hourly. This data as well as data from untagged birds is overlaid on a detailed vegetation map of the area to assess daily and seasonal patterns of habitat use and will be used to guide reintroduction programmes in terms of identifying optimal habitat mosaics.*
2012 - 2013	Endangered Wildlife Trust Carnivore Conservation Project Field Officer: Kruger National Park Wild Dog Project (North) *Responsibilities included:* • *Assessing the threats to Wild Dogs within and along the western boundary of the park* • *Effect of human interaction and communities on the behavioural patterns of African wild dogs* • *Collecting primary and secondary data on Wild Dogs north of the Olifants River* • *Managing database* • *Report writing* • *Liaising with park staff and EWT conservation managers* • *Raising awareness about the project and the species*
2013 – 2014	Savannah Environmental Ecologist *Responsibilities included:* • *Acted as the in-house faunal specialist, with specific applications in avifauna and mammals* • *Conducted baseline and specialist biodiversity surveys in the field, as well as on-going monitoring programmes (including wind farm monitoring)* • *Report writing throughout the Environmental Impact Assessment process, as well as Environmental Management Plans*

2015 - present	Simon Todd Consulting Specialist Terrestrial Ecologist *Responsibilities include:* • *Conducting baseline and specialist biodiversity surveys in the field, as well as on-going monitoring programmes* • *Conducting specialist research studies (specifically on avifauna and mammals)* • *Report writing throughout the Environmental Impact Assessment process, as well as Environmental Management Plans*
Other work experience	
2005 2006 - 2010 2007	Full Stop Restaurant: Waiter Service Station Restaurant: Waiter Keswick Country House and Lodge, Lake District, UK: Worked from May to October during GAP year after school. *Responsibilities included:* • *Bar functions- serving, stocking* • *Banqueting and functions* • *Guest relations* • *Night duty manager* • *Housekeeping*
Clubs and societies	
	FGASA (membership number 1328) Loch Vaal Water Ski Club Johannesburg Country Club Wits University Golf Club Explorers Club (at Wits) Aquatics Club (at Wits)
Interests and hobbies	
	Birding Wildlife Photography Fly fishing Water sports Golf Soccer (Wits University team) Squash Travel (SA wildlife orientated, USA, Europe, Australia)
Competencies and strengths	
	I am a very determined person and once I put my mind to achieving my goals I work very hard and will make whatever sacrifices are necessary to achieve my aspirations. I have an outgoing, friendly personality and get on well with people at an individual level as well as at a group or team level. I have overcome many obstacles in life through my determination and strong character and my will to succeed. I am physically fit, strong and healthy. I have a passion for birding and wildlife conservation and have always wanted to pursue a career in some aspect of wildlife or ornithology research and conservation. I thoroughly enjoy research and completed my Masters in Science dissertation, specialising in Zoology, in 2015.

References	
Graeme Ellis	South African National Parks Scientific Services (previously with Organisation for Tropical Studies) 079-881-5215
Michele Hofmeyr	South African National Parks Scientific Services 083-290-2078 / 013-735-4240
Kelly Marnewick	Endangered Wildlife Trust Carnivore Conservation Project Manager 082-451-6376
Dr Ian Whyte	South African National Parks (formerly) Scientific Services 082-908-2686 / 013-767-1196
Marianne Strohbach	Savannah Environmental Head Ecologist marianne@savannahsa.com
Prof. Peter Ryan	University of Cape Town Director: Percy FitzPatrick Institute of African Ornithology 021-650-2966
Dr Rob Little	University of Cape Town Manager: DST/NRF Centre of Excellence 021-650-4026
Paddy Hagelthorn	Savanna Private Game Reserve General Manager 082-497-0062 / 013-735-8700
Neil Whyte	Savanna Private Game Reserve Head Ranger 082-567-1689 / 013-735-8700
Mark Anderson	BirdLife South Africa Chief Executive Officer 082-788-0961
Duncan Pritchard	BirdLife Southern Africa (formerly) 083-225-5960
Irving Knight	South African National Parks Head Guide: Kruger National Park 082-735-7459

CURRICULUM VITAE

JACO VAN DER WALT

Profession : Archaeologist
Specialisation : Cultural Resource Management and Iron Age Archaeology
Work experience : 10 years

SKILLS BASE AND CORE COMPETENCIES

- Archaeological Impact Assessments
- Heritage Impact Assessments
- Heritage Management Plans
- Archaeological research projects
- Cultural resource management
- Phase II cultural resource management projects: archaeological excavations
- Grave relocation
- Project Management

TERTIARY EDUCATION

- 2001, BA Archaeology (Cultural Heritage Tourism), University of Pretoria (SA)
- 2002, BA Archaeology (Hons) , University of Witwatersrand (SA)
- Present, Masters Archaeology, University of Witwatersrand (SA)

EMPLOYMENT HISTORY

- 2011 – Present: Founder and owner of Heritage Contracts and Archaeological Consulting CC. 2007 – 2010: CRM Archaeologist, Managed the Heritage Contracts Unit at the University of the Witwatersrand
- 2005 - 2007: CRM Archaeologist, Director of Matakoma Heritage Consultants
- 2004: Technical Assistant, Department of Anatomy University of Pretoria
- 2003: Archaeologist, Mapungubwe World Heritage Site Archaeological Rehabilitation Project
- 2001 - 2002: CRM Archaeologists, For R & R Cultural Resource Consultants, Polokwane
- 2000: Museum Assistant, Fort Klapperkop, Pretoria

SELECTED RELEVANT PROJECT EXPERIENCE

- Archaeological Impact Assessment for the Chronimet Underground Mine, Opencast mine, process plant, Amandelbult, Limpopo Province.
- Archaeological And Palaeontological Impact Assessment For The Updated EMP for Trans Hex Mining Operations, Richtersveld, Northern Cape
- Archaeological Impact Assessment for Sasol's project Mafuta, Lephalale, Limpopo Province.
- Archaeological and Heritage Statement for the Proposed Lg5 Opencast Mining Area, North West Province
- Field supervisor at Mapungubwe (World Heritage Site) Archaeological Rehabilitation project
- Field Director for Iron Age mitigation for chrome Mining by Hernic Ferrochrome, North West Province.
- Field Director phase 2 documentation for The Heads Trust, Heritage Assessment, and monitoring for Lydenburg Ext 38 housing development, Lydenburg, Mpumalanga, principle investigator Prof. T. Huffman
- Field Director phase 2 documentation for Sterkspruit housing development, Lydenburg, Mpumalanga.

- Field Director Middle Iron Age Mitigation For Wesizwe Platinum mining, principle investigator.
- Field Director Phase 2 documentation of Khoni Iron Age Settlement Lydenburg.
- Field Director for the Archaeological Mitigation For Booysendal Platinum Mine, Steelpoort, Limpopo Province.
- Monitoring of heritage sites affected by the ARUP Transnet Multipurpose Pipeline from Jhb to Durban
- Field Director for the Phase 2 mapping of a late Iron Age site located on the farm Kameelbult, Zeerust, North West Province.

CURRICULUM VITAE

ELIZE BUTLER

PROFESSION: Palaeontologist

YEARS' EXPERIENCE: 23 years in Palaeontology

EDUCATION:

B.Sc Botany and Zoology, 1988

University of the Orange Free State

B.Sc (Hons) Zoology, 1991

University of the Orange Free State

Management Course, 1991

University of the Orange Free State

M. Sc. *Cum laude* (Zoology), 2009

University of the Free State

Dissertation title: THE POSTCRANIAL SKELETON OF THE EARLY TRIASSIC NON-MAMMALIAN CYNODONT *GALESAURUS PLANICEPS*: IMPLICATIONS FOR BIOLOGY AND LIFESTYLE

Registered as a PhD fellow at the Zoology Department of the UFS

2013 to current

Dissertation title: A NEW GORGONOPSIAN FROM THE UPPERMOST *DICYNODON ASSEMBLAGE ZONE*, KAROO BASIN OF SOUTH AFRICA

MEMBERSHIP

Palaeontological Society of South Africa (PSSA) 2006-currently

EMPLOYMENT HISTORY

Part time Laboratory assistant	Department of Zoology & Entomology University of the Free State Zoology 1989-1992
Part time laboratory assistant	Department of Virology

	University of the Free State Zoology 1992
Research Assistant	National Museum, Bloemfontein 1993 – 1997
Principal Research Assistant and Collection Manager	National Museum, Bloemfontein 1998 – currently

TECHNICAL REPORTS

PIA desktop: Palaeontological Impact Assessment of the proposed development of private dwellings on portion 5 of farm 304 Matjesfontein Keurboomstrand, Knysna District, Western Cape Province. 2014.

PAI site visit and report: Palaeontological Impact Assessment for the proposed upgrade of existing water supply infrastructure at Noupoort, Northern Cape Province. 2014.

PIA desktop: Palaeontological impact assessment of the proposed consolidation, re-division and development of 250 serviced erven in Nieu-Bethesda, Camdeboo local municipality, Eastern Cape. 2015.

PAI site visit and report: Palaeontological impact assessment of the proposed mixed land developments at Rooikraal 454, Vrede, Free State. 2015.

PIA exemption report: Palaeontological exemption report of the proposed truck stop development at Palmiet 585, Vrede, Free State. 2015.

PAI site visit and report: Palaeontological impact assessment of the proposed Orange Grove 3500 residential development, Buffalo City Metropolitan Municipality East London, Eastern Cape. 2015.

PAI site visit and report: Palaeontological Impact Assessment of the proposed Gonubie residential development, Buffalo City Metropolitan Municipality East London, Eastern Cape Province. 2015.

PAI site visit and report: Palaeontological Impact Assessment of the proposed Ficksburg raw water pipeline. 2015

PAI site visit and report: Palaeontological Heritage Impact Assessment report on the establishment of the 65 mw Majuba Solar Photovoltaic facility and associated infrastructure on portion 1, 2 and 6 of the farm Witkoppies 81 HS, Mpumalanga Province. 2015.

PAI site visit and report: Palaeontological Impact Assessment of the proposed township establishment on the remainder of portion 6 and 7 of the farm Sunnyside 2620, Bloemfontein, Mangaung metropolitan municipality, Free State Bloemfontein. 2015.

PIA desktop: Palaeontological Impact Assessment of the proposed Spectra foods broiler houses and abattoir on the farm Maiden Manor 170 and Ashby Manor 171, Lukhanji Municipality, Queenstown, Eastern Cape Province. 2015.

CONFERENCE CONTRIBUTIONS

NATIONAL

PRESENTATION

Butler, E., Botha-Brink, J., and F. Abdala. A new gorgonopsian from the uppermost *Dicynodon Assemblage Zone*, Karoo Basin of South Africa. 18 the Biennial conference of the PSSA 2014. Wits, Johannesburg, South Africa.

INTERNATIONAL

Attended the Society of Vertebrate Palaeontology 73th Conference in Los Angeles, America. October 2012.

CONFERENCES: POSTER PRESENTATION

NATIONAL

Butler, E., and J. Botha-Brink. Cranial skeleton of *Galesaurus planiceps*, implications for biology and lifestyle. University of the Free State Seminar Day, Bloemfontein. South Africa. November 2007.

Butler, E., and J. Botha-Brink. Cranial skeleton of *Galesaurus planiceps*, implications for biology and lifestyle. 14th Conference of the PSSA, Matjiesfontein, South Africa. September 2008:

Butler, E., and J. Botha-Brink. The biology of the South African non-mammaliaform cynodont *Galesaurus planiceps*.15th Conference of the PSSA, Howick, South Africa. August 2008.

INTERNATIONAL VISITS

Natural History Museum, London July 2008

Paleontological Institute, Russian Academy of Science, Moscow

November 2014

CURRICULUM VITAE
JONATHAN H. MARSHALL
Landscape Architect and Environmental Assessment Practitioner for Environmental Planning & Design cc

SKILLS BASE AND CORE COMPETENCIES

- Chartered Landscape Architect (UK).
- Certified Environmental Assessment Practitioner of South Africa.
- Visual Impact Assessment utilising the the Government of the Western Cape Guideline for Involving Visual and Aesthetic Specialists in EIA Processes and the Landscape Institute and Institute of Environmental Management and Assessment (UK) Guidelines for Landscape and Visual Impact Assessment.

EMPLOYMENT HISTORY

- Landscape Assistant, WS Atkins (UK) 1979 – 1981.
- Landscape Architect, Brian Clouston and Partners (Hong Kong) 1981 – 1989.
- Director, Brian Clouston and Partners (Australia) 1989 - 1990.
- Principal Landscape Architect, Gillespies (UK) 1990 – 1992.
- Principal, Opus Environment (UK) 1992 – 1995.
- Director, Environmental Design Partnership (SA) 1995 – 1998.
- Principal, Environmental Planning and Design (SA) 1998 – present.

TERTIARY EDUCATION

- Diploma in Landscape Architecture, Gloucestershire College of Art and Design, UK (1979).
- Environmental Law Short Course, University of KZN (1997)

SELECTED RELEVANT PROJECT EXPERIENCE

Visual impact assessments for developments in the Hong Kong, the UK, Ghana Guinea, Gauteng, Free State, KwaZulu-Natal, Mpumalanga. Examples of larger projects include:

- Solar plant projects including photovoltaic and concentrating solar power plants – Numerous projects for Eskom and private clients in the Northern Cape, Limpopo, Mpumalanga and the Free State.
- Proposed new mines and tailings facilities associated with existing mines in Ghana and Guinea.
- Four major shopping centre developments including projects in the UK and South Africa.
- A new international airport development to the north of Durban.
- Heavy industrial developments including a ferrochrome smelter in Richards Bay.
- Numerous new road and road upgrade proposals including projects in Hong Kong, the UK and South Africa.
- Long term landfill planning in the Durban area.
- Numerous power line proposals including projects for Eskom in the Free State and KwaZulu Natal.
- Aesthetic guideline documents including building massing in Hong Kong, development around estuaries in KwaZulu Natal.
- The provision of visual impact assessments as evidence for legal processes including parliamentary debate (UK), public enquiry (UK) and planning appeal (South Africa)
- Review of specialist reports prepared by other experts.

Dr Neville Bews & Associates
SOCIAL IMPACT ASSESSORS

Curriculum Vitae Neville Bews

Dr. Neville Bews & Associates – Johannesburg, South Africa

EDUCATION

- *B.A. (Soc), University of South Africa, 1980*
- *B.A. (Soc) (Hons), University of South Africa, 1984*
- *The Henley Post Graduate Certificate in Management, Henley Management College, United Kingdom*
- *M.A. (Cum Laude), Rand Afrikaans University, 1999*
- *D. Litt. et Phil., Rand Afrikaans University, 2000*

Dr Neville Bews is a senior social scientist and human resource professional with 36 years' experience. He consults in the fields of Social Impact Assessments and research, and human resource management. He has worked on a number of large infrastructure, mining and water resource projects. He at times lectures at both the Universities of Pretoria and Johannesburg and is a Senior Fellow in the Centre for Sociological Research, Department of Sociology, University of Johannesburg.

EMPLOYMENT HISTORY

Dr Neville Bews & Associates, Johannesburg, South Africa
Social Impact Assessment consultant and part-time lecturer, 2001 – date.
Leads social impact assessments, provides strategic social management advice to clients, acts as reviewer and mentor to young social scientists.

S A Eagle Company Ltd, Johannesburg, South Africa
Employee Relations Manager, 1992 - 2001
Human Resource management and administration; industrial relations; human resource related research projects; designing and leading implementation of research strategies; disciplinary and grievance hearings; negotiating with unions; corporate social responsibility.

Status Management Services
Human Resources Consultant, 1986 – 1992
Management training; employee assistance programmes; industrial relations; recruitment; disciplinary and grievance hearings; negotiating with unions; job evaluation.

City of Johannesburg
Professional Officer - Human Resources, 1977 - 1986
Industrial relations; disciplinary and grievance hearings; negotiating with unions; recruitment, selection and placement; management training; job evaluation.

EXPERIENCE – EXAMPLES

Water resources and regional planning Social Impact Assessments

Department of Water Affairs and Forestry **South Africa**
Social impact assessment for the Mokolo and Crocodile River (West) Water Augmentation Project for increased and assurance of water supply. Research socio-economic circumstances, data analysis, assessment, authored report.

The Aveng (Africa) Group Limited (Grinaker LTA) **South Africa**
Assisting the construction company with the social management of the Mokolo and Crocodile River (West) Water Augmentation Project. Consult and mediate between contractors and affected parties advise on strategies to reduce tensions between contractors and the public.

Department of Water Affairs and Forestry **South Africa**
Ncwabeni Off-Channel Storage Dam for security of water supply in Umzumbe, KwaZulu-Natal. Research socio-economic circumstances, data analysis, assessment, authored report.

Sedibeng District Municipality **South Africa**
Social impact assessment for the Environmental Management Plan for the Sedibeng District, on behalf of Felehetsa Environmental (Pty) Ltd. Research socio-economic circumstances, data analysis, assessment, authored report.

Felehetsa Environmental (Pty) Ltd **South Africa**
Social Impact Assessment for Waterfall Wedge housing and business development situated in Midrand Gauteng. Research socio-economic circumstances, data analysis, assessment, authored report.

NEMAI Consulting Environmental & Social Consultants **South Africa**
Ncwabeni: Off-Channel Storage Dam, KwaZulu-Natal. Research socio-economic circumstances, data analysis, assessment, authored report.

Department of Water and Sanitation **South Africa**
Mzimvubu Water Project Eastern Cape. Research socio-economic circumstances, data analysis, assessment, authored report.

Social Assessments for mining clients

Vale **Mozambique**
Socio-economic impact assessment of proposed Moatize power plant, Tete. Research socio-economic circumstances, data analysis, assessment, authored report.

Exxaro Resources Limited **South Africa**
Social impact assessment for the social and labour plan for Leeuwpan Coal Mine, Delmas. Research socio-economic circumstances, data analysis, assessment, authored report.

Exxaro Resources Limited **South Africa**
Social impact assessment for the social and labour plan for Glen Douglas Dolomite Mine, Henley-on-Klip. Research socio-economic circumstances, data analysis, assessment, authored report.

Exxaro Resources Limited **South Africa**
Social impact assessment for the social and labour plan for Grootegeluk Open Cast Coal Mine, Lephalale. Research socio-economic circumstances, data analysis, assessment, authored report.

Exxaro Resources Limited **South Africa**
Social and labour plan for the Paardekraal Project, Belfast. Research socio-economic circumstances, data analysis, assessment, authored report.

Exxaro Resources Limited **South Africa**
Social impact assessment for the Paardekraal Belfast Project Belfast. Research socio-economic circumstances, data analysis, assessment, authored report.

Kumba Resources Ltd **South Africa**
Social Impact Assessments for the Sishen Iron Ore Mine in Kathu Northern Cape. Research socio-economic circumstances, data analysis, assessment, authored report.

Kumba Resources Ltd **South Africa**
Social Impact Assessments for the Sishen South Project in Postmasburg, Northern Cape. Research socio-economic circumstances, data analysis, assessment, authored report.

Kumba Resources Ltd **South Africa**
Social Impact Assessments for the Dingleton resettlement project at Sishen Iron Ore Mine Kathu, Northern Cape. Research socio-economic circumstances, data analysis, assessment, authored report.

Gold Fields **South Africa**
Social Impact Assessment for the Gold Fields West Wits Project. Research socio-economic circumstances, data analysis, assessment, authored report.

Anglo Coal **South Africa**
Review of social impact assessment for the proposed Waterberg Gas 37-spot coalbed methane (CBM) bulk yield test project.

Sekoko Mining **South Africa**

Sekoko Wayland Iron Ore, Molemole Local Municipalities in Limpopo Province. Research socio-economic circumstances, data analysis, assessment, authored report.

Memor Mining (Pty) Ltd **South Africa**

Langpan Chrome Mine, Thabazimbi, Limpopo. Research socio-economic circumstances, data analysis, assessment, authored report.

Prescali Environmental Consultants (Pty) Ltd **South Africa**

Vlakpoort Open Cast Mine – Thabazimbi, Limpopo. Research socio-economic circumstances, data analysis, assessment, authored report.

Afrimat Ltd **South Africa**

1. Marble Hall Lime Burning Project: Social Impact Assessment – Limpopo.
2. Glen Douglas Lime Burning Project: Social Impact Assessment - Henley-on Klip, Midvaal

Social assessments for regional and linear projects

Gautrans **South Africa**

Social impact for the Gautrain Rapid Rail Link, Pretoria to Johannesburg and Kempton Park. Managed a team of 10 field workers, research socio-economic circumstances, data analysis, assessment, and co-authored report.

South African National Road Agency Limited **South Africa**

Social Impact of tolling the Gauteng Freeway Improvement Project. Research socio-economic circumstances, data analysis, assessment, authored report.

South African National Road Agency Limited **South Africa**

Social Impact of the N2 Wild Coast Toll Highway. Managed a team of three specialists. Research socio-economic circumstances, data analysis, assessment, co-authored report.

South African National Road Agency Limited **South Africa**

SIA for the N3 Keeversfontein to Warden (De Beers Pass Section). Research socio-economic circumstances, data analysis, assessment, authored report.

Transnet **South Africa**

Social impact assessment for the Transnet New Multi-Product Pipeline Project (555 km) (Commercial Farmers). Research socio-economic circumstances, data analysis, assessment, authored report.

Eskom Holdings Limited **South Africa**

Social Impact Assessment for the Ubertas 88/11kV Substation in Sandton, Johannesburg. Research socio-economic circumstances, data analysis, assessment, authored report.

Eskom Holdings Limited **South Africa**

Nuclear 1 Power Plant. Assisted with the social impact assessment consulting to Arcus GIBB Engineering & Science. Peer review and adjusted the report and assisted at the public participation feedback meetings.

Eskom Holdings Limited, Transmission Division **South Africa**
Social impact assessment for Eskom Holdings Limited, Transmission Division's Neptune-Poseidon 400kV Power Line in the Eastern Cape. Research socio-economic circumstances, data analysis, assessment, authored report.

Eskom Holdings Limited, Transmission Division **South Africa**
Social Impact assessment for Eskom Holdings Limited, Transmission Division, Forskor-Mernsky 275kV±130km Powerline and Associated Substation Works in Limpopo Province. Research socio-economic circumstances, data analysis, assessment, authored report.

MGTD Environmental **South Africa**
Social impact assessment for a 150MW Photovoltaic Power Plant and Associated Infrastructure in Mpumalanga. Research socio-economic circumstances, data analysis, assessment, authored report.

MGTD Environmental **South Africa**
10MWp Photovoltaic Power Plant & Associated Infrastructure, North West Province. Research socio-economic circumstances, data analysis, assessment, authored report.

eThekwini Municipality **South Africa**
Social impact assessment for the proposed infilling of the Model Yacht Pond at Blue Lagoon, Stiebel Place, Durban. Research socio-economic circumstances, data analysis, assessment, authored report.

MGTD Environmental **South Africa**
ABC Prieska Solar Project; Proposed 75 MWp Photovoltaic Power Plant and its associated infrastructure on a portion of the remaining extent of ERF 1 Prieska, Northern Cape. Research socio-economic circumstances, data analysis, assessment, authored report.

MGTD Environmental **South Africa**
ABC Prieska Solar Project; Proposed 75 MWp Photovoltaic Power Plant and its associated infrastructure on a portion of the remaining extent of ERF 1 Prieska, Northern Cape;

Assessments for social projects and social research

Australia – Africa 2006 Sport Development Program **South Africa**
To establish and assess the impact of the Active Community Clubs Initiative on the communities of NU2 (in the township of Mdantsane)*and Tshabo (a rural village). Lead researcher social, data collection and analysis, assessment.

United Nations Office on Drugs and Crime **South Africa**

Evaluation of a Centre for Violence Against Women in Upington. Research socio-economic circumstances, data analysis, assessment, co-authored report.

University of Johannesburg **South Africa**
Research into research outputs of academics working in the various departments of the university. Research socio-economic circumstances, data analysis, assessment, authored report.

Human Resource and management training

Various national companied **South Africa**
Developed and run various management courses such as, recruitment selection & placement; industrial relations / disciplinary hearings; team building workshops; multiculturalism workshop.
1986-2007

University of South Africa, Department of Industrial Psychology **South Africa**
Developed the performance development study guide for industrial psychology 3. 2000

Authored Chapters in HR books **South Africa**
In Slabbert J.A. de Villiers, A.S. & Parker A (eds.). Managing employment relations in South Africa.
Teamwork within the world-class organisation. 2005
In Muchinsky, P. M. Kriek, H. J. & Schreuder, A. M. G. Personnel Psychology 3rd Edition
Chapter 9 – Human resource planning.
Chapter 10 – The changing nature of work. 2005.
In Rossouw, G. J. and van Vuuren, L. Business Ethics - Made in Africa 4th Edition.
Chapter 11 – Building Trust with Ethics.

South African Management Development Institute (SAMDI) **Democratic Republic of the Congo**
Developed a course on Strategic Human Resource Planning for SAMDI and the Democratic Republic of the Congo as well as trainer's manuals for this course. 2006.

Competition Tribunal **South Africa**
Developed a Performance Management System and Policy for the Competition Tribunal South Africa.
2006

PUBLICATIONS

Bews, N. & Martins, N. 2002. An evaluation of the facilitators of trustworthiness. SA Journal of Industrial Psychology. 28(4), 14-19.

Bews, N. Martins, N. & von der Ohe, H. 2002. Editorial. SA Journal of Industrial Psychology. 28(4), 1.

Bews, N. & Rossouw, D. 2002. Contemporary organisational change and the importance of trust. SA Journal of Industrial Psychology. 28(4), 2-6.

Bews, N. & Uys, T. 2002. The impact of organisational restructuring on perceptions of trustworthiness. SA Journal of Industrial Psychology. 28(4), 21-28.

Bews, N & Rossouw, D. 2002. A role for business ethics in facilitating trustworthiness. Journal of Business Ethics. 39: 377-390.

Bews, N. 2009. A matter of trust – Gaining the confidence of the public and client. IAIA Newsletter Forthcoming (Spring 2009).

Bews, N. 2009. Does he who pays the bill call the shots? Sitting astride client and public interest – the dilemma of maintaining credibility in impact assessments. IAIA Newsletter Winter – 2009.

Bews, N. 2002. Reducing your company's risk of sexual harassment claims. HR Future. (2) 2 10-11.

Bews, N. & Martins, N. von der Ohe, H. 2002. Organisational change and trust: Experiences here and abroad. Management Today, (18) 8 34-35.

Martins, N. Bews, N. & von der Ohe, H. 2002. Organisational change and trust. Lessons from Europe and South African organisations. HR Future, (2)9 46-47.

Rossouw, D. & Bews, N. 2002. The importance of trust within a changing business environment. Management Today. 18(2) 26-27.

Bews, N. 2001. You can put a value to trust in the new economy. HR Future, (1)1 48-49.

Bews, N. 2001. Maintaining trust during organisational change. Management Today, (17) 2 36-39.

Bews, N. 2001. Business ethics, trust and leadership: how does Africa fare? Management Today, (17) 7 14-15.

Rossouw, D & Bews, N. 2001. Trust is on the decline in the workplace, yet it's vital for modern organisational success. People Dynamics. (18) 6 28-30.

Bews, N. & Uys, T. 2001. The effects of restructuring on organisational trust. HR Future, (1)8 50-52.

Rossouw, G. J. & Bews. N. F. 2010. Building Trust with Ethics. In Rossouw, G. J. and van Vuuren, L. Business Ethics - Made in Africa 4th Edition. Cape Town: Oxford University Press.

Bews N. 2005. Teamwork within the world-class organisation. In Slabbert J.A. de Villiers, A.S. & Parker A (eds.). Managing employment relations in South Africa. Durban : Butterworths.

Bews, N. F. 2005. Human resource planning. In Muchinsky, P. M. Kriek, H. J. & Schreuder, A. M. G. 2005. Personnel Psychology 3rd Edition. Cape Town; Oxford University Press.

Bews, N. F. 2005. The changing nature of work. In Muchinsky, P. M. Kriek, H. J. & Schreuder, A. M. G. 2005. Personnel Psychology 3rd Edition. Cape Town; Oxford University Press.

Bews, N. F. 2005. Chapter 9 & 13. In Muchinsky, P. M. Kriek, H. J. & Schreuder, A. M. G. 2005. Instructor's Manual. Personnel Psychology 3rd Edition. Cape Town; Oxford University Press.

Bews, N. F., Schreuder, A. M. G. & Vosloo, S. E. 2000. Performance Development. Study guide for Industrial Psychology 3. Pretoria: University of South Africa.

Uys, T. and Bews, N. 2003. ''Not in my Backyard'': Challenges in the Social Impact Assessment of the Gautrain. Department of Sociology Seminar, RAU. 23 May 2003.

Bews, N. 2002. The value of trust in the new economy. Industrial Relations Association of South Africa (Irasa). Morning seminar 21 August 2002.

Bews. N, 2002. The issue of trust considered. Knowledge Recourses seminar on Absenteeism. The Gordon Institute of Business. 27 August 2002.

Bews, N. & Uys, T. 2001. The impact of organisational trust on perceptions of trustworthiness. South African Sociological Association Conference. Pretoria.

Bews, N. 2001. Business Trust, Ethics & Leadership:- Made in Africa. International Management Today/Productivity Development Conference. Hosted by Productivity Development (Pty) Ltd & Management Today. Best Knowledge in Leadership Practice Conference 23-24 July 2001.

Bews, N. 2001. Charting new directions in leading organisational culture and climate change. Workplace Transformation and Organisational Renewal. Hosted by The Renaissance Network. November 2001.

Bews, N. 2000. Towards a model for trust. South African Sociological Association Conference. Saldanha.

Bews, N. 2003. 'Social Impact Assessments, theory and practice juxtaposed – Experience from a South African rapid rail project.' New Directions in Impact Assessment for Development: Methods and Practice Conference. University of Manchester, Manchester, England.

MEMBERSHIP OF PROFESSIONAL BODIES

Member of South African Affiliate of the International Association for Impact Assessment (IAIAsa).
Membership Number: 2399
Registered on database for scientific peer review of iSimangaliso GEF project outputs

CURRICULUM VITAE

Jared Padavattan

Profession	:	Environmental Control Officer
Specialisation	:	Compliance Monitoring and Report writing
Years' experience	:	17 Months

KEY RESPONSIBILITIES AS EAP

- Client and Authority liaison.
- Prepare terms of reference and appoint technical specialists.
- Compilation of environmental technical reports such as environmental management Programmes and environmental impact assessment.
- Development , planning and coordinating public participation processes (PPP).
- Reviewing of environmental and specialist reports.
- Water Use Licence applications.
- Compilation of Integrated Water Use License Applications and Integrated Waste Water Management Plans.

KEY RESPONSIBILITIES AS ECO

Specific responsibilities as an Environmental Control Officer include; the independent monitoring of construction activities, reporting of environmental incidences and non-compliances to the responsible contractor and the Department of Environmental Affairs, ensuring the projects' Environmental Management Programme (EMP) and Environmental Authorisation (EA) conditions and objectives are being met. ECO also ensures compliance is being met with regards to permits and licenses under Department of Fisheries and Forestry and Department of Water Affairs.

SKILLS BASE AND CORE COMPETENCIES (ECO)

- Environmental Audits and Compliance Monitoring.
- Environmental Audit reports.
- Environmental reporting to LTA, developer and Owners' Engineering team.
- Overseeing and providing input on rehabilitation activities.
- Identification of protected and specially protected species.
- Facilitation (Contractors meetings)
- Reviewing and Assessment (Contractors environmental method statements, project documentation, MSDS etc.)
- Environmental Awareness Training.
- Client and authority liaison.
- Water Use License compliance monitoring.
- Ensuring conditions stated in permits and licenses related to the project are adhered too (SAHRA, DWS, DAFF and local environmental departments).
- Reviewing of specialist reports for input on site activities.

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc. Hons. Environmental Management: UNISA, (2010-2011)
- B.Sc. Marine Biology: University of Kwa-Zulu Natal, (2007-2009)

Courses:

- ASHEPP (Applying Safety, Health and Environmental Principles and Procedures), NOSA (2013)
- Introduction to SAMTRAC and Hazard Identification nd Risk Assessment, NOSA (2013)

EMPLOYMENT HISTORY

July 2014 – Current: Savannah Environmental (Pty) Ltd, Woodmead, Johannesburg, Gauteng: Environmental Control Officer and Environmental Assessment Practitioner.

January 2014 – July 2014: GCS (Pty) Ltd, Kloof, Durban, Kwa-Zulu Natal: Environmental Assessment Practitioner (intern)

PROJECT EXPERIENCE

ECO

- Khi Solar One: Concentrated Solar Thermal Tower Plant – ECO (Abengoa Solar)
- Xina Solar One: Concentrated Solar Thermal Plant – ECO (Abengoa Solar)

ENVIRONMENTAL IMPACT ASSESSMENTS

- Proposed Rohill business Estate, Durban North, Kwa-Zulu Natal (2014): EIA.
- Zululand Anthracite Colliery (Pty) Ltd, Northern Kwa-Zulu Natal (2014): S24G application.
- Bondit Right Trading (Pty) Ltd, Marianhill, Kwa-Zulu Natal (2014): Milkyway Shopping centre, Basic assessment project initiation.
- Kangra Coal (Pty) Ltd, Near eMkhondo, Mpumalanga (2014): Extension of existing Maquasa East Discard Dump, EIA for DEA and DMR

PUBLIC PARTICIPATION AND ENVIRONMENTAL EDUCATION / AWARENESS PROGAMMES

- Zululand Anthracite Colliery (Pty) Ltd, Northern Kwa-Zulu Natal (2014): Site notices, BIDs and Adverts.
- SiVest/ Investec Avoca South, Durban North (2014): Site notices, BIDs and adverts.

WATER USE LICENCES

- Zululand Anthracite Colliery (Pty) Ltd, Northern Kwa-Zulu Natal (2014): IWULA.
- Airports Company South Africa (Pty) Ltd, La Mercy (2014): King Shaka International Airport, IWULA.
- Barberry Group cc, Northen Kwa-Zulu Natal (2014): Talana loop railway siding, IWWMP.
- Zinoju Coal (Pty) Ltd/ Forbes Coal (Pty) Ltd, near Dundee, Kwa-Zulu Natal (2014): Amendment to IWWMP for Magdelena Colliery.
- Kangra Coal (Pty) Ltd, near eMkhondo, Mpumalanga (2014): Kangra Longridge mine closure, assisting with wetland health and delineation.

ENVIRONMENTAL AUDITING

- Macambini Water Pipeline audit, Northern Kwa-Zulu Natal (2014).