XHARIEP EXPORT PROGRAMME (XEP) AGRICULTURAL DEVELOPMENT, FREE STATE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

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EMPR DETAILS

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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.

Ambient sound level: The reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such meter was put into operation.

Assessment: The process or 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 the EIA Regulations. Construction begins with any activity which requires Environmental Authorisation.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

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

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.

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'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/occur 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 are 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 (EAP): 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 proposal and its on-going 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.

Incident: Section 30 of NEMA defines an 'incident' as "an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed."[1]

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

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.

Mitigation hierarchy: The mitigation hierarchy is a framework for managing risks and potential impacts related to biodiversity and ecosystem services. The mitigation hierarchy is used when planning and implementing development projects, to provide a logical and effective approach to protecting and conserving biodiversity and maintaining important ecosystem services. It is a tool to aid in the sustainable management of living, natural resources, which provides a mechanism for making explicit decisions that balance conservation needs with development priorities

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.

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

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

[1]http://ipwis.pgwc.gov.za/ipwisdoc/Public/Publications/ChemicalsMgt/A%20Procedure%20for%20Section%2030%20of%20NEMA.pdf

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.

ABBREVIATIONS AND ACRONYMS

DFFE	Department of Forestry, Fisheries and the Environment.
DHSWS	Department of Human Settlements, Water and Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EPC	Engineering Procurement Contractor
ECO	Environmental Control Officer
EO	Environmental Officer
GG	Government Gazette
GN	Government Notice
Ha	Hectare
I&AP	Interested and Affected Party
km^2	Square kilometres
kV	Kilovolt
m^2	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No 107 of 1998)
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
PM	Project Manager
SHE	Safety, Health and Environment
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited

TABLE OF CONTENTS

APPENDICES

Appendix A: Layout and Sensitivity Maps
Appendix B: Grievance Mechanism for Public Complaints and Issues
Appendix C: Open Space Management Plan
Appendix D: Re-Vegetation and Habitat Rehabilitation Plan
Appendix E: Plant Rescue and Protection Plan
Appendix F: Traffic and Transportation Management Plan
Appendix G: Stormwater and Erosion Management Plan
Appendix H: Waste Management Plan
Appendix I: Emergency Preparedness, Response and Fire Management Plan
Appendix J: Curriculum Vitae of the Project Team

CHAPTER 1: INTRODUCTION

This Environmental Management Programme has been compiled for the Xhariep Export Programme (XEP) Agricultural Development and associated infrastructure on Farm Diepdraai 754, Farm Weltevreden 755, Farm Lemoen-spruit 667 and Portion 1 of the Farm Grootpoort 168 in Letsemeng Local Municipality of the Xhariep District Municipality. The project site is located approximately Southwest of Luckhof and Koffiefontein in the Free State Province. The preferred project site with extent of ~4690ha has been identified by JN Venter Beleggings Trust as a suitable area for the development of Xhariep Export Programme (XEP) Agricultural Development and associated infrastructure. The development footprint of the project is ~4276.32ha across four (4) interlinked properties within the project area.

This EMPr has been developed on the basis of the findings of the Environmental Impact Assessment (EIA) undertaken for the project (Savannah, 2023), 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 JN Venter Beleggings Trust employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the Xhariep Export Programme (XEP) Agricultural Development. The document must be adhered to and updated as relevant throughout the project life cycle. This document fulfils the requirement of the EIA Regulations, 2014 (as amended) and forms part of the EIA report of the project.

In terms of the Duty of Care provision in S28(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, halted or minimised. 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. While no permitting or licensing requirements arise directly by virtue of the Xhariep Export Programme (XEP) Agricultural Development, this section will be applicable throughout the life cycle of the project.

CHAPTER 2: PROJECT DETAILS

The project area is proposed to accommodate the agricultural development (cultivation), as well as most of the associated infrastructure, which is required for such development, and this will include:

- Development of centre pivot areas (cultivation and irrigation) which is planned to take approximately 2690ha or more within the project site.
- Two irrigation water storage dams, with a combined surface area of 82ha in extent.
- Establishment of an internal irrigation pipeline network from the irrigation dams to the centre pivot areas.
- A new pump station taking a total surface area of 549m^2.
- A 5MW solar PV facility occupying an area of 10ha.
- A Battery Energy Storage System covering a surface area of 0.36ha.

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in **Table 2.1.**

Table 2.1: Details or dimensions of typical infrastructure required for the agricultural development

Infrastructure	Footprint and dimensions
Total extent of the development	~4276.32ha
Centre pivot (Cultivation and irrigation system)	2690ha
Irrigation pipeline network	Internal irrigation pipeline network to take water from the dams to the various centre pivot areas for irrigation purposes
Dams for irrigation water	» Dam 1 – Diepkloof (Diepdraai) » Dam 2 – (Sump): **See below for the dams' dimensions**
A pump station	One pump station covering a total surface area of 549m^2
5MW Solar PV facility	» 10ha surface area.
Battery	A battery energy storage system to store additional power generated by the PV Facility covering an area of 0.36ha

Table 2.1a: Dimensions of the dams

Dam	Maximum wall height	Wall volume	Capacity	Water Area	Development footprint
Dam 1 – Diepkloof (Diepdraai)	17m	503250m^3	3.1 million m^3	58 ha	63 ha
Dam 2 – (Sump):	14m	426000m^3	1.0 million m^3	14 ha	19 ha

Table 2.2: Detailed description of the Xhariep Export Programme (XEP) Agricultural Development area

Province	Free State Province
District Municipality	Xhariep District Municipality
Local Municipality	Letsemeng Local Municipality
Ward number(s)	1
Nearest town(s) (measured from the centre of the project site)	Luckhof (~13km north- east)
Affected Properties: Farm name(s), number(s) and portion numbers	» Farm Diepdraai 754 » Farm Weltevreden 755 » Farm Lemoen-spruit 667

	» Portion 1 of the Grootpoort 168
SG 21 Digit Code (s)	» F01100000000066700000 - Farm Lemoen- spruit 667 » F01100000000075500000 - Farm Weltevreden 755 » F01100000000075400000 - Portion 3 of Farm Diepdraai 754 » F01100000000016800001 – Portion 1 of the Farm Grootpoort
Current zoning and Land Use	Agricultural
Site co-ordinates (centre of project site)	29°50'26.38"S; 24°41'59.10"E

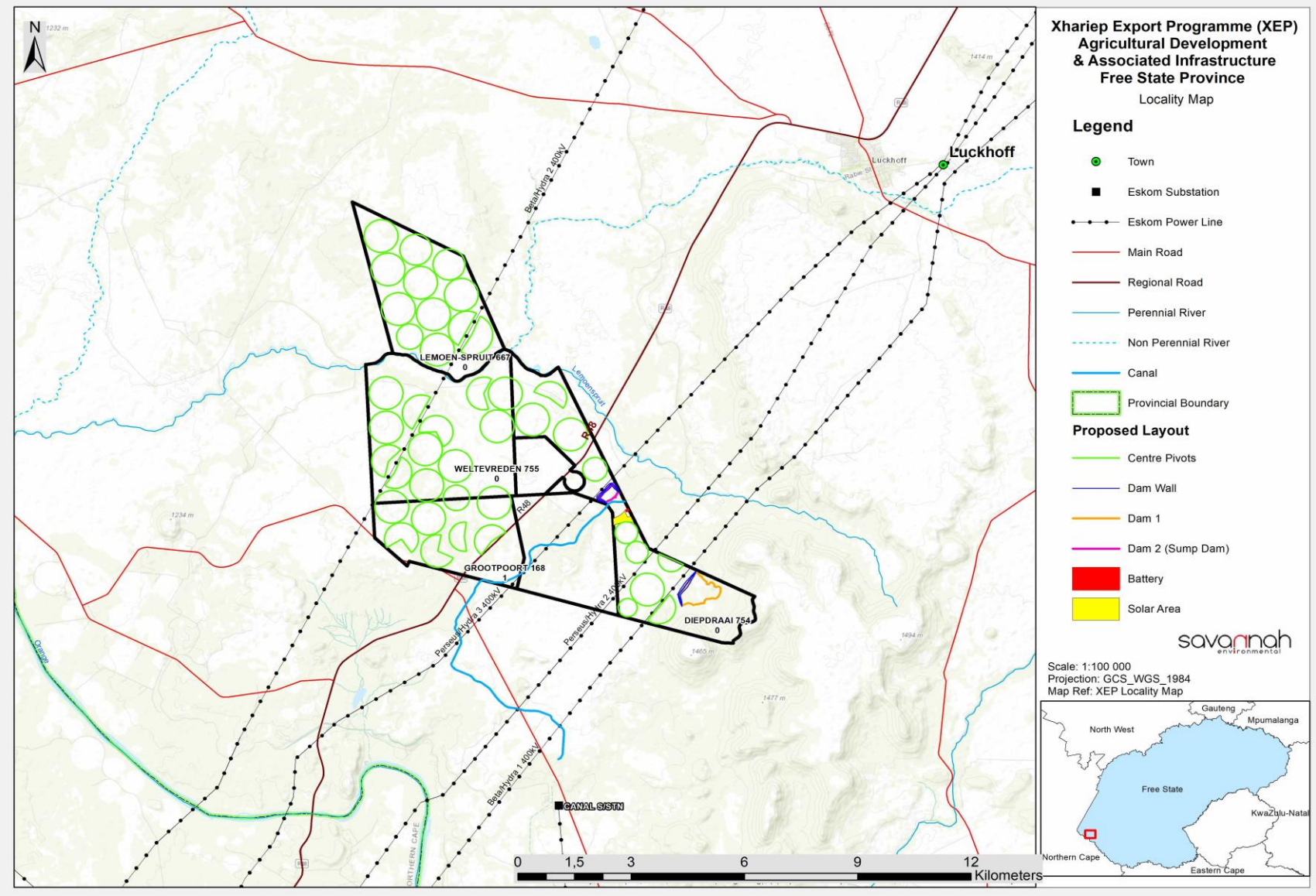


Figure 2.1: Locality map showing the location of the project site and development envelope proposed for the Xhariep Export Programme (XEP) Agricultural Development

2.1. Activities and Components associated with the Xhariep Export Programme (XEP) Agricultural Development

The main activities/components associated with the Xhariep Export Programme (XEP) Agricultural Development are detailed in **Table 2.2**.

Table 2.2: Activities associated with Planning, Construction, Operation and Decommissioning of the Xhariep Export Programme (XEP) Agricultural Development

Construction Phase	
Requirements	» Environmental Authorisation from the DESTEA » Construction period is expected to be 24 months » No on-site labour camps. Employees to be accommodated in the nearby towns such as Luckhof and Koffiefontein, to be transported to and from site on a daily basis. » Overnight on-site worker presence (if any) would be limited to security staff. » Waste removal and sanitation will be undertaken by a sub-contractor, where possible. Waste containers, including containers for hazardous waste, will be located at easily accessible location on site when construction activities are undertaken. » Electricity required for construction activities will be generated by a generator. » Create construction employment opportunities. » Services required during the development process, such as rental of chemical toilets, plant hire, etc. to be sourced from the local area, i.e. from within approximately 50km (where possible) of the site, in order to support the local economy. » Water required during the construction phase (for dust control during the ploughing phase) will be sourced from the canal and water for consumption by the workers will be municipality water.
Activities to be undertaken	
Conduct surveys prior to construction	» Including, but not limited to, site survey and confirmation of the development footprint, and survey to determine and confirm the locations of all associated infrastructure.
Establishment of internal farm roads around the site	» Internal farm roads within the site will be established at the commencement of construction. » Existing access roads will be utilised, where possible, to minimise impact.
Undertake site preparation	» Clearance of vegetation at the footprint of each proposed development activity. » Soil preparation for ploughing, earthworks for the dams and pipeline trench digging. » Stripping of topsoil to be stockpiled, backfilled, removed from site and/or spread on site. » To be undertaken in a systematic manner to reduce the risk of exposed ground being subjected erosion.
Establishment of laydown areas on site	» A laydown area for the storage of water pipes, pivot components, PV components, battery system components, construction equipment and construction/ farm machinery.

	» The laydown will also accommodate equipment and materials associated with the construction of the dams, pipeline, BESS, cementing of centre pivot areas, pump station and Solar PV facility.
Construct foundation	» Excavations of the dam basins and pipeline route to be undertaken mechanically. » Concrete foundation and slabs will be constructed to support a pivot irrigation system, pump house, support the PV panels structures, and the battery energy storage system.
Transport of components and equipment to and within the site	» Civil engineering construction equipment to be brought to the site for the civil works (e.g., excavators, trucks, ploughing tractors, graders, compaction equipment, cement trucks, etc.). » Specialised construction and lifting equipment to be transported to site to erect the centre pivot irrigation system, solar panels and the battery storage system. » Components for the establishment of the agriculture associated infrastructures to be transported to site. » Transportation will take place via the R48 road that give access to the site and the dedicated access/haul road to the laydown areas.
Undertake site rehabilitation	» Commence with rehabilitation efforts in areas outside of the areas required for operation once construction completed in an area, and all construction equipment is removed. » On commissioning, access points to the site not required during the operation phase will be closed and prepared for rehabilitation.
<u>Operation Phase</u>	
Requirements	» Duration for the agricultural development and associated infrastructure will be 20-25 years. » Requirements for security and maintenance of the project. » Employment opportunities relating mainly to ploughing and harvesting activities.
Activities to be undertaken	
Operation and Maintenance	» Soil erosion from the bare areas (fallow lands) and within the crop areas may lead to siltation and sedimentation of watercourses, implement erosion control measures. » Application of pesticides / herbicides must be limited to the cultivated areas, and measures must be taken to limit drift of chemicals into surrounding natural areas and surface water. » Disposal of waste products (e.g., fertilizer, oils) in accordance with relevant waste management legislation.
<u>Decommissioning Phase</u>	
Requirements	» Decommissioning of the Xhariep Export Programme (XEP) Agricultural Development or any infrastructure at the end of its economic life. » Apply security measures and ensure that the specifications of the Occupational Health and Safety Act (1993) are adhered to. » Decommissioning activities to comply with the EMPr and legislation relevant at the time.
Activities to be undertaken	
Site preparation	» Confirming the integrity of site access to accommodate the required equipment to be used (if any required) » Preparation of the site (e.g., laydown areas and construction platform). » Mobilisation of construction equipment and machinery.

Disassemble and infrastructure	» Relevant machinery required for disassembling of the centre pivots, solar panels, battery storage system or emptying of the dams. » Components to be reused, recycled, or disposed of in accordance with regulatory requirements. » Cables and water pipes will be excavated and removed, as may be required » General rubble resulting from demolition of structures (e.g., cement slaps) be used as fill at nearby development sites (if any), or otherwise disposed of at a licensed landfill site.
Components to be disposed of or recycled	» Centre pivot components » Regarding the foundation body and sub-base of the structures the concrete will undergo crushing and be used as combined base/wearing course » Solar panels

It is expected that the areas of the project site affected by the development infrastructure (development footprint) will revert back to their original land-use (i.e. primarily grazing) once the Xhariep Export Programme (XEP) Agricultural Development has reached the end of its economic life and all infrastructure has been decommissioned.

2.2. Findings of the Environmental Impact Assessment

An Environmental Impact Assessment (EIA) was undertaken for the proposed project in accordance with the requirements of the EIA Regulations, 2014 (as amended). The EIA Report, together with the specialist studies contained within **Appendices D-H** provide a detailed assessment of the potential impacts that may result from the development of the Xhariep Export Programme (XEP) Agricultural Development.

No environmental fatal flaws or unacceptable impacts were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of sensitive features within the development footprint as specified by the specialists.

The potential environmental impacts associated with the Xhariep Export Programme (XEP) Agricultural Development, identified and assessed through the EIA process include:

» Impacts on ecology, flora, and fauna.
» Impacts on aquatic ecology.
» Impacts on land use, soils, and agricultural potential.
» Impacts on heritage resources, including archaeology and palaeontology.
» Positive and negative socio- economic impacts.

The environmental sensitivities identified by the relevant specialists for the project site are illustrated in **Figure 2.2.** The development footprint, as assessed, has been overlain with the relevant environmental sensitivities.

2.2.1 Impacts on Ecology (Flora, fauna & Avifauna)

The Nama Karoo Biome is acknowledged to not possess a high diversity of flora species, with a total of 57 species, representing 25 families, recorded within the project area during the survey period. Dominant graminoid species, with respect to cover, indicates overgrazing. Nevertheless, the project site supports a diversity of fauna species including SCC. Five protected species were identified on the project area it is imperative that a Plant Search and Rescue Plan be developed prior to clearing and development.

Based on the fauna components recorded within the project area, the area provides important ecosystem services, particularly with regards to the maintenance of dynamic soil properties, biocontrol of pest species and pollination. The SEI of the project area was determined to vary from 'Very Low' to 'Very High' based on the confirmation of high likelihood of occurrence of fauna SCC, the extent of the area considered and its connectivity to natural areas within the landscape, as well as the low resilience of the vegetation types.

The main expected impacts of the proposed development will be the loss of habitat and mortality of fauna. Based on the outcomes of the SEI determination, the project possesses areas of 'Very High' SEI and 'High' SEI.

The 'High' SEI denotes that "avoidance mitigation wherever possible must be implemented. This includes changes to project infrastructure design to limit the amount of habitat impacted." (SANBI, 2020). Considering that the area has been zoned for agriculture, development may proceed in the 'High' SEI Areas, as long as the 'Very High' SEI areas are avoided and actively managed. Where pivots overlap minor drainage lines (also with Very High SEI), activity adjacent to these system is permissible, albeit only if the remaining channel

extent is rehabilitated and actively managed. The dam located within the 'Very High' SEI areas is considered to be acceptable due to the technical requirement for the location of the dam in this area, without requiring additional earthworks and piping. The amount of hectarage lost within that portion of the site is deemed acceptable from an ecological perspective. All of the mitigation measures and Biodiversity Impact Management Actions must be implemented if the proposed development is authorised.

2.2.2 Impacts on Aquatic Ecology

The baseline assessment established a single main watercourse with an associated tributary network draining the project area, namely the Lemoenspruit ecosystem. Additionally, numerous ephemeral drainage lines and some wetlands occur in the project area. The Lemoenspruit flows into the Orange River downstream of the project area and due to flood conditions at the time of the survey the Orange River could not be assessed. The ecological assessment of the Lemoenspruit indicated moderate modifications attributed to varying land use, comprising mostly open/ natural land with some agriculture and widespread livestock activities present in the project areas catchment.

Given the findings of this assessment, the Lemoenspruit was classed as moderately modified (class C). The entire drainage network is presented by a well-defined riparian zone consisting of woody vegetation. The soils within the catchment and along the watercourses are highly susceptible to erosion and considered sensitive to any potential anthropogenic activities along these systems which could potentially compromise the ecological integrity of the watercourses.

The directly influenced Lemoenspruit is listed as not protected, and the ecosystem is classified as Endangered. The indirectly affected Orange River system downstream of the project area is listed as poorly protected, and is classified as Critically Endangered. Additionally, Freshwater Priority Areas are assigned to them. The Lemoenspruit catchment serves as an upstream management area to assist in limiting impacts to the downstream Orange River which serves as a Fish Sanctuary area for threatened fish species such as Largemouth Yellowfish (*Labeobarbus kimberleyensis*). Largemouth Yellowfish are red listed as Near Threatened and are showing population declines due to habitat fragmentation and water quality deterioration. The Lemoenspruit includes an additional species of conservational concern, namely the recently described Orange River Chubbyhead barb (*Enteromius oraniensis*). The species currently has no threatened status and should be conserved through the precautionary principle and be treated as highly threatened. The poorly protected nature of the systems, the high EIS and presence of SCC indicates that strict mitigation measures should be adhered to ensure no further deterioration of the watercourses should the project proceed.

The riparian zones of the lower foothills geoclass Lemoenspruit require a buffer of 100m, and Lemoenspruit tributary network comprising non-perennial systems, ephemeral drainage lines and wetlands require a buffer of 50m. These buffers would ensure adequate ecological integrity maintenance adjacent to the proposed agricultural activities.

The impact assessment considered both direct and indirect impacts to the water resources. According to the layout provided and the delineated riparian zones and applicable buffers, the centre pivots, impoundments (several options), power line and internal pipeline intersect with the water resources posing risk to these receptors. The relocation of the aforementioned infrastructure to avoid sensitive water resources and the prescribed buffer zones (no-go zones) will lower the impacts to these receptors. The relocation of the centre pivots outside of no-go zones would result in an overall reduction in the number of proposed

centre pivots, lowering the associated negative ecological impacts expected. Avoidance of no-go zones would lower their impacts and should be considered. Additionally, the project should consider the least number of river crossing structures possible to limit further watercourse disturbance.

The solar area and BESS infrastructure are expected to have no impacts towards local watercourses.

Impacts associated with the proposed infrastructure are related to habitat disturbance and fragmentation, contamination of water quality and alteration of catchment hydrology which cumulatively result in negative ecology impacts within watercourses. The construction and operational phase impacts range from moderate to high, with the majority of impacts being reduced to low and moderate following the implementation of adequate mitigation measures. Due to the nature of the project, the footprint of the proposed agricultural infrastructure has a large, localised impact, while cumulatively the project poses regional water quality impacts and threat to SCC.

It is the specialist's opinion that no fatal flaws have been identified for the proposed activities, and authorisation of the proposed development must be carefully considered. Considerations must take into account the carrying capacity of the local and regional watercourses potentially influenced by the proposed activities and their resilience to future disturbances.

The alternative positioning of infrastructure is preferred due to the avoidance of water resource sensitive areas (no-go zones). The soils within the catchment are prone to erosion and care is required to ensure proposed activities do not exacerbate erosion within the catchment. Monitoring of the aquatic resources is required during construction and operational activities.

Due to the high threat level of water quality deterioration and negative ecological impacts expected, notably from typically used Organophosphates, the project must consider environmentally friendly alternatives to Organophosphates. This together with the prescribed mitigation must be implemented in totality in order to proceed in a sustainable manner.

A competent ECO must oversee the construction and operational activities, with watercourse areas as a priority. Additional recommendations listed in this report should be considered for this project.

2.2.3 Impacts on Land Use, Soil and Agricultural Potential

Various soil forms were identified throughout the development area, namely the Oakleaf, Hutton and Augrabies soil. In the terrain soils associated with the presence of lime or carbonates also occurs. These soil forms are characterised by a high carbonate subsurface horizons which includes the Addo, Augrabies and Plooysburg soil forms. The area has few profiles that are saturated for long periods with surface water such as the Katspruit soil form.

The most sensitive soil forms identified within the assessment corridor is the Oakleaf, Hutton and Augrabies soils. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Very Low" to "Moderate" sensitivities, which correlates with the findings from the baseline assessment. The area has land capability classes of "III" and "IV" with a climate capability level "C8" associated with harsh conditions. The assessment area is characterised with a land potential class level "L6" for all the soils. The footprint area is associated with non-arable soils, which correspond to the current land use of livestock grazing and irrigated crop production in the area.

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which predominantly covers "Very Low" to "Low" sensitivities. Some patches are characterised by "Moderate" sensitivities. The area has a "Low" sensitivity based on these land potential classes. The "Very Low to Moderate" sensitivities baseline findings concur with the DAFF, (2017) land potential for the requirements for a compliance statement report only. According to the DEA Screening Tool, (2022), few portions within the assessment area has "High" sensitivity crop fields. Since rainfall is one of the limiting factors for crop production in the assessment area, the agricultural pivot expansion project can increase the land potential without segregation of such agricultural lands or crop fields with high potentials. In the case the landowners of such crop fields are not part of the expansion project, it is the specialist`s recommendation that such high potential crop fields be avoid for the project. In a case relocating of the project is not feasible, the stakeholders should engage with the owners of the crop fields for an appropriate compensation. Thus, the agricultural and pivot expansion project maybe favourably considered as planned.

2.2.5 Impacts on Heritage Resources (archaeology, palaeontology and cultural landscape)

Archaeology

Only one site of archaeological significance was identified within the proposed development area in a previous archaeological assessment conducted by Van Schalkwyk in 2015. SAHRIS Site 139138 is graded IIIC and is described as "Two localised areas, associated with small outcrops, where thin scatters of MSA tools and flakes were identified. The density of the material is approximately 1 artefact/flake per 10m2. The material used for the tools are hardened shale and lideanite." Van Schalkwyk (2015) goes on to conclude that "as the density of the scatter is very low, as well as the fact that it is surface material and therefore not in its original context anymore, it is viewed to have a low significance and it is judged that the impact would be very low" and no recommendations for mitigation are provided.

As such, we reiterate the findings of Van Schalkwyk (2015) as they pertain to this site and as such, no mitigation measures are recommended in this report. There is no objection to the destruction of this site in terms of its archaeological significance.

In the field assessment conducted in 2022, all of the archaeological resources observed were determined to be low density surface scatters. As such, these sites have limited scientific value beyond their recording as per this report. To this end, these resources are determined to be Not Conservation-Worthy (NCW) and there is no objection to their impact as a result of this development.

Two burial sites were identified within the development footprint (Observation 009 and 041), graded IIIA due to their high levels of social and spiritual significance. Both of these burial grounds are located within the boundaries of the proposed development footprint and if the development proceeds as intended, it is likely that these burial sites will be negatively impacted. As such, it is recommended that a no-impact buffer of 100m is implemented around each of these sites in order to ensure that the burials are not disturbed and to maintain a semblance of sense of place associated with the burial sites. In the maps below, there are recommended pivot exclusion areas indicated as well as the recommended buffers.

The Havenga Bridge, originally constructed in 1934, was identified as a structure of high local significance for its architectural significance and as such, has been graded IIIA. This site is located well outside of the development area and no impact is anticipated.

Palaeontology

According to the SAHRIS Palaeosensiitvity Map, the area proposed for development is underlain by sediments of low, moderate and high palaeontological sensitivity. According to the extract from the Council for GeoScience Map 2924 for Koffiefontein, the area is underlain by Jurassic Dolerite (zero paleontological sensitivity) and Quaternary Sands (moderate and high sensitivity). According to the Desktop Palaeontological Assessment completed by Bamford (2021) for a grid connection project located in the immediate vicinity of this development, the proposed development is positioned within "a mix of potentially fossiliferous (trace fossils) Tierberg Formation (Ecca Group, Karoo Supergroup), Jurassic dolerite and on the Quaternary aeolian sands and calcretes that are non-fossilferous unless there are traps for fossils such as paleo-pans or palaeo-springs. No such feature is visible on the satellite imagery."

According to the desktop assessment completed by Bamford (2022), "Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. Furthermore, the material to be cultivated is soil and this does not preserve fossils. Since there is an extremely small chance that fossils from the Tierberg Formation may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

Bamford (2022) concludes that "Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the soils of the Quaternary. There is a very small chance that trace fossils may occur in the shales of the early Permian Tierberg Formation so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, or other responsible person once excavations for pipes, dam walls and infrastructure have commenced then they should be rescued, and a palaeontologist called to assess and collect a representative sample. The impact on the palaeontological heritage would be low so as far as the palaeontology is concerned, the project should be authorised".

Overall sensitivity

The overall archaeological sensitivity of the development area with regard to the preservation of Early, Middle and Later Stone Age archaeology as well as Khoe and San heritage, early colonial settlement is regarded as very high. Despite this, the field assessment conducted for this project has demonstrated that the specific area proposed for development has low sensitivity for impacts to significant archaeological heritage. Two burial sites were identified within the development footprint (Observation 009 and 041), graded IIIA due to their high levels of social and spiritual significance. Both of these burial grounds are located within the boundaries of the proposed development footprint and if the development proceeds as intended, it is likely that these burial sites will be negatively impacted. As such, it is recommended that a no-impact buffer of 100m is implemented around each of these sites in order to ensure that the burials are not disturbed and to maintain a semblance of sense of place associated with the burial sites.

The specialist concluded that there is no objection to the proposed development in terms of impacts to archaeological heritage on condition that:

» A no-impact buffer of 100m is implemented around Observations 009 and 041.
» A Chance Fossil Finds Procedure is implemented for the duration of construction activities.

» Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

2.2.6 Social Impacts

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 following general conclusions and findings can be made:

» The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focused on the construction of PV facilities and pivot infrastructure (these relate to 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 phases and the impact is rated as positive even if only a small number of individuals will benefit in this regard.
» The proposed project could assist the local economy in creating entrepreneurial development, especially if local businesses could be involved in the provision of general material and services during the construction and operational phases.
» Capacity building and skills training amongst 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 development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, represents a positive social benefit for society.

The proposed Xhariep Export Programme (XEP) Agricultural Development and associated infrastructure is unlikely to result in permanent damaging social impacts and will have a number of positive impacts from a social and economic perspective at a local and regional level. From a social perspective, it is concluded that the project could be developed subject to the implementation of the recommended mitigation measures, enhancement measures and management actions contained in the report.

2.2.7 Conclusion regarding Cumulative Impacts

Cumulative impacts are expected to occur with the development of the Xhariep Export Programme (XEP) Agricultural Development throughout all phases of the project life cycle. The main aim for the assessment of cumulative impacts considering the Xhariep Export Programme (XEP) Agricultural Development is to test and determine whether the development will be acceptable within the landscape proposed for the development, and Xhariep Export Programme (XEP) Agricultural Development, Free State Province whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The following conclusions can be drawn regarding the cumulative impacts associated with the project:

- There will be no unacceptable loss or impact on ecological aspects (vegetation types, species and ecological processes) due to the development of the Xhariep Export Programme (XEP) Agricultural Development and similar developments within the surrounding area, provided Very High SEI areas are avoided and the recommended mitigation measures are implemented resulting in a moderate residual impact. The cumulative impact is therefore acceptable.
- The footprint of the proposed development has a large, localised impact, while cumulatively the project poses regional water quality impacts and threat to SCC. There will be moderate significant loss of sensitive and significant aquatic features. The cumulative impact is therefore acceptable.
- There will be no unacceptable loss of land capability due to the development of the Xhariep Export Programme (XEP) Agricultural Development and other agricultural development projects within the surrounding areas, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- There will be no unacceptable loss of heritage resources associated with the development of the Xhariep Export Programme (XEP) Agricultural Development. The cumulative impact is therefore acceptable.
- No unacceptable negative cumulative social impacts are expected to occur. Positive cumulative impacts will be of medium significance and are expected to be beneficial at a regional level. The cumulative impact is therefore acceptable.

All cumulative impacts associated with the Xhariep Export Programme (XEP) Agricultural Development will be of a medium or low significance, with impacts of a high significance associated with the visual impacts.

2.2.8. Environmental Sensitivity Analysis

As part of the specialist investigations undertaken within the project development area, specific environmental features and areas were identified. The environmental features identified within and directly adjacent to the development area and development footprint are illustrated in **Figure 2.2.** The following points provide a description of the sensitivities identified within the development area:

- **Ecological features:**
  Based on the fauna components recorded within the project area, the area provides important ecosystem services, particularly with regards to the maintenance of dynamic soil properties, biocontrol of pest species and pollination. The SEI of the project area was determined to vary from 'Very Low' to 'Very High' based on the confirmation of high likelihood of occurrence of fauna SCC, the extent of the area considered and its connectivity to natural areas within the landscape, as well as the low resilience of the vegetation types.

  Based on the outcomes of the SEI determination, the project possesses areas of 'Very High' SEI and 'High' SEI. The 'High' SEI denotes that "avoidance mitigation wherever possible must be implemented. This includes changes to project infrastructure design to limit the amount of habitat impacted." (SANBI, 2020). Considering that the area has been zoned for agriculture, development may proceed in the 'High' SEI Areas, as long as the 'Very High' SEI areas are avoided and actively managed. Where pivots overlap minor drainage lines (also with Very High SEI), activity adjacent to these system is permissible, albeit only if the remaining channel extent is rehabilitated and actively managed. The dam located within the 'Very High' SEI areas is considered to be acceptable due to the technical requirement for the location of the dam in this area, without requiring additional earthworks and piping. The amount of hectarage lost within that portion of the site is deemed acceptable from an ecological perspective. All of the

mitigation measures and Biodiversity Impact Management Actions must be implemented if the proposed development is authorised.

» **Aquatic Ecology:**
The baseline assessment established a single main watercourse with an associated tributary network draining the project area, namely the Lemoenspruit ecosystem. Additionally, numerous ephemeral drainage lines and some wetlands occur in the project area. The Lemoenspruit flows into the Orange River downstream of the project area and due to flood conditions at the time of the survey the Orange River could not be assessed. The ecological assessment of the Lemoenspruit indicated moderate modifications attributed to varying land use, comprising mostly open/ natural land with some agriculture and widespread livestock activities present in the project areas catchment.

The riparian zones of the lower foothills geoclass Lemoenspruit require a buffer of 100m, and Lemoenspruit tributary network comprising non-perennial systems, ephemeral drainage lines and wetlands require a buffer of 50m. These buffers would ensure adequate ecological integrity maintenance adjacent to the proposed agricultural activities.

» **Soils:**
The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which predominantly covers "Very Low" to "Low" sensitivities. Some patches are characterised by "Moderate" sensitivities. The area has a "Low" sensitivity based on these land potential classes. The "Very Low to Moderate" sensitivities baseline findings concur with the DAFF, (2017) land potential for the requirements for a compliance statement report only. According to the DEA Screening Tool, (2022), few portions within the assessment area has "High" sensitivity crop fields.

» **Heritage Resources:**
The development area is underlain by sediments of low, moderate and high palaeontological sensitivity. According to the extract from the Council for GeoScience Map 2924 for Koffiefontein, the area is underlain by Jurassic Dolerite (zero paleontological sensitivity) and Quaternary Sands (moderate and high sensitivity).

Two burial sites were identified within the development footprint (Observation 009 and 041), graded IIIA due to their high levels of social and spiritual significance. Both of these burial grounds are located within the boundaries of the proposed development footprint. A no-impact buffer of 100m is recommended around each of these sites in order to ensure that the burials are not disturbed and to maintain a semblance of sense of place associated with the burial sites.

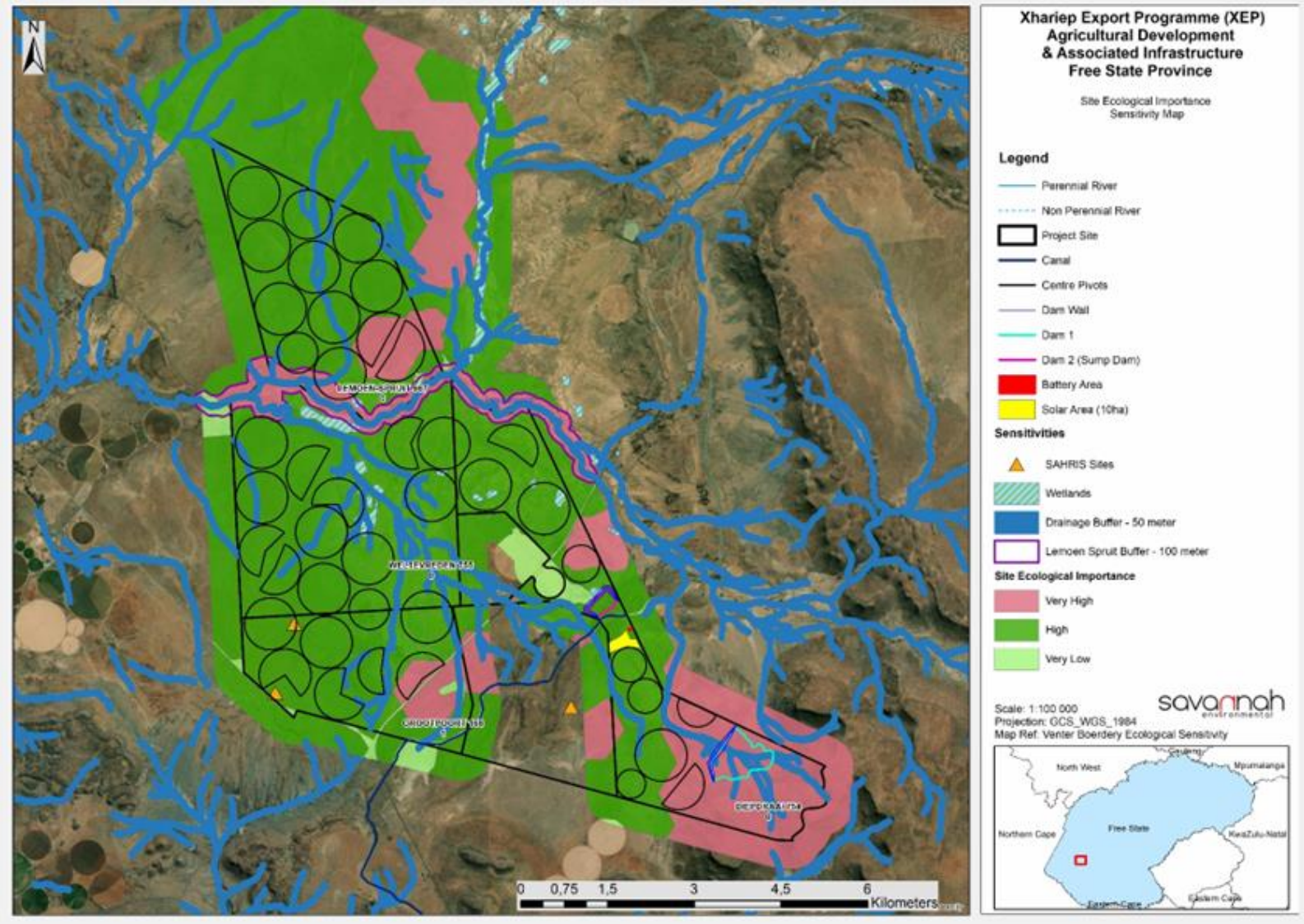


Figure 2.2: The development footprint of the Xhariep Export Programme (XEP) Agricultural Development, as assessed within this EIA Report, overlain on the identified environmental sensitive features

2.2.9. Overall Conclusion (Impact Statement)

The preferred activity was determined by the applicant for an agricultural development consisting of cultivation of various crops (maize, wheat, soya, and nuts), centre pivot irrigation system, dams for storage irrigation water, solar PV, battery storage to supply energy on the farm, and a pump house and related network of pipelines to supply water to the centre pivot system. The centre pivot system is the preferred technology, because of to how the system efficiently spreads water onto growing crops and minimises the amount of water lost due to the wind and runoff. A technically viable development footprint was proposed by the developer and assessed as part of the EIA process. The assessment of the development footprint within the development area was undertaken by independent specialists and their findings have informed the results of this EIA Report.

From a review of the relevant policy and planning framework, it was concluded that the project is well aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial and National level.

The specialist findings from the EIA studies undertaken have indicated that there are no identified fatal flaws associated with the implementation of the development footprint within the development area. The developer has designed a project development footprint in response to the identified sensitive environmental features and areas present within the development area. This approach is in line with the application of the mitigation hierarchy, where all the sensitive areas which could be impacted by the development have been avoided (i.e., tier 1 of the mitigation hierarchy).

The 'Very High' SEI areas identified through the ecological assessment are to be avoided and must be actively managed. Where pivots overlap minor drainage lines (also with Very High SEI), activity adjacent to these system is permissible, albeit only if the remaining channel extent is rehabilitated and actively managed. The dam located within the 'Very High' SEI areas is considered to be acceptable due to the technical requirement for the location of the dam in this area, without requiring additional earthworks and piping. The amount of hectarage lost within that portion of the site is deemed acceptable from an ecological perspective.

Feedback from the aquatic specialist has indicated the lower foothills of Lemoenspruit requires a buffer of 100m, and Lemoenspruit tributary network comprising non-perennial systems, ephemeral drainage lines and wetlands require a buffer of 50 m to ensure adequate ecological integrity maintenance adjacent to the proposed agricultural activities. The Heritage specialist recommended a no-impact buffer of 100m is implemented around each of burial ground sites to ensure that the burials are not disturbed and to maintain a semblance of sense of place associated with the burial sites.

The impacts that are expected to remain after the avoidance of the sensitive areas have been reduced through the recommendation of specific mitigation measures by the specialists. The minimisation of the significance of the impacts is in line with tier 2 of the mitigation hierarchy.

As detailed in the cost-benefit analysis, the benefits of the Xhariep Export Programme (XEP) Agricultural Development are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure on the project site within lower sensitive areas through the avoidance of features and areas considered to be

sensitive, the benefits of the project are expected to partially offset the localised environmental costs of the agricultural development. From a social perspective, both positive and negative impacts are expected.

Through the assessment of the development footprint within the development area, it can be concluded that the development of the Xhareip Export Programme (XEP) Agricultural Development will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures).

2.2.10. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the developer, the avoidance of the sensitive environmental features within the development area, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the Xhareip Export Programme (XEP) Agricultural Development, is acceptable within the landscape and can reasonably be authorised subject to buffer of 100m on Lemoenspruit and a buffer of 50m on the Lemoenspruit tributary network comprising non-perennial systems, ephemeral drainage lines as well as a 100m is implemented around each of burial ground sites to ensure that the burials are not disturbed and to maintain a semblance of sense of place associated with the burial sites.

The proposed agricultural development will entail the following:

The development area of ~4276.32ha has been identified within the project area by the Applicant for the development.

- Developmental of center pivot areas (cultivation and irrigation) which is planned to take approximately 2690ha or more within the project site.
- Two irrigation water storage dams, with a combined surface area of 82ha in extent.
- Establishment of an irrigation pipeline network from the irrigation dams to the centre pivot areas.
- A new pump station taking a total surface area of 549m^2.
- A 5MW solar PV facility occupying an area of 10ha.
- A Battery Energy Storage System covering a surface area of 0.36ha.

CHAPTER 3: PURPOSE AND OBJECTIVES OF THE EMPR

An Environmental Management Programme (EMPr) is defined as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced". 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 help ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the project. 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 (site clearing and site establishment) through to those incurred during the construction activities themselves (erosion, noise, dust) to those incurred during site rehabilitation (soil stabilisation, re-vegetation) and operation. The EMPr also defines monitoring requirements in order to ensure that the specified objectives are met.

This EMPr is applicable to all employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the Xhariep Export Programme (XEP) Agricultural Development. The document must be adhered to and updated as relevant throughout the project life cycle.

This EMPr has been compiled in accordance with Appendix 4 of the EIA Regulations, 2014 (as amended). This is a dynamic document and will be further developed in terms of specific requirements listed in any authorisations issued for the Xhariep Export Programme (XEP) Agricultural Development and/or as the project develops. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management). The specifications have been developed on the basis of the findings of the Environmental Impact Assessment (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.

The EMPr has the following objectives:

- Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction, rehabilitation and operation phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the Xhariep Export Programme (XEP) Agricultural Development.
- Ensure that the construction and operation phases do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
- Identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.
- Propose mechanisms and frequency for monitoring compliance, and prevent long-term or permanent environmental degradation.

» Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that were not considered in the EIA process.

The mitigation measures identified within the EIA process are systematically addressed in the EMPr, ensuring the minimisation of adverse environmental impacts to an acceptable level.

JN Venter Beleggings Trust, 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 relevant contract documentation provided to parties responsible for construction and/or operation activities on the site. The adequacy and efficacy of implementation is to be monitored by an independent Environmental Control Officer (ECO). Since this EMPr is part of the EIA process for the Xhariep Export Programme (XEP) Agricultural Development, it is important that this document be read in conjunction with the BA 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, 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 operational phases of the project, and shall be enforceable at all levels of contract and operational management within the project. The document must be adhered to and updated as relevant throughout the project life cycle.

CHAPTER 4: STRUCTURE OF THIS EMPR

The first three chapters provide background to the EMPr and the Xhariep Export Programme (XEP) Agricultural Development, 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 Xhariep Export Programme (XEP) Agricultural Development 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, i.e.: » Centre pivot components » PV panels; » Dams & pipelines; » Associated infrastructure.
Potential Impact	Brief description of potential environmental impact if objective is not met.
Activity/risk source	Description of activities which could impact on achieving objective.
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion.

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

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management plan.
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 throughout the life of the Xhariep Export Programme (XEP) Agricultural Development whenever changes, such as the following, occur:

- Planned activities change (i.e. in terms of the components of the Xhariep Export Programme (XEP) Agricultural Development).
- Modification to or addition to environmental objectives and targets.
- Additional or unforeseen environmental impacts are identified and additional measures are required to be included in the EMPr to prevent deterioration or further deterioration of the environment.
- Relevant legal or other requirements are changed or introduced.
- Significant progress has been made in achieving an objective or target such that it should be re-examined to determine if it is still relevant or should be modified, etc.

4.1. Project Team

This EMPr was compiled by:

EMPr Compilers	
Candy Mahlangu	Savannah Environmental
Jo-Anne Thomas	Savannah Environmental
Input from Specialist Consultants	
Biodiversity Impact Assessment	Jan Jacobs of The Biodiversity Company
Aquatic Baseline & Impact Assessment	Andrew Husted of The Biodiversity Company
Soil and Agricultural Assessment	Matthew Mamera of The Biodiversity Company
Heritage Impact Assessment (including Archaeology and Palaeontology)	Jenna Lavin of CTS Heritage
Social Impact Study	Nondumiso Bulunga and External Peer Review by Tony Barbour

The Savannah Environmental team have extensive knowledge and experience in environmental impact assessment and environmental management, having been involved in EIA processes for more than sixteen (16) years. They have managed and drafted Environmental Management Programmes projects throughout South Africa.

CHAPTER 5: ROLES AND RESPONSIBILITIES

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities during construction in relation to the overall implementation of the EMPr

For the purposes of the EMPr, the generic roles that need to be defined are those of the:

» Project Developer;
» Project Manager/Site Manager;
» Environmental Control Officer;
» Contractors; and
» Contractor's Safety, Health and Environment Representative/Environmental Officer.

It is acknowledged that the specific titles for these functions may vary once the project is implemented. The purpose of this section of the EMPr is to give a generic outline of what these roles typically entail. It is expected that this will be further defined during project implementation.

i) The Developer

As the Proponent, JN Venter Beleggings Trust must ensure that the implementation of the project complies with the requirements of all environmental authorisations and all other permits, and obligations emanating from other relevant environmental legislation.

ii) Project Manager/Site Manager

The Project Manager/Site Manager is responsible for overall management of project and EMPr implementation. The following tasks will fall within his/her responsibilities:

» Be fully conversant with the BA 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.
» Be familiar with the recommendations and mitigation measures of this EMP, and implement these measures.
» 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.
» Monitor site activities on a daily basis for compliance.
» Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This must be documented as part of the site meeting minutes.
» Conduct internal audits of the construction site against the EMPr.
» Confine the construction site to the demarcated area.
» Rectify transgressions through the implementation of corrective action.

iii) Environmental Control Officer

A suitably qualified Environmental Control Officer (ECO)[2] 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 Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

- Be fully knowledgeable of the contents of the EIA.
- Be fully knowledgeable of the contents of the conditions of the EA (once issued).
- Be fully knowledgeable of the contents of the EMPr.
- Be fully knowledgeable of all the licences and permits issued to the site.
- Be fully knowledgeable of the contents of all relevant environmental legislation.
- Ensure that the contents of the EMPr are communicated to the Contractors site staff and that the Site Manager and Contractors are constantly made aware of the contents through ongoing 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 the Site Manager has input into the review and acceptance of construction methods and method statements or site-specific plans.
- 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).
- Ensure that any non-compliance or remedial measures that need to be applied are reported.
- Keep records of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- Independently report to the DESTEA in terms of compliance with the specifications of the EMPr and conditions of the EA (once issued).
- Keep records of all reports submitted to DESTEA.

The ECO must be present full-time on site for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, to 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. during site establishment, and excavation of foundations). Thereafter, monthly compliance audits can be undertaken, provided that adequate compliance with the EA, environmental permits and EMPr is achieved. The developer should appoint a designated Environmental Officer (EO) to be present on-site to deal with any environmental issues as the arise. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

iv) Contractors

The Lead Contractor is responsible for the following:

- Ensure compliance with the EA, environmental permits and the EMPr at all times during construction.
- Have the overall responsibility of the EMPr and its implementation.

[2] The ECO should have a relevant degree or technical diploma in environmental management and at least 2 years' experience in the field

- Ensure that all appointed contractors and sub-contractors are aware of the EMPr and their respective responsibilities.
- Provide all necessary supervision during the execution of the project.
- Comply with any special conditions as stipulated by landowners.
- Inform and educate all employees about the environmental risks associated with the various activities to be undertaken, and highlight those activities which should be avoided during the construction process in order to minimise significant impacts to the environment.
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include:
  - Public involvement / complaints
  - Health and safety incidents
  - Hazardous materials stored on site
  - Non-compliance incidents
  - 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.
- Where construction activities are undertaken is close to any inhabited area, the necessary precautions shall be taken by the Contractor to safeguard the lives and property of the inhabitants.
- Conduct audits to ensure compliance to the EMPr.
- Ensure there is communication with the Project Manager, the ECO, and relevant discipline engineers on matters concerning the environment.
- Should the Contractor require clarity on any aspect of the EMPr the Contractor must contact the Environmental Consultant/Officer for advice.

Contractors and Service Providers must be 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 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 project.
- 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).

v) Contractor's Safety, Health and Environment Representative/Environmental Officer

The Contractor's Safety, Health and Environment (SHE) Representative/Environmental Officer (EO), 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/EO 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 SHE/EO 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.

OBJECTIVE 2: Establish clear reporting, communication, and responsibilities during operation in relation to overall implementation of the EMPr during operation

Formal responsibilities are necessary to ensure that key procedures are executed during operation. Several professionals will form part of the operation team. For the purposes of the EMPr, the generic roles that need to be defined are those of the:

- Operations Manager; and
- Environmental Manager

It is acknowledged that the specific titles for these functions may vary once the project is implemented. The purpose of this section of the EMPr is to give a generic outline of what these roles typically entail. It is expected that this will be further defined during project implementation.

i) Operations Manager

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 Operations Manager must provide fourteen (14) days written notification to the DESTEA that the Xhariep Export Programme (XEP) Agricultural Development operation phase will commence.

CHAPTER 6: MANAGEMENT PROGRAMME: PLANNING AND DESIGN

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

- Ensures that the design of the project 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 applicable).
- Enables the construction activities to be undertaken without significant disruption to other land uses and activities in the area.
- Ensures that the best environmental options are selected for the Xhariep Export Programme (XEP) Agricultural Development.

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

6.1. Objectives

OBJECTIVE 1: To ensure that the design of the project responds to the identified environmental constraints and opportunities

Subject to final micro-siting of infrastructure and subsequent acceptance from DESTEA, the development footprint detailed in **Figure 2.2** must be implemented. Cognisance of sensitive areas defined in **Figure 2.2** and within the EIA Report should be considered when undertaking the final design of the Xhariep Export Programme (XEP) Agricultural Development.

Project component/s	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Power line. » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure.
Potential Impact	» Design fails to respond optimally to the identified environmental considerations. » Employment creation for the construction, operation and decommissioning activities. » Design fails to respond optimally to the environmental considerations.
Activities/risk sources	» Positioning of the Pivot Centre components » Positioning of PV panels and alignment of access roads and underground cabling. » Positioning of battery. » Positioning of dams for irrigation water.

	» Pre-construction activities, e.g. geotechnical investigations.
Mitigation: Target/Objective	» To ensure that the design of the Xhariep Export Programme (XEP) Agricultural Development responds to the identified environmental constraints and opportunities, including the constraints identified through the EIA process. » To ensure that pre-construction activities are undertaken in an environmentally friendly manner by e.g. avoiding identified sensitive areas. » Optimal planning of visual infrastructure to minimise visual impact.

Mitigation: Action/control	**Responsibility**	**Timeframe**
Plan and conduct pre-construction activities in an environmentally responsible manner and in a manner that does not lead to unnecessary impacts and disturbance.	Developer EPC Contractor	Pre-construction
Consider design level mitigation measures recommended by the specialists, as detailed within the EIA report and relevant appendices.	Developer EPC Contractor	Design phase
All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk	Developer EPC Contractor	Design phase
Where practical, powerlines/cables on the project site should be underground.	Developer EPC Contractor	Design phase
The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths.	Developer EPC Contractor	Design phase
Temporary laydown areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.	Developer EPC Contractor	Design phase
High traffic areas and buildings such as offices, batching plants, storage areas etc. should, where possible, be situated in areas that are already disturbed.	Developer EPC Contractor	Design phase
Make use of existing roads where possible when planning the access road layout for the project. Take cognisance of the topography and limit cut and fill requirements.	Developer EPC Contractor	Design phase
the number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible.	Developer EPC Contractor	Design phase
Plan as little lighting as possible, and only where essential for operation purposes.	Developer EPC Contractor	Design phase
Following the final design of the Xhariep Export Programme (XEP) Agricultural Development a final layout must be submitted to DESTEA for review and approval prior to commencing with construction. No development is permitted within the identified no-go areas as detailed in **Figure 2.2**.	Developer	Design phase

Performance Indicator	» 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	» Ensure that the design implemented meets the objectives and mitigation measures in the EIA report through review of the project design by the Project Manager and ECO prior to the commencement of construction.

OBJECTIVE 2: Ensure that relevant permits and site-specific plans are in place to manage impacts on the environment

Project Component/s	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure.
Potential Impact	» Impact on identified sensitive areas. » Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components » Pre-construction activities. » Positioning of temporary sites.
Mitigation: Target/Objective	» To ensure that the design of the project responds to the identified environmental constraints and opportunities. » To ensure that pre-construction activities are undertaken in an environmentally friendly manner.

Mitigation: Action/Control	Responsibility	Timeframe
Obtain any additional environmental permits required prior to the commencement of construction.	Developer	Pre-construction
Obtain abnormal load permits for transportation of project components to site (if required).	Contractor(s)	Prior to construction
Pre-construction walk-through of the final layout in order to locate species of conservation concern that can be translocated as well as comply with the provincial permit conditions.	Developer Specialist	Pre-construction
Prior to construction, an avifaunal specialist should conduct a site walkthrough to identify any nests/breeding/roosting activity of sensitive species.	Developer Specialist	Pre-construction
The necessary biodiversity permits must be obtained prior to removal of any species of concern.	Project developer	Pre-construction
Search and rescue of species of conservation concern should be conducted prior to clearing activities.	Developer Contractor	Pre-construction
A detailed geotechnical investigation is required for the design phase for all infrastructure components.	Developer	Design phase
A stormwater management plan must be developed in the pre-construction phase, detailing the stormwater structures and management interventions that must be installed to manage the increase of surface water flows directly into any natural systems. The stormwater control systems must be inspected on an annual basis to ensure these are functional.	Contractor(s)	Design phase

Mitigation: Action/Control	Responsibility	Timeframe
Develop a detailed method statement for the implementation of the re-vegetation and habitat rehabilitation plan for the site (refer to **Appendix D**).	Developer	Pre-construction
Develop a detailed method statement for the implementation of the traffic and transportation management plan for the site (refer to **Appendix F**).	Developer	Pre-construction
Prepare a detailed Fire Management Plan in collaboration with surrounding landowners.	Developer	Pre-construction
Develop and implement an alien, invasive and weeds eradication/control plan.	Developer Specialist	Pre-construction
A comprehensive rehabilitation / monitoring plan must be developed in consultation with a specialist, and must be implemented from the project onset i.e. during the detailed design phase prior to construction, to ensure a net benefit to the environment within all areas that will remain undisturbed.	Developer Contractor Specialist	Pre-construction

Performance Indicator	» Permits are obtained and relevant conditions complied with. » Relevant management plans prepared and implemented.
Monitoring	» Monitor ongoing compliance with the EMPr.

OBJECTIVE 3: Ensure compliance of required mitigation measures and recommendations by contractors

Project Component/s	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure.
Potential Impact	» Impact on identified sensitive areas. » Planning fails to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components » Pre-construction activities. » Positioning of temporary sites. » Employment and procurement procedures.
Mitigation: Target/Objective	» To ensure that appropriate planning is undertaken by the contractor to ensure compliance with the conditions of the EA and EMPr. » To ensure that pre-construction and construction activities are undertaken in an environmentally friendly manner.

Mitigation: Action/Control	Responsibility	Timeframe
The terms of this EMPr and the Environmental Authorisation must be included in all tender documentation and Contractors contracts.	Developer Contractor	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
Create awareness of skills through posters and media announcements and set-up a skills desk at a central and accessible location. The skills desk should serve to record local job seeker skills.	Developer Contractor	Pre-construction
Develop a local community safety forum to establish monitoring methods for the surrounding community.	Developer Contractor	Pre-construction
The developer should engage with local authorities and business organisations to investigate the possibility of procuring construction materials, goods and products from local suppliers where feasible.	Developer Contractor	Pre-construction

Performance Indicator	» Conditions of the EA and EMPr form part of all contracts. » Local employment and procurement is encouraged.
Monitoring	» Monitor ongoing compliance with the EMPr and method statements.

OBJECTIVE 4: To ensure effective communication mechanisms

It is important to maintain on-going communication with the public (including affected and surrounding landowners) during the construction and operation phases of the Xhariep Export Programme (XEP) Agricultural Development. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project component/s	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Pump Station » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure.
Potential Impact	» Impacts on affected and surrounding landowners and land uses.
Activity/risk source	» Activities associated with pre-construction phase. » Activities associated with construction of the Xhariep Export Programme (XEP) Agricultural Development. » Activities associated with operation.
Mitigation: Target/Objective	» Effective communication with affected and surrounding landowners. » Addressing 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 (including the affected and surrounding landowners) (using **Appendix B**) to be implemented during both the construction and operation phases of the Xhariep Export Programme (XEP) Agricultural Development and if applicable	Developer Contractor Operator	Pre-construction (construction procedure) Pre-operation (operation procedure)

Mitigation: Action/control	Responsibility	Timeframe
during decommissioning. This procedure should include the 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. The mechanism must also include procedures to lodge complaints in order for the local community to express any complaints or grievances with the construction process. A Public Complaints register must be maintained by the Contractor to record all complaints and queries relating to the project and the actions taken to resolve the issue.		
Develop and implement a grievance mechanism for the construction, operation and closure phases for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Developer Contractor O&M Operator	Pre-construction (construction procedure) Pre-operation (operation procedure)

Performance Indicator	» Effective communication procedures in place for all phases as required.
Monitoring	» Grievance mechanism procedures implemented. » Public complaints register developed and maintained.

CHAPTER 7: MANAGEMENT PROGRAMME: CONSTRUCTION

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.
- Minimises the impact on the indigenous natural vegetation, faunal species, and habitats of ecological value.
- Minimises the impact on heritage sites should they be uncovered.
- Ensures rehabilitation of disturbed areas not forming part of the project following the execution of the works, such that residual environmental impacts are remediated or curtailed.

7.1. Objectives

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

OBJECTIVE 1: Securing the site and site establishment

Project component/s	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure.
Potential Impact	» Hazards to landowners and public. » Security of materials. » Substantially increased damage to natural vegetation. » Potential impact on fauna and avifauna habitat.
Activities/risk sources	» Open excavations (foundations and cable trenches). » Movement of construction employees, vehicles and plant equipment in the area and on-site.
Mitigation: Target/Objective	» To secure the site against unauthorised entry. » To protect members of the public/landowners/residents.

Mitigation: Action/control	Responsibility	Timeframe
Secure the site, working areas and excavations in an appropriate manner. Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.	Contractor EO	During site establishment Maintenance: for duration of Contract

Mitigation: Action/control	Responsibility	Timeframe
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 and any other relevant indigenous languages, all to the approval of the Site Manager. All unattended open excavations shall be adequately demarcated and/or fenced.	Contractor	During site establishment Maintenance: for duration of Contract
Where necessary to control access, fence and secure the area and implement access control procedures.	Contractor	During site establishment Maintenance: for duration of Contract
Establish SABS 089: 1999 Part 1 approved bunded areas for the storage of hazardous materials and hazardous waste.	Contractor	During site establishment and during construction
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site. These must be situated outside of any delineated watercourses and pans/depressions or the buffers shown.	Contractor	During site establishment and during construction
Water consumption requirements for the site for the construction if not obtained from an authorised water user within the area, must be authorised by the Department of Water and Sanitation.	Developer	Prior to water use
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shadecloth) at sites 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.	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 as a result of construction activities. » Fauna and flora is protected as far as practically possible. » Appropriate and adequate waste management and sanitation facilities provided at construction site.
Monitoring	» Regular visual inspection of the fence for signs of deterioration/forced access. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site. » ECO/ EO to monitor all construction areas on a continuous basis until all construction is completed; immediate reporting back to the site manager. » ECO/ EO to address any infringements with responsible contractors as soon as these are recorded.

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

Project Component/s	» Pivot Centre components » PV panels.

	» Cabling between project components. » Battery (BESS). » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure.
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. » 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
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.	Contractors	Construction
Contractors must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.	Contractor and sub-contractor/s	Pre-construction
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Contractor	Construction
All construction vehicles must adhere to clearly defined and demarcated roads. No driving outside of the development boundary must be permitted.	Contractor	Construction
Ensure all construction equipment and vehicles are properly maintained at all times.	Contractor	Construction
Minimise the development footprint within very high sensitivity areas.	Contractor	Construction
Ensure that construction workers are clearly identifiable. All workers must carry identification cards and wear identifiable clothing.	Contractor	Construction
A comprehensive employee induction programme would cover land access protocols, fire management and road safety must be prepared. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Regular toolbox talks should be undertaken to ensure appropriate levels of environmental awareness.	Contractor	Construction
Contact details of emergency services must be prominently displayed on site.	Contractor	Construction
Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.	Contractor	Construction
Personnel trained in first aid must be on site to deal with smaller incidents that require medical attention.	Contractor	Construction
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. An emergency fire plan must be developed with emergency procedures in the event of a fire.	Contractor	Duration of construction
Strict control of the behaviour of construction workers must be implemented in terms of works near watercourses.	Contractor	Construction
Ensure waste storage facilities are maintained and emptied on a regular basis.	Contractor	Duration of construction
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Contractor	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.	Contractor	Duration of construction
All contaminated water must be contained by means of careful run-off management on site.	Contractor	Construction
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.	Contractor	During construction.
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.	Contractor and sub-contractor/s	Duration of contract
Cooking and eating of meals must take place in a designated area. No fires are allowed on site. No firewood or kindling may be gathered from the site or surrounds.	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.	Contractor and sub-contractor/s	Duration of contract
Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.	Contractor	Duration of contract
A Method Statement must be compiled for the management of pests and vermin within the site, specifically relating to the canteen area if applicable.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction, including fencing of the property and site access restriction.	Contractor and sub-contractor/s	Pre-construction
All disturbed areas that are not used such as excess road widths, should be rehabilitated with locally occurring shrubs and grasses after construction to reduce the overall footprint of the development.	Contractor and sub-contractor/s	Construction
On completion of the construction phase, all construction workers must leave the site within one week of their contract ending.	Contractor and sub-contractor/s	Construction

Performance Indicator	» Code of Conduct drafted before commencement of the construction phase. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » 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 undertaken. » No complaints regarding contractor behaviour or habits.
Monitoring	» Regular audits of the construction camps and areas of construction on site by the EO. » Proof of disposal of sewage at an appropriate licensed wastewater treatment works. » Proof of disposal of waste at an appropriate licensed waste disposal facility. » An incident reporting system must be used to record non-conformances to the EMPr. » Observation and supervision of Contractor practices throughout the construction phase by the EO. » Complaints will be investigated and, if appropriate, acted upon.

OBJECTIVE 3: Minimise negative social impacts on local communities and enhance positive impacts

Project component/s	» Construction and establishment activities associated with the establishment of the project » Construction work force.
Potential Impact	» The presence of construction workers who live outside the area and who are housed in local towns can impact on family structures and social networks. » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Impact on the safety of farmers and communities (increased crime etc.) by construction workers and also damage to farm infrastructure such as gates and fences. » Increase in production and GDP-R.
Activities/risk sources	» The presence of construction workers on site. » Influx of people seeking employment.
Mitigation: Target/Objective	» Avoid and/or minimise the potential impact of construction workers on the local community and their livelihoods. » Maximise the economic benefit to the local municipality.

Mitigation: Action/control	Responsibility	Timeframe
A local employment policy be adopted to maximise the opportunities made available to the local labour force. JN Venter Beleggings Trust should make it a requirement for contractors to implement a 'locals first' policy, especially for semi and low skilled job categories.	Developer Contractor	Construction
Enhance employment opportunities for the immediate local area, i.e., Letsemeng Local Municipality. If this is not possible, then the broader focus areas should be considered for sourcing workers.	Contractor	Construction
Consideration must be given to women during the recruitment process.	Contractor	Construction
It is recommended that realistic local recruitment targets be set for the construction phase.	Contractor	Construction
Training and skills development programmes should be initiated prior to the commencement of the construction phase.	Contractor	Construction
Access in and out of the construction area should be strictly controlled by a security company.	Contractor	Construction
The appointed EPC contractor must appoint a security company and appropriate security procedures are to be implemented to limit access to the site and surrounding areas.	Contractor	Construction
The contractor must ensure that open fires on the site for heating, smoking or cooking are not allowed except in designated areas.	Contractor	Construction
Have clear rules and regulations for access to the proposed site to control loitering.	Contractor	Construction
Implement penalties for reckless driving for the drivers of heavy vehicles as a way to enforce compliance to traffic rules.	Contractor	Construction
Avoid heavy vehicle activity during 'peak' hours (when people are driving to and from work).	Contractor	Construction
The developer and contractors must ensure that any damage / wear and tear caused by construction related traffic to the roads is repaired.	Contractor	Construction

Performance Indicator	» No criminal activities attributable to the construction workers are reported. » No complaints received from landowners or the general public.
Monitoring and Reporting	» An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site.

OBJECTIVE 4: Management of dust and emissions

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

Project component/s	» Pivot Centre components » PV panels.

	» Cabling between project components. » Battery (BESS). » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure.
Potential Impact	» Dust impacts can occur from cleared areas and from vehicle movement along gravel roads. » Release of minor amounts of air pollutants (for example NO_2, CO and SO_2) from vehicles and construction equipment.
Activities/risk sources	» The movement of construction vehicles and their activities on the site. » Clearing of vegetation and topsoil. » Excavation, grading and scraping. » Transport of materials, equipment and components. » Re-entrainment of deposited dust by vehicle movements. » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces. » Fuel burning from construction vehicles with combustion engines.
Mitigation: Target/Objective	» To avoid and or minimise the potential dust impacts associated with heavy vehicles, and also minimise damage to roads. » To ensure emissions from all vehicles are minimised, where possible, for the duration of the construction phase. » To minimise nuisance to the community and adjacent landowners from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase.

Mitigation: Action/control	**Responsibility**	**Timeframe**
Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).	Contractor	Construction phase
Vehicles and equipment must be maintained in a road-worthy condition at all times. Road worthy certificates must be in place for all heavy vehicles at the outset of the construction phase and updated on a monthly basis.	Contractor	Construction phase
Ensure vehicles adhere to speed limits on public roads and speed limits set within the site by the Site Manager.	Contractor Transportation contractor	Duration of contract
Ensure that damage to gravel public roads and access roads attributable to construction vehicles is repaired before completion of the construction phase.	EPC Contractor	Before completion of construction phase
Disturbed areas not forming part of the project must be re-vegetated as soon as practicable after construction is complete in an area.	EPC Contractor	Construction

Performance Indicator	» Appropriate dust suppression measures implemented on site during the construction phase. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed or before entering the site. » Road worthy certificates in place for all heavy vehicles at the outset of the construction phase and updated on a monthly basis.
Monitoring and Reporting	» The Developer and appointed EO must monitor indicators listed above to ensure that they have been met for the construction phase.

	» Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site.

OBJECTIVE 5: Conservation of the existing soil resource within the site and in the adjacent areas

The natural soil on the site needs to be preserved as far as possible to minimise impacts on the environment. Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern. Uncontrolled run-off relating to construction activities (excessive wetting, etc.) will also lead to 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.

A set of strictly adhered to mitigation measures are required to be implemented in order to effectively limit the impact on the environment. The disturbed areas where human impact is likely are the focus of the mitigation measures laid out below.

Project component/s	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure.
Potential Impact	» Erosion and soil loss. » Increased runoff. » Downstream sedimentation.
Activities/risk sources	» Rainfall and wind erosion of disturbed areas. » Excavation, stockpiling and compaction of soil. » Concentrated discharge of water from construction activity. » Stormwater run-off from sealed surfaces. » Mobile construction equipment movement on site. » Roadside drainage ditches. » Project related infrastructure, such as buildings, PV panels and fences.
Mitigation: Target/Objective	» To minimise erosion of soil from site during construction. » To minimise damage to vegetation by erosion or deposition. » To retain all topsoil with a stable soil surface

Mitigation: Action/control	Responsibility	Timeframe
Erosion management at the site should take place on an ongoing basis. Signs of erosion must be addressed immediately to prevent further erosion of the area to prevent headcut erosion from forming.	Contractor	Construction
Loose soils are particularly prone to loss due to wind or water. It is therefore preferable that construction takes place during the	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
dry season to reduce the erosion potential of the exposed surfaces.		
Practice good soil management across the project area.	Contractor	Construction
Minimize the bare soil intercrop period as much as possible.	Contractor	Construction
Investigate the use of a cover crop (e.g. Eragrostis or better) if intercrop period is expected to be long. The cover species should not be exotic or invasive and should be chosen in consultation with a qualified vegetation specialist.	Contractor	Construction
Continue to grass all inter-cropland areas to prevent soil loss.	Contractor	Construction
Avoid the creation of concentrated flow paths wherever possible.	Contractor	Construction
Devise and implement a stormwater management plan for the croplands.	Contractor	Construction
Install sandbags as a temporary measure around key areas of soil loss to prevent soils washing into the local watercourse.	Contractor	Construction
Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching.	Contractor	Construction
Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil.	Contractor	Construction
Relandscape to gentler gradients and re-vegetate all cleared areas as soon as possible to limit erosion potential. Sandbags and geotextiles should be used to assist until vegetation has established in these reworked areas.	Contractor	Construction
Stem any headcut/ erosion gulley as it occurs by bulldozing, filling, re-contouring to gentler gradients and re-vegetating.	Contractor	Construction
The rehabilitation of watercourse banks should take place as an offset to altered land use with associated negative ecological impacts. Key areas where erosion has occurred should be rehabilitated through bank reprofiling to gentler gradients and the revegetation of the marginal and riparian areas.	Contractor	Construction

Performance Indicator	» Minimal level of soil erosion around site. » Minimal level of soil degradation. » No indications of visible topsoil loss.
Monitoring and Reporting	» Continual inspections of the site by the EO. » Reporting of ineffective erosion control systems and rectification as soon as possible.

OBJECTIVE 6: Minimise the impacts on and loss of indigenous vegetation and control of alien invasive plants

The Xhariep Export Programme (XEP) Agricultural Development is located within the Nama Karoo Biome, which is a large, landlocked region on the central plateau of the western half of South Africa and extends

into south-eastern Namibia. This is an arid biome with the majority of the river systems being non-perennial. Apart from the Orange River and the few permanent streams in the southwest that originate in higher-rainfall neighbouring areas, the limited number of perennial streams that originate in the Nama-Karoo are restricted to the more mesic east.

Project component/s	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure..
Potential Impact	» Loss of plant cover leading to loss of faunal habitat and loss of specimens of protected plants. » Soil erosion. » Increased fire hazards. » Increased water use.
Activity/risk source	» Site preparation and clearing. » Soil disturbance » Introduction of plant propagules with people and vehicles. » Activities outside of designated construction areas. » Driving off designated routes.
Mitigation: Target/Objective	» To limit construction activities to designated areas. » Implement invasive plant clearing prior to construction, but after site demarcation.

Mitigation: Action/control	Responsibility	Timeframe
Demarcate all areas to be cleared.	Contractor	Construction
Communicate clearly to all contractors that no disturbance outside the demarcated areas will be tolerated.	Contractor	Construction
All construction activity to be within the clearly defined and demarcated areas.	Contractor	Construction
Vegetation clearing to commence only after the necessary permits have been obtained.	Contractor	Construction
Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared.	Contractor	Construction
Temporary laydown areas should be clearly demarcated and rehabilitated subsequent to end of use.	Contractor	Construction
Regular monitoring for alien plants within the development footprint as well as adjacent areas must be undertaken as these are also likely to be prone to invasion problems. Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.	Contractor	Construction
All alien plant re-growth must be monitored and should these alien plants reoccur these plants should be re-eradicated. The scale of the development does however not warrant the use of a Landscape Architect and / or Landscape Contractor.	Contractor	Construction
The use of herbicides and pesticides and other related horticultural chemicals should be carefully controlled and only applied by personnel	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
adequately certified to apply pesticides and herbicides (a registered Pest Control Officer). 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.		
A registered Pest Control Officer must be appointed to implement the invasive alien plants and weeds management plan. The Pest Control Officer must supervise the clearing team to ensure compliance with the invasive alien plants and weeds management plan.	Contractor	Construction

Performance Indicator	» Construction activities restricted to the development footprint. » No disturbance outside of designated work areas. » Limited alien infestation within project control area.
Monitoring and Reporting	» Monitoring of alien plant establishment within the site on an on-going basis.

OBJECTIVE 9: Protection of terrestrial fauna

Project component/s	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure...
Potential Impact	» Vegetation clearance and associated impacts on faunal habitats. » Traffic to and from site.
Activity/risk source	» Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on site. » Construction activities.
Mitigation: Target/Objective	» To minimise footprints of habitat destruction. » To minimise disturbance to resident and visitor faunal species.

Mitigation: Action/control	Responsibility	Timeframe
Prior to commencing work each day, two individuals should traverse the working area in order to disturb any fauna and so they have a chance to vacate.		
Any fauna threatened by the construction activities should be removed safely by an appropriately qualified removal specialist.	Contractor	Construction
The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off of the construction site.	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
Any excavations should not be left open for extended periods of time as fauna may fall in and become trapped in them. Excavations should only be dug when they are required and should be used and filled shortly thereafter.	Contractor CEO	Construction
All construction vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises.	Contractor	Construction

Performance Indicator	» No disturbance outside of designated work areas. » Limited impacts on faunal species (i.e. noted/recorded fatalities), especially those of conservation concern.
Monitoring and Reporting	» Supervision of all clearing and earthworks by the EO.

OBJECTIVE 7: Minimise impacts on heritage sites

Project component/s	» Excavation of foundations. » Excavation of trenches for the installation of cabling and infrastructure.
Potential Impact	» Loss of archaeological artefacts. » Loss of fossil resources. » Impacts on heritage sites. » Impacts on graves or burial sites. » Loss of resources going unnoticed. » Destruction of resources
Activity/risk source	» All bulk earthworks.
Mitigation: Target/Objective	» To facilitate the likelihood of noticing heritage resources and ensure appropriate actions in terms of the relevant legislation

Mitigation: Action/control	Responsibility	Timeframe
Contractors must be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow if they find sites. All staff must also be familiarised with procedures for dealing with heritage objects/sites.	Contractor	Construction
<u>Chance Find Procedure:</u> » If a chance find is made the person responsible for the find must immediately stop working and all work must cease in the immediate vicinity of the find. » The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the Environmental Officer (EO) (if appointed) or site manager . The EO must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates. » A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates. » Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found. Upon receipt of the preliminary report, the Heritage Agency will inform the EO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary. » The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilised and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find. » In the event that the fossil cannot be stabilised the fossil may be collected with extreme care by the EO (or site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site. » Once Heritage Agency has issued the written authorisation, the developer may continue with the development.		

Performance Indicator	» Reporting of and liaison about possible finds of heritage resources. » Heritage resources noticed and rescued. » All heritage items located are dealt with as per the legislative guidelines.
Monitoring and Reporting	» Ensure staff are aware of heritage resources and the procedure to follow when found. » EO to conduct inspections of open excavations.

OBJECTIVE 8: Appropriate handling and management of waste

The construction of the Xhariep Export Programme (XEP) Agricultural Development, and associated infrastructure 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 activities include:

» general solid waste

- hazardous waste
- inert waste (rock and soil)
- liquid waste (including grey water and sewage)

Project Component/s	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure.
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.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an integrated waste management approach that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate. Where solid waste is disposed of, such disposal shall only occur at an appropriately licensed landfill.	Contractor	Construction
Construction method and materials must be carefully considered in view of waste reduction, re-use, and recycling opportunities.	Contractor	Construction
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	Contractor	Construction
Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises is placed, dumped or deposited on adjacent/surrounding properties.	Contractor	Construction
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.	Contractor	Construction
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.).	Contractor	Construction
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Construction
Waste must be stored seperately in accordance with the relevant legislative requirements.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Waste must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Construction
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.	Contractor	Construction
All liquid wastes must be contained in appropriately sealed vessels/ponds within the footprint of the development, and be disposed of at a designated waste management facility.	Contractor	Construction
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.	Contractor	Construction
Regularly serviced chemical toilet facilities and/or septic tank must be used to ensure appropriate control of sewage.	Contractor	Construction
Daily inspection of all chemical toilets and septic tanks must be performed by environmental representatives on site.	Contractor	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.	Contractor	Construction
Under no circumstances may waste be burnt or buried on site.	Contractor	Construction
Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly, or at an appropriate frequency, at registered waste disposal sites.	Contractor	Construction
Upon the completion of construction, the area must be cleared of potentially polluting materials (including chemical toilets). Spoil stockpiles must also be removed and appropriately disposed of or the materials re-used for an appropriate purpose.	Contractor	Construction

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. » Proof of disposal of sewage at an appropriate wastewater treatment works. » 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 9: Appropriate handling and storage of chemicals, hazardous substances

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

Project Component/s	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure.
Potential Impact	» Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers. » Soil pollution.
Activity/Risk Source	» Vehicles associated with site preparation and earthworks. » Construction activities of area and linear infrastructure. » Hydrocarbon spills by vehicles and machinery during levelling, vegetation clearance and transport of workers, materials and equipment and fuel storage tanks. » Accidental spills of hazardous chemicals. » Polluted water from wash bays and workshops. » Pollution from concrete mixing.
Mitigation: Target/Objective	» To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons. » Prevent and contain hydrocarbon leaks. » Undertake proper waste management. » Store hazardous chemicals safely in a bunded area.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an emergency preparedness plan during the construction phase.	Contractor	Construction
Any liquids stored on site, including fuels and lubricants, must be stored in accordance with applicable legislation.	Contractor	Construction
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants. These must be maintained regularly.	Contractor	Construction
Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment must be contained using a drip tray with plastic sheeting filled with absorbent material when not parked on hard standing.	Contractor	Construction
All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.	Contractor	Construction
Establish an appropriate Hazardous Stores and fuel storage area which is in accordance with the Hazardous Substance Amendment Act, No. 53 of 1992. This must include but not be limited to: » Designated area; » All applicable safety signage; » Firefighting equipment; » Enclosed by an impermeable bund as per the requirements of the relevant standards and any relevant by-laws;	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
» Protected from the elements, » Lockable; » Ventilated; and » Has adequate capacity to contain 110% of the largest container contents.		
The storage of flammable and combustible liquids such as oils must be stored in compliance with Material Safety Data Sheets (MSDS) files.	Contractor	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. Where required, a NEMA Section 30 report must be submitted to DESETA within 14 days of the incident.	Contractor	Construction
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.	Contractor	Construction
Spilled concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Construction
Accidental spillage of potentially contaminating liquids and solids must be cleaned up immediately in line with procedures by trained staff with the appropriate equipment.	Contractor	Construction
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Construction
All machinery and equipment must be inspected regularly for faults and possible leaks,	Contractor	Construction
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.	Contractor	Construction
Construction machinery must be stored in an appropriately sealed area.	Contractor	Construction
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.	Contractor	Construction
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor	Construction
The sediment control and water quality structures used on-site must be monitored and maintained in an operational state at all times.	Contractor	Construction
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.	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.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
As much material must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site.	Contractor	Construction
Have appropriate action plans on site, and training for contactors and employees in the event of spills, leaks and other potential impacts to the aquatic systems. All waste generated on-site during construction must be adequately managed.	Contractor	Construction
Minimise fuels and chemicals stored on site.	Contractor	Construction
Implement a contingency plan to handle spills, so that environmental damage is avoided.	Contractor	Construction
Drip trays must be used during all fuel/chemical dispensing and beneath standing machinery/plant.	Contractor	Construction
In the case of petrochemical spillages, the spill must be collected immediately and stored in a designated area until it can be disposed of in accordance with the Hazardous Chemical Substances Regulations, 1995 (Regulation 15).	Contractor	Construction

Performance Indicator	» No chemical spills outside of designated storage areas. » No water or soil contamination by spills. » Safe storage of hazardous chemicals. » Proper waste management.
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 must be used to record non-conformances to the EMPr. » On-going visual assessment to detect polluted areas and the application of clean-up and preventative procedures. » Monitor hydrocarbon spills from vehicles and machinery during construction continuously and record volume and nature of spill, location and clean-up actions. » Monitor maintenance of drains and intercept drains weekly. » Analyse soil samples for pollution in areas of known spills or where a breach of containment is evident when it occurs. » Records of accidental spills and clean-up procedures and the results thereof must be audited on an annual basis by the ECO. » Records of all incidents that caused chemical pollution must be kept and a summary of the results must be reported to management annually.

OBJECTIVE 10: Traffic management and transportation of equipment and materials to site

The construction and decommissioning phases of the project will be the most significant in terms of traffic impacts resulting from the transport of equipment and materials and construction crews to the site and the return of the vehicles after delivery of materials. Potential impacts associated with transportation and access relate mostly to works within the site boundary and the external road network.

Project component/s	» Pivot Centre components

	» PV panels. » Cabling between project components. » Battery (BESS). » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure.
Potential Impact	» Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted. » Risk of accidents. » Deterioration of road pavement conditions (i.e. both surfaced and gravel road) due to abnormal loads.
Activity/risk source	» Construction vehicle movement. » Speeding on local roads. » Degradation of local road conditions. » Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on-site. » Substation construction activities.
Mitigation: Target/Objective	» Minimise impact of traffic associated with the construction of the project on the local traffic volume, existing infrastructure, property owners, animals, and road users. » To minimise the potential for negative interaction between pedestrians or sensitive users and traffic associated with the project 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
Heavy vehicles travelling on secondary roads should adhere to low-speed limits to minimise noise and dust pollution.	Contractor(s), (Transportation sub-contractor)	Construction
If feasible, no construction activities should be carried out during weekends and outside day time working hours	Contractor	Construction
Provide adequate signage to warn motorists of the construction activities taking place on the site. Signage must be maintained on an on-going basis.	Contractor	Construction
A designated access (or accesses) to the proposed site must be created to ensure safe entry and exit.	Contractor	Construction
All hazardous substances must be transported in accordance with the relevant legislation and regulations.	Contractor(s)	Duration of contract

Performance Indicator	» No traffic incidents involving project personnel or appointed contractors. » Appropriate signage in place. » No complaints resulting from traffic congestion, delays or driver negligence associated with construction of the Xhariep Export Programme (XEP) Agricultural Development.
Monitoring	» Visual monitoring of traffic control measures to ensure they are effective. » 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 11: 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	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure.
Potential Impact	» Environmental integrity of the site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activity/risk source	» Site preparation and earthworks. » Excavation of foundations and trenches. » Temporary laydown areas. » Temporary access roads/tracks. » Other disturbed areas/footprints.
Mitigation: Target/Objective	» To ensure and encourage site rehabilitation of disturbed areas. » To 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
A site rehabilitation programme should be compiled and implemented (refer to **Appendix D**).	EPC Contractor in consultation with Specialist	Construction
Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks and laydown areas) must be undertaken.	Contractor	Following execution of the works
All cleared areas not forming part of the project operation phase must be revegetated with indigenous vegetation from the local area.	Contractor	Following execution of the works
Rehabilitation of the working areas must be concurrent with the construction of the project.	Contractor	Construction
All temporary facilities, equipment and waste materials must be removed from site and appropriately disposed of following completion of construction.	Contractor	Following execution of the works
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Following execution of the works
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Contractor	Following execution of the works

Mitigation: Action/control	Responsibility	Timeframe
On-going alien plant monitoring and removal should be undertaken on all areas of natural vegetation on an annual basis.	Contractor	Construction

Performance Indicator	» All portions of site, including construction camp and working areas, cleared of equipment and temporary facilities. » Topsoil replaced on all areas and stabilised. » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites. » Closed site free of erosion and alien invasive plants.
Monitoring and Reporting	» On-going inspection of rehabilitated areas in order to determine the effectiveness of the rehabilitation measures implemented during the operational lifespan of the Xhariep Export Programme (XEP) Agricultural Development. » On-going alien plant monitoring and removal should be undertaken on an annual basis. » An incident reporting system must be used to record non-conformances to the EMPr.

7.2. Detailing Method Statements

OBJECTIVE 12: 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
» 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).
- Stipulate the stormwater management procedures recommended in the stormwater management 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 the waste process.
  - Recycle, re-use and removal process and procedure.
- Liquid waste management:
  - Design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into rivers, streams or existing drainage systems.
  - Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into existing facilities or sewerage systems where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no unacceptable seepage occurs.
- Dust and noise pollution:
  - Describe the 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 the 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 for when roads are in use.
- Requirements on gate control protocols.

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

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

7.3. Awareness and Competence: Construction Phase of the Xhariep Export Programme (XEP) Agricultural Development

OBJECTIVE 13: 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 project.
- 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 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 on-site, 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:

7.3.1 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 EO 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 SHE Officer on site.

7.3.2 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 EO 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 the 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.

7.3.3 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 the reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

7.4. Monitoring Programme: Construction Phase of the Xhariep Export Programme (XEP) Agricultural Development,

OBJECTIVE 14: 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. Monitoring during construction must be on-going for the duration of this phase. The Project Manager must ensure that the monitoring is conducted and reported.

The aim of the monitoring and auditing process will be to 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 in communication and feedback to authorities and stakeholders

All documentation e.g. audit/monitoring/compliance reports and notifications must be submitted to the DESETA in terms of the Environmental Authorisation. Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

7.4.1. Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, and the ECO must be provided with 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.

7.4.2. Incident Reports

According to Section 30 of National Environmental Management Act (NEMA), an "Incident" is defined as an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.

In terms of the requirements of NEMA, the responsible person must, within 14 days of the incident, report to the Director General, provincial head of department and municipality such information as is available to enable an initial evaluation of the incident, including:

(a) the nature of the incident;
(b) the substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and data needed to assess these effects;
(c) initial measures taken to minimise impacts;
(d) causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure; and
(e) measures taken and to be taken to avoid a recurrence of such incident.

7.4.3. Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis (or as dictated by the conditions of the EA) and must be submitted to DESETA 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, or any other aspect as per the Appendix 7 of the EIA Regulations (2014, as amended 2017). 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 DESETA regarding waste related activities.

7.4.4. Audit Report

The Developer must ensure that project compliance with the conditions of the Environmental Authorisation is audited by an independent auditor, and that the audit reports are submitted to DESETA at intervals as dictated by the conditions of the EA. Such audits must be undertaken during both the construction and operation phases of the project. The effectiveness of the mitigation measures and recommendations for amongst others the following: grievance incidents; waste management, alien and open space management, re-vegetation and rehabilitation, plant rescue and protection and traffic and transportation should be audited. The results must form part of the project monitoring and audit reports.

CHAPTER 8: MANAGEMENT PROGRAMME: OPERATION

Overall Goal: To ensure that the operation of the Xhariep Export Programme (XEP) Agricultural Development 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 Xhariep Export Programme (XEP) Agricultural Development in a way that:

» Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
» Enables the operation activities to be undertaken without significant disruption to other land uses in the area.
» Minimises impacts on fauna using the site.

8.1. Objectives

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

OBJECTIVE 1: Securing the site and general maintenance during operation

Safety issues may arise with public access to the Xhariep Export Programme (XEP) Agricultural Development (e.g. unauthorised entry to the site) or to the substation. Prevention and control measures to manage public access are therefore important.

General maintenance at the Xhariep Export Programme (XEP) Agricultural Development will be required during the operation phase. The maintenance required may also include the replacement of PV panels, if required during the operation lifetime of the project.

Project component/s	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Power line. » Dams for irrigation water. » Internal irrigation pipeline.
Potential Impact	» Hazards to landowners and public.
Activities/risk sources	» Uncontrolled access to the project site.
Mitigation: Target/Objective	» To secure the site against unauthorised entry. » To protect members of the public/landowners/residents.

Mitigation: Action/control	Responsibility	Timeframe
General onsite maintenance of the project site during the operation phase must in no way impact or negatively affect the environment, and contractors or other service providers	Operator	Operation phase

Mitigation: Action/control	Responsibility	Timeframe
providing onsite maintenance must be made aware of this EMPr and the content thereof.		
Secure access to the site and entrances.	Operator	Operation phase
Should any of Xhariep Export Programme (XEP) Agricultural Development components be required to be replaced, the following will apply: » Site access must be confirmed for the transportation of the required components and equipment to the site and location of the infrastructure to be replaced. » Materials and components are to be stored within the previously disturbed construction laydown area. No disturbance of areas outside of these areas should occur. » Full clean-up of all materials must be undertaken after the removal and replacement of the project components is complete, and disturbed areas appropriately rehabilitated. » Most of the materials used for can be recycled. The majority of the panel can be recovered and re-used or recycled. Recyclable materials must be transported off-site by truck and managed at appropriate facilities in accordance with relevant waste management regulations. No waste materials may be left on-site following the replacement. » Waste material which cannot be recycled shall be disposed of at an appropriately licensed waste disposal site or as required by the relevant legislation.	O&M Operator	Operation phase

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured. » No complaints from landowners/ public.
Monitoring and Reporting	» Regular visual inspection of fence for signs of deterioration/forced access. » An incident reporting system must be used to record non-conformances to the EMPr. » A public complaints register must be developed and maintained on site. » Landowners should be consulted regularly.

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 the construction, maintenance of the areas rehabilitated post-construction must be undertaken until these areas have successfully re-established.

Project component/s	» Areas requiring regular maintenance. » Pivot Centre including access roads » Areas disturbed during the construction phase and subsequently rehabilitated at its completion.
Potential Impact	» Disturbance to or loss of vegetation and/or habitat.

	» Alien plant invasion. » 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
Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.	O&M Operator	Operation phase
The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except landowners or other individuals with the appropriate permits and permissions where required.	O&M Operator	Operation phase
All vehicles accessing the site should adhere to a low speed limit (30km/h max for heavy vehicles and 40km/h for light vehicles) to avoid collisions with susceptible species such as snakes and tortoises.	O&M Operator	Operation phase
Noise and disturbance on the site should be kept to a minimum during operation and maintenance activities.	O&M Operator	Operation phase
Site access should be strictly controlled, to avoid unnecessary disturbance.	O&M Operator	Operation phase
Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance must be undertaken, as per the Erosion Management and Rehabilitation Plans for the project.	O&M Operator	Operation phase
All erosion problems observed must be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.	O&M Operator	Operation phase
Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem plant species are already present in the area and are likely to increase rapidly if not controlled.	O&M Operator	Operation phase
Regular monitoring for alien plants within the development footprint as well as adjacent areas must be undertaken as these are also likely to be prone to invasion problems.	O&M Operator	Operation phase
Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.	O&M Operator	Operation phase
All alien plant re-growth must be monitored and should these alien plants reoccur these plants should be re-eradicated. The scale of the development does however not warrant the use of a Landscape Architect and / or Landscape Contractor.	O&M Operator	Operation phase
Vehicle movements must be restricted to designated roadways.	O&M Operator	Operation phase

Mitigation: Action/Control	Responsibility	Timeframe
The use of herbicides 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.	O&M Operator	Operation phase
Fire breaks should be established, where appropriate and as discussed with the landowners. Access roads could also act as fire breaks.	O&M Operator Specialist	Duration of contract
There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous perennial shrubs and succulents from the local area.	O&M Operator	Operation phase

Performance Indicator	» No further disturbance to vegetation or terrestrial faunal habitats. » No erosion problems resulting from operational activities within the Xhariep Export Programme (XEP) Agricultural Development. » Low abundance of alien plants within affected areas. » Maintenance of a ground cover that resist erosion. » Continued improvement of rehabilitation efforts.
Monitoring	» Observation of vegetation on-site by environmental manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas. » Annual monitoring with records of alien species presence and clearing actions. » Annual monitoring with records of erosion problems and mitigation actions taken with photographs.

OBJECTIVE 3: Appropriate handling and management of hazardous substances and waste

The operation of the Xhariep Export Programme (XEP) Agricultural Development, will involve the generation of limited waste products. The main wastes expected to be generated by the operation activities includes general solid waste and hazardous waste.

Project component/s	» Pivot Centre components » PV panels. » Cabling between project components. » Battery (BESS). » Power line. » Dams for irrigation water. » Internal irrigation pipeline. » All other associated infrastructure..
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	» Battery » PV Panel

	» Pivot Centre » Fuel and oil storage.
Mitigation: Target/Objective	» To comply with waste management legislation. » To minimise production of waste. » To ensure appropriate waste disposal. » To avoid environmental harm from waste disposal.

Mitigation: Action/control	Responsibility	Timeframe
All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.	Operator	Operation phase
Storage areas for hazardous substances must be conducted within a secured and clearly demarcated area.	Operator	Operation phase
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.	Operator	Operation phase
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.	Operator	Operation and maintenance
Waste handling, collection and disposal operations must be managed and controlled by a waste management contractor. Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Operator / waste management contractor	Operation phase
Used oils and chemicals: » Where these cannot be recycled, 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.	Operator	Operation phase
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	Operator	Operation phase
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Operator	Operation and maintenance
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	Operator	Operation phase
No waste may be burned or buried on site.	Operator	Operation phase

Performance Indicator	» No complaints received regarding waste on site or dumping. » Internal site audits identifying that waste segregation, recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests. » No contamination of soil.

Monitoring and Reporting	» Waste collection must be monitored internally on a regular basis. » Waste documentation must be completed and made available for inspection on request. » An incidents/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 and monitored by the environmental manager. All appropriate waste disposal certificates must accompany the monthly reports.

OBJECTIVE 4: Maximise benefits and opportunities for local communities associated with the project

The proposed Xhariep Export Programme (XEP) Agricultural Development and associated infrastructure is unlikely to result in permanent damaging social impacts and will have a number of positive impacts from a social and economic perspective at a local and regional level.

Project component/s	» Day to day operational activities associated with the Xhariep Export Programme (XEP) Agricultural Development, including maintenance.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised as far as possible.
Activity/risk source	» The operation phase of the Xhariep Export Programme (XEP) Agricultural Development, will create permanent employment opportunities. » The establishment of a Xhariep Export Programme (XEP) Agricultural Development, has the potential to create an attraction for visitors to the area. The development also has the potential to promote the benefits of renewable energy projects.
Mitigation: Target/Objective	» Create medium- to long-term full time employment opportunities for locals.

Mitigation: Action/control	Responsibility	Timeframe
A local employment policy is adopted by the developer to maximise the project opportunities being made available to the local community. Enhance employment opportunities for the immediate local area, Letsemeng Local Municipality, if this is not possible, then the broader focus areas should be considered for sourcing employees.	Operator	Operation phase
The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.	Operator	Operation phase
The developer should establish vocational training programs for the local employees to promote the development of skills	Operator	Operation phase

Performance Indicator	» Maximum amount of semi and unskilled labour locally sourced where possible. » Skills transfer facilitated where required.
Monitoring and Reporting	» Indicators listed above must be met for the operation phase.

OBJECTIVE 5: Implement an appropriate fire management plan during the operation phase

The vegetation on the site may be at risk of fire, especially during drought conditions experienced in the area. The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

Project Component/s	» Operation and maintenance of the Xhariep Export Programme (XEP) Agricultural Development, and associated infrastructure.
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 Xhariep Export Programme (XEP) Agricultural Development, 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: Target/Objective	» To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods.

Mitigation: Action/Control	Responsibility	Timeframe
Provide adequate fire-fighting equipment on site. Apply for membership to the local Fire Protection Association, should there be one.	O&M Operator	Operation phase
Provide fire-fighting training to selected operation and maintenance staff.	O&M Operator	Operation phase
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	O&M Operator	Operation phase
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.). Access roads may also act as fire breaks.	O&M Operator	Operation phase
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.	O&M Operator	Operation phase
Contact details of emergency services should be prominently displayed on site.	O&M Operator	Operation phase

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

8.2. Monitoring Programme: Operation Phase of the Xhariep Export Programme (XEP) Agricultural Development,

OBJECTIVE 6: 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. An internal environmental audit must be conducted every 6 months and an external audit must be conducted once a year in order to confirm compliance with the requirements of all environmental permits (including the Environmental Authorisation, once issued) for the project, this EMPr, and all relevant legislation. The results of the audit reports must be made available to the DESTEA and the relevant authorities on request, and must be part of monitoring and audit reports. An annual audit report must be compiled and submitted to DESTEA. The aim of the 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 in the communication and feedback to authorities and stakeholders.

CHAPTER 9: MANAGEMENT PROGRAMME: DECOMMISSIONING

The PV infrastructure which will be utilised for the Xhariep Export Programme (XEP) Agricultural Development, is expected to have a lifespan of 20 years (with maintenance). Equipment associated with the Xhariep Export Programme (XEP) Agricultural Development, 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 Xhariep Export Programme (XEP) Agricultural Development, would comprise the dismantling and replacement of the PV panels, Pivots Centre and supporting structures with more appropriate technology/infrastructure available at that time. It must be noted that decommissioning activities will need to be undertaken in accordance with the legislation applicable at that time, which may require this section of the EMPr to be revisited and amended.

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

» ***Site Preparation***
Site preparation activities will include confirming the integrity of the access to the site to accommodate the required equipment, preparation of the site (e.g. laydown areas, construction platform) and the mobilisation of construction equipment.

» ***Dismantle and Remove Infrastructure***
The infrastructure will be dismantled once it reaches the end of its economic lifespan. Once dismantled, the components will be reused, recycled, or disposed of in accordance with regulatory requirements (NEMA / NEM:WA). All parts of the project infrastrcuture would be considered reusable or recyclable except for the blades.

9.1. Objectives

In decommissioning the Xhariep Export Programme (XEP) Agricultural Development, JN Venter Beleggings Trust must ensure that:

» All structures not required for the post-decommissioning use of the site (may include the PV panels, substation, ancillary buildings, monitoring masts) are dismantled and/or demolished, removed and waste material disposed of at an appropriately licensed waste disposal site or as required by the relevant legislation.
» Rehabilitate access/service roads and servitudes not required for the post-decommissioning use of the site. If necessary, an ecologist should be consulted to give input into rehabilitation specifications.
» All disturbed areas are compacted, sloped and contoured to ensure drainage and runoff and to minimise the risk of erosion.
» Monitor rehabilitated areas quarterly for at least a year following decommissioning, and implement remedial action as and when required.
» Any fauna encountered during decommissioning activities should be removed to safety by a suitably qualified person.
» 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.
» Retrenchments should comply with South African Labour legislation of the day.

The general specifications of Chapter 6 (Construction) are also relevant to the decommissioning of the Xhariep Export Programme (XEP) Agricultural Development, and must be adhered to.

APPENDIX A:
XHARIEP EXPORT PROGRAMME (XEP) AGRICULTURAL DEVELOPMENT, OPTIMISED LAYOUT AND SENSITIVITY MAPS

Xhariep Export Programme (XEP)
Agricultural Development & Associated Infrastructure
Free State Province

Layout Map

N

LEMOEN-SPRUIT 667 0

WELTEVREDEN 755 0

GROOTPOORT 168 1

DIEPDRAAI 754 0

Lemoenspruit

R48

Beta/Hydra 2 400kV

Perseus/Hydra 3 400kV

Perseus/Hydra 4 400kV

Beta/Hydra 1 400kV

0 0,75 1,5 3 4,5 6 Kilometers

adaster NL, mmunity

Legend

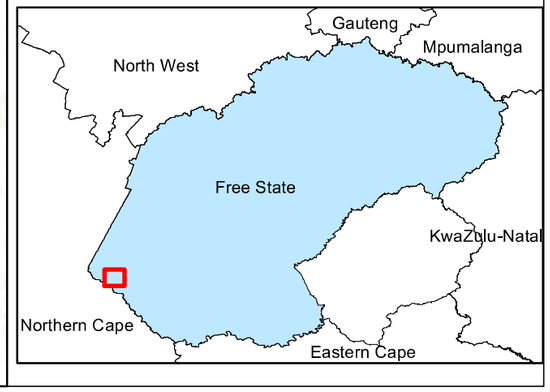
- Eskom Substation
- Eskom Power Line
- Main Road
- Regional Road
- Perennial River
- Non Perennial River
- Canal

Proposed Layout

- Centre Pivots
- Dam Wall
- Dam 1
- Dam 2 (Sump Dam)
- Battery Area
- Solar Area (10ha)

savannah environmental

Scale: 1:100 000
Projection: GCS_WGS_1984
Map Ref: XEP Layout Map



Xhariep Export Programme (XEP)
Agricultural Development
& Associated Infrastructure
Free State Province

Combined Heritage and Wetland Sensitivity Map

N

LEMOEN-SPRUIT 667
0

WELTEVREDEN 755
0

GROOTPOORT 168
1

DIEPDRAAI 754
0

R48

R48

1465 m

1477 m

Legend

- Perennial River
- Non Perennial River
- Canal
- Centre Pivots
- Dam Wall
- Dam 1
- Dam 2 (Sump Dam)
- Battery Area
- Solar Area (10ha)
- Project Site

Heritage

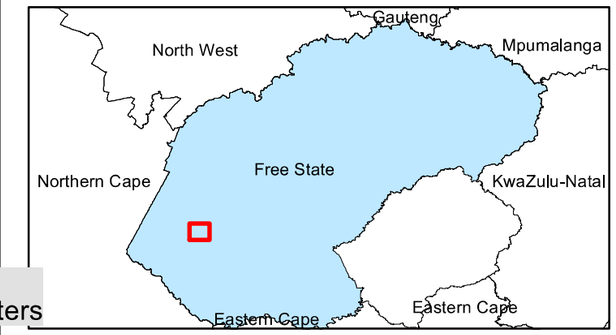
- SAHRIS Sites
- Graves
- Exclusion
- Grave buffer 100m

Sensitivities

- Wetlands
- Lemoen spruit Riparian Area
- Lemoen spruit Buffer (100 m)
- Tributary Buffer (50 m)

savannah environmental

Scale: 1:100 000
Projection: GCS_WGS_1984
Map Ref: Venter Boerdery Heritage



Sources: Esri, HERE, G
Kadaster NL, Ordnance
User Community

0 0,75 1,5 3 4,5 6
Kilometers

Xhariep Export Programme (XEP)
Agricultural Development
& Associated Infrastructure
Free State Province

Site Ecological Importance
Sensitivity Map

N

LEMOEN-SPRUIT 667
0

WELTEVREDEN 755
0

GROOTPOORT 168
1

DIEPDRAAI 754
0

Lemoenspruit

0 0,75 1,5 3 4,5 6
Kilometers

Legend

- Perennial River
- Non Perennial River
- Project Site
- Canal
- Centre Pivots
- Dam Wall
- Dam 1
- Dam 2 (Sump Dam)
- Battery Area
- Solar Area (10ha)

Sensitivities

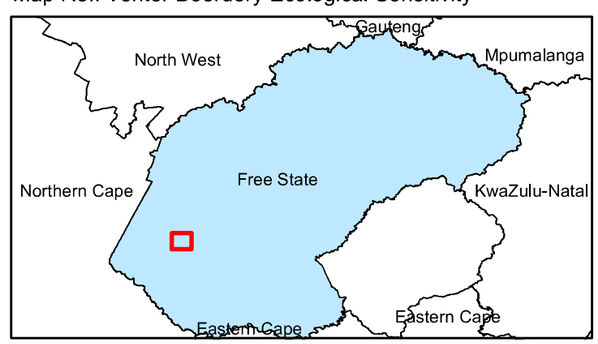
- SAHRIS Sites
- Wetlands
- Drainage Buffer - 50 meter
- Lemoen Spruit Buffer - 100 meter

Site Ecological Importance

- Very High
- High
- Very Low

Scale: 1:100 000
Projection: GCS_WGS_1984
Map Ref: Venter Boerdery Ecological Sensitivity

savannah environmental



APPENDIX B:
GRIEVANCE MECHANISM FOR COMPLAINTS AND ISSUES

GRIEVANCE MECHANISM / PROCESS

1. PURPOSE

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

- Provides a predictable, accessible, transparent, and credible process to all parties, resulting in outcomes that are fair and equitable, accountable and efficient.
- Promotes 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 provide a process to address grievances in a manner that does not require a potentially costly and time-consuming legal process.

2. PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES

The following proposed grievance procedures are to be complied with throughout the construction, operation and decommissioning phases of the Project. These procedures should be updated as and when required to ensure that the Grievance Mechanism is relevant for the Project and effective in providing the required processes.

- Local landowners, communities and authorities must be informed in writing by the Project Developer of the grievance mechanism and the process by which grievances can be brought to the attention of the Project Developer through its designated representative. This must be undertaken with the commencement of the construction phase.
- The Project Developer needs to appoint a representative as the contact person to which grievances can be directed. The name and contact details of the contact person must be provided to local landowners, communities and authorities when requested.
- Project related grievances relating to the construction, operation and or decommissioning phases 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 or are illiterate, by recording grievances and completing written grievance notices where applicable, translating requests or concerns or by facilitating contact with relevant parties who can address the raised concerns. The following information should be obtained, as far as possible, regarding each written grievance, which may act as both acknowledgement of receipt as well as record of grievance received:
    a. The name and contact details of the complainant;
    b. The nature of the grievance;
    c. Date raised, received, and for which the meeting was arranged;
    d. Persons elected to attend the meeting (which will depend on the grievance); and
    e. A clear statement that the grievance procedure is, in itself, not a legal process. Should such avenues be desired, they must be conducted in a separate process and do not form part of this grievance mechanism.

- The grievance must be registered with the contact person who, within two (2) working days of receipt of the grievance, must contact the Complainant to discuss the grievance and, if required, agree on a 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 or send a voice recording (in cases whereby the Complainant is illiterate) 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 and only if required).
- A grievance register must be kept on site (in electronic format, so as to facilitate editing and updating), and shall be made available to all parties wishing to gain access thereto.
- 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, as well as a suitable venue. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or Project Developer are entitled to invite their legal representatives to attend the meeting/s, it should be made clear to all the parties involved in the process that the grievance mechanism process is not a legal process, and that if the Complainant invites legal representatives, the cost will be their responsibility. It is therefore recommended that the involvement of legal representatives be limited as far as possible, as a matter of last resort, and that this process be primarily aimed at stakeholder relationship management as opposed to an arbitration or litigation mechanism.
- The meeting should be chaired by the Developer's representative appointed to address grievances. The Developer must supply and nominate a representative to capture minutes and record the meeting/s.
- Draft copies of the minutes must be made available to the Complainant and the Project Developer within five (5) 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 five (5) working days of receipt of the draft minutes.
- The meeting agenda must be primarily the discussion of the grievance, avoidance and mitigation measures available and proposed by all parties, as well as a clear indication of the future actions and responsibilities, in order to put into effect the proposed measures and interventions to successfully resolve the grievance.
- In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome must be 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 Project Developer 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 Project Developer will be required to identify three (3) mediators and forward the names and CVs to the Complainant within two (2) weeks of the dispute being declared. The Complainant, in consultation with the Project Developer, must identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator must be borne by the Project Developer. The Project Developer must supply and nominate a representative to capture minutes 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 Project Developer for comment before being finalised and signed by all parties, which signature may not be unreasonably withheld by either party. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within five (5) 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 is required, or indeed possible. Closure status must be classified and captured following mediation or successful resolution 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 despite mediation.
- 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 Project Developer, either party may be entitled to legal action if an appropriate option, however, these grievance mechanisms aim to avoid such interactions by addressing the grievances within a short timeframe, and to mutual satisfaction, where possible.

APPENDIX C:
OPEN SPACE MANAGEMENT PLAN

ALIEN PLANT AND OPEN SPACE MANAGEMENT PLAN

1. PURPOSE

Invasive alien plant species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Plant and Open Space Management Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the Xhariep Export Programme (XEP) Agricultural Development. The broad objectives of the plan include the following:

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

This plan should be updated throughout the life cycle of the Project, as required in order to ensure that appropriate measures are in place to manage and control the establishment of alien and invasive plant species and to ensure compliance with relevant legislation. This plan should be implemented with specific focus on sensitive areas.

2. 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 alien plant species 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 NEM:BA. 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 Category 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 Category 3 plants to exist in riparian zones.

Plants listed under the categories above are detailed within the Alien and Invasive Species published in GNR1003 of 18 September 2020. 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 plant 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.

Three (3) species of invasive plants that are categorised as 1b were observed within the project area and surrounding area (**Table 1**). Disturbance of areas due to the activities of the proposed development may enable encroachment of the invasive species into these areas.

Table 1: Summary of Invasive Alien Plants recorded within the proposed Xhariep Export Programme Agricultural Development project area during the survey period

Species Name	NEMBA Category	Control	Photograph
Arundo donax	1b	Difficult to control. Plants should be cut down and regrowth sprayed with a herbicide. All slash material must be burnt. Physical removal is only possible by complete removal of the rhizome.	
Cylindropuntia imbricata	1b	Hand-spraying with Monosodium Methyl Arsenate (MSMA). Biological control is the most effective.	

Opuntia cespitosa	1b	Stem injection with herbicide. Biological control is the most effective.	

3. ALIEN PLANT MANAGEMENT PRINCIPLES

3.1. 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 already on site, as well as those that are introduced to the site by the construction activities. 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 additional 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 (where permissible only) should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on the Project Site.

3.2. Containment and control

If any alien invasive plants are found to become established on the Project 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 uses of chemicals are not recommended for any wetland areas. Herbicides should be applied directly to the plant and not to the soil. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least amount of 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.

3.3. General Clearing and Guiding Principles

Alien species control programmes are long-term management projects and should consist of 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 alien species are easily dispersed across boundaries by wind or watercourses. 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 and that they are appropriate to the specific species of concern. As such, regardless of the methods used, disturbance to the soil should be kept to a minimum.

Fire should not be used for alien species control or vegetation management at the Project 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 a 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 plant invasion and may also be ineffective for many woody species which re-sprout. 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 at 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.
- The use of chemicals is not recommended for wetland areas.

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 of 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 plant's 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 Forestry, Fisheries and Environment (DFFE) can be contacted.

3.4. General management practices

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

- Establish an on-going monitoring programme for the construction phase to detect and quantify any alien species that may become established.
- Alien vegetation regrowth on areas disturbed by construction must be immediately controlled.
- 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 herbicides 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 plant 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 plant 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 six (6_ months for the first two (2) years after construction and annually thereafter. All alien plants identified should be cleared using appropriate means.

3.5. Monitoring

In order to assess the impact of clearing activities, rehabilitation efforts, follow-ups and monitoring must be undertaken. This section provides a description of a possible monitoring programme that will provide an assessment of the magnitude of alien plant invasion on site, as well as an assessment of the efficacy 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 plant species	Preconstruction Monthly during Summer and Autumn (Middle November to end of March) 3 Monthly during Winter and Spring
Document alien plant distribution	Alien plant distribution map within priority areas	Quarterly
Document & record alien plant control measures implemented	Record of clearing activities	Quarterly

Operation Phase

Monitoring Action	Indicator	Timeframe
Document alien plant 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 D:
RE-VEGETATION AND HABITAT 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 within the Project Site for the Xhariep Export Programme (XEP) Agricultural Development, and that are not required for operation, are rehabilitated to their original state before the operation phase commences, and that the risk of erosion from these areas is reduced. The purpose of the Rehabilitation Plan for the site can be summarised as follows:

- Achieve long-term stabilisation of all disturbed areas.
- Re-vegetate all disturbed areas with suitable local plant species.
- Minimise visual impact of disturbed areas.
- Ensure that disturbed areas are rehabilitated to a condition similar to that found prior to disturbance.

This Rehabilitation Plan should be read in conjunction with other site-specific plans, including the Erosion Management Plan, Soil Management Plan, Alien Invasive Management Plan and Plant Rescue and Protection Plan. Prior to the commencement of construction, a detailed Rehabilitation Plan and Method Statement for the Project Site should be compiled with the aid of a suitably qualified, professionally registered specialist (with a botanical or equivalent qualification).

2. REHABILITATION METHODS AND PRACTISES

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

- The footprint should be limited much as possible through reducing the excess footprint around roads, PV panel footings etc as much as possible.
- Topsoil should be reserved wherever possible on site, to be utilised during rehabilitation.
- Clearing of invaded areas should be conducted as per the Alien Plant and Open Spaces Management Plan, included in the EMPr.
- No harvesting of vegetation may be undertaken outside the area to be disturbed by construction activities.
- It is important to select the correct species to use for rehabilitation.
- Indigenous plant material must be kept separate from alien material.
- Re-seeding with collected or commercial indigenous seed mixes is recommended. Indigenous seeds may be harvested for purposes of revegetation in areas that are free of alien invasive vegetation, either at the site prior to clearance or from suitable neighbouring sites.
- Sods used for revegetation should be obtained directly from the Project Site, but not from the sensitive areas. Sods should contain at least a 50 mm topsoil layer and be minimally disturbed, in particular to existing root systems. Sods must ideally be obtained from areas as close as possible to the region that is to be rehabilitated.
- Water used for the irrigation of re-vegetated areas should be free of chlorine and other pollutants that might have a detrimental effect on the plants.
- All seeded, planted or sodded grass areas and all shrubs or trees planted are to be irrigated at regular intervals.

- On steep slopes and areas where seed and organic matter retention is low, it is recommended that soil savers are used to stabilise the soil surface. Soil savers are man-made materials, usually constructed of organic material such as hemp or jute and are usually applied in areas where traditional rehabilitation techniques are not likely to succeed.
- In areas where soil saver is used, it should be pegged down to ensure that it captures soil and organic matter flowing over the surface.
- The final rehabilitated area should resemble the current composition and structure of the soil as far as practicably possible.
- Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible.
- No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been rehabilitated.
- Where rehabilitation sites are located within actively grazed areas, they should be fenced off, this must be undertaken in consultation with the landowner.
- Any runnels, erosion channels or wash-aways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.
- Re-vegetated areas should be monitored frequently and prepared and revegetation from scratch should inadequate signs of surface coverage or grown be evident after two growth seasons. Adequate recovery must be assessed by a qualified botanist or rehabilitation specialist.
- The stockpiled vegetation from the clearing operations should be reduced to mulch where possible, and retained along with topsoil to encourage seedbank regrowth and soil fertility.
- Mulches must be collected in such a manner as to restrict the loss of seed.
- Mulch must be stored for as short a period as possible.
- Mulch is to be harvested from areas that are to be denuded of vegetation during construction activities, provided that they are free of seed-bearing alien invasive plants.
- Where herbicides are used to clear vegetation, species-specific chemicals should be applied to individual plants only. General spraying should be strictly prohibited, and only the correct herbicide type should be applied.
- Once rehabilitated, areas should be protected to prevent trampling and erosion.
- Fencing should be removed once a sound vegetative cover has been achieved.

3. 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 Project Developer 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:

- Associated nature and stability of surface soils.
- Re-emergence of alien and invasive plant species. If noted, remedial action must be taken immediately, as per the alien management plan and mitigation measures contained within the EMPr.

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

- Rehabilitation areas should be monitored every 4 months for the first 12 months following construction, or as per the recommendations of specialist.
- 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 timeframe between construction activities and rehabilitation should be minimised. Phased construction and progressive rehabilitation, where practically possible, are therefore important elements of the erosion control and rehabilitation strategy.
- Any areas showing erosion, should be adaptively managed with particular erosion control measures, depending on the situation.

If the current state of the environment prior to construction (which will be disturbed during the construction phase) is not achieved post impact, within the specified rehabilitation period, maintenance of these areas must continue until an acceptable state is achieved (excluding alien plant species or weeds). Additional rehabilitation methods may be necessary to achieve the current state before construction commenced.

Monitoring of the rehabilitation success, as well as follow-up adaptive management, combined with the clearing of emerging alien plant species should all continue for as long as is considered necessary, depending on regrowth rates.

APPENDIX E:
PLANT RESCUE AND PROTECTION PLAN

SEARCH AND RESCUE AND PROTECTION PLAN

1. PURPOSE

The purpose of the Search and Rescue and Protection Plan is to implement avoidance and mitigation measures, in addition to the mitigations included in the EMPr to reduce the impact of Xhariep Export Programme (XEP) Agricultural Development on listed and protected plant species and their habitats during construction and operation. This subplan is required in order to ensure compliance with national and provincial legislation for vegetation clearing and any required destruction or translocation of provincially and nationally protected species within the Development Footprint.

2. IDENTIFICATION OF SPECIES OF CONSERVATION CONCERN

Plant species are protected at a national level as well as the provincial level and different permits may be required for different species depending on their protection level. At the national level, protected trees are listed by the Department of Forestry, Fisheries and Environment (DFFE) under the National List of Protected Trees, which is updated on a regular basis. Any clearing of nationally protected trees requires a permit from DFFE. At the provincial level, all species red-listed under the Red List of South African plants (http://redlist.sanbi.org/) as well as species listed under the the National Environmental Management Biodiversity Act, No. 10 of 2004 protected and require provincial permits.

Protected fauna species red-listed under the Red List of South African plants (http://redlist.sanbi.org/) as well as species listed under the National Environmental Management Biodiversity Act, No. 10 of 2004 are protected and require provincial permits.

3. IDENTIFICATION OF LISTED SPECIES

The vegetation assessment was conducted throughout the extent of the Project Site. A total of 57 species, representing 25 families were recorded within the project area during the survey period (**Table 1**). Six of these species are endemic to South Africa, accounting for 11% of the total number of recorded species. None of the species recorded are regarded as SCC. Nevertheless, five species are protected by legislation and if granted authorisation, it is imperative that a Plant Search and Rescue Plan be developed prior to clearing and development. A permit from the relevant authority, Free State Department of Economic Development, Tourism and Environmental Affairs, must be obtained to remove and relocate individuals of these species to surrounding natural areas. **Protected plant identified on site include *Cineraria lyratiformis, Lessertia frutescens, Aloe claviflora, Euphorbia crassipes, Malephora smithii and Moraea polystachya*)**

Table1: Trees, shrub and herbaceous plant species recorded on the Project Site.

Family	Species Name	Growth Form	Conservation Status	Endemism
Acanthaceae	Justicia divaricata	Herb	LC	
Aizoaceae	Aizoon canariense	Succulent herb	LC	
Aizoaceae	**Malephora smithii**	**Succulent herb**	**LC**	**Endemic**
Aizoaceae	Ruschia spinosa	Succulent herb	LC	
Aizoaceae	**Titanopsis calcarea**	**Succulent herb**	**LC**	**Endemic**

Amaranthaceae	Salsola aphylla	Succulent herb	LC	
Anacardiaceae	Searsia burchellii	Small tree	LC	
Anacardiaceae	Searsia lancea	Tree	LC	
Apocynaceae	Gomphocarpus fruticosus	Herb	LC	
Asparagaceae	Asparagus cooperi	Herb	LC	
Asparagaceae	Eriospermum sp.	Geophytic herb		
Asphodelaceae	**Aloe claviflora**	**Succulent herb**	**LC**	
Asteraceae	Berkheya multijuga	Herb	LC	
Asteraceae	Cineraria lyratiformis	Herb	LC	
Asteraceae	**Crassothonna patula**	**Succulent herb**	**LC**	**Endemic**
Asteraceae	Felicia filifolia subsp. filifolia	Herb	LC	
Asteraceae	Helichrysum luteoalbum	Herb	LC	
Asteraceae	Kleinia longiflora	Succulent herb	LC	
Asteraceae	Pentzia globosa	Herb	LC	
Asteraceae	Tarchonanthus camphoratus	Small tree	LC	
Bignoniaceae	Rhigozum trichotomum	Small tree	LC	
Brassicaceae	Heliophila minima	Succulent herb	LC	
Colchicaceae	**Colchicum melanthoides**	**Geophytic herb**	**LC**	
Cyperaceae	Afroscirpoides dioeca	Graminoid	NE	
Cyperaceae	Cyperus sp.	Graminoid		
Cyperaceae	Isolepis sp.	Graminoid		
Euphorbiaceae	**Euphorbia crassipes**	**Succulent herb**	**LC**	
Fabaceae	Lotononis laxa	Herb	LC	
Fabaceae	Melolobium microphyllum	Herbaceous shrub	LC	
Fabaceae	Senegalia mellifera subsp. detinens	Small tree	LC	
Fabaceae	Vachellia karoo	Small tree	LC	
Geraniaceae	Pelargonium sp.	Succulent herb		
Iridaceae	**Moraea polystachya**	**Geophytic herb**	**LC**	
Oxalidaceae	Oxalis sp.	Geophytic herb		
Poaceae	Aristida adscensionis	Graminoid	LC	
Poaceae	Aristida congesta subsp. barbicollis	Graminoid	LC	
Poaceae	Aristida congesta subsp. congesta	Graminoid	LC	
Poaceae	Chloris virgata	Graminoid	LC	
Poaceae	Digitaria eriantha	Graminoid	LC	
Poaceae	Enneapogon scoparius	Graminoid	LC	
Poaceae	Eragrostis capensis	Graminoid	LC	
Poaceae	Eragrostis lehmanniana var. lehmanniana	Graminoid	LC	
Poaceae	Eragrostis superba	Graminoid	LC	
Poaceae	Hyparrhenia hirta	Graminoid	LC	
Poaceae	Stipagrostis obtusa	Graminoid	LC	
Poaceae	Themeda triandra	Graminoid	LC	

Polygalaceae	**Polygala pungens**	**Succulent herb**	**LC**	**Endemic**
Ranunculaceae	Clematis brachiata	Herbaceous climber	LC	
Rhamnaceae	Ziziphus mucronata subsp. mucronata	Large tree	LC	
Santalaceae	**Viscum continuum**	**Semiparasitic epiphyte**	**LC**	**Endemic**
Santalaceae	Viscum rotundifolium	Semiparasitic epiphyte	LC	
Scrophulariaceae	Diclis petiolaris	Herb	LC	
Scrophulariaceae	Nemesia rupicola	Herb	LC	
Solanaceae	Lycium cinereum	Woody shrub	LC	
Solanaceae	Lycium hirsutum	Small tree	LC	
Zygophyllaceae	Sisyndite spartea	Succulent herb	LC	
Zygophyllaceae	**Zygophyllum incrustatum**	**Small tree**	**LC**	**Endemic**

In terms of the National Forest Act, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate, or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Contravention of this declaration is regarded as a first category offence.

4. MITIGATION & AVOIDANCE OPTIONS

The primary mitigation and avoidance measure that must be implemented at the pre-construction phase is the Pre-construction Walk-Through of the Development Footprint. This defines which and how many individuals of listed and protected species are found within the Development Footprint. This information is required for the DESTEA and The National Environmental Management Biodiversity Act 10 of 2004 permits which must be obtained before construction can commence.

Where listed species fall within the Development Footprint and avoidance is not possible, then it may be possible to translocate the affected individuals outside of the Development Footprint. However, not all species are suitable for translocation as only certain types of plants are able to survive the disturbance. Suitable candidates for translocation include most geophytes and succulents. Although there are exceptions, the majority of woody species do not survive translocation well and it is generally not recommended to try and attempt to translocate such species. Recommendations in this regard would be made following the walk-through of the facility footprint before construction, where all listed and protected species within the Development Footprint will be identified and located.

5. RESCUE AND PROTECTION PLAN

5.1. Pre-construction

» Identification of all listed species which may occur within the Project Site, based on the SANBI POSA database as well as the specialist studies for the Project Site and any other relevant literature.
» Before construction commences at the site, the following actions should be taken:
  - A walk-through of the final Development Footprint by a suitably qualified botanist/ecologist to locate and identify all listed and protected species which fall within the Development Footprint. This should

happen during the flowering season at the Project Site which, depending on rainfall, is likely to be during spring to early summer (August-October).

- A walk-through report following the walk-through which identifies areas where minor deviations to roads and other infrastructure can be made to avoid sensitive areas and important populations of listed species must be compiled. The report should also contain a full list of localities where listed species occur within the development footprint and the number of affected individuals in each instance, so that this information can be used to comply with the permit conditions required by the relevant legislation. Those species suitable for search as rescue should be identified in the walk-through report.
- A permit to clear the Project Site and relocate species of concern is required from the North-West provincial conservation authority before construction commences.
- A tree clearing permit is also required from Department of Economic Development, Tourism and Environmental Affairs to clear protected trees from the Project Site (if recorded).
- Once the permits have been issued, there should be a search and rescue operation of all listed species that cannot be avoided, which have been identified in the walk-through report as being suitable for search and rescue within the Development Footprint. Affected individuals should be translocated to a similar habitat outside of the Development Footprint and marked for monitoring purposes.

5.2. Construction

» Vegetation clearing should take place in a phased manner, so that large cleared areas are not left standing with no activity for long periods of time and pose a wind and water erosion risk. This will require coordination between the contractor and EO, to ensure that the EO is able to monitor activities appropriately.
» All cleared material should be handled according to the Revegetation and Rehabilitation Plan and used to encourage the recovery of disturbed areas.
» The EO should monitor vegetation clearing at the Project Site. Any deviations from the plans that may be required should first be checked for listed species by the EO and any listed species present which are able to survive translocation should be translocated to a safe site.
» All areas to be cleared should be demarcated with construction tape, survey markers or similar. All construction vehicles should work only within the designated area.
» Plants suitable for translocation or for use in rehabilitation of already cleared areas should be identified and relocated before general clearing takes place.
» Any listed species observed within the Development Footprint that were missed during the pre-construction plant sweeps should be translocated to a safe site before clearing commences.
» Many listed species are also sought after for traditional medicine or by collectors and so the EO and ECO should ensure that all staff attend environmental induction training in which the legal and conservation aspects of harvesting plants from the wild are discussed.

5.3. Operation

» Access to the Project Site should be strictly controlled and all personnel entering or leaving should be required to sign in and out with the security officers.
» The collecting of plants or their parts should be strictly forbidden and signs stating so should be placed at the entrance gates to the Project Site.

6. MONITORING & REPORTING REQUIREMENTS

The following reporting and monitoring requirements are recommended as part of the Plant Rescue and Protection plan:

- Pre-construction walk-through report detailing the location and distribution of all listed and protected species must be compiled. This should include a walk-through of all infrastructure including all new access roads, cables, buildings and substations. The report should include recommendations of route adjustments where necessary, as well as provide a full account of how many individuals of each listed species will be impacted by the development. Details of plants suitable for search and rescue must also be included.
- Permit applications to FS DESTEA. This requires the walk-through report as well as the identification and quantification of all listed and protected species within the Development Footprint. The permit is required before any search and rescue or vegetation clearance can take place. Where large numbers of listed species are affected, a site inspection and additional requirements may be imposed by FS DESTEA as part of the permit conditions. All documentation associated with this process needs to be retained and the final clearing permit should be kept at the Project Site.
- Active daily monitoring of clearing during construction by the EO must be undertaken to ensure that listed species and sensitive habitats are avoided. All incidents should be recorded along with the remedial measures implemented.
- Post construction monitoring of plants translocated during search and rescue to evaluate the success of the intervention. Monitoring for a year post-transplant should be sufficient to gauge success.

APPENDIX F:
TRAFFIC AND TRANSPORTATION MANAGEMENT PLAN

PRINCIPLES FOR TRAFFIC MANAGEMENT

1. PURPOSE

The purpose of this Traffic Management Plan (TMP) 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 Xhariep Export Programme (XEP) Agricultural Development 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. TRAFFIC AND TRANSPORTATION MANAGEMENT PRINCIPLES

- Prior to the commencement of construction, the contractor must develop their own detailed Transport Management Plan (TMP) based on traffic volumes and road carry capacity outlines 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 Project 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 Construction 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 Project 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.

3. MONITORING

- The Construction 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 G:
STORMWATER AND EROSION MANAGEMENT PLAN

STORMWATER AND EROSION MANAGEMENT PLAN

1. PURPOSE

By taking greater cognisance of natural hydrological patterns and processes it is possible to develop stormwater management systems in a manner that reduces potentially negative impacts and mimics 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 Project Site and significant impacts relating to resultant impacts such as soil erosion and downstream sedimentation. The main factors influencing the planning of stormwater 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 Stormwater Management Plan must be updated and refined once the construction/ civil engineering plans have been finalised following detailed design.

2. RELEVANT ASPECTS OF THE PROJECT SITE

The project area is located within the Nama Karoo Biome, which is a large, landlocked region on the central plateau of the western half of South Africa and extends into south-eastern Namibia. This is an arid biome with the majority of the river systems being non-perennial. Apart from the Orange River and the few permanent streams in the southwest that originate in higher-rainfall neighbouring areas, the limited number of perennial streams that originate in the Nama-Karoo are restricted to the more mesic east.

The project area is commonly dominated with the Hutton, Valsrivier and Glenrosa soil forms (see Figure 7.5). In the terrain soils associated with the presence of lime or carbonates also occur. The soil profiles characterised with high carbonate subsurface horizons which were identified within the development area includes the Addo, Augrabies and Plooysburg soil forms. The area has few profiles that are saturated for long periods with surface water such as the Katspruit soil form. Most of the identified soils are freely drained due to their apedal weak structure which can be suitable for irrigation purposes. Limitations in water drainage is

usually common in duplex soils with higher clay contents in the subsurface horizons that can restrict profile flows. Such soils require proper drainage systems to increase their productive.

The Lemoenspruit flows into the Orange River downstream of the project area and due to flood conditions at the time of the survey the Orange River could not be assessed. The ecological assessment of the Lemoenspruit indicated moderate modifications attributed to varying land use, comprising mostly open/ natural land with some agriculture and widespread livestock activities present in the project areas catchment.

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, and 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.
- Silt traps must be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- Construction of gabions and other stabilisation features on steep slopes may be undertaken to prevent erosion, if deemed necessary.
- Minimise the area of exposure of bare soils to minimise 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% cross fall back into the slope, allowing stormwater to be channelled in a controlled manner 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 Project 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

Detailed engineering specifications for a 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 Stormwater 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) must be indicated within the Final/Updated Stormwater Management Plan.
» 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 stormwater around and away from infrastructure.
» Procedures for stormwater 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.
» The Resident Engineer and EO is 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.

4. EROSION MANAGEMENT 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 Project 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.

4.1. On-Site Erosion Management

Soil erosion is a frequent risk associated with the development of a Xhariep Export Programme (XEP) Agricultural Development on account of the vegetation clearing and disturbance associated with the construction phase of the development and may continue occurring throughout the operation phase. Service roads and installed infrastructure will generate increased direct runoff during intense rainfall events and may exacerbate the loss of topsoil and the effects of erosion. These eroded materials may enter the nearby watercourses and may potentially impact these systems through siltation and change in chemistry and turbidity of the water. General factors to consider regarding erosion risk at the Project Site includes the following:

- Reduction of a stable vegetation cover and associated below-ground biomass that currently increases soil surface porosity, water infiltration rates and thus improves the soil moisture availability. Without the vegetation, the soil will be prone to extensive surface capping, leading to accelerated erosion and further loss of organic material and soil seed reserves from the local environment.
- 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. Additionally it is recommended where possible that 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 with energy dissipation features present to slow and disperse the water into the receiving area.
- Roads used for project-related activities 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.
- Runoff may have to be specifically channelled or stormwater adequately controlled to prevent localised rill and gully erosion.
- 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 de-nuded 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 must be used on steep slopes and other areas vulnerable to erosion to minimise erosion risk as far as possible.

- Activity at the Project Site after large rainfall events when the soils are wet and erosion risk is increased should be reduced. No driving off of hardened roads should occur at any time, and particularly immediately following large rainfall events.
- 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 Project Site for erosion problems during construction (on-going) 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.

4.1.1 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;
- Stormwater channels and catch pits;
- Soil bindings;
- Geofabrics;
- Hydro-seeding and/or re-vegetating;
- Mulching over cleared areas;
- Boulders and size varied rocks; and
- Tilling.

4.2. Engineering Specifications

A detailed engineering specifications Stormwater Management Plan describing and illustrating the proposed stormwater control measures must be prepared during the detailed design phase and should be based on the underlying principles of the Stormwater Management Plan 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.
- The Resident Engineer and EO to be responsible for ensuring implementation of the erosion control measures on site during the construction period. The ECO should 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 Stormwater Management Plan is not correctly or appropriately implemented and damage to the environment is caused.

4.3 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 EO (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 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.

5. CONCLUSION

The Erosion Management Plan is a document to assist the Project Developer/ 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). During the construction phase, the Contractor must prepare an Erosion 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 this plan are met before, during and after construction. The designated responsible person on site, must be indicated in the Method Statement and shall ensure that relevant erosion control measures are in place throughout the construction phase.

An operation phase Erosion 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 H:
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 various 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 generated from the Project activities on the Project Site.

This WMP has been compiled as part of the EMPr and is based on waste stream information available at the time of compilation. Construction and operation activities must be assessed 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 updated should further detail regarding waste quantities and categorisation become available, during the construction and/or operation stages.

2. RELEVANT ASPECTS OF THE SITE

It is expected that the development of the Xhariep Export Programme (XEP) Agricultural Development will generate construction solid waste, general waste and hazardous waste during the lifetime of the Project.

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

- Concrete waste generated from spoil and excess concrete.
- Contaminated water, soil, rocks and vegetation due to hydrocarbon spills.
- Hazardous waste from vehicle, equipment and machinery parts and servicing, fluorescent tubes, used hydrocarbon containers, and waste ink cartridges.
- Recyclable waste in the form of paper, glass, steel, aluminium, wood/ wood pallets, plastic (PET bottles, PVC, LDPE) and cardboard.
- Organic waste from food waste as well as alien and endemic vegetation removal.
- Sewage from portable toilets and septic tanks.
- Inert waste from spoil material from site clearance and trenching works.

3. LEGISLATIVE REQUIREMENTS

Waste in South Africa is currently governed by several regulations, 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); and
- Air Quality Act (Act 39 of 2004).

Storage of waste must be conducted in accordance with the National Norms and Standards for the Storage of Waste, published in GNR 926.

4. WASTE MANAGEMENT PRINCIPLES

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

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 the greatest 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.

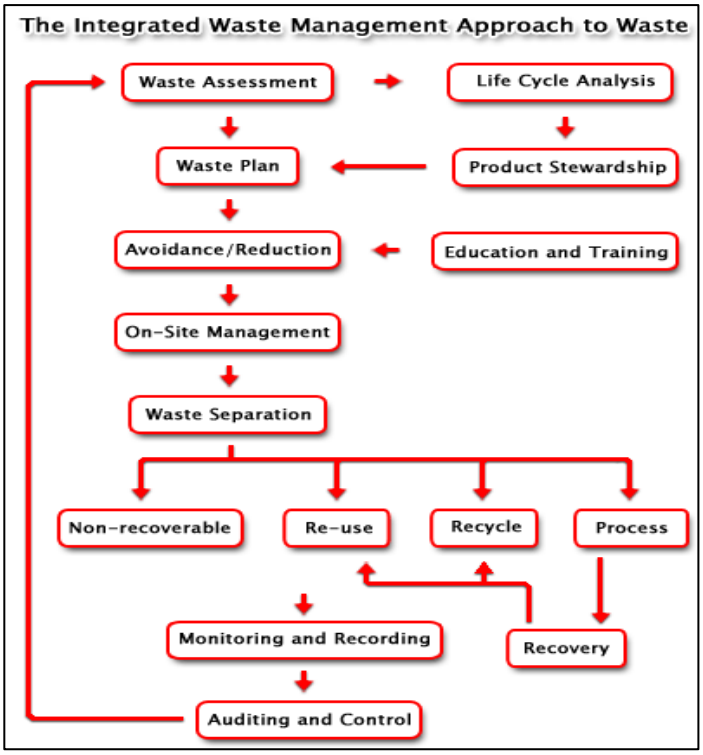


Figure 1: Integrated Waste Management Flow Diagram
(Source : http://www.enviroserv.co.za/pages/content.asp?SectionId=496)

4.1. Construction phase

A plan for the management of waste during the construction phase is detailed below. A Method Statement detailing specific waste management practices during construction should be prepared by the Contractor prior to the commencement of construction, for approval by the Resident Engineer, Project/Site Manager and/or ECO.

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 methods and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities, to be pro-actively implemented.
- Once a waste inventory has been established, targets for the 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. Such practises must be made contractually binding upon appointment of the subcontractors.
- Waste manifests and waste acceptance approvals (i.e. receipts) from designated waste facilities must be kept on file at the site office, in order to record and prove continual compliance for future auditing.
- Septic tanks and portable toilets must be monitored by the EO or responsible subcontractor and maintained regularly. 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 moving around in the surrounding area.
- Waste collection bins and hazardous waste containers must be provided by the principal contractor and subcontractors and placed at strategic locations around the site for the storage of organic, recyclable and hazardous waste.
- A dedicated waste area must be established on Project Site for the storage of all waste streams before removal from site. The storage period must not trigger listed waste activities as per the NEM:WA, 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, and must ensure complete containment of the spilled material in the event of a breach. As such, appropriate bunding material, design, capacity and type must be utilised to ensure that no contamination of the surrounding environment will occur despite a containment breach. The net capacity of a bunded compound in a storage facility should be at least 110% of the net capacity of the largest tank.
- Take into consideration the capacity displaced by other tanks within the same bunded area and any foundations.

- Treat interconnected tanks as a single tank of equivalent total volume for the purposes of the bund design criteria
- 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, while being reasonably placed in terms of centrality and accessibility on site. Where required, an additional temporary waste storage area may be designated, provided identical controls are exercised for these locations.
- Waste storage shall be in accordance with all Regulations and best-practice guidelines and under no circumstances may waste be burnt on site.
- A dedicated waste management team must be appointed by the principal contractors' EOOfficer, who 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 Officer.
- All waste removed from site must be done by a registered/ licensed subcontractor, who 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, records of which must be kept on file at the site camp for the duration of the construction period.

4.1.3. Management of waste storage areas

- The position of all waste storage areas must be located so as to ensure minimal degradation to the environment. The main waste storage area must have a suitable stormwater system separating clean and contaminated stormwater.
- Collection bins placed around the Project 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 to avoid overflowing receptacles.
- 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. Monitor for rodents and take corrective action if they become a problem.
- Waste must be stored in designated containers and not on the ground.
- Inspections and maintenance of bunds must be undertaken regularly. 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 treated by oil/water separation (or similar method) prior to dewatering, or removed and stored as hazardous waste, and not released into the environment.
- If any leaks occur in the bund, these must be removed immediately.
- Bund systems must be designed to avoid dewatering of contaminated water, but to rather separate oil and hydrocarbons from water prior to dewatering.
- Following rainfall event bunds must always be dewatered in order to maintain a sufficient storage capacity in the event of a breach.
- No mixing of hazardous and general waste is allowed.

4.1.4. Disposal

- Waste generated on site must be removed on a regular basis. This frequency may change during construction depending on waste volumes generated at different stages of the construction process,

however removal must occur prior to the storage capacity being reached to avoid overflow of containers and poor waste storage.
» Waste must be removed by a suitably qualified contractor and disposed of 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 and 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.

4.2. Operation phase

It is expected that the operation 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. Hazardous wastes (including grease, oils) will 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 or other facilities.

The following waste management principles apply during the operation phase:

» The EO 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 operation 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 operation 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.

5. 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 I:
EMERGENCY PREPARDENESS, RESPONSE AND FIRE MANAGEMENT PLAN

EMERGENCY PREPAREDNESS, RESPONSE AND FIRE MANAGEMENT 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 responses 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 responses 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 the construction phase detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation.

- 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

The Project Site has been identified by the applicant as a technically feasible site which has the potential for the development Xhariep Export Programme (XEP) Agricultural Development and associated infrastructure on a site located south-west of Luckhof in the Free State Province. The proposed project is in line with the surrounding land-use in the area. The potential for the proposed crop cultivation (i.e. maize, wheat, soya and possibly peanuts) is apparent as many commercial cultivation developments already occupy the general location. The soil and climate are suited to the proposed crop cultivation, and as a result the proposed development is anticipated to yield high volumes of quality crops for export and domestic distribution.

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in **Table 1.**

Table 1: Details or dimensions of typical infrastructure required for the agricultural development

Infrastructure	Footprint and dimensions
Total extent of the development	~4276.32ha
Centre pivot (Cultivation and irrigation system)	2690ha
Irrigation pipeline network	Internal irrigation pipeline network to take water from the dams to the various centre pivot areas for irrigation purposes
Dams for irrigation water	» Dam 1 – Diepkloof (Diepdraai) » Dam 2 – (Sump) **See below for the dam dimensions**
A pump station	One pump station covering a total surface area of 549m^2
5MW Solar PV facility	» 10ha surface area.
Battery	A battery energy storage system to store additional power generated by the PV Facility covering an area of 0.36ha

Table 1a: Dimensions of the dams

Dam	Maximum wall height	Wall volume	Capacity	Water Area	Development footprint
Dam 1 – (Diepdraai)	17m	503250m^3	3.1 million m^3	58 ha	63 ha
Dam 2 – (Sump):	14m	426000m^3	1.0 million m^3	14 ha	19 ha

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

» Fires;
» Leakage of hazardous substances;
» Storage of flammable materials and substances;
» Accidents; and
» Natural disasters.

3. EMERGENCY RESPONSE PLAN

There are three (3) 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 to 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.

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/contained or bunded 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 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 emergency 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 the spill to limit entering surrounding areas.
5. Identify the substance spilled.
6. Quantify the spill (under or over guideline/threshold levels).
7. Notify the Site Manager and emergency response crew and authorities (in the event of major spill).
8. Inform users (and downstream users) of the potential risk.
9. Clean up of the spill using spill kit or by HazMat team.
10. Record of the 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 located outside of the Project Site. 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 the trench required. Spilled substances can then be recovered using a pump or sorbent materials.

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 licensed 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 the fire using appropriate equipment.
4. If not safe to extinguish, contain fire.
5. Notify the Site Manager and emergency response crew and authorities.
6. Inform users of the potential risk of fire.
7. Record the incident on the company database or filing register.

ii. Procedures

Because large scale fires may spread very fast 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 at strategic locations throughout the site, in line with the Building Code of South Africa and the relevant provincial building code. All emergency equipment including portable fire extinguishers, hose reels and 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 the 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

In terms of the requirements of NEMA, the responsible person must, within fourteen (14) days of the incident, report to the Director General, provincial head of department and municipality.

- 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.

» SUMMARY: RESPONSE PROCEDURE

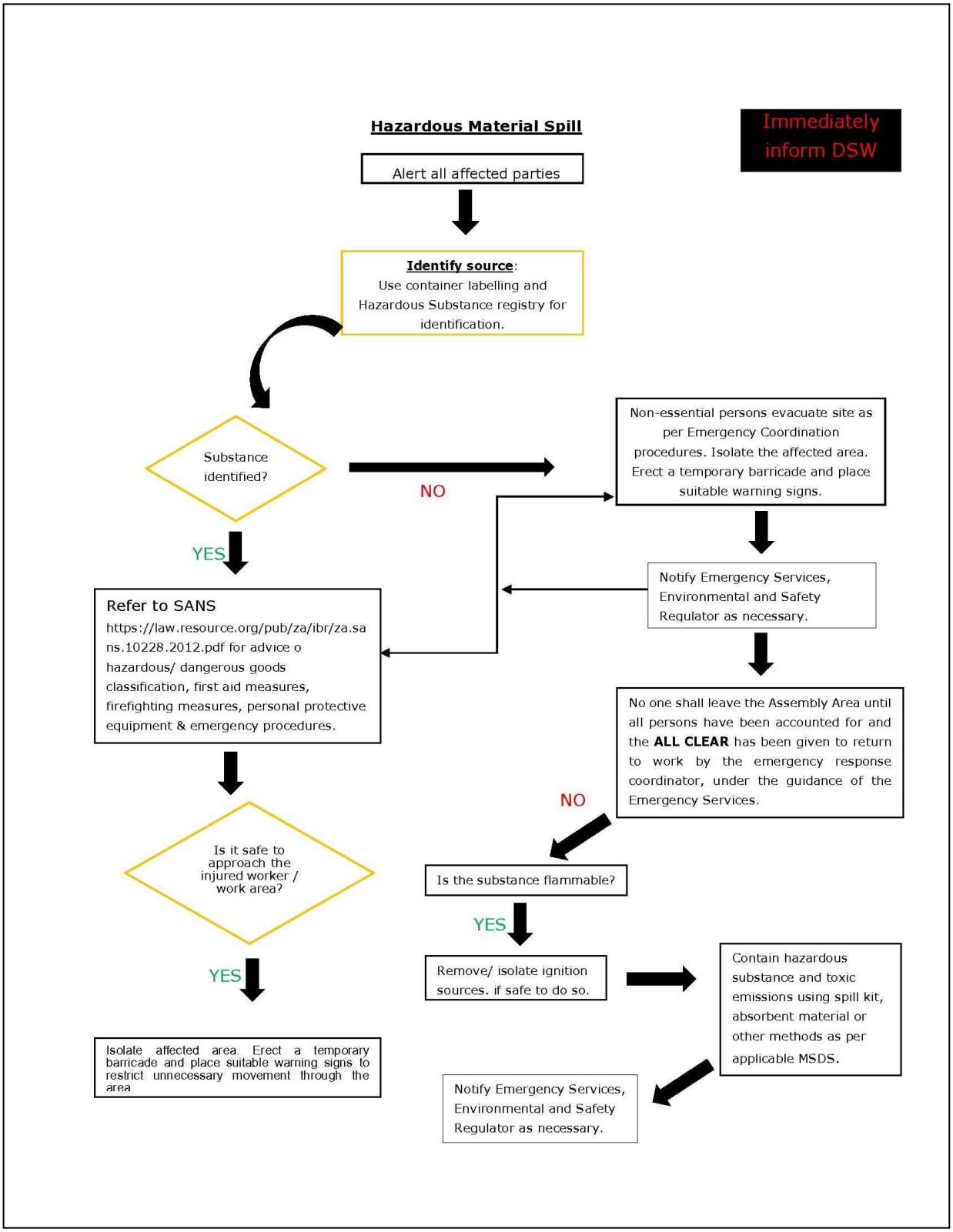


Figure 1: Hazardous Material Spill

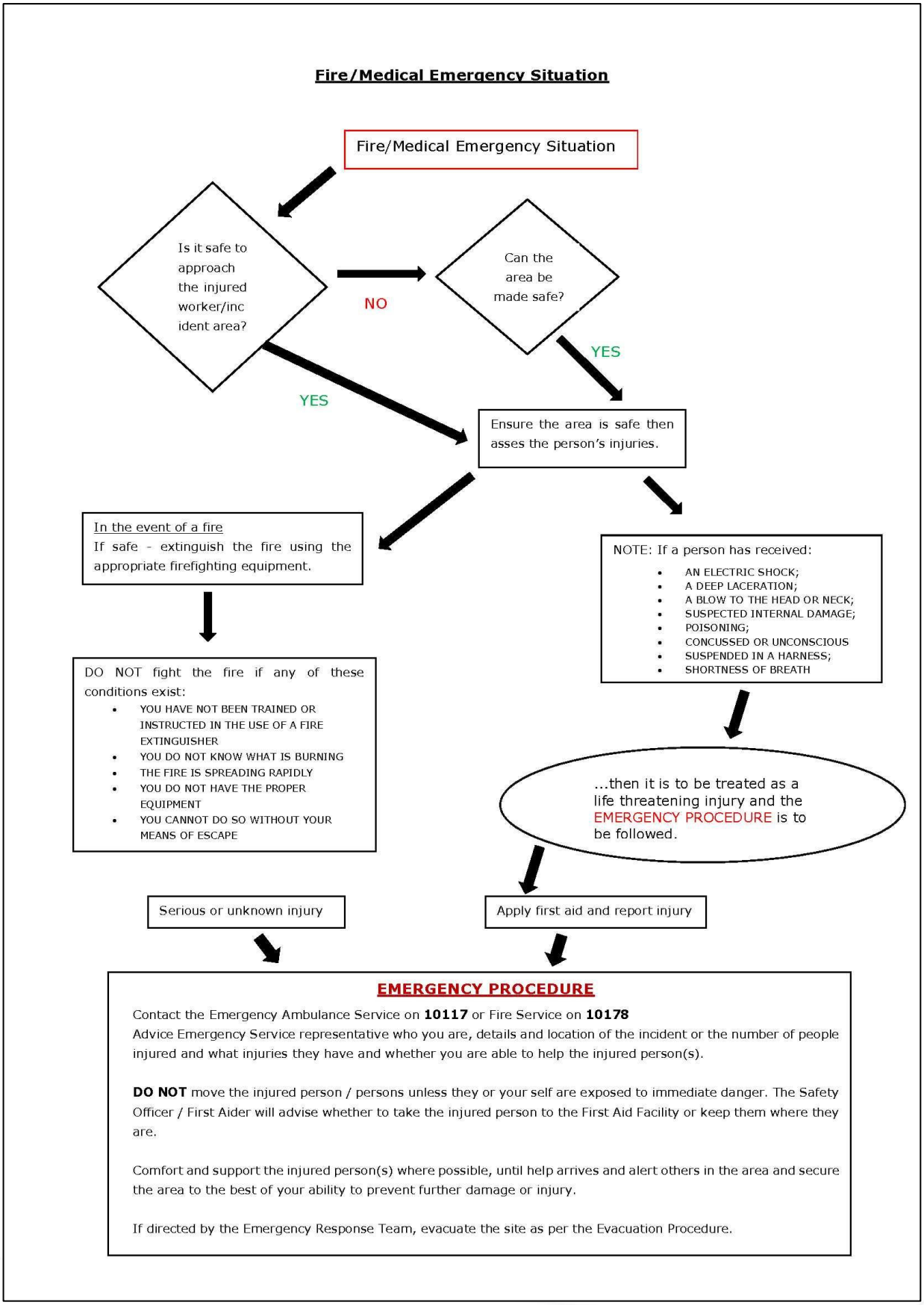


Figure 2: Emergency Fire/Medical

4. PROCEDURE RESPONSIBILITY

The Contractor's Environmental and Safety and Health officers, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this Plan, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the EO must act as liaison and advisor on all environmental and related issues.

The local authorities will provide their assistance when deemed necessary, or when it has been requested and/or indicated in Section 30 (8) of NEMA. The provincial authority will provide assistance and guidance where required and conduct awareness programmes.

APPENDIX J:
CURRICULCUM VITAE OF THE PROJECT TEAM

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Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: candy@savannahsa.com
Tel: +27 (11) 656 3237

CURRICULUM VITAE OF CANDY MAHLANGU

Profession : Environmental Consultant

Specialisation: Environmental Management, Environmental Impact Assessments, Report Writing, Project management, Stakeholder Engagement

Work Experience: 6 years in the Environmental Management and Consulting Field

VOCATIONAL EXPERIENCE

Candy holds a Bachelor of Arts degree in Environmental Management and is experienced in executing professionally consulting services for various projects in the environmental management field. She specialises in conducting Environmental Impacts Assessments, public participation processes, compiling Environmental Management Programmes, for residential developments, commercial developments, industrial upgrades, bulk services, and renewable energy projects. Her main responsibilities include conducting public participation, overall compilation of the Basic Assessments and EIA report, specialists' engagements, reviewing specialists reports and incorporating specialist studies into the Environmental Impact Assessment reports and the associated Environmental Management Programmes.

She has also been widely exposed to the associated project management in her trade and developed skills such as stakeholder engagement which includes but not limited to, site inspections, planning and liaising with clients, environmental specialists, built environment consultants, statutory bodies and competent authorities.

SKILLS BASE AND CORE COMPETENCIES

- Interpretation of environmental regulations and compilation of Environmental Impact Assessments reports and associated environmental management programmes in accordance with the relevant environmental legislative requirements.
- Project management for a variety of projects
- Public participation process for a variety of projects
- Environmental planning
- Working knowledge of environmental planning processes, policies, and frameworks.
- Review of the specialist's reports
- Undertaking Stakeholder Engagements for various projects
- Google Earth
- Organisational skills
- Effective Communicator
- Reliable and Trustworthy
- MS Office Package (Word, PowerPoint and Excel)

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- BA in Environmental Management (2015), University of South Africa (UNISA)

Short Courses:

- Section 21 c & (i) Training (2018), Department of Water & Sanitation
- Quality Management System of ISO 9001(2013), Inspection and Quality Services CC
- QGIS
- Office Administration (2011), Rosebank College

Professional Society Affiliations:

- none

Other Relevant Skills:

- none

EMPLOYMENT

Date	Company	Roles and Responsibilities
August 2022 - Current	Savannah Environmental (Pty) Ltd	*Environmental Consultant* <u>Tasks include</u>: • Undertake environmental screening assessments, environmental permitting, and environmental authorisation applications. • Undertake water use authorisation applications on the e-WULAA system. • Complete Part 1 and Part 2 EA amendment applications and prepare motivation reports

Date	Company	Roles and Responsibilities
		in support of applications for Part 2 EA amendments. • Undertake environmental compliance audits and provide ECO services. • Efficient and quality report writing to execute and manage the delivery of environmental impact assessment (EIA) reports and Environmental Management Programmes in line with the requirements of the National Environmental Management Act and EIA Regulations. • Liaison with relevant environmental authorities. • Execution of the public participation process. • Professional client liaison. • Project management. • Manage third parties or sub-consultants to which functions have been outsourced. • Preparation of proposals and budgets.
December 2016 – February 2019	L LEAP: Landscape Architects and Environmental Planners (Imbrillinx CC)	*Environmental Assessment Practitioner* <u>Tasks included:</u> • Compilation of Environmental Impact Assessment (EIA) reports, Basic Assessment (BA) reports and Environmental Management Programmes (EMPr), • environmental Screening reports, • co-ordination of public participation • Project management, • Client liaison • Process EIA and amendments applications • Stakeholder Engagement.
August 2014 – July 2016	Delron Consulting (Pty) Ltd	*Environmental Assessment Practitioner* <u>*Task Included:*</u> • *Research and Project administration* • *Application Authorisation and Assessment Report Compilation* • *General office administration* • *Report Writing* • *Assistant Environmental Control Officer* • *Managing and following up on completion of the reports* • *Facilitate Public participation processes* • *Co-ordinate site visits* • *Environmental management and control monitoring* • *Communicating with Stakeholders*

Date	Company	Roles and Responsibilities
		• *Identification of and liaison with specialists and* • *Routine legislative reviews to keep updated with relevant environmental legislation.*

PROJECT EXPERIENCE

Project experience includes renewable energy projects (solar & wind), including electricity generation, sewer services, property (mixed-use) development including housing, recreational parks, agricultural development, filling stations and industrial upgrades.

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES

Part 1 Amendment

Project Name & Location	***Client Name***	***Role***
Photovoltaic (PV) Solar Panels. Krugersdorp Gauteng	*Fariavile Solar Energy (Pty) Ltd*	*Environmental Impact Assessment*
Photovoltaic (PV) Solar Panels. Krugersdorp Gauteng	*B.M Faria Investments (Pty)Ltd*	*EAP and Project manager*

Commercial, Residential, Community & Development Planning

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Haakdoringboom East Residential. Tshwane Gauteng.	*Power Developments Project (Pty) Ltd*	*EAP & Project Manager*
Airport Park Extension 7. Germiston, Gauteng.	*Aerospace Developers (Pty) Ltd*	*EAP & Project Manager*
Chloorkop Extension 67. Kempton Park, Gauteng	*Acire Property Holdings (Pty) Ltd*	*EAP & Project Manager*
Blue Hills Extension 95. Blue Hills, Gauteng.	*Enlightened Christian Gathering Church*	*EAP & Project Manager*
Temba Landfill Site. City of Tshwane, Gauteng.	*City of Tshwane Waste Department*	*EAP & Project Manager*
Ennerdale Extension 6. Johannesburg, Gauteng	*City of Johannesburg Metropolitan Municipality*	*EAP & Project Manager*

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Mondi Agri Villages. Mkhondo, Mpumalanga	*Mondi Limited*	*EAP*
Rustenburg Mall. Rustenburg, Gauteng	*Moolman Group*	*EAP*

ROADS / STORM WATER

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Upgrade K50 & K69. Tshwane, Gauteng.	*City of Tshwane Roads and Storm Water Department*	*EAP*

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Menlyn Learning Hub, Tshwane, Gauteng.	*Feenstra Group*	*EAP*

Environmental Control Officer (ECO)

Project Name & Location	***Client Name***	***Role***
Amka Industrial Development	*Amka Products (Pty) Ltd*	*ECO*
Menlyn Learning Hub, Tshwane, Gauteng	*Feenstra Group*	*ECO*

FILLING STATION, STORAGE OF HAZADOUS MATERIALS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Storage and Handling of Diesel Infrastructure. Isando, Gauteng.	*Teraco Data Environmental (Pty)Ltd*	*EAP*
Annlin-Wes Filling Station. Tshwane, Gauteng.	*Moolman Group*	*EAP*
Phola Park Filing Station. KwaMhlanga, Mpumalanga.	*Phola Shopping Centre (Pty)Ltd*	*EAP*
Morokweng Filling Station. Morokweng. North West	*The Vildev Group (Pty)Ltd*	*EAP*

ECO-TOURISM, RESORTS AND LEISURE DEVELOPMENTS

Basic Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Mokala National Park. Northern Cape	*SANParks*	*EAP*
Addo Elephant National Park, Eastern Cape	*SANParks*	*EAP*
Mountain Zebra National Park. Eastern Cape	*SANParks*	*EAP*
Zwavelpoort Lodge. Tshwane, Gauteng	*Square Time Café (Pty) Ltd*	*EAP*
Fort Recce. Tshwane, Gauteng.	*South African Special Forces Heritage Foundation*	*EAP*

savannah environmental

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Johannesburg, South Africa

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CURRICULUM VITAE OF JO-ANNE THOMAS

Profession:	Environmental Management and Compliance Consultant; Environmental Assessment Practitioner
Specialisation:	Environmental Management; Strategic environmental advice; Environmental compliance advice & monitoring; Environmental Impact Assessments; Policy, strategy & guideline formulation; Project Management; General Ecology
Work experience:	Twenty four (24) years in the environmental field

VOCATIONAL EXPERIENCE

Provide technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Key focus on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures. Compilation of the reports for environmental studies is in accordance with all relevant environmental legislation.

Undertaking of numerous environmental management studies has resulted in a good working knowledge of environmental legislation and policy requirements. Recent projects have been undertaken for both the public- and private-sector, including compliance advice and monitoring, electricity generation and transmission projects, various types of linear developments (such as National Road, local roads and power lines), waste management projects (landfills), mining rights and permits, policy, strategy and guideline development, as well as general environmental planning, development and management.

SKILLS BASE AND CORE COMPETENCIES

- Project management for a range of projects
- Identification and assessment of potential negative environmental impacts and benefits through the review and manipulation of data and specialist studies
- Identification of practical and achievable mitigation and management measures and the development of appropriate management plans
- Compilation of environmental reports in accordance with relevant environmental legislative requirements
- External and peer review of environmental reports & compliance advice and monitoring
- Formulation of environmental policies, strategies and guidelines
- Strategic and regional assessments; pre-feasibility & site selection
- Public participation processes for a variety of projects
- Strategic environmental advice to a wide variety of clients both in the public and private sectors
- Working knowledge of environmental planning processes, policies, regulatory frameworks and legislation

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc Earth Sciences, University of the Witwatersrand, Johannesburg (1993)
- B.Sc Honours in Botany, University of the Witwatersrand, Johannesburg (1994)
- M.Sc in Botany, University of the Witwatersrand, Johannesburg (1996)

Short Courses:

- Environmental Impact Assessment, Potchefstroom University (1998)
- Environmental Law, Morgan University (2001)
- Environmental Legislation, IMBEWU (2017)
- Mining Legislation, Cameron Cross & Associates (2013)
- Environmental and Social Risk Management (ESRM), International Finance Corporation (2018)

Professional Society Affiliations:

- Registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (2019/726)
- Registered with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Scientist (400024/00)
- Registered with the International Associated for Impact Assessment South Africa (IAIAsa): 5601
- Member of the South African Wind Energy Association (SAWEA)

EMPLOYMENT

Date	Company	Roles and Responsibilities
January 2006 - Current:	Savannah Environmental (Pty) Ltd	Director Project manager Independent specialist environmental consultant, Environmental Assessment Practitioner (EAP) and advisor.
1997 – 2005:	Bohlweki Environmental (Pty) Ltd	Senior Environmental Scientist at. Environmental Management and Project Management
January – July 1997:	Sutherland High School, Pretoria	Junior Science Teacher

PROJECT EXPERIENCE

Project experience includes large infrastructure projects, including electricity generation and transmission, wastewater treatment facilities, mining and prospecting activities, property development, and national roads, as well as strategy and guidelines development.

RENEWABLE POWER GENERATION PROJECTS: PHOTOVOLTAIC SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Christiana PV 2 SEF, North West	Solar Reserve South Africa	Project Manager & EAP
De Aar PV facility, Northern Cape	iNca Energy	Project Manager & EAP
Everest SEF near Hennenman, Free State	FRV Energy South Africa	Project Manager & EAP
Graafwater PV SEF, Western Cape	iNca Energy	Project Manager & EAP
Grootkop SEF near Allanridge, Free State	FRV Energy South Africa	Project Manager & EAP
Hertzogville PV 2 SEF with 2 phases, Free State	SunCorp / Solar Reserve	Project Manager & EAP

Project Name & Location	Client Name	Role
Karoshoek CPV facility on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Kgabalatsane SEF North-East for Brits, North West	Built Environment African Energy Services	Project Manager & EAP
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy Global	Project Manager & EAP
Lethabo Power Station PV Installation, Free State	Eskom Holdings SoC Limited	Project Manager & EAP
Majuba Power Station PV Installation, Mpumalanga	Eskom Holdings SoC Limited	Project Manager & EAP
Merapi PV SEF Phase 1 – 4 South-East of Excelsior, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Sannaspos Solar Park, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Ofir-Zx PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV Energy South Africa	Project Manager & EAP
Project Blue SEF North of Kleinsee, Northern Cape	WWK Development	Project Manager & EAP
S-Kol PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Sonnenberg PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Tutuka Power Station PV Installation, Mpumalanga	Eskom Transmission	Project Manager & EAP
Two PV sites within the Northern Cape	MedEnergy Global	Project Manager & EAP
Two PV sites within the Western & Northern Cape	iNca Energy	Project Manager & EAP
Upington PV SEF, Northern Cape	MedEnergy Global	Project Manager & EAP
Vredendal PV facility, Western Cape	iNca Energy	Project Manager & EAP
Waterberg PV plant, Limpopo	Thupela Energy	Project Manager & EAP
Watershed Phase I & II SEF near Litchtenburg, North West	FRV Energy South Africa	Project Manager & EAP
Alldays PV & CPV SEF Phase 1, Limpopo	BioTherm Energy	Project Manager & EAP
Hyperion PV Solar Development 1, 2, 3, 4, 5 & 6, Northern Cape	Building Energy	Project Manager & EAP
Vrede & Rondavel PV, Free State	Mainstream Renewable Energy Developments	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Aberdeen PV SEF, Eastern Cape	BioTherm Energy	Project Manager & EAP
Christiana PV 1 SEF on Hartebeestpan Farm, North-West	Solar Reserve South Africa	Project Manager & EAP
Heuningspruit PV1 & PV 2 facilities near Koppies, Free State	Sun Mechanics	Project Manager & EAP
Kakamas PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Kakamas II PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Machadodorp 1 PV SEF, Mpumalanga	Solar To Benefit Africa	Project Manager & EAP
PV site within the Northern Cape	iNca Energy	Project Manager & EAP
PV sites within 4 ACSA airports within South Africa, National	Airports Company South Africa (ACSA)	Project Manager & EAP
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo3 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo4 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Sannaspos PV SEF Phase 2 near Bloemfontein, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Solar Park Expansion within the Rooiwal Power Station, Gauteng	AFRKO Energy	Project Manager & EAP
Steynsrus SEF, Free State	SunCorp	Project Manager & EAP
Sirius Solar PV Project Three and Sirius Solar PV Project Four (BA in terms of REDZ regulations), Northern Cape	SOLA Future Energy	Project Manager & EAP
Northam PV, Limpopo Province	Northam Platinum	Project Manager & EAP
Kolkies PV Suite (x 6 projects) and Sadawa PV Suite (x 4 projects), Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Allemans Fontein SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Amandel SEF near Thabazimbi, Limpopo	iNca Energy	Project Manager & EAP
Arola/Doornplaat SEF near Ventersdorp, North West	FRV & iNca Energy	Project Manager & EAP
Bloemfontein Airport PV Installation, Free State	The Power Company	Project Manager & EAP
Brakspruit SEF near Klerksorp, North West	FRV & iNca Energy	Project Manager & EAP
Carolus Poort SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Damfontein SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Everest SEF near Welkom, Free State	FRV & iNca Energy	Project Manager & EAP
Gillmer SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Grootkop SEF near Allansridge, Free State	FRV & iNca Energy	Project Manager & EAP
Heuningspruit PV1 & PV 2 near Koppies, Free State	Cronimat	Project Manager & EAP
Kimberley Airport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Kolonnade Mall Rooftop PV Installation in Tshwane, Gauteng	Momentous Energy	Project Manager & EAP
Loskop SEF near Groblersdal, Limpopo	S&P Power Unit	Project Manager & EAP
Marble SEF near Marble Hall, Limpopo	S&P Power Unit	Project Manager & EAP
Morgenson PV1 SEF South-West of Windsorton, Northern Cape	Solar Reserve South Africa	Project Manager & EAP
OR Tambo Airport PV Installation, Gauteng	The Power Company	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV & iNca Energy	Project Manager & EAP
Rhino SEF near Vaalwater, Limpopo	S&P Power Unit	Project Manager & EAP
Rustmo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
Spitskop SEF near Northam, Limpopo	FRV & iNca Energy	Project Manager & EAP
Steynsrus PV, Free State	Suncorp	Project Manager & EAP
Tabor SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
UpingtonAirport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Valeria SEF near Hartebeestpoort Dam, North West	Solar to Benefit Africa	Project Manager & EAP
Watershed SEF near Lichtenburg, North West	FRV & iNca Energy	Project Manager & EAP
Witkop SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
Woodmead Retail Park Rooftop PV Installation, Gauteng	Momentous Energy	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Adams Solar PV Project Two South of Hotazel,	Enel Green Power	Project Manager

Project Name & Location	Client Name	Role
Northern Cape		
ECO for the construction of the Kathu PV Facility, Northern Cape	REISA	Project Manager
ECO and bi-monthly auditing for the construction of the Pulida PV Facility, Free State	Enel Green Power	Project Manager
ECO for the construction of the RustMo1 SEF, North West	Momentous Energy	Project Manager
ECO for the construction of the Sishen SEF, Northern Cape	Windfall 59 Properties	Project Manager
ECO for the construction of the Upington Airport PV Facility, Northern Cape	Sublanary Trading	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Kathu PV facility, Northern Cape	REISA	Project Manager
ECO for the construction of the Konkoonsies II PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
ECO for the construction of the Aggeneys PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager

Compliance Advice and ESAP Reporting

Project Name & Location	Client Name	Role
Aggeneys Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Airies II PV Facility SW of Kenhardt, Northern Cape	BioTherm Energy	Environmental Advisor
Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Environmental Advisor
Kathu PV Facility, Northern Cape	Building Energy	Environmental Advisor
Kenhardt PV Facility, Northern Cape	BioTherm Energy	Environmental Advisor
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Environmental Advisor
Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Environmental Advisor
Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Lephalale SEF, Limpopo	Exxaro	Environmental Advisor
Pixley ka Seme PV Park, South-East of De Aar, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Environmental Advisor
Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Environmental Advisor
Sirius PV Plants, Northern Cape	Aurora Power Solutions	Environmental Advisor
Upington Airport PV Power Project, Northern Cape	Sublunary Trading	Environmental Advisor
Upington SEF, Northern Cape	Abengoa Solar	Environmental Advisor
Ofir-ZX PV SEF near Keimoes, Northern Cape	Networx S28 Energy	Environmental Advisor
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Environmental Advisor
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
5 PV SEF projects in Lephalale, Limpopo	iNca Energy	Environmental Advisor
Prieska PV Plant, Northern Cape	SunEdison Energy India	Environmental Advisor
Sirius Phase One PV Facility near Upington, Northern Cape	Aurora Power Solutions	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Biodiversity Permit & WULA for the Aggeneys SEF near Aggeneys, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permit for the Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Project Manager & EAP
Environmental Permitting for the Upington SEF, Northern Cape	Abengoa Solar	Project Manager & EAP
Environmental Permitting for the Kathu PV Facility, Northern Cape	Building Energy	Project Manager & EAP
Environmental Permitting for the Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Project Manager & EAP
Environmental Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Project Manager & EAP
Environmental Permitting for the Sirius PV Plant, Northern Cape	Aurora Power Solutions	Project Manager & EAP
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Permits for the Kleinbegin and UAP PV Plants, Northern Cape	MedEnergy Global	Project Manager & EAP
S53 Application for Arriesfontein Solar Park Phase 1 – 3 near Danielskuil, Northern Cape	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for Hertzogville PV1 & PV 2 SEFs, Free State	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for the Bloemfontein Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
S53 Application for the Kimberley Airport PV Facility, Northern Cape	Sublunary Trading	Project Manager & EAP
S53 Application for the Project Blue SEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 Application for the Upington Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
WULA for the Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ilanga CSP 2, 3, 4, 5, 7 & 9 Facilities near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Ilanga CSP near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Ilanga Tower 1 Facility near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Karoshoek CPVPD 1-4 facilities on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshoek CSP facilities on sites 1.4; 4 & 5 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshoek Linear Fresnel 1 Facility on site 1.1 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the !Khi CSP Facility, Northern Cape	Abengoa Solar	Project Manager
ECO for the construction of the Ilanga CSP 1 Facility near Upington, Northern Cape	Karoshoek Solar One	Project Manager
ECO for the construction of the folar Park, Northern Cape	Kathu Solar	Project Manager
ECO for the construction of the KaXu! CSP Facility, Northern Cape	Abengoa Solar	Project Manager
Internal audit of compliance with the conditions of the IWUL issued to the Karoshoek Solar One CSP Facility, Northern Cape	Karoshoek Solar One	Project Manager

Screening Studies

Project Name & Location	Client Name	Role
Upington CSP (Tower) Plant near Kanoneiland, Northern Cape	iNca Energy and FRV	Project Manager & EAP

Compliance Advice and ESAP reporting

Project Name & Location	Client Name	Role
Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Environmental Advisor
Ilangalethu CSP 2, Northern Cape	FG Emvelo	Environmental Advisor
Kathu CSP Facility, Northern Cape	GDF Suez	Environmental Advisor
Lephalale SEF, Limpopo	Cennergi	Environmental Advisor
Solis I CSP Facility, Northern Cape	Brightsource	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Environmental Permitting for the Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP
Environmental Permitting for the Kathu CSP, Northern Cape	GDF Suez	Project Manager & EAP
WULA for the Solis I CSP Facility, Northern Cape	Brightsource	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Sere WEF, Western Cape	Eskom Holdings SoC Limited	EAP
Aberdeen WEF, Eastern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Amakhala Emoyeni WEF, Eastern Cape	Windlab Developments	Project Manager & EAP
EXXARO West Coast WEF, Western Cape	EXXARO Resources	Project Manager & EAP
Goereesoe Wind Farm near Swellendam, Western Cape	iNca Energy	Project Manager & EAP
Hartneest WEF, Western Cape	Juwi Renewable Energies	Project Manager & EAP
Hopefield WEF, Western Cape	Umoya Energy	EAP
Kleinsee WEF, Northern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Klipheuwel/Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Moorreesburg WEF, Western Cape	iNca Energy	Project Manager & EAP
Oyster Bay WEF, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Project Blue WEF, Northern Cape	Windy World	Project Manager & EAP
Rheboksfontein WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Spitskop East WEF near Riebeeck East, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Suurplaat WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Swellendam WEF, Western Cape	IE Swellendam	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro	Project Manager & EAP
West Coast One WEF, Western Cape	Moyeng Energy	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Amakhala Emoyeni Wind Monitoring Masts, Eastern Cape	Windlab Developments	Project Manager & EAP
Beaufort West Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
Koekenaap Wind Monitoring Masts, Western Cape	EXXARO Resources	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Palm Tree Power	Project Manager & EAP
Laingsburg Area Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Overberg Area Wind Monitoring Masts, Western Cape	BioTherm Energy	Project Manager & EAP
Oyster Bay Wind Monitoring Masts, Eastern Cape	Renewable Energy Systems Southern Africa (RES)	Project Manager & EAP
Wind Garden & Fronteer WEFs, Eastern Cape	Wind Relc	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Albertinia WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Pal Tree Power	Project Manager & EAP
Napier Region WEF Developments, Western Cape	BioTherm Energy	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro Resources	Project Manager & EAP

Project Name & Location	Client Name	Role
Various WEFs within an identified area in the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Investec Bank Limited	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Eskom Holdings Limited	Project Manager & EAP
Various WEFs within the Western Cape	Western Cape Department of Environmental Affairs and Development Planning	Project Manager & EAP
Velddrift WEF, Western Cape	VentuSA Energy	Project Manager & EAP
Wind 1000 Project	Thabo Consulting on behalf of Eskom Holdings	Project Manager & EAP
Wittekleibosch, Snylip & Doriskraal WEFs, Eastern Cape	Exxarro Resources	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager
ECO for the construction of the Gouda WEF, Western Cape	Blue Falcon	Project Manager
EO for the Dassiesklip Wind Energy Facility, Western Cape	Group 5	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Gouda Wind Energy facility near Gouda, Western Cape	Blue Falcon	Project Manager
Annual auditing of compliance with all environmental licenses for the operation activities at the West Coast One Wind Energy facility near Vredenburg, Western Cape	Aurora Wind Power	Project Manager
External environmental and social audit for the Amakhala Wind Farm, Eastern Cape	Cennergi	Project Manager
External environmental and social audit for the Tsitsikamma Wind Farm, Eastern Cape	Cennergi	Project Manager
ECO for the construction of the Excelsior Wind Farm and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
External compliance audit of the Dassiesklip Wind Energy Facility, Western Cape	BioTherm Energy	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Amakhala Phase 1 WEF, Eastern Cape	Cennergi	Environmental Advisor
Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Environmental Advisor
Excelsior Wind Farm, Western Cape	BioTherm Energy	Environmental Advisor
Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Hopefield Community WEF, Western Cape	African Clean Energy Developments (ACED)	Environmental Advisor

Rheboksfontein WEF, Western Cape	Moyeng Energy	Environmental Advisor
Tiqua WEF, Western Cape	Cennergi	Environmental Advisor
Tsitsikamma WEF, Eastern Cape	Cennergi	Environmental Advisor
West Coast One WEF, Western Cape	Moyeng Energy	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
Witteberg WEF, Western Cape	EDPR Renewables	Environmental Advisor
IPD Vredenburg WEF within the Saldanha Bay area, Western Cape	IL&FS Energy Development Company	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Biodiversity Permitting for the Power Line between the Tsitikamma Community WEF & the Diep River Substation, Eastern Cape	Cennergi	Project Manager & EAP
Biodiversity Permitting for the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager & EAP
Environmental Permitting for the Excelsior WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Plant Permits & WULA for the Tsitsikamma Community WEF, Eastern Cape	Cennergi	Project Manager & EAP
S24G and WULA for the Rectification for the commencement of unlawful activities on Ruimsig AH in Honeydew, Gauteng	Hossam Soror	Project Manager & EAP
S24G Application for the Rheboksfontein WEF, Western Cape	Ormonde - Theo Basson	Project Manager & EAP
S53 Application & WULA for Suurplaat and Gemini WEFs, Northern Cape	Engie	Project Manager & EAP
S53 Application for the Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
S53 Application for the Project Blue WEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 for the Oyster Bay WEF, Eastern Cape	RES	Project Manager & EAP
WULA for the Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (COAL)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Mutsho Power Station near Makhado, Limpopo	Mutsho Consortium	Project Manager & EAP
Coal-fired Power Station near Ogies, Mpumalanga	Ruukki SA	Project Manager & EAP
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Project Manager & EAP
Transalloys Coal-fired Power Station, Mpumalanga	Transalloys	Project Manager & EAP
Tshivasho IPP Coal-fired Power Station (with WML), near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Umbani Coal-fired Power Station, near Kriel, Mpumalanga	ISS Global Mining	Project Manager & EAP

Project Name & Location	Client Name	Role
Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Coal Stockyard on Medupi Ash Dump Site, Limpopo	Eskom Holdings	Project Manager & EAP
Biomass Co-Firing Demonstration Facility at Arnot Power Station East of Middleburg, Mpumlanaga	Eskom Holdings	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Baseload Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Coal-Fired Power Plant near Delmas, Mpumalanga	Exxaro Resources	Project Manager & EAP
Makhado Power Station, Limpopo	Mutsho Consortium, Limpopo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the Camden Power Station, Mpumalanga	Eskom Holdings	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Permit application for the Thabametsi Bulk Water Pipeline, near Lephalale, Limpopo	Axia	Project Manager & EAP
S53 & WULA for the Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP
S53 Application for the Tshivasho Coal-fired Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (GAS)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ankerlig OCGT to CCGT Conversion project &400 kV transmission power line between Ankerlig and the Omega Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Gourikwa OCGT to CCGT Conversion project & 400kV transmission power line between Gourikwa & Proteus Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Plant, KwaZulu-Natal	Richards Bay Gas Power 2	Project Manager & EAP
Decommissioning & Recommissioning of 3 Gas Turbine Units at Acacia Power Station & 1 Gas Turbine Unit at Port Rex Power Station to the existing	Eskom Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Ankerlig Power Station in Atlantis Industria, Western Cape		
320MW gas-to-power station in Richards Bay, KwaZulu-Natal	Phinda Power Projects	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Fatal Flaw Analysis for 3 area identified for the establishment of a 500MW CCGT Power Station	Globeleq Advisors Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Aggeneis-Oranjemond Transmission Line & Substation Upgrade, Northern Cape	Eskom Transmission	Project Manager & EAP
Ankerlig-Omega Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Koeberg-Omega Transmission Power Lines,, Western Cape	Eskom Transmission	Project Manager & EAP
Koeberg-Stikland Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Kyalami Strengthening Project, Gauteng	Eskom Transmission	Project Manager & EAP
Mokopane Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Saldanha Bay Strengthening Project, Western Cape	Eskom Transmission	Project Manager & EAP
Steelpoort Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Transmission Lines from the Koeberg-2 Nuclear Power Station site, Western Cape	Eskom Transmission	Project Manager & EAP
Tshwane Strengthening Project, Phase 1, Gauteng	Eskom Transmission	Project Manager & EAP
Main Transmission Substation (MTS) associated with the Choje Wind Farm cluster, Eastern Cape	Wind Relic	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Dassenberg-Koeberg Power Line Deviation from the Koeberg to the Ankerlig Power Station, Western Cape	Eskom Holdings	Project Manager & EAP
Golden Valley II WEF Power Line & Substation near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Golden Valley WEF Power Line near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Project Name & Location	Client Name	Role
Konkoonsies II PV SEF Power Line to the Paulputs Substation near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Perdekraal West WEF Powerline to the Eskom Kappa Substation, Westnern Cape	BioTherm Energy	Project Manager & EAP
Rheboksfontein WEF Powerline to the Aurora Substation, Western Cape	Moyeng Energy	Project Manager & EAP
Soetwater Switching Station near Sutherland, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Solis Power I Power Line & Switchyard Station near Upington, Northern Cape	Brightsource	Project Manager & EAP
Stormwater Canal System for the Ilanga CSP near Upington, Northern Cape	Karoshoek Solar One	Project Manager & EAP
Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape	Eskom Holdings	Project Manager & EAP
Two 132kV Chickadee Lines to the new Zonnebloem Switching Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Electrical Grid Infrastructure for the Kolkies and Sadawa PV clusters, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Sadawa Collector substation, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Electrical Grid Infrastructure for the Vrede and Rondavel PV facilities, Free State	Mainstream Renewable Energy Developments	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Ferrum-Mookodi Transmission Line, Northern Cape and North West	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section A Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section B Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Hydra IPP Integration project, Northern Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Kappa-Sterrekus Section C Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Namaqualand Strengthening project in Port Nolloth, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
ECO for the construction of the Neptune Substation Soil Erosion Mitigation Project, Eastern Cape	Eskom	Project Manager
ECO for the construction of the Ilanga-Gordonia 132kV power line, Northern Cape	Karoshoek Solar One	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Environmental Permitting and WULA for the Rockdale B Substation & Loop in Power Lines,	Eskom Holdings	Project Manager & EAP
Environmental Permitting and WULA for the Steelpoort Integration project, Limpopo	Eskom Holdings	Project Manager & EAP
Environmental Permitting for Solis CSP near Upington, Northern Cape	Brightsource	Project Manager & EAP

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Elitheni Coal Mine near Indwe, Eastern Cape	Elitheni Coal	Project Manager & EAP
Groot Letaba River Development Project Borrow Pits	Iiso	Project Manager & EAP
Grootegeluk Coal Mine for coal transportation infrastructure between the mine and Medupi Power Station (EMPr amendment) , Limpopo	Eskom Holdings	Project Manager & EAP
Waterberg Coal Mine (EMPr amendment), Limpopo	Seskoko Resources	Project Manager & EAP
Aluminium Plant WML & AEL, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP
Decommissioning and Demolition of Kilns 5 & 6 at the Slurry Plant, Kwa-Zulu Natal	PPC	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Duhva Mine Water Recovery Project, Mpumalanga	Eskom Holdings SoC Limited	Project Manager
External compliance audit of Palesa Coal Mine's Integrated Water Use License (IWUL), near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Palesa Coal Mine's Waste Management License (WML) and EMP, near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Mbali Coal Mine's Integrated Water Use License (IWUL), near Ogies, Mpumalanga	HCI Coal	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mining Operations (Brand se Baai), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mineral Separation Plant (MSP), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Smelter Operations (Saldanha), Western Cape	Tronox Namakwa Sands	Project Manager
Compliance Auditing of the Waste Management Licence for the PetroSA Landfill Site at the GTL Refinery, Western Cape	PetroSA	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Waste Licence Application for the Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP

WULA for the Expansion of the Landfill site at Exxaro's Namakwa Sands Mineral Separation Plant, Western Cape	Exxaro Resources	Project Manager & EAP
S24G & WML for an Aluminium Plant, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Bridge across the Ngotwane River, on the border of South Africa and Botswana	Eskom Holdings	Project Manager & EAP
Chemical Storage Tanks, Metallurgical Plant Upgrade & Backfill Plant upgrade at South Deep Gold Mine, near Westornaria, Gauteng	Goldfields	Project Manager & EAP
Expansion of the existing Welgedacht Water Care Works, Gauteng	ERWAT	Project Manager & EAP
Golden Valley WEF Access Road near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Great Fish River Wind Farm Access Roads and Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Ilanga CSP Facility Watercourse Crossings near Upington, Northern Cape	Karoshoek Solar one	Project Manager & EAP
Modification of the existing Hartebeestfontein Water Care Works, Gautng	ERWAT	Project Manager & EAP
N10 Road Realignment for the Ilanga CSP Facility, East of Upington, Northern Cape	SANRAL	Project Manager & EAP
Nxuba (Bedford) Wind Farm Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Pollution Control Dams at the Medupi Power Station Ash Dump & Coal Stockyard, Limpopo	Eskom	Project Manager & EAP
Qoboshane borrow pits (EMPr only), Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Tsitsikamma Community WEF Watercourse Crossings, Eastern Cape	Cennergi	Project Manager & EAP
Clayville Central Steam Plant, Gauteng	Bellmall Energy	Project Manager & EAP
Msenge Emoyeni Wind Farm Watercourse Crossings and Roads, Eastern Cape	Windlab	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Harmony Gold WWTW at Doornkop Mine, Gauteng	Harmony Doornkop Plant	Project Manager & EAP
Ofir-ZX Watercourse Crossing for the Solar PV Facility, near Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Qoboshane bridge & access roads, Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Relocation of the Assay Laboratory near Carletonville, Gauteng	Sibanye Gold	Project Manager & EAP
Richards Bay Harbour Staging Area, KwaZulu-Natal	Eskom Holdings	Project Manager & EAP
S-Kol Watercourse Crossing for the Solar PV Facility, East of Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Sonnenberg Watercourse Crossing for the Solar PV Facility, West Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
Masetjaba Water Reservoir, Pump Station and Bulk Supply Pipeline near Nigel, Gauteng	Naidu Consulting Engineers	Project Manager & EAP
Access Road for the Dwarsug Wind Farm, Northern Cape Province	South Africa Mainsteam Renewable Power	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Roodepoort Open Space Optimisation Programme (OSOP) Precinct, Gauteng	TIMAC Engineering Projects	Project Manager & EAP
Vegetable Oil Plant and Associated Pipeline, Kwa-Zulu Natal	Wilmar Oils and Fats Africa	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Olifants River Water Resources Development Project (ORWRDP) Phase 2A: De Hoop Dam, R555 realignment and housing infrastructure	Department of Water and Sanitation	Project Manager Auditor
ECO for the Rehabilitation of the Blaaupan & Storm Water Channel, Gauteng	Airports Company of South Africa (ACSA)	Project Manager
Due Diligence reporting for the Better Fuel Pyrolysis Facility, Gauteng	Better Fuels	Project Manager
ECO for the Construction of the Water Pipeline from Kendal Power Station to Kendal Pump Station, Mpumalanga	Transnet	Project Manager
ECO for the Replacement of Low-Level Bridge, Demolition and Removal of Artificial Pong, and Reinforcement the Banks of the Crocodile River at the Construction at Walter Sisulu National Botanical Gardens, Gauteng Province	South African National Biodiversity Institute (SANBI)	Project Manager
External Compliance Audit of the Air Emission Licence (AEL) for a depot in Bloemfontein, Free State Province and in Tzaneen, Mpumalanga Province	PetroSA	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
WULA for the Izubulo Private Nature Reserve, Limpopo	Kjell Bismeyer, Jann Bader, Laurence Saad	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Environmental Advisor
WULA for the Ezulwini Private Nature Reserve, Limpopo	Ezulwini Investments	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Project Manager & EAP
WULA for the N10 Realignment at the Ilanga SEF, Northern Cape	Karoshoek Solar One	Project Manager & EAP
WULA for the Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
S24G and WULA for the Ilegal construction of structures within a watercourse on EFF 24 Ruimsig Agricultural Holdings, Gauteng	Sorror Language Services	Project Manager & EAP

HOUSING AND URBAN PROJECTS

Basic Assessments

Project Name & Location	Client Name	Role
Postmasburg Housing Development, Northern Cape	Transnet	Project Manager & EAP

Compliance Advice and reporting

Project Name & Location	Client Name	Role
Kampi ya Thude at the Olifants West Game Reserve, Limpopo	Nick Elliot	Environmental Advisor
External Compliance Audit of WUL for the Johannesburg Country Club, Gauteng	Johannesburg Country Club	Project Manager

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Due Diligence Audit for the Due Diligence Audit Report, Gauteng	Delta BEC (on behalf of Johannesburg Development Agency (JDA))	Project Manager

ENVIRONMENTAL MANAGEMENT TOOLS

Project Name & Location	Client Name	Role
Development of the 3rd Edition Environmental Implementation Plan (EIP)	Gauteng Department of Agriculture and Rural Development (GDARD)	Project Manager & EAP
Development of Provincial Guidelines on 4x4 routes, Western Cape	Western Cape Department of Environmental Affairs and Development Planning	EAP
Compilation of Construction and Operation EMP for the Braamhoek Transmission Integration Project, Kwazulu-Natal	Eskom Holdings	Project Manager & EAP
Compilation of EMP for the Wholesale Trade of Petroleum Products, Gauteng	Munaca Technologies	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for Medupi Power Station, Limpopo	Eskom Holdings	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Dube TradePort Site Wide Precinct	Dube TradePort Corporation	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Kusile Power Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Review of Basic Assessment Process for the Wittekleibosch Wind Monitoring Mast, Eastern Cape	Exxaro Resources	Project Manager & EAP
Revision of the EMPr for the Sirius Solar PV	Aurora Power Solutions	Project Manager & EAP

Project Name & Location	Client Name	Role
State of the Environment (SoE) for Emalahleni Local Municipality, Mpumalanga	Simo Consulting on behalf of Emalahleni Local Municipality	Project Manager & EAP
Aspects and Impacts Register for Salberg Concrete Products operations	Salberg Concrete Products	EAP
First State of Waste Report for South Africa	Golder on behalf of the Department of Environmental Affairs	Project Manager & EAP
Responsibilities Matrix and Gap Analysis for the Kruisvallei Hydroelectric Power Generation Scheme, Free State Province	Building Energy	Project Manager
Responsibilities Matrix and Gap Analysis for the Roggeveld Wind Farm, Northern & Western Cape Provinces	Building Energy	Project Manager

PROJECTS OUTSIDE OF SOUTH AFRICA

Project Name & Location	Client Name	Role
Advisory Services for the Zizabona Transmission Project, Zambia, Zimbabwe, Botswana & Namibia	PHD Capital	Advisor
EIA for the Semonkong WEF, Lesotho	MOSCET	Project Manager & EAP
EMP for the Kuvaninga Energia Gas Fired Power Project, Mozambique	ADC (Pty) Ltd	Project Manager & EAP
Environmental Screening Report for the SEF near Thabana Morena, Lesotho	Building Energy	EAP
EPBs for the Kawambwa, Mansa, Mwense and Nchelenge SEFs in Luapula Province, Zambia	Building Energy	Project Manager & EAP
ESG Due Diligence for the Hilton Garden Inn Development in Windhoek, Namibia	Vatange Capital	Project Manager
Mandahill Mall Rooftop PV SEF EPB, Lusaka, Zambia	Building Energy	Project Manager & EAP
Monthly ECO for the PV Power Plant for the Mocuba Power Station	Scatec	Project Manager

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CURRICULUM VITAE OF NONDUMISO BULUNGA

Comprehensive CV

Profession : Lead - Social, GIS and Stakeholder Engagement

Specialisation: Social, GIS and Stakeholder Engagement in the environmental field

Work Experience: 8 years in the Environmental field.

VOCATIONAL EXPERIENCE

Nondumiso Bulunga is a Social, GIS and Stakeholder Engagement Specialist at Savannah Environmental. Nondumiso has eight (8) years working experience in project management and facilitation in various industries such as environmental services field including but not limited to recycling, industrial, energy, mining and agriculture.

Working for small and large organisations, Nondumiso has gained exposure in research, collection of data, critical analysis, GIS, and environmental solutions. Nondumiso has worked on projects in South Africa and Malawi.

Nondumiso is very well versed in the IFC Environmental and Social Performance Standards (including IFC PS 2012) and the associated Equator Principles, which have informed the approach and standard for projects regarding ESIA. Nondumiso is skilled at organising and driving effective project teams at a scale relevant to the project's requirements. She has technical experience and can quickly identify the most pertinent issues of a particular project whilst focussing on driving project success by rigorously implementing project management tools.

Nondumiso has experience ranging over several aspects of social research, including the planning and execution of social surveys, participatory rural appraisal, sustainable livelihoods assessments, data management and statistical analysis, capturing and management of spatial data, stakeholder identification and community facilitation. She has worked in local and regional projects taking part in socioeconomic impact assessment, livelihood restoration plans and resettlement plans.

SKILLS BASE AND CORE COMPETENCIES

- Consultation
- Stakeholder Engagement
- Facilitation
- Social Impact Assessments
- Communication
- Project Management
- Project Coordination
- Research
- Training and Development
- Geographical Information Systems, Remote Sensing
- Stakeholder Engagement Plans
- Stakeholder Analysis and Mapping
- IFC Performance Standards
- Comments and Response Reports
- Grievance Mechanism
- Awarness Campaign

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- 2018 : MSC GEOGRAPHICAL INFORMATION SYSTEM and REMOTE SENSING
- 2015 : BAHONS in GEOGRAPHY
- 2013 : BA in GEOGRAPHY AND SOCIOLOGY

Short Courses:

- 2015 One day information session on Modern Technologies and Pathways for the Energetic Use of Biomass
- 2015 One day Public lecture on Climate Change
- 2017 Accredited facilitation certification
- 2017 One day course on Office Management Training
- 2018 Resettlement as part of Impact Assessment

EMPLOYMENT

Duration	Position	Company	Roles and Responsibilities
May 2021 – current ●Permanent	Lead Consultant: Social, Stakeholder Engagement and GIS	Savannah Environmental (Pty) Ltd	Build, lead and manage a Stakeholder Consultation and Engagement team. Advance the Social Impact Assessment reporting service offering. Manage an in-house GIS team and upskill to improve and develop new deliverables for the EIA and Compliance teams. New business development, including development and driving the development of new products and/or services as part of the Savannah Environmental service offering. Manage and mentor staff and critically review and edit reporting/deliverables. Provide strategic input to business and project deliverables.

Duration	Position	Company	Roles and Responsibilities
October 2020 – February 2021 ●Contract	Data Analyst	Community Insights Groups (International)	Desk review of project documentation to inform data collection tools Contribute to the development of monitoring indicators Develop new databases of indicators and consolidate with existing databases from the client Develop household and focus group questionnaires Develop interview/ focus group guidelines Develop fieldwork plan Set up survey software Train local enumerators in the use of the survey software (over ZOOM) Provide remote support to the field team on the survey software Undertake phone KIIs Develop information campaign materials and visual aids for focus groups, KIIs Data organization and quality assurance during the field work (remote) Organize, clean and handover raw data to the client Desktop data analysis – qualitative and quantitative Produce and populate pivot and frequency distribution tables Produce narrative and graphic description of the data for the client report GIS Data Management and Handling Map creation and analysis
November 2019 – March 2021 ●Contract	Policy Coordinator Consultant	International Finance Corporation (International)	Support to the Agri-processing resource efficiency program Coordinate public and private stakeholders to propose specific policy Regulatory and procedural measures to promote improved water efficiency Convening a public-private dialogue process to reach consensus Manage partnerships with local authorities Due Diligence and risk assessment
April 2020 – October 2020 ●Contract	Project Manager	Pax Advisory (Pty) Ltd (South African)	Plan and implement projects Define project scope Help define goals Define deliverables Define tasks and required resources Create schedule Project timeline Manage budget Allocate project resources Track deliverables Support and direct team Lead quality assurance Monitor and report on project progress Present to stakeholders reports on progress as well as problems and solutions Implement and manage change Project data management

Duration	Position	Company	Roles and Responsibilities
March 2017- November 2019 ●Permanent	Environmental Stakeholder Consultant	Digby Wells Environmental (Pty) Ltd (South African)	Addressing issues and needs of communities' Public participation process and communicate Liaise with stakeholders Scientific report writing for social and stakeholder engagement inclusion Assistance is provided in maintaining and updating Interested and Affected database Print / photocopy and the deliver documents to various stakeholders Distribute information (placing posters, posting, mailing, emailing, sending SMS messages, etc.) Assist with the project administration on large and small projects Data collection and inclusion into scientific reports Assist with information material and report compilation material
February 2015 – February 2017 ●Permanent	Environmental Officer	EcoPartners (Pty) Ltd (South African)	Public participation for environmental legal authorisation applications Compiling legal registers and monthly legal update letter Supply all services required for I and APs Write and edit reports Research various environmental aspects. Environmental awareness training Creation of maps for all environmental applications Collection of spatial information Build and Maintain data and information libraries Data collection and analysis Environmental legal authorisation applications
February 2014- September 2014 ●Permanent	Graduate Researcher	Linkd Environmental Services (Pty) Ltd (South African)	Research for projects given as tenders Collecting data from the different forms of information Collecting data for the purpose of controlling it and reporting on it in order to formulate status quo Create reports based on the data, give recommendations for better quality data to be collected Participate in workshop strategy sessions. Help implement policies formulated in strategy sessions and approved by steerco.
October 2014 – December 2014 ●Contract	Researcher and Report Writer	South African Cities Network (Pty) Ltd (South African)	Research Project co-ordination and management Knowledge management Reporting and administrative support GIS support and map analysis Report writing and research gaps

PROJECT EXPERIENCE

Project Name & Location	Client Name	Role
EIA for the Buffelspoort Solar Project, North West Province	Total Eren/Chariot Transitional Power	Social Impact Assessor and Public Participation Consultant
Environmental, Social & Governance (ESG) assessment	Richards Bay Coal Terminal (Pty) Ltd	Social Assessor
To Conduct Study of Sanitation Systems at Two Health Facilities, Swaziland	Ministry of Health, Swaziland	Environmental, Social and Health Specialist

Project Name & Location	**Client Name**	**Role**
Social Impact Assessment - Doornhoek PV Cluster including 132kV line to the Hermes MTS	Atlantic Energy Partners (Pty) Ltd	Social Impact Assessor
Stakeholder engagement for the Socio-economic Impact Assessment for the closure of 3 Eskom power stations	Urban Econ on behalf of Eskom	Project Manager
Exxaro 22-month Resettlement Monitoring Proposal for Phumulani Agri-Village, Mpumalanga	CSG Water & Environmental Consultants on behalf of Exxaro	Report Writer Reviewer, Quality Assurance & Project Support
Environmental Impact Assessment for Agricultural and Pivot Development on various farm portions, Free State Province	Venter Boerdery (Pty) Ltd	Project Manager
Scoping and environmental Impact Report for 175 MW PV, North West	Sibanye Stillwater	Report Writer Reviewer, Quality Assurance & Project Support
EIA Process for Siyanda PV Facilities & BESS	SoLink	Social Impact Assessor and Public Participation Consultant
BA for Hopefield Watercourse Crossing	Umoya Energy (Pty) Ltd	Reviewer & Quality Assurance
BAR for the 10MW Sigma PV Project, Free State	SOLA Group	Social Impact Assessor
SIAs for 2x EIAs for PV & BESS at Siyanda Bakgatla Mine, Limpopo	SoLink	Social Impact Assessor
SIA for 2x 100MW PV south of Hartebeesfontein, North West - in Klerksdorp REDZ	Cape EPrac	Social Impact Assessor
Socio-economic impact assessments (Scoping/EIA) for Pofadder Wind farm cluster, Northern Cape	Atlantic Energy Partners (Pty) Ltd	Social Impact Assessor
Socio-economic impact assessments (Scoping/EIA) for Pofadder Wind farm cluster, Northern Cape	Engie Solar	Reviewer & Quality Assurance
BA for additional area for Grootspruit Solar PV facility, Free State Province	Engie Solar	Reviewer & Quality Assurance
EIA for additional area for Graspan Solar PV facility, Northern Cape Province	Engie Solar	Reviewer & Quality Assurance
EIA for additional area for Sannaspos Solar PV facility, Free State Province	Engie Solar	Reviewer & Quality Assurance
EIA for 225MW San Solar PV on a site north west of Kathu, Northern Cape Province	San Solar Energy (Pty) Ltd	Social Impact Assessor
SIA for a Battery Energy Storage System (BESS) within the authorised footprint of Hotazel Solar - amendment application	Cape EPrac	Social Impact Assessor
BA processes for 3x Kheis PV facilities	AGV Projects	Social Impact Assessor
Screening of sites for the placement of PV facilities near Northam, Limpopo Province	SoLink	GIS Specialist
BAR for the 10MW Sigma PV Project, Free State	SOLA Group	Social Impact Assessor
Land sensitivity analysis on the identified land for the Merafong Solar Farm Cluster Project	Gauteng Infrastructure Financing Agency	Social and GIS Specialist
EIA/WML for Majuba waste disposal facility	Eskom – Majuba Power Station	Reviewer & Quality Assurance
P2 amendment for Poortjies Wind Energy Facility	Mainstream Renewable Power	Reviewer & Quality Assurance
EIAs for 2x 100MW PV on a site west of Lichtenburg, North West	Atlantic Energy Partners (Pty) Ltd	Reviewer & Quality Assurance
EIA processes for the Great Karoo Renewable Energy Cluster	Great Karoo Renewable Energy	Reviewer & Quality Assurance
Proposed Grid Connection Infrastructure for the Woodhouse 1 and Woodhouse 2 Solar Energy Facilities	Genesis Eco-Energy Developments (Pty) Ltd	Report Writer Reviewer, Quality Assurance & Project Support
Environmental Impact Assessment And Public Participation Process For The Proposed Development Of The Nama Solar East Facility And Nama Solar West Solar Facility With Associated	Nama Solar East (Pty) Ltd and Nama Solar West (Pty) Ltd.	Reviewer, Quality Assurance & Project Support

Project Name & Location	**Client Name**	**Role**
Infrastructure, Northern Cape		
Proposed Development of a New Waste Disposal Site at the Eskom Majuba Power Station near Amersfoort, Dr Pixley Ka Seme Local Municipality, Mpumalanga Province	Eskom Holdings Ltd	Report Writer, Quality Assurance & GIS Support
The Construction of the 100MW Nku Solar Photovoltaic Facility (PV1), on portion 96 of the Farm Rondavel 85 and Farm Annex Rondavel, near Richmond, Northern Cape Province	Great Karoo Renewable Energy (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Environment, Social & Governance (ESG) Assessment and Development of ESG Policy	Richards Bay Coal Terminal Proprietary Limited	Report Writer and Assessment Practitioner
Environmental Impact Assessment Process for 2X 100MW Solar PV Facilities	Atlantic Energy Partners (Pty) Ltd	Report Writer - Social Impact Assessment Quality Assurance/Reviewer
Moeding Solar PV Facility and Tiger Kloof Solar Facility with nearby settlements	Kabi (Pty) Ltd	Geographical Information Systems Specialist (GIS) & Reviewer/Quality Assurance
Solar PV Screening, Kathu Northern Cape Province	AGV Projects (Pty) Ltd	Report Writer, Researcher & Quality Assurance & GIS Support
Solar PV Screening/and or Wind Projects, Vredendal Western Cape Province	ABO Wind (Pty) Ltd	Report Writer, Researcher & Quality Assurance & GIS Support
Komsberg West Wind Energy Northern and Western Cape Provinces Revised Environmental Management Programme and Final Layout	Gunstfontein Wind Farm (Pty) Ltd,	Reviewer, Quality Assurance & Project Support
Grid Connection Infrastructure for the Namas Wind Farm	Genesis Namas Wind (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Grid Connection Infrastructure for the Zonnequa Wind Farm	Gensis Zonnequa Wind (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Proposed 10mw Northam Solar Pv Facility Near Thabazimbi, Limpopo Province	Northam Platinum Limited	Reviewer, Quality Assurance & Project Support
Amendment of the Environmental Authorisation for the Proposed Construction of The Gunstfontein Switching Station, 132kv Overhead Power Line And Ancillary Infrastructure For The Proposed Gunstfontein Wind Farm	Gunstfontein Wind Farm (Pty) Ltd	Geographical Information Systems Specialist (GIS) & Reviewer/Quality Assurance
Grid Connection Infrastructure, including 132kv Overhead Powerline, Switching Station And Ancillaries, For The Great Karoo Wind Farm, Northern Cape	Great Karoo Wind Farm (Pty) Ltd	Geographical Information Systems Specialist (GIS)
Perdekraal West Wind Energy Facility and Associated Infrastructure, Located in the Witzenburg Local Municipality Within The Western Cape Province	Perdekraal West Wind Farm (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Pienaarspoort Wind Energy Facility 1, Western Cape Province	Pienaarspoort Wind Energy Facility 1 (Pty)	Reviewer, Quality Assurance & Project Support
Environmental Impact Assessment And Public Participation Process Bergriver Wind Farm, Western Cape Province	FE Berg River (Pty) Ltd	Stakeholder Engagement and Reviewer, Quality Assurance
Construction and operation of the 100MW Rondavel PV facility, BESS and associated infrastructure near Kroonstad, Free State Province	South Africa Mainstream Renewable Power Developments (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Kolkies and Sadawa PV and EGI Suite of projects, Western Cape	South Africa Mainstream Renewable Power Developments (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Cluster Of Renewable Energy Facilities And Redz 3 Power Corridor 400 Main Transmission Substation Between Somerset East And Makhanda, Eastern Cape Province	Wind Relic (Pty) Ltd	Reviewer, Quality Assurance & Project Support

Project Name & Location	**Client Name**	**Role**
Wind Garden Wind Farm And Fronteer Wind Farm Near Makhanda, Eastern Cape Province	Wind Garden (Pty) Ltd & Fronteer (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Environmental Authorisation required for Prospecting Right Application on various Portions of the Farm Schaapkopje 194 HT, 5km North of Vryheid Town in the AbaQulusi Local Municipality, KwaZulu Natal	Tuutuuka Resources Proprietary Limited	Report Writer and Project Administrator, Stakeholder Engagement & GIS Support
Social Impact Assessment for the Proposed Infrastructure Amendments Environmental Authorisation and Water Use License	Seriti Power (Pty) Ltd	Report Writer- Stakeholder Engagement & GIS Support
Social Impact Assessment for the Proposed Middelburg Mining Services (MMS) Boschmanskrans Section Implementation of Wetland Mitigation and Offset Strategy	Seriti Power (Pty) Ltd	Report Writer- Stakeholder Engagement & GIS Support
Environmental Authorisation And Integrated Water Use Licence Application For The Proposed Liquid Mist Trading Beneficiation Plant Expansion Project	Liquid Mist (Pty) Ltd	Report Writer and GIS Support
Basic Assessment Process In Support Of The Proposed The Construction Of Doornpoort Pumping Main And Pumpstation, Emalahleni Local Municipality In The Mpumalanga Province	Lefatshe Infrastructure Services (Pty) Ltd	Report Writer and Project Administrator & GIS Support
Water Use Licence Renewal Application for the Inyanda Coal Wash Plant, on the Portions 2, 20 And 21 Of Farm Kalbasfontein 284 JS & Portion 4 of Farm Mooifontein 285 JS Near Witbank in the eMalahleni Local Municipality, Mpumalanga	Inyanda Mining Holdings	Report Writer and Project Administrator
Social Impact Assessment for the Proposed Ikwezi Vanadium Mining Project	Ikwezi Vanadium (Pty) Ltd	Report Writer – Social Impact & Project Administrator
Environmental Authorisation (EIA) for the proposed Giyani Renewable Energy Solar Photovoltaic Power	Giyani Renewable Energy	Report Writer- Stakeholder Engagement & GIS Support
Environmental Authorisation required for Prospecting Right Application on farm Mooihoek and various farm portions of farm Pivaanspoort	Pivaanspoort (Pty) Ltd	Report Writer
Draft Basic Assessment Report For The Proposed Upgrade Of Weltevreden Wetland Interventions	Seriti Power (Pty) Ltd	Report Writer
Social and Labour Plan for the Straffontein Colliery	Mnambithi Mining (Pty) Ltd	Report Writer – Social Impact and Social Labour Plans & GIS Support
Social and Labour Plan for the existing operational expansion Leeuwfontein Colliery Mining Right Amendment Applications	Zomhlaba Resources (Pty) Ltd	Report Writer – Social Impact and Social Labour Plans & GIS Support
Social and Labour Plan for the existing operational expansion Lakeside Colliery Mining Right Amendment Applications	Zomhlaba Resources (Pty) Ltd	Report Writer – Social Impact and Social Labour Plans & GIS Support
Social Impact Assessment for the Proposed Aangewys Coal Mine Mining Right Application	National Treasure Minerals (Pty) Ltd	Report Writer – Social Impact and Social Labour Plans & GIS Support
Environmental Impact Assessment And Water Use Licence Application In Support Of The Proposed Grootlaagte Open Cast Mining, Mpumalanga – Arnot Opco (Pty) Ltd	Arnot OpCo	Report Writer- Stakeholder Engagement & GIS Support
Malawi Solar Projects, Livelihood restoration and social performance monitoring and planning	JCM Power	Data Analyst
750 AMPED Campaign	Health Wellness SETA	Project Manager
Integrity Due Diligence Reports	Various (South African Poultry Industry, Centre of Industrial Scientific Research; SA Milk Producers	Policy Coordinator/ Report Writer
Policy Component for agri-processing projects	eThekwini Municipality	Policy Coordinator/ Report Writer

Project Name & Location	**Client Name**	**Role**
Alignment of EIA's and WUL's	South 32	Social Specialist/Report Writer
Environmental Authorisation for Klipspruit Colliery	South 32	Social Specialist/Report Writer
Expansion and Development of Sun City Resorts	Sun International	Social Specialist/Report Writer
Environmental Authorisation for a Regulatory Environmental Process	Blyvoor Gold	Social Specialist/Report Writer
Mooikraal Road Diversion Project	Sasol (Pty) Ltd	Social Specialist/Report Writer
Pretorius Park Housing Development	Luengo Consulting	Social Specialist/Report Writer
Grave Relocation Project	Exxaro Resources	Social Specialist/Report Writer
Syferfontein Housing Development	LTE Consulting	Social Specialist/Report Writer
Leeuwpan Lifex Project	Exxaro Resources	Social Specialist/Report Writer
Environmental Authorisation required for Proposed Palmietkuilen Colliery near Springs	Canyon Resources (Pty) Ltd	Social Specialist/Report Writer
Environmental Authorisation required for the Agnes Gold Mine, Barberton	Galaxy Gold Reefs (Pty) Limited	Social Specialist/Report Writer
Environmental Authorisation for the Proposed Hendrina Underground Coal Mine, Mpumalanga	Glencore Operations South Africa (Pty) Ltd	Social Specialist/Report Writer
Environmental authorisation applications(Waste management, Water use license, EMP)	Various	Social Specialist/Report Writer
Environmental Authorisation Applications related to the Construction of Power Station, Associated Infrastructure, and Coal Mine near Colenso, KZN	Dunrose Investments 244 for Colenso Power (Pty) Ltd	Project Administrator/ Social Specialist
Environmental Awareness Training	Various	Facilitator
Legal register	Various	Report Compiler
Dynamics and Incidence of Child Abuse, Neglect and Exploitation(DICANE)	Department of Social Development	Facilitator
The Alexandra Environment Public Upgrade-management of the public participation process	Johannesburg Development Agency	Project Administrator
Cities Green Transport Programme	South African Cities Network	Project Researcher
Project Management of the EPWP Construction of the Mvoti Regional Landfill	Department of Environmental Affairs	Project Researcher
Development of climate change adaptation and mitigation programme	Department of Agriculture Forestry and Fisheries	Project Researcher
Capacity Building in spatial transformation	South African Cities Network	Project Researcher

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CURRICULUM VITAE OF MOLATELA LEDWABA

Comprehensive CV

Profession : Public Participation and Social Consultant

Specialisation: Public participation process, stakeholder engagement, Facilitation (focus group and public meeting)

Work Experience: 13 years

VOCATIONAL EXPERIENCE

Molatela Ledwaba works as a public participation and social consultant at Savannah Environmental. She has a BA in Environmental Management and is currently working on her BA(Hons) in Environmental Management. Molatela has thirteen (13) years of experience in office administration, project coordination, and public participation in a variety of industries including geohydrological and environmental services projects, but not limited to infrastructure development and mining.

She has worked for both small and large organizations, gaining experience in research, data collection, planning and execution of social surveys, data management and community facilitation. Molatela has experience working on projects in South Africa and Kenya. She has been taking part in public participation, stakeholder engagement and socioeconomic baseline. She has successfully completed several public participation processes for ESIA BA, and WULA projects.

SKILLS BASE AND CORE COMPETENCIES

- Competent in Microsoft Word, PowerPoint, excel and Outlook
- Public Participation and Stakeholder Engagement
- Geographical Information Systems (basic – ArcGis & QGis)
- Social Research
- Comments and Response Report
- Facilitation
- Desktop -Socio economic baseline
- Ability to accurately track inventory and compile reports
- Great team player and can work well independently
- Google Earth

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- BA(Hons) Environmental Management (current) University of South Africa
- BA Environmental Management (2017) University of South Africa

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EMPLOYMENT

Date	Company	Roles and Responsibilities
29 August 2022 - Current:	Savannah Environmental (Pty) Ltd	*Public Participation and Stakeholder Engagement* Tasks include: • Facilitation of stakeholder meeting • The execution of all tasks relating to public participation such as identification of affected parties and relevant stakeholders, ongoing stakeholder consultation, liaison with relevant environmental authorities and stakeholders, arranging, co-ordinating and attending public consultation meetings, compilation of public participation documentation and public administration tasks • Administration task associated with the public participation process required to be undertaken in terms of the National Environmental Management Act, 1998(Act No.107 of 1998), read with the EIA Regulations (2014), as amended. Tasks include, inter alia identification of affected parties and relevant stakeholders, arranging public consultation meetings, compilation of public participation documentation and filing of public participation related records, report release, administration uploads and accurate record keeping. • Administrative support to environmental authorisation, permitting and licensing tasks and undertake site visits to support public participation or social impact assessment processes. • Project-related GIS mapping. • Implementation of appropriate procedures and mechanisms to consolidate and complete a compliance check on project-related files with a view to enhance overall management of project documentation for all closed, live

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Date	Company	Roles and Responsibilities
		and future projects executed by the company. *Social Consultant* Tasks include: • Compilation of Social Impact Assessment • Conduct socio-economic analyses and public participation processes • Undertaking community engagement and liaison activities • Contributing socio economic baseline details to the EIA process • Liaise with landowners, government at various levels • Demographic profiling • Conducting research • Compile and review reports for submission to client and/ or legal authorities • Project, client and management
10 June 2022 – 26 August 2022	Nemai Consulting Cc	Environmental Officer Tasks included: • Contributing to EIA projects • Conducting site visits • Carrying out Stakeholder Engagement process • Data analysis • Public Participation process • Conducting Social survey • Community Participation Consultant
01 March 2018 – 31 July 2022	Golder Associates Africa	Social Sciences Project Coordinator Tasks included: • Compilation of reports, i.e., public participation and Socio-economic baseline. • Helped with Social research. • Contributing to EIA projects. • Desktop study analysis and assisted with Water Use License applications. • Compiled and maintained stakeholder database. • Compilation of announcement documents for EIA projects. • Assisted with mail and email merges.

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Date	Company	Roles and Responsibilities
		• Liaised with a wide range of stakeholders representing various sectors of society. • Coordinated the publication of mandatory advertisements and collected tear sheets. • Coordinated delivery of documents to the authorities. • Captured stakeholder comments and social survey data in appropriate MS Office programmes. • Preparation of meeting agendas, presentations, and compilation of minutes. • Carried out structural crack survey. • Arranged logistics for public participation meetings. • Performed general administrative support to Environmental Services division. • Managing courier services. • Coordinating travel arrangements and accommodation bookings
26 May 2006 – 31 May 2017	Khulani GeoEnviro Consultants Pty Ltd	Office Administrator/ Database and GIS Operator Tasks included: • Geohydrological and geological data capturing on Aquabase and Log plot. • GIS work and map productions (Qgis and ArcGIS). • Contributed to compilation of geohydrological reports. • Prepared and attended Public Participation Meetings. • Liaised with relevant government departments regarding issuing of Record of Decision. • Prepared Water Use License Applications for boreholes. • Performed general administrative support to specific projects. • Operated Switchboard by answering, screening, and forwarding calls to the person(s), taking massages and scheduling appointments. • Greeted clients and visitors with a positive and helpful attitude, determined nature

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Date	Company	Roles and Responsibilities
		and purpose of visit, directed, and escorted them to the relevant person. • Collected, distributed messages and managed courier deliveries. • Made travel arrangements and accommodation bookings. • Coordinating monthly payments of office bills. • Filling and maintenance of electronic and manual record for department within the company. • Coordinated appointments, meeting and managed the MD's diary effectively. • Took minutes of meetings. • Ordered office supplies and maintained proper stock levels.

PROJECT EXPERIENCE

Project Name & Location	***Client Name***	***Role***
EIA Zondereinde PV Solar Energy	*Letsatsi PV (Pty) Ltd*	*Public Participation Consultant*
EIA Buffelspoort PV Solar Energy	*Buffelspoort Solar Project (Pty) Ltd*	*Social Impact Assessor*
EIA- Danielskuil Solar PV and Wind Farm Energy	*AGV Renewable Energy Pty Ltd*	*Public Participation and Social Impact Assessor*
Orange Farm to Johannesburg Inner City Integrated Corridor Management, City of Johannesburg	*SMEC South Africa*	*Stakeholder Engagement Consultant*
Illovo Water Pipeline Upgrade, City of Johannesburg	*PHB Engineers*	*Social Facilitator*
Application for Environmental Authorisation (EA), Water Use Licence (WUL)& Atmospheric Emission Licence (AEL), KwaZulu Natal	*Lanele Group*	*Stakeholder Engagement Consultant*
Water Use Licence at Kliprivier Plant, Gauteng	*Twinsaver Group (Pty) Ltd*	*Public Participation Consultant*
IWULA/ WUL, Greater Tubatse	*Tubatse Ferrochrome (Pty) Ltd*	*Public Participation Consultant*
Section 24 G and Air Emissions Licence Application, Richards Bay	*Grindrod Terminals (Pty) Ltd*	*Public Participation Consultant*
Proposed Road Realignment EIA/ EMP, Mpumalanga	*Mafube Coal Mining (Pty) Ltd*	*Public Participation Consultant*

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Air Emissions Licence Application and WUL, Richards Bay	*Hillside Aluminium (Pty) Ltd*	*Public Participation Consultant and Water Use Licence Application*
EIA EMP IWULA/ WUL, Turfvlakte Coal Mine Mpumalanga	*Exxaro Coal (Pty) Ltd*	*Water Use Licence Application*
Environmental Impact Assessment, Lakenvalei & Impunzi Mine, Limpopo	*Glencore Operation South Africa (Pty) Ltd*	*Water Use Licence and Socio-economic Baseline report Writer*
Environmental and Social Impact Assessment, Democratic Republic of Congo	*MMG Limited (Kinsevere Mine)*	*Public Participation Consultant*
Seriti Metsimaholo Mining Right Application, Free state	*Serite Coal (Pty) Ltd*	*Public Participation Consultant*
Proposed Lokichar to Lamu Crude Oil Pipeline Project, Kenya	*Government of Kenya and its commercial partners- Tullow-Oil Kenya Ltd, Africa Oil Turkana Ltd and Total/ Maersk Oil Kenya Ltd*	*Public Participation, Socio-Economic Baseline and Report writer*
Basic Assessment process, Northern Cape	*South32 Hotazel Manganese Mine (Pty) Ltd – Mamantwan Mine*	*Public Participation Consultant*
Basic Assessment Process, Northern Cape	*Goodrock Chemworks (Pty) Ltd*	*Public Participation Consultant*
Basic Assessment and Water Use Licence process	*AngloGold Ashanti (Pty) Ltd*	*Public Participation Consultant*
Ibutho Coal Exploration Project, Kwa Zulu Natal	*Ibutho Coal (Pty)Ltd*	*GIS Support*
Mpefu Coal Exploration Project, Limpopo	*Ibutho Coal (Pty) Ltd*	*GIS Support*
Welbedacht Water Supply, Northwest Province	*Phumaf Consulting Engineers (Pty) Ltd*	*Public Participation Consultant, Water Use Licence Application and GIS Support*
Praktiseer and Dzumeri RDP Development Projects, Greater Tubatse	*SMV Consulting Engineers*	*Public Participation Consultant*
Coligny Water Supply, Northwest Province	*Phumelela Africa (Pty) Ltd*	*Water Use Licence Application and GIS Support*
Setlagole Water Supply	*Phumelela Africa (Pty) Ltd*	*Water Use Licence Application and GIS Support*
Itsoseng Water Supply	*Phumelela Africa (Pty) Ltd*	*GIS Support and Report Writer*
EIA for the proposed new development of houses, Northwest Province	*Kananibo Investments CC*	*Public Participation Consultant*