ENVIRONMENTAL MANAGEMENT PLAN

132 kV OVERHEAD TRANSMISSION LINE WITH SUBSTATION AND METERING STATION

DECEMBER 2021

BANNERMAN
RESOURCES

URBAN Green
SUSTAINABILITY CONSULTANTS

PROJECT INFORMATION

STUDY PHASE	FINAL
PROJECT TITLE	Bannerman Resources 132 kV Overhead Transmission Line and Substation with Metering Station (Erongo Region)
DEVELOPMENT LOCATION	Between Walvis Bay and Swakopmund, Erongo Region
COMPETENT AUTHORITY	Ministry of Mines and Energy
APPROVING AUTHORITY	Ministry of Environment, Forestry and Tourism
PROPONENT	Bannerman Mining Resources (Namibia) (Pty) Ltd
ENVIRONMENTAL ASSESSMENT PRACTITIONER	Urban Green cc P O Box 11929 Klein Windhoek Telephone: +264-61-300 820 Fax: +264-61-401 294 E-mail: urbangreen@iway.na Website: www.urbangreenafrica.net

EMP REVISION STATUS

Version	Date Approved	Revision Details
V1 – Original EMP		

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APPENDICES

LIST OF ACRONYMS

BID	Background Information Document
°C	degrees Celsius
DEA	Directorate of Environmental Affairs
DSR	Draft Scoping Report
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
i.e.	Example
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMA	Environmental Management Act
EMP	Environmental Management Plan
EPL	Exploration Licence
etc.	Etcetera

FSR	Final Scoping Report
Ha	Hectare
I&AP	Interested and Affected Parties
MAWLR	Ministry of Agriculture, Water and Land Reform
MET	Ministry of Environment and Tourism
MEFT	Ministry of Environment, Forestry and Tourism
ML	Mining Licence
MME	Ministry of Mines and Energy
No	Number
OHTL	Overhead Transmission Line
ToR	Terms of Reference

GLOSSARY

The definitions given below are for explanatory purposes only.

Activity	The physical work that a Proponent proposes to construct, operate, modify, decommission, or abandon or an activity that a Proponent proposes to undertake.
Alien Species	It refers to a non-indigenous plant, animal or micro-organism; or an indigenous plant, animal or micro-organism, translocated or intended to be translocated to a place outside its natural range of nature, that does not normally interbreed with individuals of another kind, including any subspecies cultivar, variety, geographic race, strain, hybrid or geographically separate population.
Alternatives	A possible course of action, in place of another, that would meet the same purpose and need but which would avoid or minimize negative impacts or enhance project benefits. These can include alternative locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The "no-go" alternative constitutes the 'without project' option and provides a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid undesirable negative impacts.
Assessment	The process of identifying, predicting, and evaluating the significant effects of activities on the environment; and the risks and consequences of activities and their alternatives and options for mitigation with a view to minimise the effects of activities on the environment.
Audit	Regular inspection and verification of construction activities for implementation of the EMP.
Batch Plant	Machinery used on site for the mixing and production of concrete and associated equipment and materials.

Bulk Supply	The wholesale supply of i.e. water on a business-orientated basis, in large quantities, whether in treated or untreated form, for any utilisation purpose to a customer for own use or for subsequent supply by the customer to consumers.
Bund	An enclosure designed to hold at least 120% of the contents of a liquid storage vessel, tank, or drums to contain any spillage.
Competent Authority	A body or person empowered under the local authorities act or Environmental Management Act to enforce the rule of law.
Construction Activity:	A construction activity is any action taken by the Contractor, his subcontractors, suppliers, or personnel during the construction process.
Construction Camp	Refers to all storage stockpiles sites, site offices, container sites, other areas required to undertake construction and rest areas for construction staff or management.
Contaminated Water	Water contaminated by the Contractor's activities, e.g. concrete water, and runoff from plant/personnel wash areas.
Contractor	The principal person or company, including all subcontractors, undertaking the construction of the development as appointed by the Proponent.
Critically Endangered (IUCN)	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V of the IUCN Red List Categories and Criteria[1]), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
Cumulative Impacts	In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.
Emergency Situation	An incident, which potentially can significantly impact on the environment, and which, could cause irreparable damage to sensitive environmental features. Typical situations entail amongst others the: • Spill of petroleum products and lubricants into the aquatic system. • Potential damage, erosion and slumping of unstable river embankments or drainage channels. • Potential event of impeding the continuous flow of water to downstream water user's dependant on the flow; and Dangerous situation where livestock and children can be injured by any activity

[1] Available at http://s3.amazonaws.com/iucnredlist-newcms/staging/public/attachments/3097/redlist_cats_crit_en.pdf

	emanating from the construction or rehabilitation of the project implementation.
Endangered (IUCN)	A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V of the IUCN Red List Categories and Criteria[2]), and it is therefore considered to be facing a very high risk of extinction in the wild.
Environment	As defined in the Environmental Assessment Policy and Environmental Management Act - "land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, paleontological or social values".
Environmental Impact Assessment (EIA)	The process of examining the environmental effects of a development as prescribed by the Environmental Impact Assessment Regulations (GN. No. 30 of 2012) for activities listed as List of Activities which may not be undertaken without an Environmental Clearance Certificate from the Environmental Commissioner (GN. No. 29 of 2012).
Environmental Management Plan (EMP)	A working document on environmental and socioeconomic mitigation measures, which must be implemented by several responsible parties during all the phases of the proposed project.
Environmental Site Manager (ESM)	It is a suitably qualified environmental officer appointed by the Contractor who oversees the on-site daily environmental responsibilities of the Contractor.
Evaluation	The process of ascertaining the relative importance/significance of information, in light of people's values, preference and judgements in order to make a decision.
Hazardous Substance	A substance that, in the reasonable opinion of the Engineer and/or ECO, can have a harmful effect on the environment.
Independent Environmental Officer (IEO)	A suitably qualified professional independent from the Proponent and Contractor who oversees the construction phase and ensure that all environmental specifications and EMP obligations are met during the phase. The IEO will be responsible for the monitoring, reviewing, and verifying of compliance with the EMP by the Contractor.
Interested and Affected Party (I&AP)	Any person, group of persons or organisation interested in, or affected by an activity; and any organ of state that may have jurisdiction over any aspect of the activity.

[2] Available at http://s3.amazonaws.com/iucnredlist-newcms/staging/public/attachments/3097/redlist_cats_crit_en.pdf

Listed Activity	An activity listed in terms of section 27(2) of the Environmental Management Act and the List of Activities which may not be undertaken without an Environmental Clearance Certificate from the Environmental Commissioner (GN. No. 29 of 2012).
Mitigate	The implementation of practical measures to reduce adverse impacts.
Monitoring	Regular inspection and verification of construction activities for degree of compliance to the EMP.
No-Go Areas	Areas identified as being environmentally sensitive in some manner and demarcated on plan, and on the Site with pegs or fencing and which are out of bounds to unauthorised persons. Authorisation must be obtained prior to entry.
Project Engineer	The person(s) who represents the Proponent and are responsible for the technical and contractual implementation of the works to be undertaken by the appointed contractors.
Proponent:	Any person who has submitted or intends to submit an application for an authorisation, as legislated by the Environmental Management Act no. 7 of 2007, to undertake an activity or activities identified as a listed activity or listed activities; or in any other notice published by the Minister or Ministry of Environment, Forestry & Tourism.
Public	Citizens who have diverse cultural, educational, political and socio-economic characteristics. The public is not a homogeneous and unified group of people with a set of agreed common interests and aims. There is no single public. There are a number of publics, some of whom may emerge at any time during the process depending on their particular concerns and the issues involved.
Resident Engineer (RE)	A person who represents the Project Engineer on Site and is responsible for the technical and contractual implementation of the works to be undertaken.
Scoping Process	Process of identifying: issues that will be relevant for consideration of the application; the potential environmental impacts of the proposed activity; and alternatives to the proposed activity that are feasible and reasonable.
Search and Rescue	The location and removal of specified plant species, without unnecessary damage, and their transfer to a specified location (on-site nursery).
Significant Effect/Impact	Means an impact that by its magnitude, duration, or probability of occurrence may have a notable effect on one or more aspects of the environment.
Solid Waste	All solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food, and domestic waste.

Species of Special Concern	Those species listed in the Endangered, Threatened, Rare, Indeterminate, or Monitoring categories of the South African Red Data Books, and/or species listed in Globally Near Threatened, Nationally Threatened or Nationally Near Threatened categories (Barnes, 1998).
Specification	A technical description of the standards of materials and workmanship that the Contractor is to use in the works to be executed, the performance of the works when completed and the way payment is to be made.
Topsoil	The top 150 mm of soil (topsoil) and root material of cleared vegetation.
Works	The construction operations and all related and incidental works, such as search and rescue, fencing and rehabilitation, in connection with the execution and carrying to completion of the project.

1 BACKGROUND INFORMATION

This chapter of the EMP provides the necessary background information to the 132 kV Overhead Transmission Line, Substation and Metering Station (i.e. proposed Project) and receiving environment, which is presented in much detail in the Environmental Scoping Report dated November 2021.

This EMP should be read along with the Environmental Scoping Assessment Report (November 2021).

1.1 PROJECT OVERVIEW

The proposed Project entails the -

- Installation of a 132kV Feeder Bay at the existing Kuiseb Substation;
- Construction of a 132kV substation (Etanago-8 Substation) at Bannerman Resources Mine;
- Construction of a 132 kV metering station (Etanago-8 Metering Station) at Bannerman Resources Mine; and
- Construction of a 132 kV self-supporting steel monopole overhead line from Kuiseb Substation to the proposed Etanago-8 Substation; as explained in more detail below.

1.1.1 SITE LOCALITY & OHTL ALIGNMENT

The proposed Project Site falls within the central western parts of Namibia approximately 25 km inland from the Atlantic Ocean. The Etanago-8 Uranium Project is located within the Namib Desert in the Erongo Region, 25km south-east of Swakopmund. Refer to Figure 1.1. for the locality map.

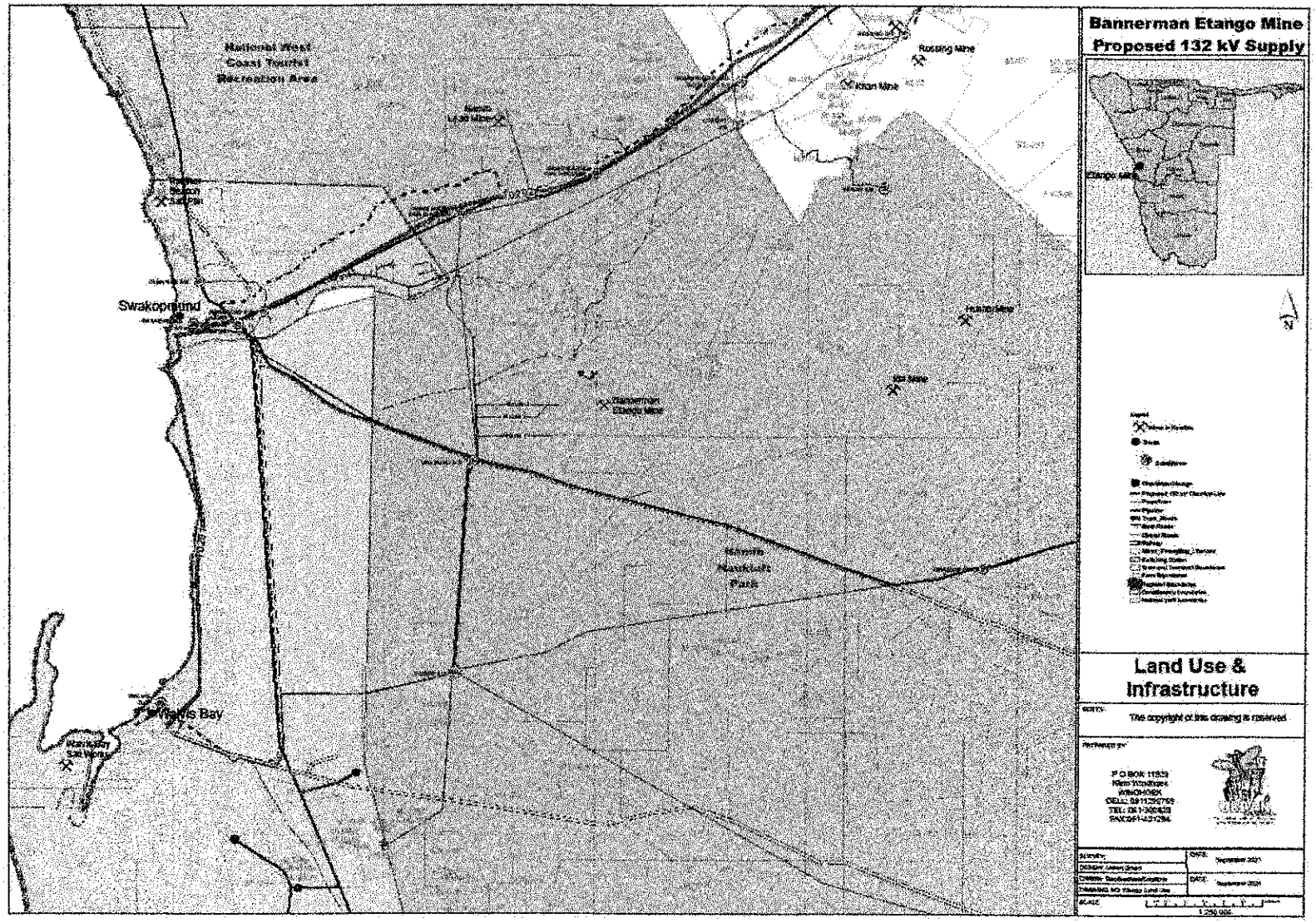

Figure 1.1. – Locality Map of the proposed Project

1.1.2 ROUTE ALIGNMENT OF TRANSMISSION LINES

The designed route, ±25 km in length, will extend from the existing Kuiseb Substation into a northerly direction past the existing Walmund Substation and terminate at the Bannerman Etanago-8 Project's proposed substation (i.e. Etanago-8 Substation), as indicated by Figure 1.2 below. The proposed 132kV OHTL will run parallel for the larger part of the route with the existing two 220kV lines (yellow lines) and to the east thereof.

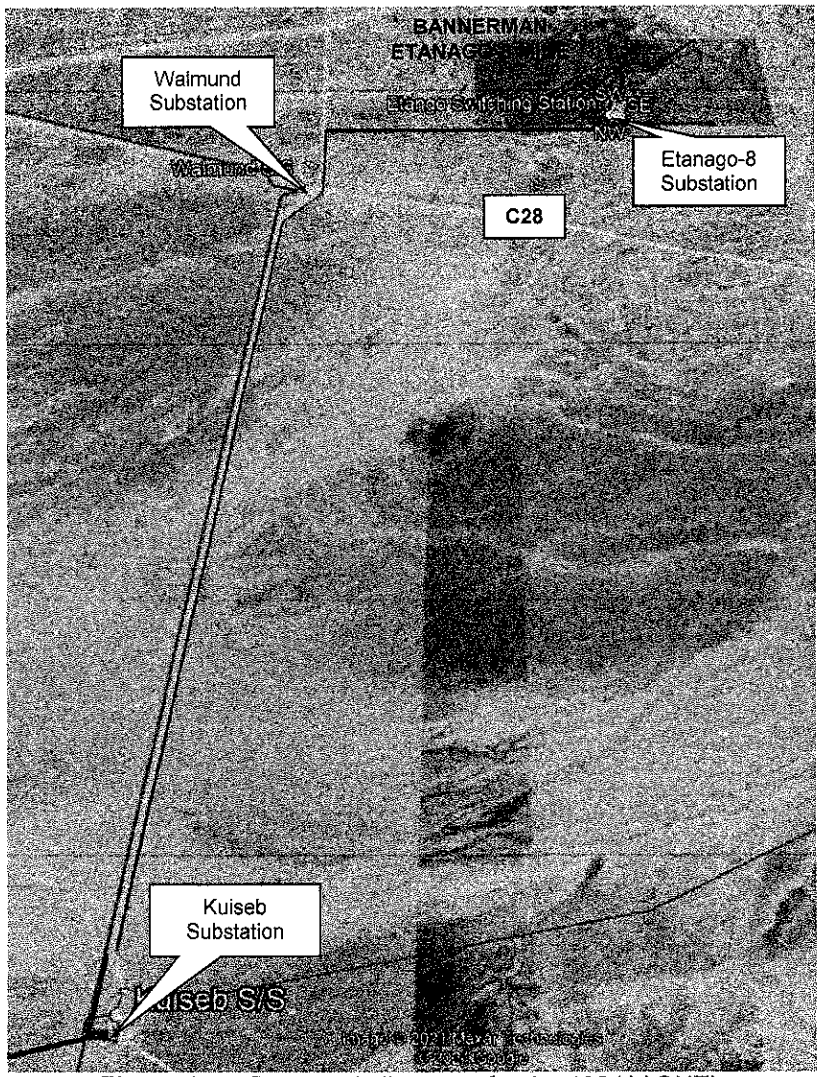

Figure 1.2 – Proposed alignment for the 132 kV OHTL

In the southern part (from Kuiseb Substation to Walmund Substation; 16.7 km), the proposed 132 kV steel monopole transmission line will be offset (to the east) from the existing 220 kV Kuiseb – Lithops 1 and 220 kV Kuiseb – Walmund 1 transmission lines, with the 66 kV Walmund Ruby 1 and 66 kV Walmund Ruby 2 to the west (see Figure 1.3 and 1.4).

The proposed 132kV OHTL will cross the C28 road near the existing Walmund Substation at the same crossing as the existing 220kV line (see Figure 1.4), for which a road crossing permit will be obtained from the Roads Authority.

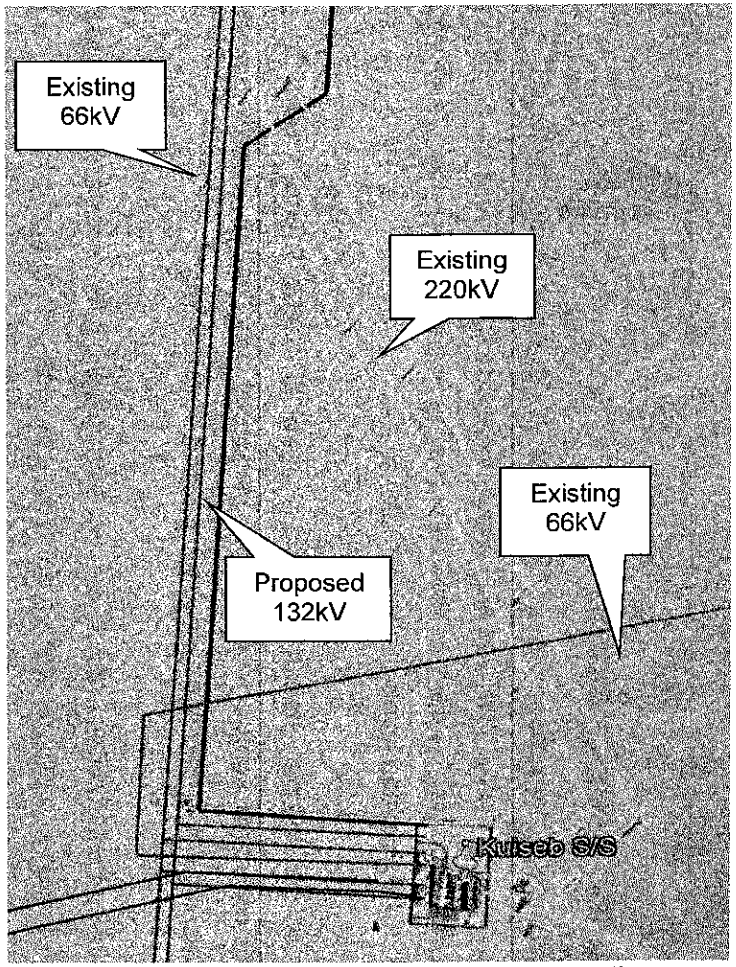

Figure 1.3 – OHTL Crossings around Kuiseb Substation

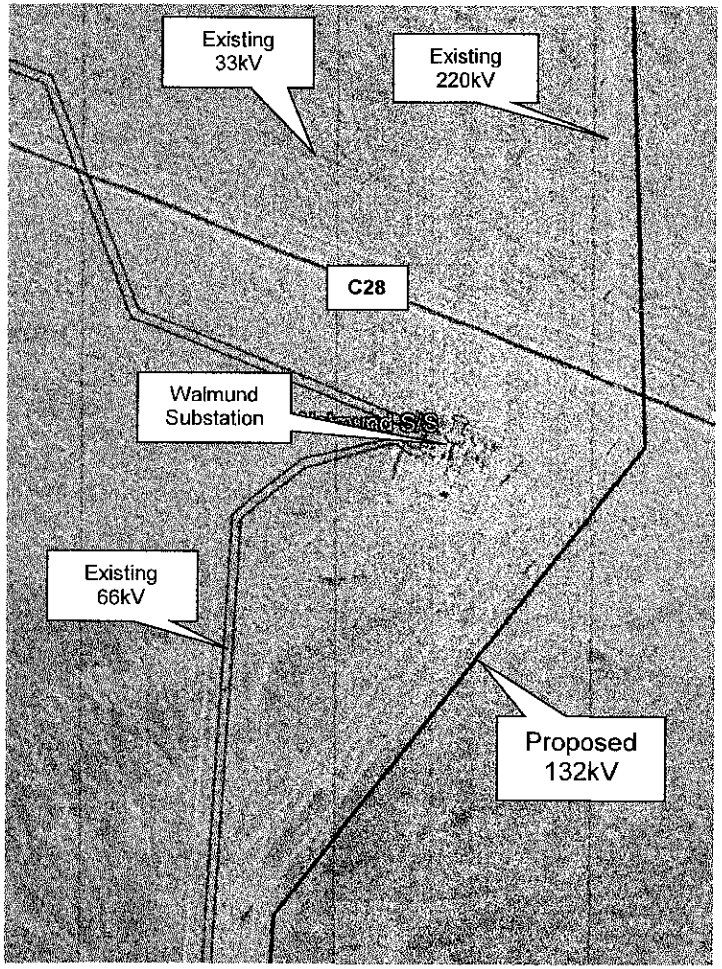

Figure 1.4 – OHTL Crossings around Walmund Substation

North of Walmund Substation (from 2 km up to 4.4 km northwards), the proposed 132 kV OHTL will be offset (to the east) from the existing 220 kV Kuiseb - Lithops 1 and 220 kV Lithops – Walmund 1 transmission lines (in one double circuit steel lattice transmission structure, the poles of which are guyed), with the 22 kV "wishbone" wooden pole distribution line to the west/left.

For the section of the proposed 132kV OHTL alignment extending from the 220kV OHTL eastwards, alternative routes were considered, as indicated by Figure 1.5 below. Route 3 option was chosen for reasons discussed in Section 4.9 of the Scoping Report (Nov. 2021).

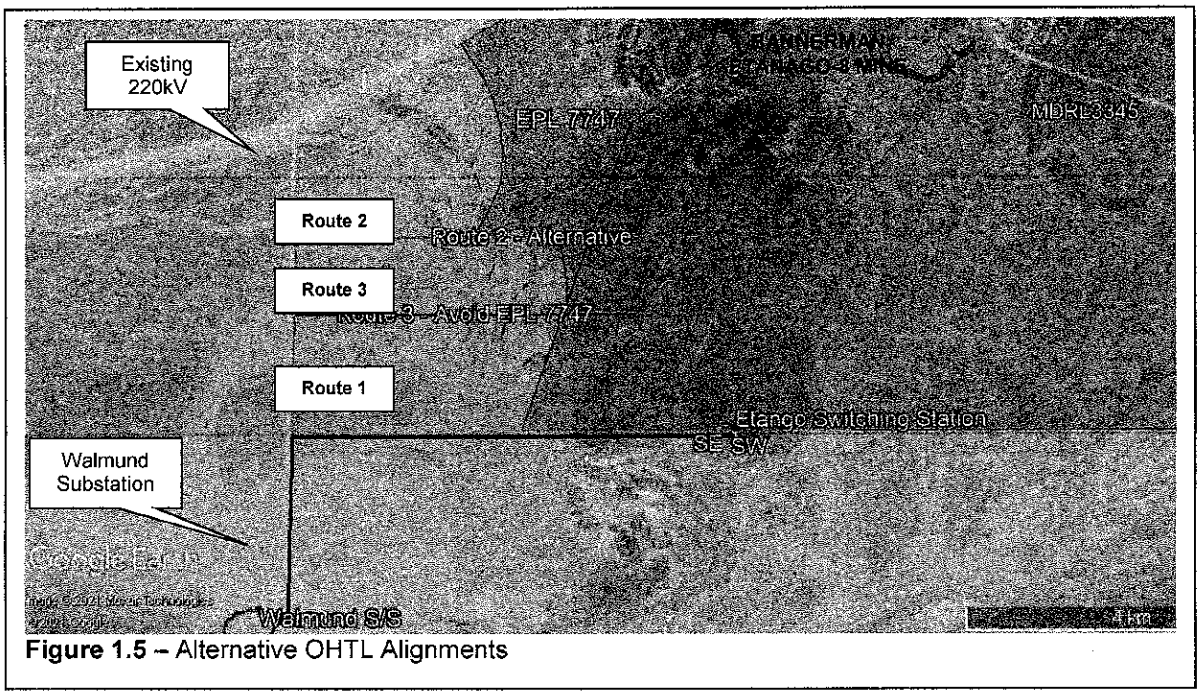

Figure 1.5 – Alternative OHTL Alignments

1.1.3 ETANAGO-8 SUBSTATION

The proposed Etanago-8 Substation will be located within the Bannerman Etanago-8 Uranium Project area, as close to the highest load as possible to reduce electrical losses. It will transfer power from the transmission system to the distribution system of the mine. It will include transformers to change voltage levels from the 132kV to 11kV.

The substation will be an open station of with a footprint of 4 080m² (68m x 60m) fenced-in (2.4m high) with controlled access to authorised personnel only. It will contain components such as switching, protection and control equipment, and transformers.

Presently an outdoor configuration is proposed, but extra precaution and measures will be taken considering the corrosive conditions of the area. These include amongst other:

(1) extra galvanising;

(2) marine protection for all equipment; and

(3) installing wind shields to protect the substation and especially the 132/11kV transformers from the prevailing south-westerly wind.

1.1.4 METERING STATION

The proposed Etanago-8 Metering Station will be located at the point along the proposed 132kV OHTL where the OHTL enters the Etanago-8 Uranium Mine area. It will be constructed under the proposed 132 kV OHTL just outside of the mine security fence for easy access to the metering station by NamPower personnel.

The proposed metering station will be approximately 22m x 22m in extent and fenced-in with a 2.4m high security fence with controlled access to authorised personnel only.

Further details on infrastructure design and specifications, servitude width and supporting infrastructure is addressed in Section 4.5 of the Scoping Report (Nov. 2021)

1.2 CONSTRUCTION PHASE

Construction of the proposed OHTL is expected to take ±12 months and will involve the following tasks:

- Setting-out of the alignment of the OHTL, poles' locality and metering station;
- Setting-out of the temporary construction camp and laydown area for infrastructure and equipment (no temporary accommodation and amenities for construction workers are allowed within the Park);
- Clearing of vegetation at the point where concrete base for pole structures will be casted (if so required);
- Clearing of vegetation within the boundaries of the temporary construction camp with laydown area;
- Transportation of construction material (i.e. steel mono poles, conductors, insulators, etc.) and storage at temporary construction camp;
- Digging of holes of 3m (depth) x 1.4m (width) x 1.4m (width) for the monopole structures' with a drill or TLB, depending the underground conditions;
- Placement of monopole structures within the excavated areas and backfilled with concrete and anchoring;
- Once the concrete base is dry, insulators will be fixed to the monopole structures and conductors strung between poles making use of human labour and machinery;
- Connection to substation and metering station and commissioning; and
- Rehabilitation of the disturbed areas.

Construction of the proposed substation and metering station is expected to take ±18 months and will involve the following tasks:

- Clearing of vegetation for the extend of the site;
- Fencing of the site and provision of controlled access;
- Transportation of construction material and equipment, and storage at temporary construction camp;
- Digging of trenches, excavations and casting of foundations;
- Installation of equipment;
- Applying final grade to the site;
- Testing and commissioning; and
- Clearing of site.

The impacts expected to occur during the construction phase, the assessment therefore and the mitigations recommended are discussed in Section 7.4.1 of the Scoping Report, Nov. 2021, while the environmental requirements are listed in Section 4 of this Environmental Management Plan (EMP).

1.3 OPERATIONAL PHASE

Some of the typical operational phase activities might include the following:

- Clearance of vegetation along the power line servitude and within the fenced-in area of the substation and metering station site;
- Bi-monthly inspections to check for signs of wear and tear, which is done by foot and vehicle;
- Replacement of damaged or malfunctioning infrastructure; and
- Emergency maintenance.

The impacts expected to occur during the operational phase, the assessment therefore and the mitigations recommended are discussed in more detail in Section 7.4.2 of the Scoping Report, Nov. 2021, while the environmental requirements are listed in Section 4 of this Environmental Management Plan (EMP).

1.4 DECOMMISSIONING

The project life of the Etanago-8 Uranium Mine is envisaged to be 14-17 years. On mine closure, it is anticipated that no future alternative land uses are likely to be considered as the

mine is within the Namib Naukluft National Park. The 132 kV OHTL will become the property of NamPower after 10 years and it is envisaged the OHTL will continue to be used as part of the West Coast electricity network.

If the proposed 132 kV OHTL from Walmund Substation will not form part of the regional electricity network, it will be the responsibility of the Proponent to undertake the decommissioning, which will be done as per the Proponent's Decommissioning & Rehabilitation Plan. It is recommended that a Botanist and Ecologist be involved to advice on how to go about restoring the servitude area to its original condition.

A complete decommissioning exercise, which should be covered by the Decommissioning & Rehabilitation Plan should involve as a minimum:

- Demolishing and removal of all temporary and permanent structures;
- Disposing of building rubble;
- Preparation of disturbed areas and recovery of biological soil crust;
- Search and relocate of local indigenous vegetation onto the site;
- Rehabilitated vegetation patch; and
- Rehabilitation monitoring.

1.5 THE RECEIVING ENVIRONMENT

1.5.1 THE PHYSICAL ENVIRONMENT

The proposed Project Site falls within the *Central Namib*, generally defined as an area between the Kuiseb River in the south and the Huab River in the north. The physical environment of the Project Site is typical of the *Central Namib* coast, characterised by extreme aridity, which directly determines this particular bio-physical environment.

The 50 m servitude for the proposed 132 kV OHTL crosses extensive sandy gravel plains in the southern parts from the Kuiseb Substation to the Walmund Substation (16,7 km), with several drainage line systems. Further north, from the Walmund Substation to the point where the OHTL turns east (3,4 km), the route crosses gravel plains that are more undulating, also with drainage lines, but deeper than in the south, with rocky outcrops to the north-east. The final section (4,9 km) in the vicinity of the Etanago-8 Substation is a more deeply incised, rocky landscape with deep washes.

The proposed Project will by its nature impact on the project site's peculiar physical character and vice-versa, which again will affect the bio-physical environment.

1.5.2 THE BIOPHYSICAL ENVIRONMENT

The *Central Namib* forms part of southern Africa's *Desert Biome*. The lack of rain has led to adaptations by plants and animals, which facilitate use of fog as an alternative water source. Due to the low rainfall, there is also limited amount of vegetation and as a consequence many animals use detritus, which is composed of wind-blown dried bits of vegetation as a food source. Thus the extensive use of fog and detritus largely characterises the biology of the Namib and therefore the high endemism in these specifically adapted desert species. (*Seely 2004*) The level of endemism is exceptionally high among flora, insect - and reptile species. (*Burke, 2006*)

The present conservation status of the Namib Desert is good since most of the ecoregion is intact and protected in extensive conservation areas. The project area falls within the Namib-Naukluft National Park (49,768 km2), which is the largest conservation area in southern Africa and protects the central area of this ecoregion.

The *Central Namib* support sparse vegetation that is often inconspicuous, but they are not devoid of life. Just over 400 flora species occur in the Central Namib, making up nearly 10% of the flora of the country. Because of the extraordinary climatic conditions, many endemic flora species are restricted to the foggy coastal area and have a localised range. (*Burke, 2006*).

Vegetation cover in the Project Site are highly dependent on the little moisture available for their survival and drainage patterns greatly determine their distribution. Vegetation is limited to lichen fields on the gravel plains and sparse shrubs along the drainage lines. Grasses grow only after sufficient rain occurred and no trees are present here.

The scarcity of vegetation in the Namib has resulted in only the most resilient and hardy animals occurring within the area. Animal life in this harsh terrain is nourished by the sparse vegetation and the fact that fog precipitation provides fairly regular and adequate water for their survival, year-round. Animals living in the Namib have adapted to the varying habitats that are presented by the diverse landscape. It is estimated that at least 55 reptile, 5 amphibian and 21 mammal species are expected to occur in the Project site. (*Smithers, 2000*) A high proportion (60%) of the reptiles are endemics. (*Branch, 1998*)

Refer to Appendix D of the Scoping Report, Nov. 2021 for the flora and fauna species lists.

1.5.3 LAND USE AND INFRASTRUCTURE

The most significant activities in the larger surrounding area of the proposed Project are conservation, nature-based tourism, mining, commerce and industrial development in the municipal areas and limited subsistence agriculture (see section 5.3 of the Environmental Scoping Report, Nov. 2021).

The proposed Project falls within the Namib Naukluft Park to its east and Dorob National Park to its west, which includes Important Bird Areas (IBA). MDRL 3345, and consequently the Etanago-8 Uranium Mine, also falls within this park.

The Project area is located in close proximity to some of the park's most important tourist attractions, namely the Moon Landscape, Swakop River and Welwitschia flats. Nature-based tourism, cultural heritage and historical sites play a key role in tourism activities, contributing to job creation as well as the development of Swakopmund and Walvis Bay.

Various exclusive prospecting licences exist in most of the western part of the Namib Naukluft Park north of the Kuiseb River, while a number of mining claims and uranium mines have been established within the park. These EPLs and MDRLs received Environmental Clearance to operate in the Namib Naukluft Park under regulated conditions.

The closest populated area to the proposed Project site is that of Swakopmund, located about 25km to the north-west of Walmund Substation, while Walvis Bay is located about 36km to the south-west of Kuiseb Substation. The Topnaar people still live along the Kuiseb River inside the Namib Naukluft Park and make a living of subsistent farming. Limited agricultural cultivation takes place along the Swakop River including Swakopmund Plots which makes use of the water for irrigation.

The coastal towns of Swakopmund and Walvis Bay accommodates typical municipal services associated with the supply of potable water (i.e. reservoirs; pump station; pipelines), electricity (powerlines) and sewage (pump stations; pipe lines; wastewater treatment plant).
The Walvis Bay Airport is approximately 15 km to the east of Walvis Bay.

The Erongo Region is connected by the national road network to the rest of the country via Okahandja, Windhoek and Otjiwarongo and forms part of the Trans Kalahari Highway. Industrial infrastructure is provided by a railway connection that is also used by the mines to transport ore to Walvis Bay from where it is shipped through the Port of Walvis Bay. A corridor of infrastructure exists in a north-south direction between Swakopmund and Walvis Bay. Infrastructure found within the area includes overhead power lines; water lines and pump stations, tarred and gravel roads and dirt tracks. Walvis Bay town council installed a containerised desalination plant in 2009 and another desalination plant was constructed by Areva north of Swakopmund.

2 THE ENVIRONMENTAL MANAGEMENT PLAN

2.1 PURPOSE OF THE EMP

The purpose of the EMP is to provide specifications for "good environmental practice" in a sensitive environment for application during construction and operation.

As such, the EMP provides specifications that the Proponent and his nominated Contractors must adhere to minimise adverse environmental impacts associated with the construction activities. The Proponent to which authorisation was granted, is ultimately responsible for overall environmental performance.

The guidelines for the execution of an EMP include the following:

- Responsibilities for the environmental performance of the proposed development are delegated to the construction staff;
- Communications channels to report on environmental performance, problems and priorities are in place;
- Monitoring schedules are established to identify potential negative environmental impacts associated with the construction of the proposed development;
- Mitigation measures are implemented to avoid or minimise the identified negative environmental impacts (loss of endemic and endangered vegetation species, loss of endemic and endangered fauna species, soil, archaeological sites and visual impact) as well as to enhance the positive impact on the environment (employment; support of local businesses, conservation efforts); and
- Monitoring programme is developed to track the plans that have been implemented to ensure the effectiveness of the plan.

2.2 SCOPE OF THE EMP

In order to ensure a holistic approach to the management of environmental impacts during the construction works, this EMP sets out the methods by which proper environmental controls are to be implemented by the Contractor and all other parties involved, and monitored by the Independent Environmental Officer (IEO) and Resident Engineer (RE).

This EMP intends to guide and manage the construction activities and surrounding areas as they relate to the natural environment. It describes mitigation measures and is prescriptive in identifying specific people or organisations to undertake specific tasks. This document must further be open-ended, requiring regular review and updating via the correct channels for it to effectively guide environmental management of this project.

The provisions of this EMP are binding on the Proponent until the end of project life. Any third party appointed by the Proponent in terms of the design, construction and operation of the project must comply with the conditions of this EMP.

This EMP has been designed to suite the construction activities needs of the proposed development as well as operation, and incorporates the following:

- General civil construction mitigation measures;
- Specific project mitigation measures;
- Construction activities that could impact on the environment;
- Specifications with which the Contractor shall comply to protect the environment from the identified impacts; and
- Actions that shall be taken in the event of non-compliance.

The EMP is a dynamic document subject to similar influences and changes as are created by variations to the provisions of the project specification. Any substantial changes shall require the approval from the Independent Environmental Officer (IEO).

2.3 FORMAT OF THE EMP

The EMP consists of four parts:

- **Chapter 1** gives **Background** information on the proposed Project and the receiving environment;
- **Chapter 2** contains a brief description of the EMP, i.e. purpose, scope, format and amendments;
- **Chapter 3** deals with **Compliance Monitoring** stipulating the general requirements, responsibilities of the different role players, financing of environmental control, dispute resolution, and requirements for monitoring; and
- **Chapter 4** details with the **Environmental Specifications** that set out the environmental objectives and targets with which the Contractor/s shall comply.

2.4 AMENDMENTS TO THE EMP

Any party involved with the Project can suggest changes to the EMP via the IEO and Engineer. Approved changes will be recorded and drafted into this existing EMP in the form of an appendix or amendments. This should be clearly stipulated in the EMP to avoid confusion.

3 ADMINISTRATION AND REGULATION OF ENVIRONMENTAL OBLIGATIONS (COMPLIANCE MONITORING)

3.1 MANAGEMENT STRUCTURE

Details of the management structure are presented below. All official communication and reporting lines including instructions, directives and information shall be channelled according to the organisational structure presented below.

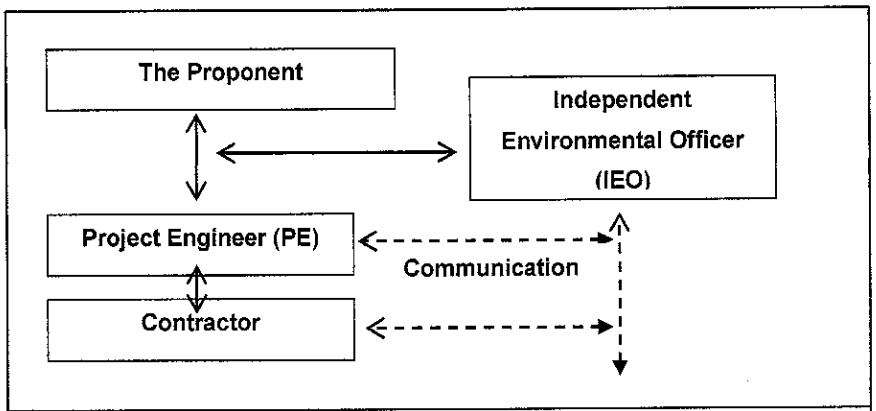

Figure 3.1 – EMP Implementation Organisational Structure

3.2 ROLES AND RESPONSIBILITIES

The implementation of this EMP requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management.

3.2.1 PROPONENT (BANNERMAN RESOURCES (NAMIBIA) (PTY) LTD

The Proponent is ultimately responsible for the implementation of the EMP and the financial cost of all environmental control measures. The Proponent must ensure that any person acting on their behalf complies with the conditions/specifications contained in this EMP. The Proponent is also responsible for the appointment of a Project Engineer, Contractor/s and Independent Environmental Officer (IEO) to the development. It is also the responsibility of the Proponent to appoint a Botanist and/or Ecologist to assist with the site layout process right from the onset of the project to ensure no loss of critical biodiversity species throughout the project.

The Proponent shall address any site problems pertaining to the environment at the request of the Project Engineer and/or the IEO.

3.2.2 PROJECT ENGINEER

The Project Engineer is responsible for the engineering design of the development and management of the on-site construction activities from the side of the appointed contractors.

The Project Engineer shall as part of his duties address any site problems pertaining to the environment at the request of the Proponent and/or the IEO. The Project Engineer shall have the responsibility to ensure that the Proponent's responsibilities are executed in compliance with the EMP and/or any other documentation proposed from the Proponent and/or IEO. Any on-site decisions with the appointed contractors having relevance to environmental matters are ultimately the responsibility of the Project Engineer.

The Project Engineer shall assist the IEO where necessary and shall have the following responsibilities in terms of the implementation of this EMP:

- The Engineer, along with the IEO and RE, must obtain, examine and approve Method Statements.
- Promptly issuing instructions requested by the IEO and Resident Engineer to the Contractor/s.
- Deduct environmental penalties from certificate payments as agreed and instructed by the IEO.
- Assisting the IEO in making decisions and finding solutions to environmental problems that may arise during the construction phase.
- Oversee the responsibilities of the Resident Engineer and Contractor/s, and assist in all required matters.
- Monitor and verify that the EMP are always adhered to and act if specifications are not followed.
- Order the removal of person(s) and/or equipment not complying with the EMP specifications.
- Provide input into the IEO's on-going internal review of the EMP.
- Communicate environmental issues to the IEO.

3.2.3 INDEPENDENT ENVIRONMENTAL OFFICER (IEO)

The Independent Environmental Officer (IEO) is acting on behalf of the Proponent and shall communicate directly with the Project Engineer and/or Proponent. The IEO shall be responsible for monitoring, reviewing, and verifying the Contractor's compliance with the EMP during the construction phase. The IEO shall have the right to investigate the site at any time during the project phases and unexpected visits will be allowed.

The IEO duties shall include, inter alia, the following:

- The IEO shall make recommendations independent of the Project Engineer; take immediate action on Site when (i) prescriptive conditions are violated, or in danger of being violated, and to inform the Project Engineer, Resident Engineer/s and Contractor/s immediately of the occurrence and to take action, e.g. issuing of penalties; and (ii) where clearly defined and agreed 'no go' areas are violated, or in danger of being violated, and

to inform the Project Engineer, Resident Engineer/s and Contractor/s of the occurrence and action taken.

- Advise the Contractor and/or the Project Engineer on environmental issues within the project area.
- Undertake regular site visits to ensure compliance with the EMP and verify that environmental impacts are kept to a minimum throughout the construction phase (i.e. construction monitoring).
- Keep a photographic record of progress on site from an environmental perspective.
- Assist the Contractor and/or the Project Engineer in finding environmentally acceptable solutions to construction problems as and if any arise.
- Recommend additional environmental protection measures should this become necessary.
- Keep a register of complaints and dealing with any community issues or comments.
- Report any incidents to the Proponent and Project Engineer that may or have caused damage to the environment or which is in breach of the EMP.
- Prepare an environmental audit report at the conclusion of the construction phase.
- The IEO, along with the Project Engineer and Resident Engineer, must obtain, examine and approve Method Statements.
- Ordering the removal of, or issuing penalties for person/s and/or equipment not complying with the specifications of the EMP.
- Involve specialists to advise on environmental management issues as they emerge during the construction phase.

The IEO must have:

- a good working knowledge of all relevant environmental policies, legislation, guidelines and standards;
- the ability to conduct inspections and audits and to produce thorough and informative reports;
- the ability to manage public communication and complaints;
- the ability to think holistically about the structure, functioning and performance of environmental systems; and
- proven competence in the application of the following integrated environmental management tools:
    - EIAs.
    - EMPs.
    - Environmental auditing.
    - Mitigation and optimisation of impacts.
    - Monitoring and evaluation of impacts.

3.2.4 CONTRACTOR (TO BE APPOINTED)

The Contractor shall have the following responsibilities:

- Implement and monitoring that all provisions of the EMP are always adhered to and acting if specifications are not followed. If the Contractor encounters difficulties with the specifications, he/she must discuss alternative approaches with the IEO and/or the Project Engineer prior to proceeding.
- Monitor and verify that the environmental impacts are kept to a minimum and mitigations proposed are applied throughout the construction phase.
- Make and keep construction personnel aware of environmental issues and to ensure they show adequate consideration to the environmental sensitivities.
- Report any incidents of non-compliance with the EMP to the Project Engineer and/or the IEO.
- Keep a register of complaints on-site and record community comments and issues, and the actions taken in response to these complaints.
- Rehabilitate any sensitive environments damaged due to his/her negligence. This shall be done in accordance with the IEO and Project Engineer's specifications and instructions.
- The Contractor shall ensure that no damage whatsoever is caused because of his operations or otherwise by his workmen in the areas adjacent to the construction sites.
- The Contractor shall ensure that his workmen are properly instructed and carry out the requirements of this EMP.
- The Contractor will be held liable for all unauthorised damage caused by him or any of his workmen or Sub-Contractors.

Failure to comply with the EMP from the side of the Contractor may result in penalties (Appendix B) and reported non-compliance may result in the suspension of work or termination of the contract by the Project Engineer on instruction from the Proponent.

3.3 DISPUTES AND DISAGREEMENTS

Any disputes or disagreements between role players on Site (regarding environmental management) will be referred to the Directorate of Environmental Affairs (Ministry of Environment and Tourism). If no resolution on the matter is possible it must be presented to an outside party agreed by all parties involved.

3.4 EMP MONITORING RESPONSIBILITIES

The day-to-day monitoring and verification that the EMP is being adhered to shall be undertaken by the appointed Contractor/s.

The IEO shall visit and inspect the site at least once a month to ensure that correct operational procedures are being implemented and that the Contractor is complying with the environmental specifications of the EMP.

Additional site inspections by the IEO may be required during the initial and final stages of the construction phase. The IEO shall address any queries to the Project Engineer. If the queries cannot be resolved at this level, they shall be referred to the Proponent, if necessary.

- The IEO will carry the responsibility of monitoring the implementation of the EMP on Site, assisted by the Project Engineer. In this regard, the IEO will submit a monthly monitoring report to the DEA until after all rehabilitation work has been completed. A pro-forma Monitoring Report is contained in Appendix C.
- Regular meetings will be held between the Project Engineer, RE, Contractor and the IEO. The purposes of the meetings shall be:
    - To establish the suitability of the Contractor's methods and machinery to lower the risk involved for the environment.
    - To discuss possible non-conformance to EMP guidelines or environmental legislation.
    - To assess the general state of the environment on site and discuss any environmental problems which may have materialised.

Any non-compliance with the agreed procedures of the EMP is a transgression of the various statutes and laws that define how the environment is managed. Non-conformance identified during monitoring must be recorded. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor and could stand as evidence should legal action be required. If possible, photographs should also be included as evidence to substantiate the report. This report will also suggest mitigation measures to correct the non-conformance (if necessary) and contemplate revisions to any of the strategies used in the construction phase, whether they pertain to monitoring or to construction methods used on site. The non-conformance shall be documented and reported as part of the Monitoring Report.

3.5 POST-CONSTRUCTION ENVIRONMENTAL AUDIT

A post-construction environmental audit must be carried out to fulfil conditions of this EMP.

3.6 NON-COMPLIANCE AND PENALTIES

The IEO shall issue the Contractor a notice of non-compliance whenever transgressions are observed. The contractor/s shall act immediately when such notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received

regarding activities on the project site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken.

The Contractor is deemed not to have complied with the EMP if, inter alia:

- There is evidence of contravention of the EMP specifications within the boundaries of the project site, site extensions and roads;
- There is contravention of the EMP specifications which relate to activities outside the boundaries of the construction site;
- Environmental damage ensues due to negligence;
- Construction activities take place outside the defined boundaries of the site; and/or
- The Contractor fails to comply with corrective or other instructions issued by the IEO and/or Engineer within a specific time.
- The Contractor fails to respond adequately to complaints from the public.

A system of penalties shall be implemented to ensure compliance with the EMP (see Appendix B). Where the Contractor inflicts irreparable damage upon the environment or fails to comply with any of the environmental specifications of the EMP (within 10 days) this would constitute a breach of Contract for which the Contractor may be liable to pay a penalty.

The system of penalties shall be implemented in the following way:

- Penalties shall be issued per incident and individual at the discretion of the IEO;
- Penalties shall be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications;
- The IEO shall not collect the penalties from individuals, but shall inform the Project Engineer and Contractor of the contravention, the individual's identity, and the amount of the penalties; and
- Penalties, including but not limited to those activities presented in Appendix B, shall be imposed by the Project Engineer on the Contractor, his staff, and/or the subcontractors' staff for contravention of the environmental specifications. Where there are ranges, the amount shall depend on the severity and extent of the damage done to the environment.

Failure by any employee of the Contractor or their sub-contractors to show adequate consideration to the environmental aspects of the contract shall be considered sufficient cause for the Project Engineer to have that employee removed from the site. The IEO may, through the Project Engineer, also order the removal of equipment that is causing continual environmental damage.

It is recommended that the engineers/contractors institute penalties for the following violations and any others determined during work as detailed below:

- Littering on site.
- Lighting of illegal fires on site.

- Hazardous chemical/oil spill and/or dumping in non-approved sites and persistent or un-repaired fuel and oil leaks.
- Any persons, vehicles or equipment related to the Contractor's operations found within the designated "no-go" areas.
- Excess dust or excess noise emanating from site.
- Any vehicles being driven more than designated speed limits.
- Any vehicles driven off demarcated tracks.
- Damage to sensitive environments.
- Uncontrolled/unmanaged erosion.
- Unauthorised removal and/or damage to fauna, flora or cultural or heritage objects on site.
- Possession or use of intoxicating substances on site.
- Urination and defecation anywhere except at designated facilities.
- Where environmental damage is caused or a pollution incident, and/or failure to comply with any of the environmental specifications contained in the EMP, the Contractor shall be liable.

3.7 ENVIRONMENTAL COMPLETION STATEMENT

An Environmental Completion Statement will be prepared by the IEO for submission to the Department of Environmental Affairs indicating completion of construction and compliance with the EMP and conditions. This statement will be prepared after the final construction audit.

3.8 EMERGENCY PREPAREDNESS

The Contractor shall compile and maintain environmental emergency procedures to ensure that there will be an appropriate response to unexpected or accidental actions or incidents that will cause environmental impacts, throughout the construction period. Such activities may include, inter alia:

- Accidental fires.
- Accidental spillage of hazardous substances.
- Accidental discharges to land.
- Accidental exposure of employees to hazardous substances.
- Specific environmental and ecosystem effects from accidental releases or incidents.

These plans shall include:

- Emergency organisation (manpower) and responsibilities, accountability, and liability.
- A list of key personnel and contact details.

- Details of emergency services available (e.g. the fire department, spill clean-up services, etc.).
- Actions to be taken in the event of different types of emergencies.
- Incident recording, progress reporting and remediation measures required to be implemented.
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.

3.9 ENVIRONMENTAL AWARENESS TRAINING

Contractors shall ensure that its employees and any third party who carries out all or part of the Contractor's obligations are adequately trained about the implementation of the EMP, as well as regarding environmental legal requirements and obligations. Training shall be conducted by the Contractor's Health and Safety Officer where necessary.

The purpose of this environmental training is to provide a general explanation of sustainable environmental practises, but also to explain the content of the EMP, the relevance thereof and how it will be implemented through monitoring. The environmental specifications as per Chapter 4 of this EMP should clearly be explained to all the Contractors and their site staff, as well as non-compliance to it and related penalties.

Environment and health awareness training programmes should be targeted at three distinct levels of employment, i.e. the executive, middle management and labour. The Contractor shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness and the content of the EMP. The presentation needs to be conducted in the language of the employees to ensure it is understood.

The environmental training shall, as a minimum, include the following:

- The mitigation measures required to be implemented when carrying out their work activities.
- Environmental legal requirements and obligations.
- Details regarding flora/faunal species of special concern and protected species, and the procedures to be followed should these be encountered during the construction.
- Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should these be encountered.
- The importance of not littering.
- The importance of using supplied toilet facilities.
- The need to use water sparingly.
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible.

3.10 INFORMATION BOARD(S)

The Contractor shall be responsible for erecting information boards on site. The number and locations of these boards shall be agreed by the Project Engineer and IEO.

Information boards should be placed at conspicuous locations at the entrance to the project site. The contents of the information board shall be provided by the Project Engineer and will essentially be to advise the public of the construction operation and the prohibition on entering certain areas. The information board shall apart from the details of the contractor also provide the name and contact number of the Project Engineer to ensure that the public has access to the engineer to ask for information and/or to lodge any complaints.

3.11 METHOD STATEMENTS

Method statements from the Contractor will be required for specific sensitive actions on request of the authorities or IEO. A method statement forms the baseline information on which sensitive area work takes place and is thus considered a "live document" in that modifications can be negotiated between the Contractor and IEO if or as required. The Contractor (and, where relevant, any subcontractors) must also sign the Method Statement, thereby indicating that the works will be carried out according to the approved methodology. Changes in the methodology must be reflected by amendments to the original approved Method Statement. Amendments must be signed by both the IEO and RE, denoting that the change is environmentally acceptable. The Contractor must also sign the amended Method Statement.

All method statements will form part of the EMP documentation and are subject to all terms and conditions contained within the EMP main document (see Appendix D). The Method Statement shall cover applicable details about:

- Construction procedures;
- Materials and equipment to be used;
- How and where materials will be stored;
- The containment of accidental leaks or spills;
- Timing and location of activities; and
- Any other information deemed necessary by the IEO.

A method statement describes the scope of the intended work in a step-by-step description for the IEO or Engineer to understand the Contractor's intentions. This will enable them to assist in devising any mitigation measures, which would minimise environmental impact during these tasks. The method statement should also clearly stipulate mitigation methods of the intended works, against which the contractor's performance will be measured. For each instance wherein it is requested that the Contractor submit a method statement to the satisfaction of the IEO and Engineer, the format should clearly indicate the following:

- What - a concise, description of the task/work to be undertaken;
- How - a detailed description of the process of work, methods, materials and mitigation strategies;

- Where - a description/sketch map of the locality of work (if applicable); and
- When - the sequencing of actions with due commencement dates and completion date estimates.

The Contractor must submit the method statement two weeks before any construction activity is due to start. Work may not commence until the method statement has been accepted by the IEO and Engineer, and clearly communicated to the workforce. The Contractor shall, except in the case of emergency activities, allow 14 days for consideration and approval of the Method Statement. The RE or IEO may require changes to a Method Statement if the proposal does not comply with the specifications or if, in the reasonable opinion of the RE or IEO, the proposal may result in damage to the environment in excess of that permitted by the specifications. Approved Method Statements shall be communicated to all relevant personnel.

All Method Statements listed below, shall be provided by the Contractor before the activity commences:

- Dust
  - Dust control protocol.
- Concrete batching
  - Location, layout, and preparation of concrete batching facilities, including the methods employed for mixing of concrete including the management of runoff water from such areas.
- Demolition
  - Proposed method of demolition, including handling and disposal of materials.
- Fire and hazardous substances
  - Handling and storage of hazardous wastes.
  - Emergency spillage procedures and compounds to be used
  - Emergency procedures for accidental fire.
  - Methods for the disposal of hazardous materials.
  - Fuels and fuel spills.
  - Methods of refuelling vehicles.
  - Details of methods for fuel spills and clean-up operations.
- Protection of archaeological resources
  - Methods for dealing with archaeological resources if any are found.
- Protection of environmentally sensitive resources (fauna and flora)
  - Methods for dealing with areas identified as environmentally sensitive requiring protection.
  - Locality and preparation of onsite nursery to house vegetation relocated from construction areas or propagated locally for replanting purposes.
  - Details of methods dealing with the identification, transportation and transplanting of flora species of conservation value.

- Details of methods dealing with the identification, capture and relocation of fauna species of conservation value.

- Rehabilitation
  - Rehabilitation of disturbed areas after construction is complete.

- Solid waste management
  - Solid waste control and removal of waste from Site.

- Topsoil handling and stockpiling
  - Details on stripping, handling, and stockpiling of topsoil.

- Wash areas
  - Location, layout, preparation, and operation of all wash areas.

- Storm water management
  - Details of how storm water is to be handled on Site.

See Appendix D for more information on the Method Statement and Pro-forma Method Statement.

3.12 RECORD KEEPING

All records related to the implementation of this management plan (e.g. site instruction book, HSE Officers daily diary, induction records, method statements) must be kept together in an office where it is safe and can be retrieved easily. All relevant records should be kept for a minimum of two years after construction and should at any time be available for scrutiny by any relevant authority or stakeholder.

It is recommended that photographs (fixed point photographs for better comparisons before/during/after) are taken of the site prior to, during and immediately after construction as a visual reference. These photographs should be stored with related documents and other records related to this EMP.

A list of other reports to be kept on site is:

- Final site layout, design documents and diagrams issued to and by the Contractor.
- All communications detailing changes of design/scope that may have environmental implications.
- Occupational Health and Safety reports.
- Complaints register.
- Incident and accident reports.
- Emergency preparedness and response plans.
- Search & Rescue monitoring plan.
- Crisis communication manual.

- Site meeting minutes during construction.
- All relevant permits..
- All method statements from the Contractor.

4 ENVIRONMENTAL SPECIFICATIONS

4.1 SCOPE

These specifications cover the requirements for controlling the impact of construction activities on the natural and social environment.

4.2 CONSTRUCTION

4.2.1 SITE DIVISION

The Contractor will not establish a construction camp site on the project area, but rather commute construction workers from Swakopmund/Walvis Bay daily.

(i) Temporary Construction Area

- The Contractor shall submit a Method Statement, indicating the layout and preparation of the temporary construction camp with laydown area where construction material will be temporary stored (this shall include the positioning of any fuels/hazardous materials). The extent and location of the Construction Area shall be agreed upon by the Proponent, Botanise/Ecologist, Project Engineer and IEO.
- The planning and design for the temporary construction camp must ensure that there is minimal impact on the environment. The following should apply:
    - The temporary construction camp will be placed within an existing disturbed area as far as possible.
    - It shall be in an area of low environmental sensitivity.
    - Its final location shall be identified in consultation with the Proponent, Botanist/Ecologist, Engineer and ESM.
- With the decommissioning of the structures all compacted platforms and slab foundations must be ripped up and be removed.

(ii) Vehicle Parking Area

All vehicles will be allocated a dedicated parking area within the temporary construction area. The position of which will be agreed by the Proponent, Ecologist, Project Engineer and IEO. No storage of vehicles will be allowed outside of the designated areas.

4.2.2 CEMENT AND CONCRETE BATCHING

(i) Location

- It is recommended that bulk cement storage be kept indoors in the nearest industrial area and that only daily required amounts be taken to the Project Site.
- The concrete batching activity shall be in dedicated areas of low environmental sensitivity to be identified and approved by the Botanist/Ecologist, RE and IEO.
- The permitted location of a batching plant (including the location of cement stores and sand and aggregate stockpiles) shall be indicated on the site layout plan and approved

by the Botanist/Ecologist, Engineer and IEO. A Method Statement indicating the layout and preparation of this facility is required in this regard.

(ii) Maintenance

- Cement should be covered entirely by impervious sheeting or placed in a contained and closed-off area.
- All wastewater resulting from batching of concrete shall be disposed of via a proper wastewater management system.
- The concrete batching works shall always be kept neat and clean. No batching activities shall occur on unprotected substratum of any kind.
- All runoff from batching areas shall be strictly controlled and cement-contaminated water shall be collected, stored and disposed of at a site approved by the Engineer and IEO. Dagga boards, mixing trays and impermeable sumps shall be used at all mixing and supply points.
- Contaminated water storage facilities shall not be allowed to overflow and appropriate protection from rain and flooding shall be implemented.
- Unused cement bags are to be stored so as not to be affected by rain or runoff events.
- Used cement bags shall be stored in weatherproof containers to prevent windblown cement dust. Used bags shall be disposed of on a regular basis via the solid waste management system and shall not be used for any other purpose.
- Cleaning of equipment and flushing of mixers shall not result in pollution of the surrounding environment: Care shall be taken to collect contaminated wash water from cleaning activities and dispose of it in a manner approved by the RE and IEO.
- Suitable screening and containment shall be in place to prevent wind-blown contamination associated with bulk cement silos, loading and batching.
- With respect to exposed aggregate finishes, the Contractor shall collect all contaminated water and fine material and store it in sumps for disposal at an approved waste-disposal site.
- All visible remains of excess concrete shall be removed on completion of the plaster or concrete pour work and disposed of. All excess aggregate shall also be removed.

4.2.3 EARTHWORKS

No major earthworks are envisaged for the construction of the solar park. Holes of 3m (depth) x 1.4m (width) x 1.4m (width) will be dug for the monopole structures' with a drill or TLB, depending the underground conditions. The soil crust disturbance will happen along the track of this machine, i.e. two tracks of 500mm in width per track, as well as the 1,4 m concrete collar around the pole. The construction of the substation and metering station will involve digging of trenches, excavations and casting of foundations. All earthworks shall be undertaken in such a manner to minimise the extent of any impacts caused by such activities. The Contractor/s shall take all reasonable measures to limit soil crust destruction. Earthworks are to be phased so that no areas are left exposed for longer than is necessary.

4.2.4 FENCING

The Substation will be fenced-in (2.4m high around a 68m x 60m area) with controlled access. The Metering Station will be fenced-in with a 2.4m high security fence around a 22m x 22m area.

It is important that works be conducted within a limited Construction Area to facilitate control and to minimise the footprint on the surrounding environment. This area should also be temporarily fenced in. The purpose of the fenced area is to control construction and personnel activity within this designated area, and limit unauthorised access.

- No unauthorised pedestrian or vehicular access shall be allowed into fenced, off-limit areas.
- Fences will be constructed around Heritage resources (should these be present) to prevent access into such areas during construction.
- If fencing is removed temporarily for the execution of work, the Contractor shall reinstate it as soon as practicable. Until re-instatement, the contractor shall demarcate the working area by surrounding it with danger-tape marking.
- Breaches in the fencing must be repaired immediately.
- The Contractor to the satisfaction of the RE and IEO shall erect and maintain all fencing. Such fence shall be erected before the start of any construction works.

4.2.5 ACCESS ROUTES

The OHTL access and service road will be along existing service roads of the other OHTL in the servitude. This road can accommodate large trucks that need to access the site during emergencies and repairs.

- The movement of plant and workmen shall be restricted to the construction area and access route. The access route, which shall need the approval of the Botanist/Ecologist, IEO and Project Engineer, shall be along existing routes. The Contractor/s shall control the movement of all vehicles and plant machinery so that they remain on designated/demarcated routes.
- Only if absolutely necessary will new routes (temporary or permanent) be allowed, but should be planned in consultation with the Botanist/Ecologist, IEO and Project Engineer, constructed and maintained in such manner not to cause any harm or damage to the natural environment. Temporary roads should be rehabilitated soon after their purpose has expired and should be done in a manner as approved by the Botanist/Ecologist and IEO.
- Special care should be taken to prevent spillages on the roads. Vehicles should be equipped with drip trays to prevent oil and fuel spillages. In the event of spillages, it should be reported to the IEO and Resident Engineer immediately and cleaned as soon as possible.

- The speed limit for light vehicles is 30 km/h and for heavy vehicles 20 km/h. No vehicles are to leave or reverse off designated access roads unless at areas previously agreed to with the Botanist/Ecologist, Project Engineer or ECO.
- Notices should be placed on visible locations in the vicinity of the construction area to warn public of construction activities and indicating that heavy vehicles may be using the road. Failure to maintain road signs, warning signs or flicker lights, etc., in a good condition shall constitute ample reason for the Project Engineer to suspend the work until the road signs, etc., have been remedied to his satisfaction.

4.2.6 CLEARING AND GRUBBING FOR CONSTRUCTION PURPOSE

Clearing should first be discussed with the Botanist/Ecologist, IEO and RE before commencement. Within the site the Contractor shall take steps to protect all vegetation and biological soil crust not directly affected by the works and shall ensure that no avoidable damage or disturbance is caused, and that no erosion is allowed to occur. The IEO shall identity and confirm with the Botanist/Ecologist certain areas within the vicinity that are to be protected.

(i) Protected Vegetation Location and Rescue

- The location and rescue of endemic and/or protected plants, and their transfer to a specified location shall be conducted by a suitably qualified Botanist/Ecologist prior to the onset of any site clearing operations.
- Where possible direct transplantation of rescued plant material, into areas earmarked and prepared for revegetation, shall occur. Transplantation shall only occur in areas of similar habitat and soil type from which rescued plant material originates.
- Where direct transplantation is not feasible, plant material shall be moved to a nursery for transplantation once the permanent revegetation areas become available.
- Rescued plants, which are to be stockpiled at a nursery, shall be stored under damp shade cloth/hessian until they are transported to these sites. They shall be watered and bagged in the topsoil from the area.

(ii) Vegetation Clearance

- All cleared areas shall be stabilised as soon as possible. Areas that are, in the opinion of the IEO, less stable, shall be stabilised immediately following vegetation clearance.
- All alien vegetation species situated within of the proposed project should be removed. Vegetation not to be removed (i.e. indigenous and protected species) should be identified and marked by a suitably qualified Botanist/Ecologist.
- Vegetation should preferably be cleared manually making use of labourers. Care shall be taken to minimise the disturbance to topsoil during this process.
- The use of herbicides or pesticides is prohibited.
- The Contractor shall ensure that the clearance of vegetation is only restricted to that required to facilitate the execution of the construction works.

- The disposal of vegetation through burying or burning is prohibited. Stockpiling of cut vegetation shall only be permitted in areas indicated by the Botanist/Ecologist, Project Engineer and/or the IEO.
- The Contractor shall stabilise soil in unstable areas to control wind-blown dust and erosion.

(iii) Conservation of Topsoil

- Where necessary topsoil (an approximately 300mm layer) shall be removed from areas to be disturbed during construction and stockpiled for rehabilitation purposes.
- The Contractor shall always carefully consider what machinery is appropriate for the task while minimising the extent of environmental damage.
- Topsoil is to be handled twice only – once during clearing and stockpiling & once during rehabilitation.
- Topsoil stockpiles shall not be subject to compaction greater than 1500 kg/m^2 and shall not be pushed by a bulldozer for more than 50m. Stockpiles shall be monitored regularly to identify any alien plants, which shall be removed when they germinate to prevent contamination of the seed bank.
- Appropriate measures, as agreed with the Botanist/Ecologist and Project Engineer, shall be taken to protect topsoil stockpiles from erosion by wind or water, containment using hessian or similar material and/or by establishing suitable temporary vegetation. Stockpiles shall not be covered with materials such as plastic that may cause it to compost or would kill the seed bank.
- No vehicles shall be allowed access onto the stockpiles after they have been placed.
- The Contractor shall be held responsible for the replacement, at his/her own cost, for any unnecessary loss of topsoil due to his failure to work according to the requirements of this EMP.

4.2.7 STOCKPILING

- The Botanist/Ecologist and ECO will identify suitable sites for stockpiling.
- Stockpiles shall be convex in shape, shall be no higher than 2m and shall be located to cause minimal disturbance. Stockpiles shall be so placed to occupy minimum width compatible with the natural angle of repose of material, and measures shall be taken to prevent the material from being spread over too wide a surface. Where required, appropriate precautions shall be taken to prevent the erosion and limit the compaction of the stockpiles. The Contractor shall ensure that all stockpiles do not cause the damming of water or run off or is itself washed away.
- Top material stockpiles shall not be covered with any material (e.g. plastic) that may kill seeds or cause it to compost. If the stockpiles start to erode significantly or cause dust problems, they shall be covered with hessian. Where practical, top material shall not be left for longer than eight months before being used for rehabilitation. If stored for longer

than eight months, the top material shall be analysed and, if necessary, upgraded before placement.

4.2.8 NO-GO AREAS

- Areas outside the demarcated Construction Area as well as areas on the site identified as sensitive by the Botanist/Ecologist and ECO, are 'no go' areas.
- No unauthorised entry, stockpiling, dumping or storage of equipment or material shall be allowed outside the demarcated work areas.

4.2.9 PROTECTION OF NATURAL FEATURES

- The Contractor shall not deface, paint, damage or mark any natural features situated in or around the project site for survey or other purposes unless agreed beforehand with the IEO.
- Any features affected by the Contractor in contravention of this clause shall be restored/ rehabilitated to the satisfaction of the Botanist/Ecologist and/or IEO.

4.2.10 PROTECTION OF INDIGENOUS FAUNA AND FLORA

- No herbicides, pesticides and other poisonous substances to be used and/or stored on-site.
- Collecting of any plant or animal species is prohibited.
- No removing of birds' nests or eggs allowed.
- No collection of fruit or seeds allowed.
- Nobody may enter important habitat areas (gravel plains/drainage lines/rocky outcrops) outside of the project area;
- No introduction of ornamental plants, especially potential invasive alien species, as part of the landscaping, but rather use localised indigenous species;
- No driving on site at night as this increases mortalities of nocturnal species;
- Avoid and/or limit the use of lights during the night as this could influence and/or affect various nocturnal species. Use focused lighting for least effect;
- No killing of species viewed as dangerous – e.g. various snakes – when on site;
- No setting of snares or any form of illegal hunting activities;
- No dogs or cats allowed on site;
- Remove and relocate slow moving vertebrate fauna (e.g. tortoises, chameleon, snakes, etc.) to suitable habitat elsewhere in area;
- Do not electrify strands around the substation and metering station lower than 20cm from the ground as this could result in fauna mortalities;
- Keep a bird collision monitoring programme after construction to determine "high collision" areas so as to mitigate these areas as well once identified;

- Keep a mammal electrocution monitoring programme after construction to determine "high risk" areas so as to mitigate these areas as well once identified.
- No feeding of any wild animals.

4.2.11 EROSION AND SEDIMENTATION CONTROL

- During construction works, the Contractor shall protect all areas susceptible to erosion.
- Any erosion channels developed during construction or during the defect's liability period shall be backfilled and compacted, and the areas restored. Stabilisation of cleared areas to prevent and control erosion shall be actively managed. Traffic and movement over stabilised areas shall be restricted and controlled and damage to stabilised areas shall be repaired and maintained to the satisfaction of the Engineer.
- Anti-erosion compounds shall consist of an organic or inorganic material to bind soil particles together and shall be a proven product able to suppress dust and erosion. The method of stabilisation shall be determined in consultation with the Botanist/Ecologist, Engineer and IEO. Consideration shall be made to make use of mechanical covers or packing structures, e.g. gabions and mattresses, geofabric, hessian cover, armourflex, log/pole fencing and retaining walls.

4.2.12 LANDSCAPING AND REHABILITATION

- On completion of the construction phase, the Contractor shall ensure that all structures, equipment, materials, waste, rubble, notice boards and temporary fences used during the construction operation are removed with minimum damage to the immediate and surrounding area. The Contractor shall clean and clear the site to the satisfaction of the IEO.
- Any areas that the Botanist/Ecologist and IEO believe may have been impacted upon or disturbed shall be rehabilitated to his/her satisfaction, which includes all areas where top material has been stripped. The area/s to be rehabilitated shall first be landscaped to match the topography of the surrounding area as it was prior to construction. The composition of vegetation to be used for any rehabilitation shall be as per the specifications from a suitably qualified Botanist/Ecologist.
- All rehabilitated areas shall be considered "no go" areas and the Contractor shall ensure that none of his staff or equipment enters these areas. The Contractor shall undertake to remove all alien vegetation re-establishing on the area and shall implement the necessary temporary or permanent measures to combat soil erosion.
- For all rehabilitation work, only plants approved by suitably qualified Botanist/Ecologist may be used. No declared invasive alien species may be used.

4.2.13 PROTECTION OF ARCHAEOLOGICAL AND PALEONTOLOGICAL REMAINS

- Archaeological sites are protected by the National Heritage Act No 27 of 2004. Generally, it is an offence to disturb, destroy or remove from its original site any archaeological material, or excavate any such site without permission.

- The Contractor shall take reasonable precautions to prevent any person from removing or damaging any fossils, coins, articles of value or antiquity and structures and other remains of archaeological interest discovered on the project site, immediately upon discovery thereof and before removal.
- If an archaeological site or remains (i.e. fossils, coins, articles of value or antiquity) is discovered during any construction activity, the work is to be halted and the "chance finds" procedure are to be followed.
- The "chance finds" procedure covers the actions to be taken from the discovery of a heritage site or item, to its investigation and assessment by a trained archaeologist or other appropriately qualified person. This process involves the following:
    - Procedure
      Action by person identifying archaeological or heritage material:
      a) If operating machinery or equipment stop work;
      b) Identify the site with flag tape;
      c) Determine GPS position if possible;
      d) Report findings to IEO or PE.
    - Responsibility

Contractor	To exercise due caution if archaeological remains are found.
PE	To secure site and advise management timeously.
IEO	To determine safe working boundary and request inspection.
Archaeologist	To inspect, identify, advise management, and recover remains

- The Project Engineer and IEO should be notified immediately, who shall contact the Namibian Heritage Council. Only after the site has been inspected by an Archaeologist other appropriately qualified person will the Contractor be allowed to continue.
- The Contractor will be required to abide by the specifications as set out by the Namibian Heritage Council or the heritage specialist appointed to investigate the find. The Contractor may not, without a permit issued by the relevant heritage resources authority, destroy damage, excavate, alter, deface or otherwise disturb archaeological material.
- The Project Engineer and IEO are to be kept informed of all developments in the event where modifications are made to the clearing or earthworks schedule.

4.2.14 SAFETY

- Relevant occupational Health and Safety requirements shall be adhered to. Telephone numbers of emergency services, including the fire safety officer, shall be displayed conspicuously in the Contractor's office near a telephone. No firearms are permitted.
- Staff must be made aware of their responsibilities to ensure that impacts such as fire, safety and pollution are taken care of. This must form part of the Environmental Education. The movement of construction workers must be controlled.
- The Contractor's personnel must be adequately trained and informed in the tasks that they are expected to perform. This is required for their own safety as well as the safety of colleagues and other interested and/or affected parties.

- All excavated areas and/or holes should be clearly demarcated.

4.2.15 FIRE CONTROL

Fire is not a significant part of the Namib Desert's ecological dynamics, and should be limited to accidental or emergency fire on electrical equipment.

- The Contractor shall ensure that the fire risk on and near the site is reduced to a minimum and shall take immediate and effective steps to extinguish any fire that may break out.
- The Contractor shall take all reasonable steps to prevent the accidental occurrence or spread of fire. The Contractor shall appoint a fire officer who shall be responsible for ensuring immediate and appropriate action in the event of a fire. The Contractor shall ensure that all site personnel are aware of the procedure to be followed in the event of a fire. The appointed fire officer shall notify the Engineer and IEO in the event of a fire and shall not delay doing so until such time as the fire is beyond his/her control.
- The Contractor shall ensure that there is always basic fire-fighting equipment on site. This equipment shall include fire buckets, fire extinguishers and fire beaters.
- All costs relating to damage by fire caused by the Contractor will be for the Contractor's cost.
- No fires may be lit except if approved by the Project Engineer or IEO, and in properly prepared facilities approved by the IEO. Fires shall be kept small and appropriate to their function.
- Smoking is only permitted in designated smoking areas. Appropriate signage shall be erected in these areas. A container filled with sand and a dedicated fire extinguisher must be available at the smoking area.
- In terms of the Atmospheric Pollution Prevention Act (No. 45 of 1965), burning is not permitted as a disposal method.

4.2.16 EMERGENCY PROCEDURES

The Contractor's procedures for the following emergencies shall include:

(i) Fire

- The Contractor shall ensure that his employees are aware of the procedure to be followed in the event of a fire as discussed in Section 4.2.15.

Accidental Leaks and Spillages

- The Contractor shall ensure that his employees are aware of the procedure to be followed for dealing with spills and leaks, which shall include notifying the IEO and Resident Engineer.
- The Contractor shall ensure that the necessary materials (e.g. chemcap, spill-sorb, drizzat pads, enretech and peat moss) and equipment for dealing with spills and leaks are always available on Site.

- The source of the spillage shall be isolated. The Contractor shall contain the spillage using sand berms, sandbags, pre-made booms, saw dust or absorbent materials. Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the IEO and Resident Engineer.

4.2.17 COMMUNITY RELATIONS

- The Contractor shall erect and maintain information boards in the position, quantity, design and dimensions specified. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the Engineer.
- The Contractor shall also keep a "Complaints Register" on Site. The Register shall contain all contact details of the person who made the complaint, and information regarding the complaint itself.

4.2.18 CONSTRUCTION PERSONNEL INFORMATION POSTERS

The Contractor shall erect and maintain information posters for the information of his employees depicting actions to be taken to ensure compliance with aspects of the specifications. Such posters shall be erected at the Construction area.

4.2.19 TEMPORARY SITE CLOSURE

If the project site is closed for a period exceeding one week, the following checklist procedure shall be carried out by the Contractor in consultation with the IEO and Resident Engineer. Contractor's Safety Officers (in terms of the relevant Occupational Health and Safety Act) to check the Site and report.

(i) Fuels/flammables/hazardous materials stores

- Ensure fuel stores as low in volume as possible.
- No leaks.
- Outlet secure/locked.
- Bund empty (where applicable).
- Fire extinguishers serviced and accessible.
- Secure area from accidental damage, e.g. plant collision.
- Emergency and contact numbers to be available and displayed.
- Adequate ventilation.

(ii) Safety

- All trenches and manholes secured.
- Fencing and barriers in place as per the relevant Occupational Health and Safety Act.
- Notice boards applicable and secured.
- Emergency and management contact details displayed.

- Security persons briefed and have facility for contact.
- Fire hazards identified.
- Inspection schedule and log by security staff.

(iii) Erosion and Siltation

- Wind and dust mitigation in place.
- Stockpiles at stable angle.
- Erosion protection measures in place.

(iv) Water Contamination and Pollution

- Fuels hazardous stores secure.
- Cement and materials stores secured.
- Toilets empty and secured.
- Refuse bins empty and secured (lids).
- Bunding clean and treated.
- Drip trays empty and secure (where possible).
- Structures vulnerable to high winds secure.

4.3 MATERIALS

4.3.1 HAZARDOUS SUBSTANCES

If petroleum, chemicals, harmful and hazardous waste needs to be stored, it must be kept in an enclosed and bunded area at the construction area. This area shall be subject to the approval of the Project Engineer and IEO. The waste shall be disposed of at the nearest Hazardous Waste Disposal Site.

4.3.2 HANDLING, USE AND STORAGE OF CONSTRUCTION MATERIALS

- The Contractor shall ensure that delivery personnel are informed of all procedures and restrictions (including 'no go' areas) required to comply with the Specifications. The Contractor shall ensure that delivery personnel are supervised during offloading by someone with an adequate understanding of the requirements of the Specifications.
- Materials shall be appropriately secured to ensure safe passage between destinations.
- Loads including, but not limited to sand, stone chip, cement, and refuse, shall have appropriate cover to prevent them spilling during transit.
- The Contractor shall be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.
- All manufactured and/or imported material/technology shall be stored within the Construction Area.

(i) Importation of Fill/Soil/Sand Materials

- Imported materials shall be free of weeds, seeds, litter and contaminants.
- Sources of imported material shall be listed and approved by the Resident Engineer.
- Stockpile areas will be identified by the Project Engineer and agreed upon by the IEO before any stockpiling commences.

(ii) Topsoil

- The top 300mm of topsoil must be stripped before any grading or bulk earthworks begin and stockpiled separately for use in rehabilitation. Topsoil may not be compacted or covered in any way during stockpiling.
- Topsoil shall be stockpiled in the area where it was removed and should be used again in the vicinity where it was removed.

(iii) Spoil Material

- The location of spoil stockpiles shall be identified by the Botanist/Ecologist and Project Engineer and agreed upon by the IEO prior to any stockpiling.
- No spoil material shall be dumped outside the defined site unless it is being removed from the site, as approved by the IEO and Resident Engineer.
- Spoil stockpiles shall be convex and should not exceed 2m in height. The Contractor shall ensure that the spoil material does not blow or wash away. If it is in danger of being washed or blown away, the Contractor shall cover it with a suitable material, such as hessian or plastic.

4.4 CONSTRUCTION AREA

4.4.1 FUEL AND OIL

Preferably no fuel and oil to be kept onsite, but construction vehicles and equipment should refuel in Swakopmund or Walvis Bay. If so required, fuel should be stored at the Construction Area in a depot complying with the requirements listed below. The surface under the refuelling area shall be protected (bunded) against pollution to the satisfaction of the Project Engineer and IEO prior to any refuelling activities.

The Contractor shall ensure that there is always a supply of absorbent material (e.g. chemcap, spill-sorb, drizzat pads, enretech and peat moss) readily available to neutralise and where possible be designed to encapsulate minor spillage. The quantity of such materials shall be able to handle a minimum of 200l of liquid spill.

4.4.2 ABLUTION FACILITIES

The Contractor shall provide suitable temporary sanitary arrangements within the boundaries of the Construction Area or within walking distance (±200m) from where construction activities are taking place.

The exact location of the facilities shall be approved by the Botanist/Ecologist, IEO and Project Engineer prior to establishment. All temporary portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause.

Toilets supplied by the Contractor for the workers shall occur at a maximum ratio of 1 toilet per 15 workers and be within walking distance of the staff. These facilities shall be maintained in a hygienic state and serviced regularly. Toilet paper shall be provided. The Contractor shall ensure that toilets are emptied regularly. The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from Site. Discharge of waste from toilets into the environment is prohibited.

4.4.3 EATING AREA

Eating areas should be within the boundaries of the Construction Area as agreed with by the IEO. Temporary eating areas (i.e. outside the construction camp) would require strict requirements and control and would only be allowed once approved by the IEO.

The Contractor shall provide adequate refuse bins at the eating area (i.e. permanent or temporary eating areas) to the satisfaction of the IEO and shall ensure that all eating areas are cleaned daily. Collected waste shall be stored in a central waste area at the main construction camp and disposed of at the local solid waste site on a regular basis. Waste receipts in this regard should be kept on site.

Waste bins at the eating areas should have scavenger proof lids and not left overnight but removed to the main construction camp on a daily basis.

Cooking of food shall be done using gas cookers only and within the main construction area only. Cooking with wood is strictly prohibited. No fires may be lit except if approved by the Engineer or IEO, and in properly prepared facilities approved by the Engineer.

4.4.4 SOLID WASTE MANAGEMENT

No burying or dumping of any waste materials, rubble or refuse may occur in the Namib Naukluft Park. The Contractor shall set up a solid waste control and removal system at the main construction camp and waste shall be disposed of at the nearest solid waste site on a regular basis. Waste receipts in this regard should be kept on site.

Waste bins at the eating areas should not be left overnight but removed to the solid waste control and removal system at the main construction camp daily.

The accumulation of construction waste materials must be avoided as far as possible. The system shall comply with the following detailed requirements:

(i) Dumping

- Receipts for hazardous waste disposal shall be copied to the IEO and Project Engineer.
- Refuse must be disposed of at Swakopmund or Walvis Bay landfill site.
- The Contractor shall make provision for workers to clean up the camps and working areas daily.

(ii) Recycling

- Wherever possible, materials used or generated by construction shall be recycled.
- Containers for glass, paper, metals, and plastics (a four-bin recycling system) shall be provided at the main construction camp.
- Where possible and practical, such as at stores and offices, waste shall be sorted for recycling purposes.

4.4.5 WASTEWATER MANAGEMENT

No contaminated wastewater may enter the soil, ground- or surface water of the Namib Naukluft Park. The Contractor shall prevent the discharge of water contaminated with any pollutants, such as soaps, detergent, cements, concrete, lime, chemicals, glues, solvents, paints, and fuels, into the environment. The Contractor shall set up a contaminated water management system, which shall include collection facilities to be used to prevent pollution, as well as suitable methods of disposal of contaminated water to fit into the larger wastewater management system. Contaminated wastewater shall be directed into a conservancy tank and disposed of at Walvis Bay's hazardous waste site. The Contractor shall notify the IEO and Resident Engineer immediately of any pollution incidents on Site.

4.4.6 WORKSHOP, EQUIPMENT MAINTENANCE AND STORAGE

Where practical, no maintenance of plant and equipment allowed on the Project Site. If necessary to do maintenance the Contractor shall obtain the approval of the IEO prior to commencing activities.

All plant and equipment shall be kept in good working order and serviced regularly. Faulty equipment shall be removed from the Project Site and repaired in Swakopmund or Walvis Bay.

When the Contractor carries out emergency plant maintenance, it is essential that there is no pollution to the environment. This will be overseen by the IEO and Project Engineer.

Drip trays shall be used to collect the waste oil and other lubricants. Drip trays shall be inspected and emptied daily. Drip trays shall be closely monitored during rain events to ensure that they do not overflow. Where practical, the Contractor shall ensure that equipment is covered so that rainwater is excluded from the drip trays.

No washing of construction vehicles or equipment in the Namib Naukluft Park.

(i) Drip Trays and Bunding

- All plant or machinery, which includes but is not limited to generators, pumps, compressors, drill rigs, static plant, shall have drip trays strategically placed to catch incidental spills.
- Drip trays shall be inspected and emptied daily and serviced when necessary. Drip trays shall be closely monitored during rain events to ensure that they do not overflow.
- All emergency repairs done on machinery using hydrocarbons as fuels or lubricants shall have a drip tray placed strategically to avoid incidental spillage.
- All static plant (stationary >6 months) shall be located within a bunded area.

4.4.7 NOISE

The Contractor shall limit noise levels (e.g. install and maintain silencers on machinery). Appropriate directional and intensity settings are to be maintained on all hooters and sirens. No amplified music shall be allowed on Site. The use of radios, compact disc players and television sets shall not be permitted unless the volume is kept sufficiently low.

The Contractor shall not use sound amplification equipment on Site unless in emergency situations.

No blasting is permitted.

The Contractor must comply with all applicable Occupational Health and Safety requirements.

4.4.8 DUST

It is not envisaged that dust would be a significant nuisance during construction, due to the occurrence of fog and the biological soil crust of the Project Site. However, the Contractor shall take all reasonable measures to minimise the generation of dust because of construction activities to the satisfaction of the Engineer and IEO.

The Contractor's dust management planning shall, as a minimum, take cognisance of the following:

- Speed limits for vehicles on unpaved roads and minimisation of haul distances. The speed limit for light vehicles is 30 km/h and for heavy vehicles 20 km/h.
- Measures to ensure that material loads are properly covered during transportation.
- Minimisation of the areas disturbed at any one time and protection of exposed soil against wind erosion.
- Location and treatment of material stockpiles taking into consideration prevailing wind directions and location of sensitive receptors.
- Reporting mechanism and action plan in case of excessive wind and dust conditions.
- Removal of any vegetation shall be avoided as far as possible, while handling and transport of erodible materials shall be avoided under high wind conditions.
- During high wind conditions, the IEO or Project Engineer will evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level. Where possible, stockpiles shall be in sheltered areas. Where erosion of stockpiles becomes a problem, erosion control measures shall be implemented at the discretion of the IEO and Project Engineer.
- Appropriate dust suppression measures shall be used when dust generation is unavoidable.

4.4.9 LIGHTS

The Contractor shall ensure that any lighting installed on the site for his activities does not interfere with road traffic or cause a reasonably avoidable disturbance to the Namib Naukluft Park and its environs.

4.4.10 SITE STRUCTURES

All site establishment components (as well as equipment) shall be positioned to limit visual intrusion on users of the area and the size of area disturbed.

4.4.11 GROUNDWATER

No abstraction of groundwater for use during the construction.

4.5 POST CONSTRUCTION

4.5.1 SITE REHABILITATION

All disturbed areas and areas where soil has been compacted due to construction activities must be rehabilitated and restored to its original condition as discussed in section 4.2.12. The site must be cleared of all construction equipment, waste and associated materials by the end of the construction phase of the project.

Stockpiled topsoil and indigenous vegetation should be used for all rehabilitation purposes. The rehabilitation plan must ensure that erosion by runoff water does not occur.

4.5.2 MEASUREMENT AND PAYMENT

No separate measurement and payment will be made to cover the costs of complying with the EMP and such costs shall be deemed to be covered by the rates tendered for the items in the Schedule of Quantities completed by the Contractor when submitting his tender.

4.6 MITIGATION MEASURES AND PROPOSED MANAGEMENT PROGRAMME

The table below outlines those specific mitigation measures required to fulfil the recommendations. These measures must be implemented during the construction phase (including future construction). The responsibility for these measures is included in Column IV.

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
PLANNING & DESIGN				
Contractor Requirements	Ensure that the Contractor is aware of his/her responsibility.	Provide the contractor with the EMP.	Proponent Project Engineer	
Independent Environmental Officer (IEO)	Ensure that activities on site are compliant with the requirements of the EMP.	Appoint an Independent Environmental Officer to oversee environmental aspects of the development.	Proponent Project Engineer	
Waste Management	Ensure the effective and efficient separation, storage and removal of waste from the site.	Develop a Waste Management Plan for the construction phase which will detail: - Schedules for collection; - Responsible parties for collection; - Details regarding waste separation (hazardous vs. general); - Provision of facilities for the separation and storage of waste; - Details regarding the disposal of the waste (hazardous and general); - Assigns responsibilities for these activities.	Project Engineer Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Loss of biodiversity and habitat destruction	Be aware of the highly sensitive nature of the flora species and that each plant is of value. Due to the unique flora biodiversity, be aware of unique habitat for fauna species.	A Botanist should be involved in the planning and design of the project to identify protected species that must be removed or transplanted. This will ensure hands on prevention of important biodiversity loss and assistance with avoidance or transplantation of relevant species.	Proponent Project Engineer Botanist IEO Contractor	
Loss of biodiversity and habitat destruction	Be aware of bird mortalities associated with powerlines.	Horizontal configured designs experience more problems with bird streamers than vertically configured designs.	Contractor Project Engineer IEO	
Loss of biodiversity and habitat destruction		Make provision for anti-collision mechanisms.	Contractor Project Engineer IEO	
Loss of biodiversity and habitat destruction		Make provision for adequate gaps between wires on power lines	Contractor Project Engineer IEO	
Loss of biodiversity and habitat destruction	Be aware of electrocution of animals.	Plan for electro static animal guards on the bushings.	Contractor Project Engineer IEO	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Loss of biodiversity and habitat destruction		Pole mounted transformers and bushings can be insulated.	Contractor Project Engineer IEO	
Loss of biodiversity and habitat destruction	Be aware of interference of security fence with small animal movement	Do not electrify strands around the solar plant lower than 20 cm from the ground.	Contractor Project Engineer IEO	
SITE ESTABLISHMENT				
Construction activities	Be aware of the sensitive nature of the flora species and that each plant is of value. Due to the unique flora biodiversity, be aware of unique habitat for fauna species.	A layout plan for construction activities needs to be developed and approved by the Botanist and Environmental Site Manager.	Proponent Project Engineer Botanist IEO Contractor	
Construction activities		Ensure that there is no unnecessary disturbance to areas on the site and that construction activities take environmental considerations into account.	Proponent Engineer Botanist IEO Contractor	
Construction Area	Ensure that the Construction Area does not pollute the environment and is not located on a sensitive site.	No pollution of soil, ground-r and surface water.	Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Soil	Ensure preservation of the topsoil.	Topsoil stockpiles must be established in disturbed zones.	Contractor Botanist IEO	
Soil	Ensure that erosion impacts are kept under control.	Areas scheduled for construction should be cleared only 1 week prior to construction.	Contractor	
Training	Improve the awareness of all construction personnel regarding environmental matters.	Develop and implement a training programme to address environmental issues and responsibilities.	IEO Contractor	
CONSTRUCTION				
Independent Environmental Officer	Ensure that there is compliance with the EMP on site.	An Independent Environmental Officer may inspect the site at any time during the construction phase.	IEO	
Effect of the EMP	Ensure that the EMP is enforced on all contractors.	Each contractor and subcontractor must be notified and bound by the content of this EMP.	Project Engineer IEO Contractor(s)	
Archaeological Evidence	Ensure the protection of archaeological sites.	Construction must be stopped, and a professional archaeologist consulted should any archaeological remains be uncovered.	Contractor IEO Archaeologist	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Borrow Pits	Ensure that the soil resources are not over exploited.	No borrow pit may be excavated from any sensitive or open space areas.	Contractor IEO	
Cleaning of equipment	No cleaning of equipment in the Namib Naukluft Park.	In case of emergency cleaning, proper cleaning trays should be used for the cleaning of cement mixing and handling equipment.	Contractor	
Communication	Ensure that interested and affected parties are provided with a medium through which to lay complaints regarding activities on site.	A complaints register should be kept in the site office. The IEO needs to be informed of all complaints and corrective action must be taken where required.	Contractor IEO	
Contaminated Soil	Ensure that soils that are contaminated do not pollute the environment.	All soils that have been contaminated by fuel spills, paints spills, etc. must be appropriately removed from the site.	Contractor	
Dust	Ensure dust does not cause nuisance to environment.	Wet all exposed sand areas such as roadways, stockpiles and working areas that give rise to dust. This must ensure adequate dust suppression.	Contractor	
Ground Water	Prevent the contamination of groundwater resources.	Vehicles must be equipped with drip trays to prevent spillages of oils and fuels.	Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Loss of biodiversity and habitat destruction	Be aware of the sensitive nature of the flora species and that each plant is of value. Due to the unique flora biodiversity, be aware of unique habitat for fauna species.	Protected, medicinal and/or sensitive plants that are likely to be destroyed or affected by construction activities should be relocated to more suitable areas.	Botanist IEO Contractor	
Loss of biodiversity and habitat destruction		Ensure that there is no unnecessary disturbance to areas on the site and that construction activities take environmental considerations into account.	Botanist IEO Contractor	
Installation of Services	Ensure that all points for water provision are regularly inspected for erosion impacts.	Implement adequate mitigating measures to curtail any erosion impacts.	Contractor	
General waste	Ensure that the site remains clean and clear of litter.	All litter must be collected into rubbish bins located on the site. These bins must be regularly (i.e. weekly) collected and transported to a registered waste disposal facility.	Contractor	
Noise	Ensure that nuisance noise from construction activities does not disrupt the surrounding environment.	Take appropriate measures to reduce noise in the tranquil desert environment.	Contractor	
Road Works and	Ensure that travellers are not	Notices should be placed on the	Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Traffic	inconvenienced by the movement of construction vehicles off-site or construction of OHTL across the C28.	access road and C 28 during the construction period indicating that heavy vehicles are using the road.		
Safety & Security	Ensure the safety and security of staff and the public.	All local authority by-laws must be adhered to.	Contractor	
Safety & Security		All contractors must take cognisance of and abide by the Occupational Health and Safety Act.	Contractor	
Safety & Security		Provided fencing needs to be checked and maintained.	Contractor	
Safety & Security		No movement of construction workers through the neighbouring area.	Contractor	
Soil	Ensure that storm water cannot erode the topsoil stockpile.	Construct and maintain a berm around topsoil stockpiles.	Contractor	
Storage Facilities	Ensure that hazardous materials are stored according to legislative requirements.	Specifically, designed storage facilities need to be provided and used for hazardous materials.	Contractor	
Storage Facilities	Ensure that fuel stored on site does not pose a pollution and fire hazard.	No fuel to be stored on site, but if necessary it shall be bunded to 110% of the capacity of the largest container.	Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Storm Water Run-off	Ensure that run-off does not contribute to erosion & siltation.	Construct and maintain berms on the site to contain storm water run-off or establish riffle beds or retention ponds, as appropriate.	Contractor	
Vehicle repairs	Ensure that spillages are minimised and that where these occur, that they are appropriately managed.	No vehicle repairs on site, but if necessary an appropriate work surface may only take place within the provided area in the Construction Area	Contractor	
Waste	Ensure the adequate removal of solid waste.	All wastes (hazardous or general) must be collected and disposed of at an appropriate registered facility.	Contractor	
	Ensure the adequate management of waste	Refuse shall be disposed of into scavenger- (predators, rodents, etc.) and weather-proof bins. The Contractor shall then remove the refuse collected from the working areas, on a daily basis. Refuse must be disposed of at appropriate landfill sites.	Contractor	
	Ensure the adequate management of waste.	No waste should be burnt on site.	Contractor	
POST CONSTRUCTION				

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Site Rehabilitation	Ensure the site is left clean, orderly and free of rubble after construction activities.	Remove all rubble, rubbish, litter, unused building equipment, contaminated soils or any other relevant articles from the site following the end of the construction phase.	Contractor IEO Botanist/ Ecologist	
Soil	Rehabilitation of the site back to its original condition as far as possible.	Soil that has been compacted during construction activities must be ripped in two perpendicular directions.	Project Engineer Contractor IEO	
	Ensure the re-use of top soil for rehabilitation.	Top soil that is stockpiled on site must be used to rehabilitate the disturbed areas.	Project Engineer Contractor IEO	
Vegetation	Promote replanting of endemic species associated with the area.	Plant species that had to be removed/damaged during construction should be replanted.	Contractor Botanist IEO	
MONITORING				
Audit Reports	Ensure adequate reporting of progress with the development	Regular reports, monthly and construction end are proposed, and should be forwarded to the DEA.	IEO	
Monitoring	Ensure compliance with the requirements of the EMP.	Undertake monitoring activities monthly.	IEO	