

Oshakati Solar Plant

ENVIRONMENTAL MANAGEMENT PLAN



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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
DEA	Directorate of Environmental Affairs
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EA	Environmental Assessment
EMP	Environmental Management Plan
ER	Employer's Representative
GG	Government Gazette
GN	Government Notice
HIV	Human Immunodeficiency Virus
I&APs	Interested and Affected Parties
MVA	Mega Volt-Ampere
NHC	National Heritage Council
OPE	Oshakati Premier Electric
OSP	Oshakati Solar Plant
OTC	Oshakati Town Council
PPE	Personal Protective Equipment
PV	Photovoltaic
TB	Tuberculosis

1 INTRODUCTION

Oshakati Premier Electric (OPE) (Pty) Ltd plans to establish a 10 MVA photovoltaic (PV) solar plant in Oshakati (Oshakati Solar Plant (OSP) hereafter). This document details the Environmental Management Plan (EMP) as informed by the Environmental Assessment (EA) conducted for this project.

The proposed site is approximately 28 ha in size. The following are the main project components:

- The solar panels and support structures;
- Inverters and step-up transformers; and
- 11 kV transmission line supported by monopole structures.

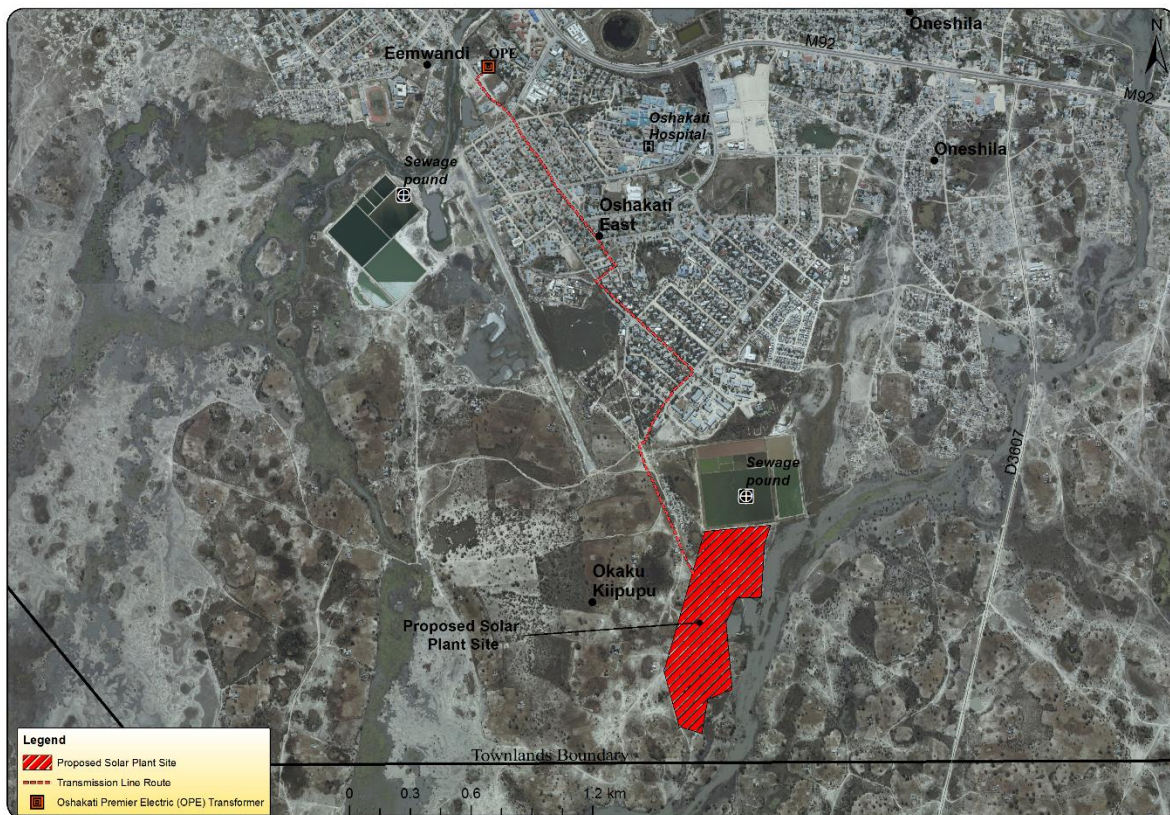


Figure 1: Proposed project site and transmission line route

The OSP, once established, will consist of 1 350 solar PV tables with each table (17 m X 3.2 m) comprising 34 solar panels (45 900 solar panels in total). A single solar PV table will be mounted approximately 1 m above the ground supported by several steel poles with a concrete footing. 12 substations will be erected on-site each with an inverter and small step-up transformer. The electricity generated will be transmitted to the OPE Substation 3.3 km to the north-west along six aluminium conductors in three phases (two conductors per phase) supported by 12 m high monopole structures (potentially wooden, but most probably concrete).

An EMP is one of the most important products of an Environmental Assessment (EA) process. An EMP synthesises all recommended mitigation and monitoring measures, laid out according to the various stages of a project life cycle, with clearly defined follow-up actions and responsibility assigned to specific actors. This EMP has been drafted in accordance with the Namibian Environmental Management Act (No. 7 of 2007) and its Environmental Impact Assessment Regulations (2012). This plan describes the mitigation and monitoring measures to be implemented during the following phases of the OSP development:

- Planning and design;
- Construction tender preparation; and
- Operation and maintenance.

The explicit decommissioning of this project is not foreseen, however some mitigation measures will be provided for, in the event that decommissioning takes place.

The commitments described here form part of the Environmental Clearance Certificate (ECC) between OPE and the state, as represented by the Ministry of Environment and Tourism. Non-compliance is considered illegal and may have legal consequences. The amendment, transfer or renewal of the ECC for this project, as well as any changes to this EMP, should be communicated to the Environmental Commissioner as stipulated in the Environmental Management Act of 2007 (S 39-42).

2 RESPONSIBILITIES

The responsibility for the implementation of the EMP ultimately lies with the OPE (the Developer), who is also responsible for the eventual operation of the project. The implementation of this EMP requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during each phase of this project.

The Developer should appoint an Employer's Representative (ER) to oversee all aspects of this project (including all contracts for work outsourced) – one for the construction phase and one for the operational phases (both of these positions may be assigned to one person). The ER will in turn appoint an Environmental Control Officer (ECO) to oversee the implementation of the whole EMP (if no ECO is appointed this responsibility remains with the ER). The following positions and their respective responsibilities will be outlined below:

- Employer's Representative;
- Environmental Control Officer; and
- Contractor (Construction and Operations and Maintenance).

2.1 EMPLOYERS REPRESENTATIVE (ER)

The ER is appointed by the Developer to manage all contracts for work/services that are outsourced during the construction, operations and maintenance and decommissioning phases. This position may be filled by any competent OPE employee. Any official communication regarding work agreements is delivered through this person. The ER should with the commencement of the project appoint a competent ECO who will represent the Developer on-site.

The ER shall assist the ECO where necessary and will have the following responsibilities regarding the implementation of this EMP:

- Ensuring that the necessary legal authorisations and permits (see **Table 1**) have been obtained by the Contractor;
- Assisting the Contractor in finding environmentally responsible solutions to problems with input from the ECO where necessary;
- Ordering the removal of person(s) and/or equipment not complying with the EMP;

- Issuing fines for transgression of site rules and penalties for contravention of the EMP; and
- Providing input into the ECO's ongoing internal review of the EMP. This review report is submitted on a monthly basis to the Developer.

2.2 ENVIRONMENTAL CONTROL OFFICER (ECO)

The ECO should be a competent person appointed by the ER. The ECO is the Developer's on-site representative primarily responsible for the monitoring and review of on-site environmental management and implementation of the EMP by the Contractor. If no ECO is appointed the duties of the ECO fall upon the ER.

The ECO's duties include the following:

- Assisting the ER in ensuring that the necessary environmental authorisations and permits have been obtained;
- Maintaining open and direct lines of communication between the ER, Developer, Contractor, and Interested and Affected Parties (I&APs) with regard to this EMP and matters incidental thereto;
- Monthly site inspection of all construction areas with regard to compliance with this EMP;
- Monitor and verify adherence to the EMP (audit the implementation of the EMP) and verify that environmental impacts are kept to a minimum;
- Taking appropriate action if the specifications of the EMP are not adhered to;
- Assisting the Contractor in finding environmentally responsible solutions to problems;
- Monthly inspection to verify whether or not new personnel have received environmental awareness training;
- Advising on the removal of person(s) and/or equipment not complying with the specifications of the EMP in consultation with the ER;
- Recommending the issuing of fines for transgressions of site rules and penalties for contraventions of the EMP; and
- Undertaking a continual review of the EMP and recommending additions and/or changes to the document.

2.3 CONTRACTOR

The Contractor is responsible for the implementation of the EMP, onsite monitoring and evaluation of the EMP. It is envisaged that various contractors will be appointed at various times and for various tasks throughout the life cycle (construction through to decommissioning phase) of this project. These can be broadly grouped into Construction Contractors and Operations and Service Contractors. In order to ensure sound environmental management, the relevant sections of this EMP should be included in all contracts of work outsourced, thus legally binding all appointed contractors. All contractors shall ensure that adequate environmental awareness training (see **Section E**) of senior site personnel takes place and that all construction workers and newcomers receive an induction presentation on the importance and implications of this EMP. The presentation shall be conducted, as far as is possible, in the employees' language of choice.

The Contractor should keep records of all environmental training sessions, including names, dates and the information presented.

3 MANAGEMENT REQUIREMENTS

This EMP has been structured so as to provide its various intended recipients (Developer, ER, consulting engineers and contractors) with mitigation measures immediately applicable to their respective scopes of work. The management requirements for the various recipients carrying out work for this project are divided according to the main project phases:

- Permit and relevant legal requirements (**Table 1**);
- Planning and Design Phase requirements (**Table 2**);
- Construction Tender Preparation Phase requirements (**Table 3**);
- Construction Phase management requirements (**Table 4**); and
- Operation and Maintenance Phase management requirements (**Table 5**).

3.1 PERMITS AND RELEVANT LEGAL PROVISIONS

Table 1: Relevant legislated permit requirements

THEME	LEGISLATIVE INSTRUMENT	MANAGEMENT REQUIREMENTS	CONTACT PERSON
Archaeology	National Heritage Act 27 of 2004	All protected heritage resources (e.g. human remains etc.) discovered, need to be reported immediately to the National Heritage Council (NHC) and require a permit from the NHC before they may be relocated.	Rev Salomon April Tel: (061) 244 375/ 385/594
Compensation	Compensation Policy Guidelines for Communal land (2008)	Provides detailed guidelines pertaining to the compensation of property owners, which are to be relocated by Local Authorities.	Ministry of RLGHRD Tel: (061) 297 5111
Electricity	Electricity Act 4 of 2007	Licences are required for the generation and trading of electricity.	Electricity Control Board Tel: (061) 374 300
Environmental	EIA Regulations GN 57/2007 (GG 3812)	The amendment, transfer or renewal of the Environmental Clearance Certificate (S19 & 20).	Dr Freddy Sikabongo/ Ms Saima Angula Tel: 061 284 2751
Forestry	Forest Act 12 of 2001 Nature Conservation Ordinance 4 of 1975	<ul style="list-style-type: none"> • Protected tree species and any vegetation within 100 m from a watercourse may not be removed without a permit. 	Ongwediva Forestry Office: Tel: (065) 230

THEME	LEGISLATIVE INSTRUMENT	MANAGEMENT REQUIREMENTS	CONTACT PERSON
		<ul style="list-style-type: none"> A Harvesting Permit is required if wood is to be collected (harvested) for use as fuel. 	947
Labour	Labour Act 11 of 2007 Health and Safety Regulations (HSR) GN 156/1997 (GG 1617).	Adhere to all applicable provisions of the Labour Act and the Health and Safety regulations.	Labour Law Advice: Tel: 061 309 957
Town Planning	Local Authorities Act 23 of 1992	The Minister of Regional and Local Government Housing and Rural Development (MRLGHRD) must grant permission to the OTC for the lease or purchase of the site.	MRLGHRD Tel: (061) 297 5111
Water	Water Act 54 of 1956	A permit is required for the purification of effluent (Section 21)	MAWF: Mr Witbooi Tel: (061) 208 7226

3.2 PLANNING AND DESIGN PHASE

The management requirements detailed in the table below need to be carried out before any tender documents are drafted for the construction of various aspects of this project. These management requirements are also applicable for the period during which detailed engineering designs/drawings are carried out.

Table 2: Management requirements for the Planning and Design phase

ASPECT	MANAGEMENT REQUIREMENT
Compensation and relocation	<p>The following matters need to be attended to before any construction tenders associated with the OSP are published/advertised:</p> <ul style="list-style-type: none"> • Property owners to be relocated should be consulted (at their homes if necessary) and the implications of implementing the OSP clearly explained. Evidence of these consultations should be recorded and be available for review by the property owners to be relocated. • Compensation should take place in the event of relocation and should adhere strictly to the Compensation Policy Guidelines for Communal land (2008). Detailed records should be kept pertaining to all consultations and property evaluations conducted.
Cleaning of PV tables	<p>Investigations regarding water conserving designs should be carried out and consider as a minimum the following alternative/supplementary cleaning methods:</p> <ul style="list-style-type: none"> • Options for using recycled water; • Use of industrial leaf blowers; • Use of self-cleaning methods: <ul style="list-style-type: none"> – Use of electrostatic charge to repel dust and force it to the edges of the panels; – Use of vibrations to shake dust off of panels. <p>The tarring of service roads should be considered as an additional dust suppression method.</p>
Borrow pit investigation	<p>Borrow pit investigations need to include environmental considerations and requirements:</p> <ul style="list-style-type: none"> • As first option investigate/explore the use of local building sand suppliers to supply the project's building sand requirements. • Ensure that all borrow pits utilised, commercial or private, have environmental clearance and Environmental Management Plans in place, which are being implemented. • Avoid sensitive areas (e.g. areas with high biodiversity, protected archaeological sites, rivers or drainage lines).
Flooding	<p>Embankment designs should consider the following:</p> <ul style="list-style-type: none"> • Soft embankment options (subsoil material as opposed to concrete) should be considered first; • Topsoil should be layered on top in order to encourage revegetation of the embankment; • The embankment should be vegetated with an appropriate grass species to

ASPECT	MANAGEMENT REQUIREMENT
	prevent erosion: – <i>Cynodon dactylon</i> (Bermuda grass/lawn)
EMP Implementation	OPE needs to appoint an Employer's Representative (ER) to act as the Employer's on-site implementing agent. This person will be responsible to ensure that OPE's responsibilities are executed in compliance with relevant legislation and this EMP.
Aesthetics	A low-medium height visual barrier should be erected between the proposed future residential development to the west of the site and the solar plant: <ul style="list-style-type: none"> • One potential option is a row of mixed low-medium indigenous shrub or tree species: <ul style="list-style-type: none"> – <i>Berchemia discolor</i> (Bird Plum); – <i>Acacia arenaria</i> (Sand thorn) – <i>Acacia hebeclada</i> (Candle thorn) • If this poses a security risk a low-medium solid wall painted to blend in with its surroundings would also suffice

3.3 CONSTRUCTION TENDER PREPARATION PHASE

The management requirements described below should be consulted and carried out whenever a construction tender document is prepared.

Table 3: Construction tender preparation phase management requirements

ASPECT	MANAGEMENT REQUIREMENTS
EMP implementation	Relevant sections of this EMP should be included in the tender documents for all development so that tenderers can make provision for implementation of the EMP.
Financial provision	<ul style="list-style-type: none"> • Financial provision for the compilation of a Waste Management Plan should be included as a cost item within tenders concerning the operation and maintenance of services infrastructure. • Financial provision for topsoil management and the rehabilitation of borrow pits should be included as a cost item within construction tender documents. • Financial provision for the co-opting of a health officer from the Ministry of Health and Social Services to facilitate HIV/AIDS and TB education programmes periodically on-site during the construction phase should be included as a cost item within construction tender documents. • Financial provision for the facilitation of an induction programme for both senior, casual construction personnel as well as subcontractors and associated personnel should be included as a cost item within tenders concerning the construction and/or maintenance of services infrastructure. • Financial provision for the compilation of a Tree Management Plan should be included as a cost item within construction tender documents. • Financial provision for the drafting of a Communication Plan should be included as a cost item within construction tender documents.
Recruitment	<ul style="list-style-type: none"> • Provisions designed to maximise the use of local labour should be included within tenders concerning the construction and/or maintenance of services infrastructure. • A provision stating that all unskilled labour should be sourced from local communities should be included within tenders concerning the construction and/or maintenance of services infrastructure. • Specific recruitment procedures ensuring local firms receive preference during tender adjudication should be included within tenders concerning the construction and/or maintenance of services infrastructure. • Provisions promoting gender equality pertaining to recruitment should be included within tenders concerning the construction and/or maintenance of services infrastructure. <ul style="list-style-type: none"> – Women should be given preference for jobs, which are less toil-intensive.

3.4 CONSTRUCTION MITIGATION DETAILS

The following table provides a large scale overview of all the major environmental management themes pertaining to both generic and site specific construction mitigation details. This table serves to act as quick reference, for the detailed mitigation details that follow below, for the implementation of the construction component of this EMP.

Table 4: Generic and site-specific environmental management actions for the construction phase

THEME	OBJECTIVE	MITIGATION DETAIL	
		GENERIC	SITE-SPECIFIC
Waste management	Avoid and where not possible minimise all pollution associated with construction.	Section A	N/A
Borrow pits	Ensure topsoil protection and post-construction rehabilitation.	Section B	N/A
Health and safety	Safeguard health and safety of labourers and general public.	Section C	N/A
Dust and noise	Avoid and where not possible minimise dust and noise associated with construction.	Section D	N/A
Environmental training and awareness	Awareness creation regarding the provisions of the EMP as well as importance of safeguarding environmental resources.	Section E	N/A
Environmental conservation	Minimise construction activity footprint and safeguard biodiversity in ecologically sensitive areas.	Section F	Section F
Employment/ Recruitment	Minimise negative conflict through legal and fair recruitment practices.	Section G	N/A
Stakeholder communication	Provide a platform for stakeholders to raise grievances and receive feedback and hence minimise negative conflict	Section H	Section H
Socio-economic and Miscellaneous	Ensure due consideration is given to matters regarding the cultural and general wellbeing of the affected community and matters incidental thereto.	Section I	N/A

SECTION A: WASTE MANAGEMENT

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Waste management plan	<ul style="list-style-type: none"> • The Contractor should compile a Waste Management Plan which should address as a minimum the mitigation measures included below. • “Waste” is defined as any matter, whether gaseous, liquid or solid or any combination thereof, which is an undesirable or superfluous by-product, emission, residue or remainder of any process or activity.
Hazardous waste	<ul style="list-style-type: none"> • All heavy construction vehicles and equipment on site should be provided with a drip tray. <ul style="list-style-type: none"> – Drip trays are to be transported with vehicles wherever they go. – Drip trays should be cleaned daily and spillage handled, stored and disposed of as hazardous waste. • All heavy construction vehicles should be maintained regularly to prevent oil leakages. • Maintenance and washing of construction vehicles should be take place only at a designated workshop area. <ul style="list-style-type: none"> – The workshop area should be lined with concrete. – The workshop should be contoured so that run-off from the servicing and washing of vehicles and equipment drains into an oil-water separator, silt trap or lined pit (which should also be installed). • Spilled concrete (wet or dry) should be treated as hazardous waste and disposed of by the end of each day in the appropriate hazardous waste containers. • All hazardous substances (e.g. fuel etc.) or chemicals should be stored temporarily in labelled, safe and sealable containers at a specific location on an impermeable surface, which is bunded. The bunded area should be able to contain 1.5 times the volume of the hazardous material to be stored in the bunded area.
Sewage and grey water	<ul style="list-style-type: none"> • Do not allow sewage (black water) to be discharged directly onto open soil along drainage lines, or any unspecified area. • All sewage must be removed regularly and disposed of at a recognised (municipal) sewage treatment facility. • The water collected from equipment cleaning areas (grey water), should not be left standing for long periods of time as this promotes parasite and bacterial proliferation. Grey water should, if practicable, be recycled: <ul style="list-style-type: none"> – Used for dust suppression; – Used to clean equipment. • If grey water will not be recycled it should be removed along with the black water on a regular basis.

ASPECT	MITIGATION MEASURE
General waste	<ul style="list-style-type: none"> • The construction site should be kept tidy at all times. All domestic and general construction waste produced on a daily basis should be cleaned and contained daily. • No waste may be buried or burned. • Waste containers (bins) should be emptied regularly and removed from site to a recognised (municipal) waste disposal site. All recyclable waste needs to be taken to the nearest recycling depot. • A sufficient number of separate waste containers for hazardous and domestic/general waste must be provided on site. These should be clearly marked as such. • Construction labourers should be sensitised to dispose of waste in a responsible manner and not to litter. • No waste may remain on site after the completion of the project

SECTION B: BORROW PITS

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Topsoil	The Contractor should adhere to prescribed measures emanating from the borrow-pit investigation (see Table 2) and the design for excavations and disposal of spoil material.
Rehabilitation	<ul style="list-style-type: none"> • Upon completion of the construction phase consultations should be held with the local community regarding the post-construction use of the borrow pit(s). • In the event that no post-construction uses are requested, all borrow pits need to be rehabilitated as follows: <ul style="list-style-type: none"> – Borrow pits may only be backfilled with clean or inert fill. No material of hazardous nature (e.g. sand removed with an oil spill) may be dumped as backfill. – Rehabilitated borrow pits need to match the contours of the existing landscape. – Take note of drainage channels in the vicinity of the borrow pit. The rehabilitated area should not be higher (or lower) than a drainage channel. This ensures the efficiency of revegetation and reduces the chances of potential erosion. – Topsoil is to be spread across borrow pit areas evenly. – Deep ripping is required, not just simple scarification, so as to enable rip lines to hold water after heavy rainfall. – Ripping should be done along contour lines, not up and down a slope, which could lead to enhanced erosion. – Rehabilitated borrow pits need to remain fenced-off after they have been decommissioned to prevent livestock from removing the newly established vegetation on the area.

APPENDIX C: HEALTH AND SAFETY

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION MEASURES	
HIV/AIDS and TB training	The Contractor should approach the Ministry of Health and Social Services to co-opt a health officer to facilitate HIV/AIDS and TB education programmes periodically on site during the construction phase.
Road Safety	<ul style="list-style-type: none"> • Demarcate roads clearly. • Provide warning signage where appropriate. • Off-road driving should not be allowed. • All vehicles that transport materials to and from the site must be road-worthy. • Drivers that transport materials should have a valid driver's license and should adhere to all traffic rules. • Loads upon vehicles should be properly secured to avoid items falling off the vehicle.
Safety Around Excavated and Work Areas	<ul style="list-style-type: none"> • Excavations should be left open for an absolute minimum time. • Excavate short lengths of trenches and box areas for services or foundations in such a way that the trench will not be left unattended for more than 24 hours. • Demarcate the following areas with danger tape: <ul style="list-style-type: none"> – All excavation works; – Soil and other building material stockpiles; and – Temporary waste stockpiles • Provide additional warning signage in areas of movement and in "no personnel" areas where workers are not active. • Borrow pits are to be fenced off with steel wire fencing. • Work areas must be set out and isolated with danger tape on a daily basis with additional warning signage where appropriate. • All building materials and equipment are to be stored only within set-out and demarcated work areas. • Only construction personnel will be allowed within these work areas. • 2 fire extinguishers should be available at the fuel storage area • Comply with all mitigation measures laid out in Section A (Waste Management mitigation measures)
Toilets	<ul style="list-style-type: none"> • Separate toilets should be available for men and women and should clearly be indicated as such. • Portable toilets (i.e. easily transportable) should be available at every construction site: <ul style="list-style-type: none"> – 1 toilet for every 25 females. – 1 toilet for every 50 males. – Sewage waste needs to be removed on a regular basis to an official (municipal) sewage disposal site. Alternatively, pump sewage into sealable

ASPECT	MITIGATION MEASURE
	containers and store it until it can be removed. – Workers responsible for cleaning the toilets should be provided with latex gloves and masks.
Open fires	No open fires may be made anywhere on site.
General	<ul style="list-style-type: none"> • All workers should have appropriate Personal Protective Equipment (PPE) and records of the distribution of PPE should be kept/maintained • Dust protection masks should be provided to workers if they complain about dust. • Potable water should be provided to workers. • No person should be allowed to smoke close to fuel storage facilities or portable toilets (if toilets are chemical toilets – the chemicals are flammable). • No workers should be allowed to drink alcohol during work hours. • No workers should be allowed on site if under the influence of alcohol.

SECTION D: DUST AND NOISE

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Dust	<ul style="list-style-type: none"> • A watering truck should be used on gravel roads with the most heavy vehicle movement especially during dry and windy conditions. However, due consideration should be given to water restrictions during times of drought. • Ensure that adequate ventilation is available in the event of sanding or grinding work. • Stockpiles of building materials and earth material to be kept moist or the surfaces stabilised • Limit the size of stockpiles of large quantities of soil, topsoil and other fine material. • Improve awareness of ambient air quality and consideration regarding wind speed and direction when undertaking dust generating activities
Noise	<ul style="list-style-type: none"> • Work hours should be restricted to between 07h00 and 17h00 where construction involving the use of heavy equipment, power tools and the movement of heavy vehicles is less than 500 m from residential areas. • In the event that work is necessary outside the designated working hours, all receptors (residents or businesses within 500 m from the work areas) will need to be notified at least 2 days in advance.

SECTION E: ENVIRONMENTAL TRAINING AND AWARENESS

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Environmental Induction (Training)	<p>All construction workers are to undergo environmental induction (training) which should include as a minimum the following:</p> <ul style="list-style-type: none"> • Explanation of the importance of complying with the EMP. • Discussion of the potential environmental impacts of construction activities. • Employees' roles and responsibilities, including emergency preparedness. • Explanation of the mitigation measures that must be implemented when particular work groups carry out their respective activities. • Explanation of the specific mitigation measures within this EMP especially unfamiliar provisions.

SECTION F: ENVIRONMENTAL CONSERVATION

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Conservation of vegetation	<ul style="list-style-type: none"> • No driving beyond demarcated areas and off established roads. • The layout and building design should incorporate large indigenous trees as far as possible. • The Contractor should compile a Tree Management Plan which should include the following as a minimum: <ul style="list-style-type: none"> – Trees with a trunk size of 150 mm and bigger should be surveyed, marked with paint (readily visible) and protected; – Trees with a trunk size of 150 mm and bigger, which are impossible to conserve, need to be identified and their location recorded on a map; – The Contractor should write a formal letter requesting permission from the Oshakati Town Council to remove these trees. – A list should be compiled of all trees to be removed detailing the general location, the species as well as which trees will be planted to replace these. The nursery where these trees will be sourced from should also be included; – Each mature tree that is removed needs to be replaced after construction (see Appendix A for list of recommended trees); – Some of these trees can be obtained at the nearest forestry office or at a commercial nursery (most of these are located in Windhoek). The forestry officers can also direct to nearby nurseries where additional trees may be bought.
Conservation of water	<ul style="list-style-type: none"> • Water effective equipment should be used. • All leaking fittings need to be repaired or replaced timeously. • Brooms should be used to clean floors rather than hosing them down with a pipe. • Use buckets or high pressure hoses to clean areas, equipment or vehicles instead of a regular hose pipe.
Materials camp and lay-down areas	<p>Suitable locations for the materials camp and lay-down areas should be identified with the assistance of the ER and the following should be considered in selecting these sites:</p> <ul style="list-style-type: none"> • Avoid sensitive areas (e.g. protected archaeological sites, rivers or drainage lines). • The areas designated for the proposed services infrastructure should be used as far possible as lay-down areas. • Second choice should be degraded land.
SPECIFIC MITIGATION DETAILS	
Conservation of vegetation	<ul style="list-style-type: none"> • All mature trees located in and around the old borrow pit located along the eastern border of the proposed site should not be removed (see Figure 2 below). • All trees located within 100 m from the banks of the ephemeral river (see Figure 2 below) should not be removed.
Conservation of water	<p>The provisions contained in the Water Management Plan (see Table 2) should be implemented.</p>

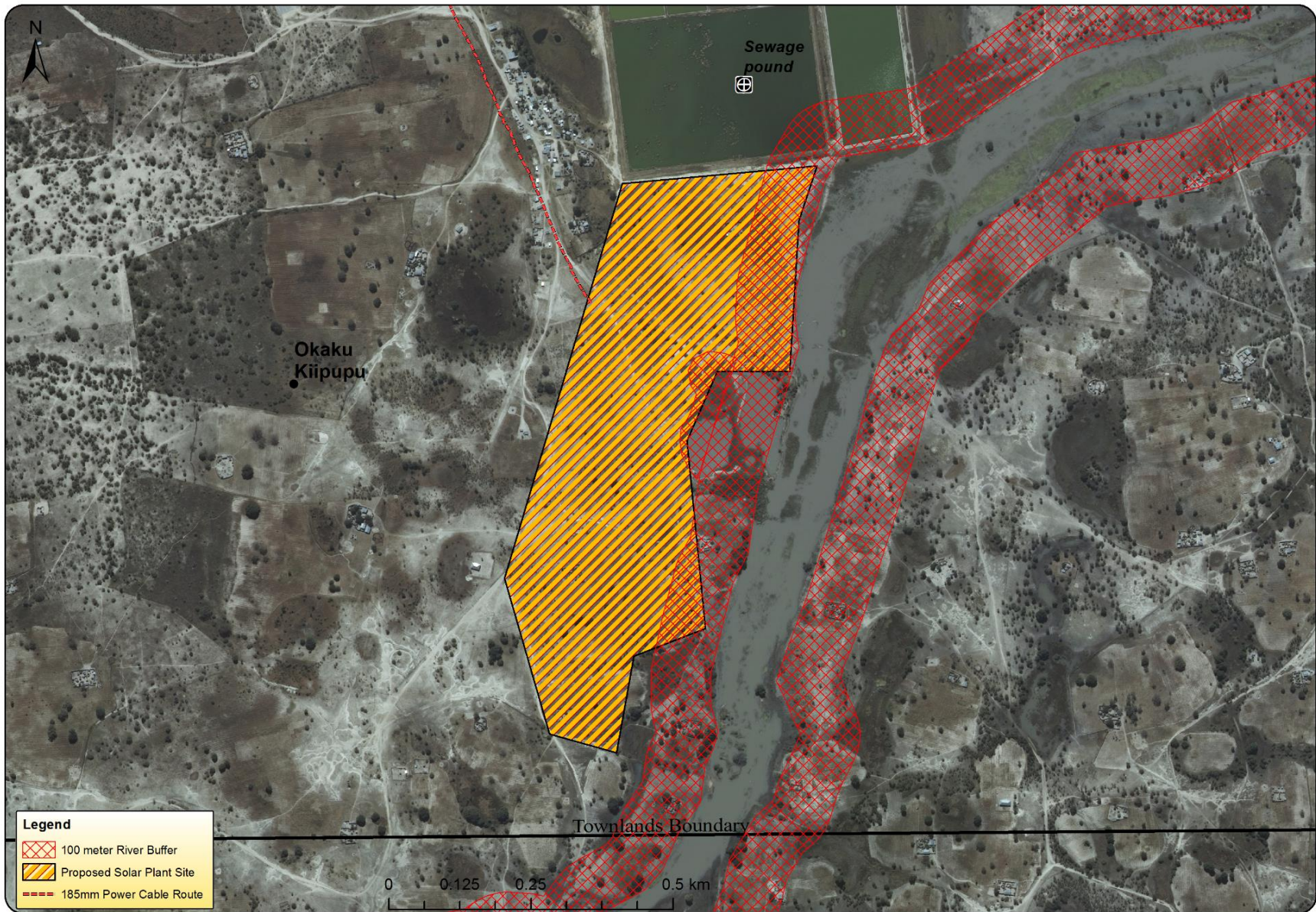


Figure 2: Designated tree conservation area (in red)

SECTION G: EMPLOYMENT/RECRUITMENT

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Legislation	Adhere to the legal provisions in the Labour Act (see Table 1) for the recruitment of labour (target percentages for gender balance, optimal use of local labour and SME's, etc.) in the Contract.
Recruitment	<p>The Contractor should compile a document to be used as a guide for the recruitment process, which should include the following provisions as a minimum:</p> <ul style="list-style-type: none"> • The local authority (town council, local headman etc.) should assist with the recruitment process. • Recruitment should not take place at construction sites. • Ensure that all sub-contractors are aware of recommended recruitment procedures and discourage any recruitment of labour outside the agreed upon process. • Contractors should give preference in terms of recruitment of sub-contractors and individual labourers to those from the project area and only then look to surrounding towns. • Clearly explain to all job-seekers the terms and conditions of their respective employment contract (e.g. period of employment etc.) – make use of interpreters when necessary.

SECTION H: STAKEHOLDER COMMUNICATION

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Communication plan	<p>The Contractor should draft a Communication Plan, which should outline as a minimum the following:</p> <ul style="list-style-type: none"> • How stakeholders, who require ongoing communication for the duration of the construction period, will be identified and recorded and who will manage and update these records; • How these stakeholders will be consulted on an ongoing basis; • Make provision for grievance mechanisms – i.e. how concerns can/ will be lodged/ recorded and how feedback will be delivered as well as further steps of arbitration in the event feedback is deemed unsatisfactory.
General communication matters	<ul style="list-style-type: none"> • The ER should appoint an ECO to liaise between the Contractor, stakeholders, Developer, and consultants. The appointed Contractor shall appoint a person from the construction team to take responsibility for the implementation for all provisions of this EMP. • The Contractor shall at every site meeting report on the status of the implementation of all provisions of the EMP. • The Contractor should implement the environmental awareness training as stipulated in Section E. • The Contractor must list the stakeholders of the project and their contact details with whom ongoing communication would be required for duration of the contract. This list, together with the Communication Plan must be agreed upon and given to the ER before construction commences. • The Communication Plan, once agreed upon by the Developer, shall be binding. • All communication with the stakeholders must take place through the ECO. • A copy of the EMP must be available at the site office and should be accessible to all stakeholders • Key representatives from the above mentioned list need to be invited to attend monthly site meetings to raise any concerns and issues regarding project progress. • The Contractor should liaise with the Developer regarding all issues related to community consultation and negotiation before construction commences. • A procedure should be put in place to ensure that concerns raised have been followed-up and addressed. • All people on the stakeholders list should be informed about the availability of the complaints register in writing by the ER prior to the commencement of construction activities.
SPECIFIC MITIGATION DETAILS	
Communication with property owners	<p>At the outset (i.e. before commencement) of the construction programme, all residents along the route will have to be informed about construction activities within the reserve in front of their property. This should be done in cooperation with the applicable constituency councillors.</p>

SECTION I: SOCIO-ECONOMIC AND MISCELLANEOUS

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Archaeology and Heritage Resources	<ul style="list-style-type: none"> • Should a heritage site or archaeological site be uncovered or discovered during the construction phase of the project, a “chance find” procedure should be applied in the order they appear below: <ul style="list-style-type: none"> – If operating machinery or equipment stop work; – Demarcate the site with danger tape; – Determine GPS position if possible; – Report findings to foreman; • Action taken by foreman: <ul style="list-style-type: none"> – Report findings, site location and actions taken to superintendent; – Cease any works in immediate vicinity; • Action taken by Superintendent: <ul style="list-style-type: none"> – Visit site and determine whether work can proceed without damage to findings; – Determine and demarcate exclusion boundary; – Site location and details to be added to the project’s Geographic Information System (GIS) for field confirmation by archaeologist; • Action taken by archaeologist <ul style="list-style-type: none"> – Inspect site and confirm addition to project GIS; – Advise the National Heritage Council (NHC) and request written permission to remove findings from work area; and – Recovery, packaging and labelling of findings for transfer to National Museum. • Should human remains be found, the following actions will be required: <ul style="list-style-type: none"> – Apply the chance find procedure as described above; – Schedule a field inspection with an archaeologist to confirm that remains are human; – Advise and liaise with the NHC and Police; and – Remains will be recovered and removed either to the National Museum or the National Forensic Laboratory as directed.

3.5 OPERATION AND MAINTENANCE PHASE

The following mitigation measures should be complied with and carried out during any operation and maintenance works associated with the project facilities and services infrastructure for the proposed project.

Table 5: Operation and maintenance phase mitigation measures

ASPECT	MITIGATION MEASURE
Maintenance of associated infrastructure	Maintenance works for the associated infrastructure within the project area should adhere to all provisions contained in Sections A to G of the construction mitigation measures of this EMP (Chapter 3.4).
Tree management	The Developer should take over responsibility for the care of the trees planted by the Contractor (planted to replace trees removed) after the construction phase.
Post-construction borrow pit usage	Borrow pits to be utilised post-construction should adhere to the same topsoil and rehabilitation measures outlined within construction mitigation measures of this EMP (Chapter 3.4) above.
Post-construction environmental training and awareness	All contractors appointed for maintenance work on the respective services infrastructure must ensure that all personnel are aware of necessary health, safety and environmental considerations applicable to their respective work.
Cleaning of PV tables	<ul style="list-style-type: none"> • A Water Management Plan should be compiled by the Developer and should include as a minimum the following: <ul style="list-style-type: none"> – All measures emanating from the Investigations regarding water conserving designs (see Table 2); and – Water effective equipment should be used (i.e. high-pressure hoses instead of regular hose pipes). • Drought resistant grass (<i>Cynodon dactylon</i> common name Bermuda grass/lawn) should be planted beneath and around the PV tables to suppress dust. <ul style="list-style-type: none"> – A few sheep should be kept on site to control the height of the grass.

3.6 DECOMMISSIONING

ASPECT	MITIGATION MEASURE
Dismantling of project components and associated waste	<ul style="list-style-type: none"> • All materials produced from the dismantling of project components (which will not be sold) should be sorted into recyclable and non-recyclable materials. Recyclable material should be transported to the nearest recycling depot. • No waste should be left on site after the project has been decommissioned
Construction-like activities	Many of the activities involved in decommissioning a large project have considerable overlap with the activities for which mitigation measures have been provided for in Chapter 3.4 . Where applicable these should be complied with

APPENDIX A: LIST OF PERMITTED INDIGENOUS TREES TO PLANT

COMMON NAME	SCIENTIFIC NAME
Leadwood Tree	<i>Combretum imberbe</i>
Worm-cure Albizia	<i>Albizia anthelmintica</i>
Kalahari Omupanda	<i>Philenoptera nelsii</i>
Buffalo-thorn	<i>Ziziphus mucronata</i>
Shepherd's Tree	<i>Boscia albitruca</i>
Camel Thorn Tree	<i>Acacia erioloba</i>
Umbrella Thorn Tree	<i>Acacia tortilis</i>