

ENVIRONMENTAL MANAGEMENT PLAN

Final – February 2023

THE PROPOSED 221 MW SOLAR FARM, NGCANGCANA, KAVANGO EAST, NAMIBIA



PROJECT DETAILS

Project Title:	Environmental Management Plan for the Proposed 221 Megawatts Solar Farm at Ngcangcana, Kavango East Region, Namibia
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DEFINITION OF TERMS

Construction Phase	The activities pertaining to the preparation for and the physical construction of the proposed development
Contractor	Persons/organisations contracted by the Developer to carry out parts of the work for the proposed pipeline
Developer	WAPS NAMIBIA
Project Manager	Person/organisation appointed by the Developer to oversee the work of all consultants, sub-developers, contractors, residents and visitors.
Site Manager	The person, representing the Contractor, responsible for all the Contractor's activities on the site including supervision of the construction staff and activities associated with the Construction Phase. The Site Manager will liaise with the Principal Agent in order to ensure that the project is conducted in accordance with the Environmental Management Plan.
Environment Control Officer	Person/organisation appointed by the Developer who will provide direction to the Principal Agent concerning the activities within the Construction Zone. The ECO will also be responsible to liaise with the independent auditor who will conduct an environmental audit during the construction phase of the project according to the provisions of the Environmental Management Plan
environment	The environment is defined in terms of the National Environmental Management Act, No 107 of 1998, as the surroundings within which humans exist and that are made up of – the land, water and atmosphere of the earth; micro-organisms, plant and animal life; any part or combination of (i) and (ii) and the interrelationships among and between them; and the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being

<p>Environmental Management Plan</p>	<p>The EMP is a detailed plan for the implementation of the mitigation measures to minimise negative environmental impacts during the life-cycle of a project. The MP contributes to the preparation of the contract documentation by developing clauses to which the contractor must adhere for the protection of the environment.</p> <p>The EMP specifies how the construction of the project is to be carried out and includes the actions required for the Post-Construction Phase to ensure that all the environmental impacts are managed for the duration of the project’s life-cycle. Therefore the EMP will be a working document, which will be reviewed when necessary, or if required by the authorities. A revision will be done once the detailed design of the proposed Solar power plant and water pipeline construction has been completed</p>
<p>Pre Construction Phase</p>	<p>The period prior to commencement of the Construction Phase, during which various activities associated with the preparation for the Construction Phase will be undertaken.</p>
<p>Operational Phase</p>	<p>The period following the Construction Phase, during which the proposed development will be operational.</p>
	<p>The person, representing the Contractor, responsible for all the Contractor’s activities on the site including supervision of the construction staff and activities associated with the Construction Phase. The Site Manager will liaise with the Principal Agent in order to ensure that the project is conducted in accordance with the Environmental Management Plan.</p>
<p>Rehabilitation</p>	<p>Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (where possible) which it was before disruption. Rehabilitation for the purposes of this specification is aimed at post-reinstatement re-vegetation of a disturbed area and the</p>

	<p>insurance of a stable land surface. Re-vegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment.</p>
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ABBREVIATIONS AND ACRONYMS

ECC Environmental Clearance Certificate

ECO Environmental Control Officer

EIA Environmental Impact Assessment

EMP Environmental Management Plan

MSDS Material Safety Data Sheet

PM Project Manager

PV Photovoltaic

1. INTRODUCTION

Namibia enjoys a very high number of annual sunshine hours and offers one of the highest solar energy yields in the world. Namibia uses coal solely for generating electricity, thus through the country's only coal-powered station (Van Eck Power Station). All the coal used in Namibia is imported, and it mostly comes from South-Africa. Currently, Namibia imports most of its electricity from South Africa and other countries in the region. A special arrangement between NamPower and Eskom, the South African Power utility, enables Namibia to buy and utilize the surplus energy from SA at affordable rates. Access to electricity (% of population) in Namibia was reported at 55.2 % in 2019, according to the World Bank collection of development indicators, compiled from officially recognized sources. Namibia has its own Ruacana hydro power generation station. An 80 MW generating units are driven by water from the surge head bay on top. Electricity is generated at 11 000 volts, transformed to 330 000 volt and fed up vertical tunnels to the switchgear on the surface from where it is distributed to the central areas of Namibia.

Namibia's installed electricity generation capacity is 498 MW. The country's electricity demand significantly exceeds this generation capacity while the Namibian Integrated Resource Plan assumes that electricity consumption will grow by 4.25 percent p.a. between 2011 and 2031. Therefore, Namibia heavily relies on energy imports. The Namibian administration, however, plans to eliminate the dependence on imports by increasing the country's electricity generation capacities.

The Ruacana hydropower plant, built on the Kunene River, is Namibia's main power producer. The hydropower plant relies on the constant flow of water, which is particularly problematic in the time of drought currently plaguing the country. The situation should be remedied, among others, by large-scale projects such as the Kudu Gas project. But the completion of this project has been delayed for years now.

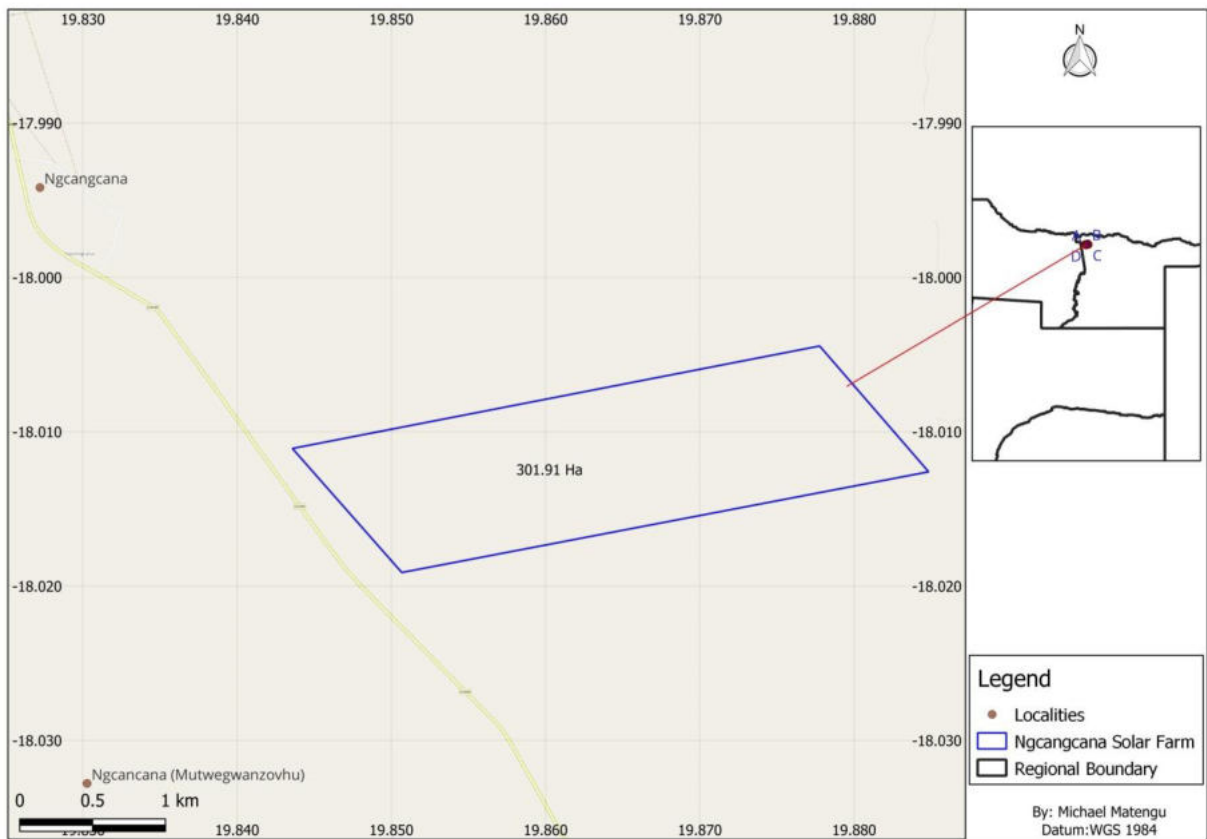
This situation creates opportunities also for renewable energy investors. There is enormous potential for photovoltaic panels (PV) projects.

1.1. Applicable documentation

The following documents should be read in conjunction with this EMP:

- Final Environmental Scoping Report or Final Environmental Impact Assessment Report – “ENVIRONMENTAL IMPACT ASSESSMENT STUDY FOR A PROPOSED SOLAR PLANT AT MUSHANGARA, DIVUNDU”;
- Environmental Clearance Certificate issued by the Ministry of Environment Forestry and Tourism.

Site Map

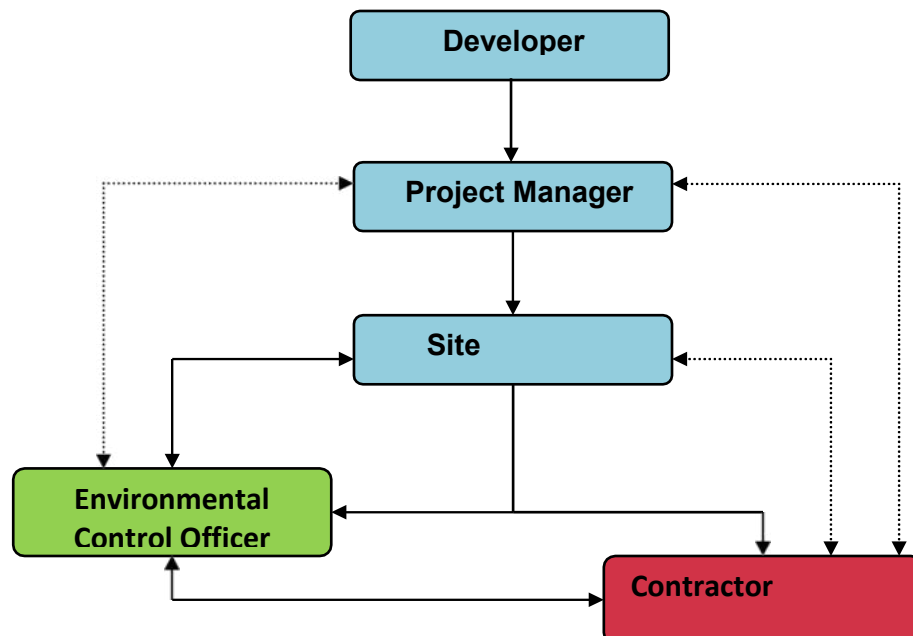


2. PROJECT RESPONSIBILITIES

Several professionals will form part of the construction team. The most important from an environmental perspective are the Project Manager, the Environmental Control Officer (ECO), the contractor and the developer (Water and Power Supply Namibia (Pty) Ltd).

The *Project Manager* is responsible for the implementation of the EMP on the site during the **pre-construction** and **construction** phases of the project. The *ECO* is responsible for monitoring the implementation of the EMP during the **design, pre-construction** and **construction** phases of the project. The *Contractor* is responsible for abiding by the mitigation measures of the EMP which are to be implemented by the Project Manager during the **construction** phase. The *Developer* is responsible for the implementation of the EMP during the **operational** and **decommissioning** phases of the project. Decommissioning will however entail the appointment of a new professional team and responsibilities will be similar to those during the design, pre-construction and construction phases.

Figure 1. Company Structure



2.1. Project Manager

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

- Be conversant with the findings of the Environmental Impact Assessment for the project, the conditions of the EA, and all relevant environmental legislation.
- Be familiar with the recommendations and mitigation measures of this EMP, and implement these measures.
- Ensure that all stipulations within the EMP are communicated and adhered to by the Developer and its Contractor(s).
- Monitor the implementation of the EMP throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
- Monitor site activities on a daily basis for compliance.
- Conduct internal audits of the construction site against the EMP.
- Confine the construction site to the demarcated area.
- Rectify transgressions through the implementation of corrective action.

2.2. Environmental Control Officer

The ECO is responsible for the implementation of the EMP during the construction phase and liaison between the developer, Contractor and the Landowners. The following tasks will fall within his, her responsibilities:

- Be aware of the findings and conclusions of the Environmental Impact Assessment and the conditions stated within the EA.
- Be familiar with the recommendations and mitigation measures of this EMP.
- Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them.
- Undertake regular and comprehensive site inspections, audits of the construction site

according to the EMP and EA in order to monitor compliance with the EMP.

- Educate the construction team about the management measures of the EMP and EA.
- Monitor and verify that environmental impacts are kept to a minimum, as far as possible.
- In consultation with the Project Manager/Site Manager, order the removal of person(s) and/or equipment in contravention of the specifications of the EMP. Regular liaison with the construction team and the project leader.
- Recommend corrective action for any non-compliance incidents on the construction site.
- Compile a regular report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMP.
- All negotiations for any reason shall be between the ECO, the affected parties (including affected landowners) and the Contractor. No verbal agreements shall be made. All agreements shall be recorded in writing and all parties shall co-sign the relevant documentation.
- The affected parties shall always be kept informed about any changes to the construction programme should they be involved. If the ECO is not on site the Contractor should keep the affected parties informed. The contact numbers of the Contractor and the ECO shall be made available to the affected parties. This will ensure open channels of communication and prompt response to queries and claims.

2.3. Contractor

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

- Ensure the implementation and compliance with recommendations and conditions of the EMP.
- Submitting an obligatory Methods Statement for approval by the ECO before any work is undertaken.

- Adhering to any instructions issued by the Engineer/Project Manager on the advice of the ECO.
- Submitting a report at each site meeting which will document all incidents that have occurred during the period before the site meeting.
- Ensuring that the list of transgressions issued by the ECO in the site office is available on request.
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include:
 - Public involvement / complaints.
 - Health and safety incidents.
 - Incidents involving hazardous materials stored on site.
 - Noncompliance incidents.
- Arrange that all his employees and those of his subcontractors receive training before the commencement of construction.

2.4. Environmental Liaison Officer

The Environmental Liaison Officer (ELO) will be appointed by the Contractor to monitor activities on site on a daily basis. The ELO will be the ECO's representative on the site and will report back on all audit trips. The ELO must report any major incidents immediately to the ECO.

- The ELO will be the responsible party for all compliance of this EMP during the construction phase.
- The monitoring party will be the ECO.
- Method of record keeping will be weekly to two weekly audits depending on the stage of the project.
- Audit technique to be undertaken will either be:
 - The review of records that will be kept on site by the ELO and / or
 - A site inspection.
- The Developer will bear ultimate responsibility.

2.5. Independent Auditor

The independent auditor will conduct an environmental audit during the construction phase of the project. Quarterly audits are needed for the duration of the construction phase.

3. THE ENVIRONMENTAL MANAGEMENT PLAN

This EMP seeks to manage and keep to a minimum the negative impacts of a development and at the same time, enhance the positive and beneficial impacts.

3.1. Objectives of an EMP

The objectives of the EMP are to:

- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels.
- To identify measures that could optimize beneficial impacts.
- To create management structures that address the concerns and complaints of I&APs with regards to the development.
- To establish a method of monitoring and auditing environmental management practices during all phases of development.
- Ensure that the construction and operational phases of the project continue within the principles of Integrated Environmental Management.
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project.
- Ensure that the safety recommendations are complied with.
- Propose mechanisms for monitoring compliance with the EMP and reporting thereon.
- Specify time periods within which the measures contemplated in the draft environmental management plan must be implemented, where appropriate.

3.2. Emphasis of the EMP

- Avoiding impacts by not performing certain actions.
- Minimizing impacts by limiting aspects of an action.
- Rectifying impacts through rehabilitation, restoration, etc of the affected environment.
- Compensating for impacts by providing substitute resources or environments.
- Minimizing impacts by optimizing processes, structural elements and other designfeatures.
- Provide ongoing monitoring and management of environmental impacts of a development and documenting of any digressions /good performances.
- The EMP is a legally binding document that all parties involved in the projectmust be made aware of.

3.3. Environmental Monitoring

A monitoring programme will be implemented for the duration of the construction phase of the project. This programme will include:

- Monthly audits will be conducted by the Environmental Control Officer for the duration of the construction phase (approximately 24 months). These audits can be conducted randomly and do not require prior arrangement with the Project Manager.
- Compilation of an audit report with a rating of the compliance with the EMP. The ECO shall keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from damage should be directed to the ECO for appraisal. The Contractor shall be held liable for all unnecessary damage to the environment. A register shall be kept of all complaints from the Landowners and / or the Local Community. All complaints / claims shall be

handled immediately to ensure timeous rectification / payment by the responsible party.

It should be noted that it is difficult to outline a formal monitoring protocol for specific environmental parameters and key impacts until such time as the detailed solar plant design and final alignment for the water pipeline and 132kV overhead power line have been completed.

3.4. Non-Conformance and Corrective Action

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

- Within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of clauses.
- If environmental damage ensues due to negligence.
- The contractor fails to comply with corrective or other instructions issued by the Principal Agent within a specified time.
- The Contractor fails to respond adequately to complaints from the public.

The Developer is deemed not to have complied with the EMP if:

- Within the boundaries of the site there is evidence of contravention of clauses.
- If environmental damage ensues due to negligence.
- They fail to respond adequately to complaints from the public.

3.5. Layout of the EMP

The EMP is separated into four phases. Each phase has specific issues unique to that period of the development and operation of the proposed Solar plant and associated infrastructure.

The impact is identified and given a brief description. The four phases of the development are identified as below:

- Pre-Construction Phase.
- Construction Phase and associated rehabilitation of affected environment.
- Operational Phase (Post-Construction).
- Closure and Decommissioning.

After analyzing the criteria such as extent, duration, intensity, etc. under each phase, a discussion is presented where appropriate. The Environmental Management Plan is then shown and the mitigation measures in each development phase identified.

3.6. Awareness and Training

3.1.1. Awareness

It is important to ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimization of environmental harm.

To achieve effective environmental management, it is important that employees, contractors and subcontractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. Environmental training must include the following:

- Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment;
- Employees will be familiar with the requirements of the EMP and the environmental specifications as they apply to the construction of the solar plant.
- Employees must undergo training for the operation and maintenance activities

associated with a Concentrating Solar Plant and have a basic knowledge of the potential environmental impacts that could occur and how they can be minimized and mitigated.

- Basic training in the identification of protected, rare and endangered flora and fauna that may be encountered on the site.
- Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- The training must ensure all the workers have proof of work performed for future job applications.
- Records must be kept of those that have completed the relevant training.
- Training must include the environment, health and safety as well as basic HIV/AIDS education.

3.1.2. Training of Construction Workers

Training can be done either in a written or verbal format but will be in an appropriate format for the receiving audience. Where training has been done verbally, persons having received training must indicate in writing that they have indeed attended a training session and have been notified in detail of the contents and requirements of the EMP.

The Construction Workers must receive basic training in environmental management, including the storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution. They must also be appraised of the EMP's requirements.

3.2. Contractor Performance

The Contractor must ensure that the conditions of the EMP are adhered to. Should the Contractor require clarity on any aspect of the EMP the Contractor must contact the ECO for advice.

3.3. Monitoring

A monitoring programme will be in place not only to ensure conformance with the EMP through the contract/work instruction specifications, but also to monitor any environmental issues and impacts which have not been accounted for in the EMP that are, or could result in significant environmental impacts for which corrective action is required. As part of the contract or work instruction, the Developer will stipulate the period and frequency of monitoring required. This will be determined in consultation with relevant stakeholders and authorities. The Project Manager will ensure that the monitoring is carried out.

An ECO must be appointed to ensure compliance with the EMP, and to carry out monitoring activities. The ECO must have the appropriate experience and qualifications to undertake the necessary tasks. The ECO will report to the Main Contractor should any non-compliance be evident or corrective action necessary. Only in severe cases of non-compliance, or repeated offences, will the ECO be required to report to the Project Manager / Developer.

All instruments and devices used for the measurement or monitoring of any aspect of this EMP must be calibrated and appropriately operated and maintained.

3.4. Documentation and Reporting

The following documentation must be kept on site in order to record compliance with the EMP:

- Record of Complaints.
- Monitoring Results.
- Notification of Emergencies and Incidents.

3.4.1. Environmental Register

The Contractor:

- Report incidents involving contractor employees and/or the public that could potentially cause negative sentiment and perception towards the project and/or the Developer.
- Report environmental complaints and correspondence received from the public to the Project Manager or the ECO.
- Record and report incidents that cause harm or may cause harm to the environment to the ECO.
- Record all hazardous materials used on site.
- Maintain a record of all Waste Disposal Manifests detailing the nature of the waste disposed of, the waste classification and the location of the site to which such waste was sent.

The above records will form an integral part of the Contractors' Records. These records will be kept with the EMP, and will be made available for scrutiny if so requested by the Project Manager or his delegate and the Environmental Control Officer.

The ECO will put in place an Environmental Register to document:

- All environmental complaints and correspondence received from the public or the construction workforce.
- Incidents of non-compliance with the EMP.
- Any other environmental incidents related to the construction phase of the project.

The ECO will ensure that the following information is recorded for all complaints or incidents:

- Nature of complaint/ incident.
- Causes of complaint/ incident.
- Party/parties responsible for causing complaint/incident.
- Immediate actions undertaken to stop/reduce/contain the causes of the complaint/incident.
- Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the complaint/incident.
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions.
- Procedures to be undertaken and/or penalties to be applied if corrective or remedial actions are not implemented.
- Copies of all correspondence received regarding complaints/incidents.

4. LEGISLATIVE CONTEXT

4.1. Legislation

The following environmental legislation is applicable to the proposed project.

- Environmental Management Act (2007)
- Nature Conservation Ordinance 4 OF 1975
- National Climate Change Strategy & Action Plan 2013 – 2020
- United Nations Framework Convention on Climate Change
- National Heritage Act 27 of 2004
- Soil Conservation Act 76 of 1969
- Water Act 54 of 1956
- Labor Act (No 11 of 2007) in concurrence with Regulation 156, 'Regulations Relating to the Health and Safety of Employees at a working place'.
- Public Health and Environmental Act, 2015
- Road Ordinance 1972 (Ordinance 17 Of 1972)
- Pollution and Waste Management Bill (draft)
- The Namibian Constitution Act, (1990)
- Namibia's Draft Wetland Policy
- The National Land Policy 1998

5. ENVIRONMENTAL MANAGEMENT PLAN: PRE-CONSTRUCTION PHASE

Requirements for the pre-construction phase:

- Proper timeous and continuous liaison between the developer, the Contractor and Landowners to ensure all parties are appropriately informed at all times.
- The Contractor must adhere to all conditions of contract including the Environmental Management Programme and landowner special conditions.
- Adequate planning of the construction programme to allow for disruptions due to rain and very wet conditions.
- Where existing private roads are in a bad state of repair, such roads' condition shall be documented before they are used for construction purposes. This will allow for easy assessment of any damage to the roads which may result from the construction process. If necessary some repairs should be done to prevent damage to equipment.
- All manmade as well as natural (vegetation) structures outside the boundary of the servitude shall be protected against damage at all times and any damage shall be rectified immediately.
- Proper documentation and record keeping of all complaints and actions taken.
- Regular site inspections by the ECO and good control over the construction process throughout the construction period.

Table 5-1: Pre-construction phase

IMPACT	PRE-CONSTRUCTION PHASE (This section deals with the preparation of the site and actions that need to be implemented before construction commences)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	PRE – CONSTRUCTION	Developer, ECO	Weekly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<ul style="list-style-type: none"> • Appoint an Environmental Control Officer (ECO). • Before construction begins, all areas to be developed must be clearly demarcated with fencing. • The contractor must ensure compliance with conditions described in the EA. • Records of compliance / non-compliance with the conditions of the authorization must be kept and be available • Records of all environmental incidents must be maintained and a copy of these records be made available • Confirm with ECO, suitable sites for the construction camps (equipment and batching etc.) and storage areas for materials. • All construction equipment must be stored within this construction camp and all associated oil changes etc (no servicing) must take place within this camp. • Unskilled labourers should be drawn from the local 		

	<p>market.</p> <ul style="list-style-type: none">• Training of site staff.		
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IMPACT	PRE-CONSTRUCTION PHASE (This section deals with the preparation of the site and actions that need to be implemented before construction commences)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artifacts. • Project Manager shall ensure that the training and capabilities of the Contractor’s site staff are adequate to carry out the designated tasks. • Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks. • No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Manager. • Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and • water resources and receive the necessary safety training. 		

6. ENVIRONMENTAL MANAGEMENT PLAN: CONSTRUCTION PHASE

6.1. Site Clearing

Site clearing must take place in phased matter, as and when required. Areas which are not to be constructed on within two months of time must not be cleared to reduce erosion risks. The area to be cleared must be clearly demarcated and this footprint strictly maintained. Spoil that is removed from the site must be removed to an approved spoil site licensed landfill site. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent. These include watercourses and steep areas.

6.2. Site Establishment

Site establishment shall take place in an orderly manner and all required amenities shall be installed at camp sites before the main workforce move onto site. The construction camp² shall have the necessary ablution facilities with chemical toilets at commencement of construction. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities.

The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at a registered landfill. A certificate of disposal shall be obtained by the Contractor and kept on file. Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. The

disposal of waste shall be in accordance with all relevant legislation. Under no circumstances may solid waste be burnt on site.

Table 6.1: Construction traffic and access

IMPACT	CONSTRUCTION TRAFFIC AND ACCESS (This section deals with the impact that construction traffic and access has on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Main Contractor, ECO	Weekly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<p><i>Construction traffic</i></p> <ul style="list-style-type: none"> • Construction routes must be clearly defined. • Delivery of equipment must be undertaken with the minimum amount of trips. • Access of all construction and material delivery vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure. • Planning of site delivery hours must be scheduled to avoid peak hour traffic, weekends and evenings. • Wheel washing and damping down of un-surfaced roads must be implemented to reduce dust. • Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc. 		

	<ul style="list-style-type: none">• Servicing must be done off-site.• Oil changes must take place on a concrete platform or on a drip tray.• Soils compacted by construction shall be deep ripped to loosen		
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IMPACT	CONSTRUCTION TRAFFIC AND ACCESS (This section deals with the impact that construction traffic and access has on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>compacted layers and re-graded to even running levels.</p> <p>Access</p> <ul style="list-style-type: none"> • Temporary access roads that might be required must be rehabilitated prior to the contractor leaving the site. • Strategic positioning of entry and exit points to ensure as little effect as possible on the traffic. • The main routes to the site must be clearly signposted and printed delivery maps must be issued to all suppliers and Sub-Contractors. • Planning of temporary access routes to the site for construction purposes shall be done in conjunction between the Contractor, Developer and the Landowner(s). All agreements reached should be documented and no verbal agreements should be made. The Contractor shall properly mark all access roads. Roads not to be used shall be marked with a "NO ENTRY" sign. • Where new access roads are constructed, this must be done according to design and contract specifications. Drainage channels shall be suitably designed to ensure erosion does not occur, especially at the outflow points. The new access road 		

	<p>shall be designed to allow for the natural flow of water where required. Crossing of dongas and eroded areas on access</p>		
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IMPACT	CONSTRUCTION TRAFFIC AND ACCESS (This section deals with the impact that construction traffic and access has on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>routes to new sites shall be thoroughly planned and installed according to design and contract specifications. All areas susceptible to erosion shall be protected with suitable erosion control measures from the onset of the project. Prevention is the ultimate aim, as restoration is normally very difficult and costly.</p> <p>Road maintenance</p> <p>15. Where necessary suitable measures shall be taken to rehabilitate damaged areas. In the event of rehabilitation work being required on private roads, such work will be done to the original specifications of the private road.</p> <p>16. Contractors should ensure that access roads are maintained in good condition by attending to potholes, corrugations and storm water damage as soon as these develop.</p> <p>17. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt.</p> <p>General</p> <p>18. The Contractor shall meet these safety requirements under all circumstances. All equipment transported shall be clearly</p>		

	<p>labelled as to their potential hazards according to specifications.</p> <p>All the required safety labelling on the containers and trucks</p>		
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IMPACT	CONSTRUCTION TRAFFIC AND ACCESS (This section deals with the impact that construction traffic and access has on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>used shall be in place.</p> <ul style="list-style-type: none"> • The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken in the event of an accident. • Due precautions, including the monitoring of traffic speeds by all suppliers and sub-contractors where required, should be undertaken to prevent accidents leading to injury to persons on • access roads and to minimise the likelihood of injury to wildlife. 		

Table 6.2: Construction camp

IMPACT	CONSTRUCTION CAMP (This section deals with the impacts relating to the construction camp i.e. equipment and batching camp)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Main Contractor, ELO, ECO	Weekly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<p><i>Site of construction camp</i></p> <ol style="list-style-type: none"> 1. Choice of site for the Contractor’s camp requires the Engineer and ECOs permission and must take into account location of local residents and / or ecologically sensitive areas, including flood zones and slip / unstable zones. A site plan must be submitted to the Engineer for approval. 2. If the Contractor chooses to locate the camp site on private land, he must get prior permission from both the Engineer and the landowner. 3. The size of the construction camp should be minimized (especially where natural vegetation or grassland has had to be cleared for its construction). 4. Adequate parking must be provided for site staff and visitors. This should not inconvenience or serve as a nuisance for neighbors. 		

IMPACT	CONSTRUCTION CAMP (This section deals with the impacts relating to the construction camp i.e. equipment and batching camp)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • The Contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion. • Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented. <p><i>Storage of materials (including hazardous materials)</i></p> <ul style="list-style-type: none"> • Choice of location for storage areas must take into account prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary. • Storage areas must be designated, demarcated and fenced. • Storage areas should be secure so as to minimize the risk of crime. They should also be safe from access by children / animals etc. • Fire prevention facilities must be present at all storage facilities. • Proper storage facilities for the storage of oils, paints, grease, 		

	<p>fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s).</p>		
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IMPACT	CONSTRUCTION CAMP (This section deals with the impacts relating to the construction camp i.e. equipment and batching camp)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>These pollution prevention measures for storage should include a bund wall high enough to contain at least 110% of any stored volume, and this should be sited away from drainage lines in a site with the approval of the Engineer.</p> <ul style="list-style-type: none"> • Any water that collects in the bund must not be allowed to stand and must be removed immediately and the hydrocarbon digestion agent within must be replenished. • All legal compliance requirements with respect to Fuel storage and dispensing must be met. • All fuel storage tanks (temporary or permanent) and associated facilities must be designed and installed in accordance with the relevant oil industry standards • Areas for storage of fuels and other flammable materials must comply with standard fire safety regulations and may require the approval of the Municipal Fire Prevention Officer. • Flammable fuel and gas must be well separated from all welding workshops, assembly plants and loading bays where ignition of gas by an accidental spark may cause an explosion 		

	<p>or fire.</p> <ul style="list-style-type: none">• The tank must be erected at a safe distance from buildings, boundaries, welding sites and workshops and any other combustible or flammable materials.		
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IMPACT	CONSTRUCTION CAMP (This section deals with the impacts relating to the construction camp i.e. equipment and batching camp)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Symbolic safety signs depicting “No Smoking”, “No Naked Flames” and “Danger” are to be prominently displayed in and around the fuel storage area. • The capacity of the tank must be clearly displayed and the product contained within the tank clearly identified. • There must be adequate fire-fighting equipment at the fuel storage and dispensing area or areas. • The storage tank must be removed on completion of the construction phase of the project. • All such tanks to be designed and constructed in accordance with a recognized code (international standard). • The rated capacity of tanks must provide sufficient capacity to permit expansion of the product contained therein by the rise in temperature during storage. • Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks must be sealed and stored in an area where the ground has been protected. 		

	<ul style="list-style-type: none">• Any electrical or petrol-driven pump must be equipped and positioned so as not to cause any danger of ignition of the product.• If fuel is dispensed from 200 litre drums, the proper dispensing		
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IMPACT	CONSTRUCTION CAMP (This section deals with the impacts relating to the construction camp i.e. equipment and batching camp)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>equipment must be used.</p> <ul style="list-style-type: none"> • The drum must not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank must be stored in a waterproof container when not in use. • All waste fuel and chemical impregnated rags must be stored in leak-proof containers and disposed of at an approved hazardous waste site. • The amounts of fuel and chemicals stored on site will be minimised. • Storage sites will be provided with bunds to contain any spilled liquids and materials. • These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources. • Clear signage must be placed at all storage areas containing hazardous substances / materials. • Material Safety Data Sheets (MSDSs) shall be readily available 		

	<p>on site for all chemicals and hazardous substances to be used on site. Where possible the available, MSDSs should additionally include information on ecological impacts and measures to minimise negative environmental impacts during</p>		
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IMPACT	CONSTRUCTION CAMP (This section deals with the impacts relating to the construction camp i.e. equipment and batching camp)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p><i>Drainage of construction camp</i></p> <ul style="list-style-type: none"> • Run-off from the camp site must NOT discharge into any water course. <p><i>End of construction</i></p> <ul style="list-style-type: none"> • Once construction has been completed on site and all excess material has been removed, the storage area shall be rehabilitated. If the area was badly damaged, re-seeding shall be done and fencing in of the area shall be considered if livestock/faunal species specific to the area may subsequently have access to such an area. • Such areas shall be rehabilitated to their natural state. Any spilled concrete shall be removed and soil compacted during construction shall be ripped, levelled and re-vegetated. • Only designated areas must be used for storage of construction materials, soil stockpiles, machinery and other equipment. • Specific areas must be designated for cement batching plants. Sufficient drainage for these plants must be in place to ensure that soils do not become contaminated. 		

	<ul style="list-style-type: none">• The construction camp must be kept clear of litter at all times.• Spillages within the construction camp need to be cleaned up immediately and disposed of in the hazardous skip bin for		
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Table 6.3: Environmental Education and Training

IMPACT	ENVIRONMENTAL EDUCATION AND TRAINING (This section deals with the environmental training of construction employees)	RESPONSIBILITY	FREQUENCY /MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Main Contractor, ECO	Monthly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<p><i>Environmental training</i></p> <ul style="list-style-type: none"> • Ensure that all site personnel have a basic level of environmental awareness training. The Contractor must submit a proposal for this training to the ECO for approval. Topics covered should include; • What is meant by “Environment”. • Why the environment needs to be protected and conserved. • How construction activities can impact on the environment. • What can be done to mitigate against such impacts. • Awareness of emergency and spills response provisions. • Social responsibility during construction e.g. being considerate to local residents. • It is the Contractor’s responsibility to provide the site foreman with environmental training and to ensure that the 		

	<p>foreman has sufficient understanding to pass this information onto the construction staff.</p> <ul style="list-style-type: none">• Training should be provided to the staff members in the use of		
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	<p>the appropriate fire-fighting equipment. Translators are to be used where necessary.</p> <ul style="list-style-type: none"> • Use should be made of environmental awareness posters on site. • The need for a “clean site” policy also needs to be explained to the workers. • Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks. <p><i>Monitoring of environmental training</i></p> <ul style="list-style-type: none"> • The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and / or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended. 		
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Table 6.4: Borrow Pits

IMPACT	BORROW PITS (This section deals with the impact that construction traffic and access has on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Main Contractor, ELO, ECA	Monthly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<p>Location of borrow pits</p> <ul style="list-style-type: none"> Borrow pit localities must be negotiated with the relevant town council to ensure consensus of their location. <p>Management of borrow pits</p> <ul style="list-style-type: none"> The contractor must also compile an information document which states the methods which will be utilised when creating borrowpits. This document must include, but not be limited to the following: <ul style="list-style-type: none"> Plans which detail the expected quantity of excavation that will be required. 		

IMPACT	BORROW PITS (This section deals with the impact that construction traffic and access has on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Temporary and permanent stormwater control. • The final contouring of the borrow pit and the proposed method of rehabilitation. • The current status and land use of the borrow pit. • Topsoil management strategy (preservation of topsoil for reinstatement). • Proposed management of dangerous conditions (eg steep slopes, loose and unstable material, holes). 		

Table 6.4: Soils and Geology

IMPACT	SOILS AND GEOLOGY (This section deals with the impact that the proposed development will have on soils and geology)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	ECO, Contractor	Main Monthly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION / METHOD STATEMENT	<p><i>Topsoil</i></p> <ul style="list-style-type: none"> The contractor should, prior to the commencement of earthworks determine the average depth of topsoil, and agree on this with the ECO. The full depth of topsoil should be stripped from areas affected by construction and related activities prior to the commencement of major earthworks. This should include the building footprints, working areas and storage areas. Topsoil must be reused where possible to rehabilitate disturbed areas. Care must be taken not to mix topsoil and subsoil during stripping. Should any topsoil become polluted the contractor must remove the polluted soil to the full depth of pollution and replace it at his own expense with approved topsoil which should be at least equal to Department of Agriculture 		

	<p>approved topsoil specifications.</p> <ul style="list-style-type: none">• Removed topsoil should be transported to a licensed landfill site <p>or used onsite for landscaping as required.</p>		
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IMPACT	SOILS AND GEOLOGY (This section deals with the impact that the proposed development will have on soils and geology)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>Soil Stripping</p> <ol style="list-style-type: none"> 5. No soil stripping must take place on areas within the site that the contractor does not require for construction works or areas of retained vegetation. 6. Subsoil and overburden should, in all construction and lay down areas, be stockpiled separately to be returned for backfilling in the correct soil horizon order. 7. Construction vehicles must only be allowed to utilise existing tracks or pre-planned access routes. <p>Stockpiles</p> <ol style="list-style-type: none"> 8. Stockpiles should not be situated such that they obstruct natural water pathways. 9. Stockpiles should not exceed 2m in height unless otherwise permitted by the Engineer. 10. If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or cloth, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick 		

	<p>walls around their bases.</p> <p>11. Stockpiles should be kept clear of weeds and alien vegetation</p>		
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IMPACT	SOILS AND GEOLOGY (This section deals with the impact that the proposed development will have on soils and geology)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>growth by regular weeding.</p> <ul style="list-style-type: none"> • Where contamination of soil is expected, analysis must be done prior to disposal of excess soil to determine the appropriate disposal route. Proof from an applicable waste disposal site where contaminated soils are dumped if and when a spillage / leakage occurs should be on record <p>Fuel storage</p> <ul style="list-style-type: none"> • Topsoil and subsoil to be protected from contamination. • Fuel and material storage must be away from stockpiles. • Cement, concrete and chemicals must be mixed on an impermeable surface and provisions should be made to contain spillages or overflows into the soil. • Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. • Contaminated soil must be contained and disposed of off-site 		

	<p>at an approved landfill site.</p> <p><i>Cement mixing</i></p> <ul style="list-style-type: none">• Concrete mixing must be contained within a bunded area.		
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IMPACT	SOILS AND GEOLOGY (This section deals with the impact that the proposed development will have on soils and geology)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Cement mixing must only take place within designated areas. • Ready mixed concrete must be utilised where possible. • No vehicles transporting concrete to the site may be washed on site. • If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Run-off from the batch plant must not be allowed to get into the storm water system or any rivers, streams, wetlands or existing erosion channels / dongas. <p>Earthworks</p> <ul style="list-style-type: none"> • All earthworks and borrow pits must be adequately controlled and managed. • Soils compacted during construction should be deeply ripped to loose compacted layers and re-graded to even running levels. Topsoil should be re-spread over landscaped areas. According to specifications by the Developer's Landscape Architect / Ecologist the area should be re-vegetated upon completion of construction activities. • It is very important that the foundation excavations for the 		

	<p>proposed structures be inspected by an engineering geologist orge or technical engineer prior to the placing of steel reinforcement</p>		
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IMPACT	SOILS AND GEOLOGY (This section deals with the impact that the proposed development will have on soils and geology)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>or concrete in order to determine that the structure is being founded upon the correct material, and also to detect whether any active layers have been exposed by the foundation excavation.</p> <p><i>Herbicides / pesticides</i></p> <ul style="list-style-type: none"> • Fertilisers should not be used excessively and slow release fertilizers and organic products should be used in preference to highly soluble and inorganic fertilizers. • The use of herbicides and pesticides and other horticultural chemicals should be carefully controlled wherever these are used. Where feasible, 'environmentally friendly' products should be utilised. 		

Table 6-11: Erosion Control

IMPACT	EROSION CONTROL (This section deals with the impact that the proposed development will have with regards to potential erosion)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	ECO, Main Contractor	Bi-Monthly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<ul style="list-style-type: none"> • Wind screening and stormwater control should be undertaken to prevent soil loss from the site. • The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion. • Other erosion control measures that can be implemented are as for the solar field: <ul style="list-style-type: none"> a. Brush packing with cleared vegetation. b. Mulch, stone chip packing. c. Planting of vegetation. d. Hydroseeding / hand sowing. • Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented. • All erosion control mechanisms need to be regularly maintained. • Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces. 		

	<ul style="list-style-type: none">• Retention of vegetation where possible to avoid soil erosion.• Vegetation clearance should be phased to ensure that the		
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IMPACT	EROSION CONTROL (This section deals with the impact that the proposed development will have with regards to potential erosion)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>minimum area of soil is exposed to potential erosion at any one time.</p> <p>Where possible re-vegetation of disturbed surfaces should occur immediately after construction activities are completed.</p> <ul style="list-style-type: none"> • No impediment to the natural water flow other than approved erosion control works is permitted. • To prevent stormwater damage, the increase in stormwater run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. A drainage plan must be submitted to the Engineer for approval and must include the location and design criteria of any temporary stream crossings. • Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion. 		

Table 6.7: Ground and surface water pollution

IMPACT	GROUNDWATER AND SURFACE WATER POLLUTION (This section deals with the impact that the construction and operation of the development could have on Ground and surface water pollution)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Main Contractor, ECO	Weekly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION / METHOD STATEMENT	<p>Sanitation</p> <ul style="list-style-type: none"> Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers). The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution. <p>Hazardous materials</p> <ul style="list-style-type: none"> Controlled use and or storage of materials, fuels and chemicals which could potentially leak into the ground. All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. Any hazardous substances must be stored at least 20m from any water course. 		

	<ul style="list-style-type: none">• The ELO should be responsible for ensuring that potentially harmful materials are properly stored in a dry, secure		
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IMPACT	GROUNDWATER AND SURFACE WATER POLLUTION (This section deals with the impact that the construction and operation of the development could have on Ground and surface water pollution)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>environment, with concrete or sealed flooring and a means of preventing unauthorised entry.</p> <ul style="list-style-type: none"> Contaminated wastewater must be managed by the Site Manager to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp shall be collected and removed from the site for appropriatedisposal at a licensed commercial facility. <p>Cement mixing</p> <ul style="list-style-type: none"> Cement contaminated water must not enter the water system as this disturbs the natural acidity of the soil and affects plant growth <p>Public areas</p> <ul style="list-style-type: none"> Food preparation areas should be provided with adequate washing facilities and food refuse should be stored in sealed refuse bins which should be removed from site on a regular basis. The contractor should take steps to ensure that littering by 		

	<p>construction workers does not occur and persons should be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines.</p>		
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IMPACT	GROUNDWATER AND SURFACE WATER POLLUTION (This section deals with the impact that the construction and operation of the development could have on Ground and surface water pollution)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • No washing or servicing of vehicles on site. <p>Water resources</p> <ul style="list-style-type: none"> • Site staff shall not be permitted to use any other open waterbody or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction or related activities. • Water sources/taps available for drinking water etc. must be pointed out by the ECO. It is not advisable that a contractor makes use of or collects water from any other source other than those pointed out to them as being suitable for use. • Treated raw water from the river or bore holes to be abstracted (or another source approved by the Engineer) should instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc. 		

IMPACT	GROUNDWATER AND SURFACE WATER POLLUTION (This section deals with the impact that the construction and operation of the development could have on Ground and surface water pollution)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>Ruptures</p> <ul style="list-style-type: none"> • Installation of remote controlled and/or automatic shut off valves at regular intervals along the pipeline. These valves should be activated by pressure loss in the pipeline or activated on instruction when a major leak is noticed/observed. <p>Water Flows Across Construction Sites</p> <ul style="list-style-type: none"> • Adequate measures will be put into place to control surface water flows across and around all construction sites. • The quantity of uncontaminated stormwater entering cleared areas will be minimised by appropriate site design and by installation of control structures and drains which direct such flows away from cleared areas and slopes to stable (vegetated) areas or effective treatment installations. • Site drainage lines will be identified and control measures installed to handle predicted stormwater. 		

Table 6.8: Hydrology and stormwater

IMPACT	HYDROLOGY AND STORMWATER (This section deals with the impact that the construction and operation of the development could have on hydrology and stormwater)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	ECO, ELO, Main Contractor	Weekly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION / METHOD STATEMENT	<ul style="list-style-type: none"> • The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. • Adequate stormwater management must be provided • Silt fences should be used to prevent any soil entering the stormwater drains. • Temporary cut of drains and berms may be required to capture stormwater. • Promote a water saving mind set with construction workers in order to ensure less water wastage. • New stormwater construction must be developed strictly according to specifications from engineers in order to ensure efficiency. • Hazardous substances must be stored at least 20m away from 		

	<p>the buffer area surrounding any water course on site to avoid pollution.</p>		
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IMPACT	HYDROLOGY AND STORMWATER (This section deals with the impact that the construction and operation of the development could have on hydrology and stormwater)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • The installation of the stormwater system must take place as soon as possible after commencement of construction, to attenuate stormwater from the construction phase as well as the operation phase. • Earth, stone and rubble is to be properly disposed of so as not to obstruct natural water path ways over the site i.e. these materials must not be placed in stormwater channels or water courses. • There should be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed. • If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Run-off from the batch plant must not be allowed to get into the stormwater system or nearby streams, rivers or erosion channels or dongas. 		

Table 6.9: Air quality

IMPACT	AIR POLLUTION (This section deals with the impact from air pollution)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Main Contractor, ELO	Daily
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<ul style="list-style-type: none"> • All activities on-site must comply with the requirements of the National Environmental Management: Air Quality Act (Act No.39 of 2004). <p>Dust control</p> <ul style="list-style-type: none"> • Wheel washing and damping down of un-surfaced and un-vegetated areas. • Retention of vegetation where possible will reduce dust travel • Excavations and other clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust • Damping down of all exposed soil surfaces with a water bowser or sprinklers when necessary to reduce dust 		

IMPACT	AIR POLLUTION (This section deals with the impact from air pollution)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the neighboring Communities. • A speed limit of 30km/h must not be exceeded. • Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor. • Ensure that batching plants are fitted with the appropriate filters. • Spoil dumps will be positioned such that they are not vulnerable to wind erosion. <p><i>Odour control</i></p> <ul style="list-style-type: none"> • Regular servicing vehicles in order to limit gaseous emissions(to be done off-site). • Regular servicing of on site toilets to avoid potential odours. • Allocated cooking areas must be provided. • The contractor must make alternative arrangements (other than fires) for cooking and / or heating requirements. Liquid Petroleum Gas cookers may be used provided that all safety regulations are followed. 		

	<p>Waste must be disposed, as soon as possible at a skip or on a permitted landfill site. Waste must not be allowed to stand on site to decay, resulting in malodours and attracting vermin.</p>		
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IMPACT	AIR POLLUTION (This section deals with the impact from air pollution)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>Rehabilitation</p> <ul style="list-style-type: none"> The contractor should commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks. <p>Fire prevention</p> <ul style="list-style-type: none"> Burning of materials including wood, grass and refuse which emit visible smoke will not be permitted on construction sites. The contractor must ensure that any grass left in a natural state during construction should be cut in order to prevent veld fires, especially during the dry months. No open fires shall be allowed on site under any circumstances. All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires. The Contractor shall have operational fire-fighting equipment available on site, especially during the winter months. 		

Table 6.10: Noise

IMPACT	NOISE (This section deals with the impact that increased noise will have on surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Main Contractor, ELO	Daily
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<ul style="list-style-type: none"> • Construction site yards and other noisy fixed facilities should be located well away from noise sensitive areas adjacent to the development sites. Once the final layout, and water and power line alignments are made available by the contractor(s), the sites must be evaluated in detail and specific measures designed into the system. • All construction vehicles and equipment are to be kept in good repair. • Where possible, stationary noisy equipment (for example compressors, pumps, pneumatic breakers,) should be encapsulated in acoustic covers, screens or sheds. Proper sound insulation can reduce noise by up to 20dBA. Portable acoustic shields should be used in the case where noisy equipment is not stationary (for example drills, angle grinders, chipping hammers, poker vibrators). • Construction activities, and particularly the noisy ones, are 		

	to be contained to reasonable hours during the day and early evening.		
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IMPACT	NOISE (This section deals with the impact that increased noise will have on surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • With regard to unavoidable very noisy construction activities in the vicinity of noise sensitive areas, the contractor should liaise with local residents on how best to minimise the impact. • Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum. • In general, operations should meet the noise standard requirements of the Occupational Health and Safety Act • Construction staff working in areas where the 8-hour ambient noise levels exceed 75dBA should wear ear protection equipment. • Noise levels must be kept within acceptable limits. All noise and sounds generated must adhere to SABS 0103 specifications for maximum allowable noise levels for residential areas. No pure tone sirens or hooters may be utilised except where required in terms of emergencies. • Noisy operations should be combined so that they occur where possible at the same time 		

IMPACT	NOISE (This section deals with the impact that increased noise will have on surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • With regard to unavoidable very noisy construction activities in the vicinity of noise sensitive areas, the contractor and ECO should liaise with local residents on how best to minimise impact, and the local population should be kept informed of the nature and duration of intended activities. • Noise from labourers must be controlled. • Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the contractor may be instructed to remove the offending vehicle or machinery from site. • The contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. 		

IMPACT	NOISE (This section deals with the impact that increased noise will have on surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Where possible labour shall be transported to and from the site by the contractor or his Sub-Contractors by the contractors own transport. • Construction activities are to be contained to reasonable hours during the day and early evening. Night-time activities near noise sensitive areas should not be allowed. 		

Table 6.11: Flora

IMPACT	FLORA (This section deals with the impact that the development will have on flora on site and in the surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	ECO, ELO	Weekly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION / METHOD STATEMENT	<ul style="list-style-type: none"> • During the construction phase workers must be limited to areas under construction and access to the undeveloped areas, especially the surrounding open areas must be strictly regulated (“no-go” areas during construction activities • The site should be fenced prior to construction activities and remain fenced off. • Protected or endangered species may occur along the water pipeline and powerline route. Special care should be taken not to damage or remove any such species unless absolutely necessary. • All plants not interfering with the operation of the line shall be left undisturbed. • Collection of firewood and traditional medicinal plants is strictly prohibited. No area should be cleared of trees, bushes and other vegetation for the purpose of a camping site. • Gardens or landscaped areas around the proposed 		

	development should be planted with indigenous (preferably using endemic or local species from the area) grasses, forbs, shrubs		
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IMPACT	FLORA (This section deals with the impact that the development will have on flora on site and in the surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>and trees, which are water wise and require minimal horticultural practices.</p> <ul style="list-style-type: none"> • All alien vegetation should be eradicated over a five-year period. Invasive species should be given the highest priority • The construction of the water pipeline and powerline could result in limited opening-up of the vegetal cover during the construction phase. The opening up of existing vegetated areas, thereby creating corridors along which animals can move, may result in increased predation levels on small mammals, reptiles, amphibians, arachnids and scorpions along these corridors. • The limitation of the disturbance of vegetation cover as well as rocky outcrops, logs, stumps, termite mounds within sensitive areas will ameliorate this impact • Prior to construction and vegetation clearance an ECO should closely examine the proposed construction areas (substation and concrete supports of loop in line) for the presence of any animal burrows (including spiders and scorpions), rocky outcrops, logs, stumps and other debris and relocate any 		

	<p>affected animals to appropriate habitat away from the servitude or tower.</p> <ul style="list-style-type: none">• The removal of all economically valuable trees or vegetation shall be negotiated with the Landowner before such vegetation is removed.		
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IMPACT	FLORA (This section deals with the impact that the development will have on flora on site and in the surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Vegetation clearing on water pipeline support beams and/or pylon sites must be kept to a minimum. Big trees with large root systems shall be cut manually and removed, as the use of a bulldozer will cause major damage to the soil when the root systems are removed. Stumps shall be treated with herbicide. Smaller vegetation can be flattened with a machine, but the blade should be kept above ground level to prevent scalping. Any vegetation cleared on water pipeline support beams and/or pylon sites shall be removed or flattened and not be pushed to form an embankment around the water pipeline support beams and/or pylon sites. • Protected or endangered species of plants shall not be removed unless they are interfering with a structure. Where such species have to be removed due to interference with a structure, the necessary permission and permits shall be obtained from Provincial Nature Conservation. • Disturbed areas of natural vegetation as well as cut and fills must be rehabilitated immediately to prevent soil erosion. 		

	<p>Rehabilitation</p> <ul style="list-style-type: none">• All damaged areas shall be rehabilitated upon completion of the contract in accordance with design specifications. In accordance		
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IMPACT	FLORA (This section deals with the impact that the development will have on flora on site and in the surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>The final product should not cause an ecological imbalance in the area.</p> <ul style="list-style-type: none"> • All natural areas impacted during construction must be rehabilitated with locally indigenous grasses. • Fragmentation must be kept to a minimum. Rehabilitation of the final servitude will ensure that fragmentation is kept to a minimum. • Rehabilitation must take place as soon as construction is complete to avoid the edge effect, the infiltration of alien species and soil erosion within the servitude. • Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding. <p>Permits</p> <ul style="list-style-type: none"> • Permits for removal of any protected species must be obtained 		

IMPACT	FLORA (This section deals with the impact that the development will have on flora on site and in the surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p><i>Demarcation of construction servitude</i></p> <ul style="list-style-type: none"> • All plants not interfering with the construction of the development and associated infrastructure (water pipeline and powerline) shall be left undisturbed, unless clearing is required for a fire-break or other fire safety precaution, and clearly marked and indicated on the site plan. • The construction site /servitude must be well demarcated and no construction activities must be allowed outside of this demarcated footprint. • Areas which are identified by the Engineer or the ECO as being ecologically sensitive and which are adjacent to any construction work are to be suitably demarcated to prevent damage by labour and equipment. • Only vegetation within the site / servitude must be removed, unless clearing adjacent to the site is required for a fire-break or other fire safety precaution,. • Vegetation removal must be phased in order to reduce impact of construction. • Construction site office and laydown areas must be 		

	clearly demarcated and no encroachment must occur beyond		
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IMPACT	FLORA (This section deals with the impact that the development will have on flora on site and in the surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • The contractor should be responsible for implementing a programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion. • The spread of exotic species occurring throughout the site should be controlled. <p>Herbicides</p> <ul style="list-style-type: none"> • Herbicide use shall only be allowed with the approval of Solafrica and according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used. • The use of pesticides and herbicides within the servitude must be discouraged as this will impact on important pollinator species of indigenous vegetation. • 		

	<p><i>Construction schedule</i></p> <ul style="list-style-type: none">• Where possible, construction should take place during winter i.e. the dormant stage to minimise impacts on vegetation during the growing season.		
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IMPACT	FLORA (This section deals with the impact that the development will have on flora on site and in the surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>track on natural ground; multiple tracks are not permitted.</p> <p>Prohibit construction of new access roads as far as possible. Use should be made of existing roads, ensuring proper maintenance/upgrade.</p> <ul style="list-style-type: none"> • Provide temporary on-site ablution, sanitation, litter and waste management and hazardous materials management facilities during entire construction period. • Abluting anywhere other than in provided toilets shall not be permitted. Under no circumstances shall use of the veld be permitted. • Remove and store topsoil separately in areas where excavation/ degradation takes place. Topsoil should be used for rehabilitation purposes in order to facilitate regrowth of species that occur naturally in the area. • Ensure off site storage of hazardous materials, chemicals, fuels, oils, etc. in order to prevent accidental spillage, contamination or pollution. • Develop emergency maintenance operational plan to deal with any event of contamination, pollution or spillages, 		

	<p>particularly in sensitive areas.</p> <ul style="list-style-type: none">• Ensure proper surface restoration and resloping in order to prevent erosion, taking cognisance of local contours and landscaping		
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IMPACT	FLORA (This section deals with the impact that the development will have on flora on site and in the surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>Vegetation</p> <ul style="list-style-type: none"> • Weed control methods should be confirmed with the ECO to prevent any undesirable secondary impacts. • Removal of vegetation/ plants shall be avoided until such time as soil stripping is required and similarly exposed surfaces must be re-vegetated or stabilised as soon as is practically possible. • Disturbance of vegetation must be limited to areas of construction. • The removal or picking of any protected or unprotected plants shall not be permitted and no horticultural specimens (even within the demarcated working area) shall be removed, damaged or tampered with unless agreed to by the ECO. • No painting or marking of rocks or vegetation to identify locality or other information shall be allowed as it will disfigure the natural setting. Marking shall be done by steel stakes with tags, if required. • Cut vegetation (grass and shrubs) only if and when required. <p>No clearing of vegetation or soil by grading machinery shall be</p>		

	<p>undertaken.</p> <ul style="list-style-type: none">• Limit damage/ pruning/ cutting of indigenous trees to a minimum.		
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IMPACT	FLORA (This section deals with the impact that the development will have on flora on site and in the surrounding areas)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Exposed areas with slopes less than 1:3 should be rehabilitated with a grass mix that blends in with the surrounding vegetation. • The grass mix should consist of indigenous grasses adapted to the local environmental conditions. • The revegetated areas should be temporarily fenced to prevent damage by grazing animals • Re-vegetated areas showing inadequate surface coverage (less than 30% within eight months after re-vegetation) should be prepared and re-vegetated from scratch. • Damage to re-vegetated areas should be repaired promptly; • Re-vegetated areas should be monitored every four months for the first 12 months and once a year thereafter for the maintenance period of two years. • Plant search and rescue (i.e. the location and removal of specified plant species, without unnecessary damage, and their transfer to a specified location) and the collection of seed, will be conducted by the ECO prior to the onset of any site clearing operations. 		

	<ul style="list-style-type: none">• All individuals/ stands of protected trees must be clearly and visibly marked prior to the start of construction or maintenance procedures.• Marking should be done by means of semi-permanent		
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Table 6. : Fauna

IMPACT	FAUNA (This section deals with the impact that the development will have on fauna in the area)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	ECO, ELO	Weekly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION / METHOD STATEMENT	<ul style="list-style-type: none"> • No disturbing, injuring or killing of any fauna (including snakes)for any purposes. • No feeding of wildlife. • hunting of local fauna is prohibited. • No domestic animals are to be brought onto the site. • The construction site will be kept clean and tidy and free fromrubbish which would attract animal pest species. • Containment of construction site through identified sensitiveareas • Demarcation of sensitive areas prior to construction activities starting • Use of appropriate construction techniques (for example pipe-jacking) • Intensive environmental auditing in these areas (daily audits recommended). • Rehabilitation to be undertaken as soon as possible after construction in sensitive area has been completed. The contractor must ensure that no faunal species are disturbed, 		

Table 6.13: Employment

IMPACT	EMPLOYMENT (This section deals with the impact that increased employment from the development will have on the area)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Developer, Contactor, ELO	Main ECO, Weekly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<ul style="list-style-type: none"> • The use of labour intensive construction measures should be used where appropriate. • Training of labour to benefit individuals beyond completion of the project • Labour to be sourced from the local community where possible • Local suppliers to be used where possible • The Project Manager must ensure that all staff working on the proposed project must be in possession of a Namibian Identity Document or suitable valid work permit documentation from the Ministry of Home Affairs. 		

Table 6.14: Waste management

IMPACT	WASTE MANAGEMENT (This section deals with the impact from waste produced by the development)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Main Contractor, ECO, ELO	Weekly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<p>Construction rubble</p> <ul style="list-style-type: none"> All rubble from demolition activities must either be used on site as part of the existing development, or must be taken off the reserve and disposed of at an approved site. Rubble must not be dumped on site but must be placed within a skip bin for regular removal. Construction rubble shall be disposed of in pre-agreed, demarcated spoil dumps that have been approved. <p>Litter management</p> <ul style="list-style-type: none"> Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site. Waste disposal will need to take place in terms of requirements of the Waste Management Act 		

IMPACT	WASTE MANAGEMENT (This section deals with the impact from waste produced by the development)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>2008).</p> <ul style="list-style-type: none"> • If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling. • Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. • Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly from the site by the local council or a private waste contractor. • All waste must be removed from the site and transported to a landfill site as approved by the relevant Municipality. • Waybills providing disposal at each site shall be provided to the Engineer's inspection. <p><i>Hazardous waste</i></p> <ul style="list-style-type: none"> • All waste hazardous materials must be carefully stored as advised by the ECO, and then disposed of off site at a licensed 		

	<p>landfill site.</p> <ul style="list-style-type: none">• Contaminants to be stored safely to avoid spillage		
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IMPACT	WASTE MANAGEMENT (This section deals with the impact from waste produced by the development)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Machinery must be properly maintained to keep oil leaks in check <p>Sanitation</p> <ul style="list-style-type: none"> • The Contractor shall install mobile chemical toilets on the site. • The exact location of the toilets must be approved by the SHE Officer/ECO prior to establishment. • All temporary/portable toilets must be secured to the ground to prevent them from toppling due to wind or any other cause. • The Contractor will ensure that the entrances to toilets are adequately screened from public view. • Suitable toilets will be provided for the staff at all points at which workmen are carrying out duties under the contract. • The Contractor will ensure that no spillage occurs when the toilets are cleaned or emptied. • Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed. • All ablution activities must take place in these facilities, and the 		

	<p>waste material must be stored and disposed of at the registered waste disposal site or collected by a suitable waste contractor on a regular basis.</p>		
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IMPACT	WASTE MANAGEMENT (This section deals with the impact from waste produced by the development)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Ablution facilities shall be within 100m from workplaces but not closer than 150m from any watercourses or boreholes. There should be enough toilets available to accommodate the workforce (minimum requirement 1:15 workers). Male and females must be accommodated separately where possible. • Toilets shall be serviced regularly and the ECO shall inspect toilets regularly. • Toilets should be no closer than 150m or above the 1:100 year flood line from any watercourse or alternatively located in a place approved of by the Engineer. • Under no circumstances may open areas, or the surrounding bush be used as a toilet facility. • The construction of “Long Drop” toilets are not allowed. • Potable water must be provided for all construction staff. <p>Remedial actions</p> <ul style="list-style-type: none"> • Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. • Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers 		

	<p>until treated or disposed of at a licensed hazardous landfill site.</p> <ul style="list-style-type: none">• The Environmental Managers must determine the precise		
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IMPACT	WASTE MANAGEMENT (This section deals with the impact from waste produced by the development)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>method of treatment of polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil.</p> <ul style="list-style-type: none"> • If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent pads. • If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. • Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. • Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment, and stored in adequate containers until appropriate disposal 		

Table 6.15: Health and safety

IMPACT	HEALTH AND SAFETY (This section deals with the safety of workers and the public exposed to construction hazards)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Developer, Contractor, ELO	Main ECO, Daily
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<p>Worker safety</p> <ul style="list-style-type: none"> • Implementation of safety measures, work procedures and firstaid must be implemented on site. • A health and safety plan in terms of the Occupational Health and Safety must be drawn up to ensure worker safety. • Workers should be thoroughly trained in using potentially dangerous equipment • Contractors must ensure that all equipment is maintained in a safe operating condition. • A safety officer must be appointed. • A record of health and safety incidents must be kept on site. • Any health and safety incidents must be reported to the projectmanager immediately. • First aid facilities must be available on site at all times. • Workers have the right to refuse work in unsafe conditions. 		

IMPACT	HEALTH AND SAFETY (This section deals with the safety of workers and the public exposed to construction hazards)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • The Contractor shall take all the necessary precautions against the spreading of disease such as measles, foot and mouth, etc. especially under livestock. • A record shall be kept of drugs administered or precautions taken and the time and dates when this was done. This can then be used as evidence in court should any claims be instituted against the Developer or the Contractor. • The contractor must ensure that all construction workers are well educated about HIV/ AIDS and the risks surrounding this disease. The location of the local clinic where more information and counselling is offered must be indicated to workers. • Material stockpiles or stacks, such as, pipes must be stable and well secured to avoid collapse and possible injury to site workers / local residents. <p><i>Worker facilities</i></p> <ul style="list-style-type: none"> • Eating areas should be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness • Fires are not to be allowed. 		

	<p><i>Protective gear</i></p> <ul style="list-style-type: none">• Personal Protective Equipment (PPE) must be made available to		
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IMPACT	HEALTH AND SAFETY (This section deals with the safety of workers and the public exposed to construction hazards)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Suitable conspicuous warning signs in English and all other applicable languages must be placed at all entrances to the site. • All speed limits must be adhered to on site <p><i>Construction equipment safety</i></p> <ul style="list-style-type: none"> • All equipment used for construction, including drills, TLB's must be in good working order with up to date maintenance records. <p><i>Hazardous Material Storage</i></p> <ul style="list-style-type: none"> • Staff that will be handling hazardous materials must be trained to do so. • Any hazardous materials (apart from fuel) must be stored within a lockable store with a sealed floor. • All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bundwalls must be high enough to contain 110% of the total volume of the stored hazardous material. • Material Safety Data Sheets (MSDS) which contain the 		

	<p>necessary information pertaining to a specific hazardous substance must be present for all hazardous materials stored on the site.</p> <p>The bund walls for the transformer oil containers must be in place before the installation of these containers.</p>		
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IMPACT	HEALTH AND SAFETY (This section deals with the safety of workers and the public exposed to construction hazards)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> The provisions of the Hazardous Chemical Substances Regulations promulgated in terms of the Occupational Health and This applies to solvents and other chemicals possibly used in the construction time. <p><i>Procedure in the event of a petrochemical spill</i></p> <ul style="list-style-type: none"> The individual responsible for or who discovers the petrochemical spill must report the incident to the Project Manager. The problem must be assessed and the necessary actions required will be undertaken. The immediate response must be to contain the spill. The source of the spill must be identified, controlled, treated or removed wherever possible. <p><i>Fire management</i></p> <ul style="list-style-type: none"> A Fire Management Strategy must be compiled and implemented. <p>All construction personnel will receive training on fire hazards and techniques to extinguish any fire that may be initiated on the</p>		

	<p>fires must be prevented through proper sensitisation of employees towards the associated risks, dangers and damage of property.</p>		
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IMPACT	HEALTH AND SAFETY (This section deals with the safety of workers and the public exposed to construction hazards)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Ensure that an emergency preparedness plan is in place in order to fight accidental veld fires should they occur. The adjacent land owners/users/ managers must also be informed and/or involved. <p><i>Safety of surrounding residents</i></p> <ul style="list-style-type: none"> • All I&APss should be notified in advance of any known potential risks associated with the construction site and the activities on it. Examples of these are: <ul style="list-style-type: none"> - Earthworks / earthmoving machinery on steep slopes abovehouses / infrastructure. - Risk to residence along haulage roads / access routes. 		

Table 6-23: Security

IMPACT	SECURITY (This section deals with issues of security during construction for workers and surrounding land users)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Main Contractor, ELO	Weekly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<ul style="list-style-type: none"> • Access to the construction site should be strictly controlled by a security company. • 24 hour security on-site. • Labour should be transported to and from the site to discourage loitering in adjacent areas and possible increase in crime or disturbance. • Unsocial activities such as unauthorised consumption or illegal selling of alcohol, drug utilisation or selling and prostitution onsite should be banned. Any persons found to be engaged in such activities should receive disciplinary or criminal action taken against them. • A site camp may be required as temporary housing for workers during construction. Only construction workers shall be permitted to reside in the temporary camp. • The site shall be fenced to prevent any loss or injury to persons or livestock during the construction phase. 		

	<ul style="list-style-type: none">• If any fencing interferes with the construction process, such		
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IMPACT	SECURITY (This section deals with issues of security during construction for workers and surroundingland users)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>fencing shall be deviated until construction is completed. The deviation of fences shall be negotiated and agreed with the landowner in writing.</p> <ul style="list-style-type: none"> • No alcohol / drugs to be present on site. • No firearms allowed on site or in vehicles transporting staff to / from site (unless used by security personnel). • No harvesting of firewood from the site or from the residentialand business properties adjacent to it. • Construction staff are to make use of the facilities provided for them, as opposed to ad-hoc alternatives (e.g. fires for cooking, the use of surrounding bus as a toilet facility are forbidden). • Trespassing on private / commercial properties adjoining the site is forbidden. • Driving under the influence of alcohol is prohibited. • All employees must undergo the necessary safety training and wear the necessary protective clothing. • Secure the site in order to reduce the opportunity for criminal activity in the locality of the construction site. 		

Table 6.17: Social environment

IMPACT	SOCIAL ENVIRONMENT (This section deals with the social impacts that the new development will have on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	lines shall be deviated.		
SITE SPECIFIC MITIGATION			
Areas near residences	<ul style="list-style-type: none"> • Construction activities close to residential homes should be restricted to working hours to cause minimal disruption to local movement patterns, i.e. between the hours of 8am and 5pm. • Inform landowners of the construction process so that they are prepared for the construction activities to follow. • Consult with landowners in the event that extreme construction activities, such as blasting, would have to take place. Agree on a certain date and time with the property owners for such activities to take place. • Damage caused to housing structures as a result of blasting should be repaired as soon as possible. • Implement traffic flow controls where road closure or partial road closure is unavoidable. This can either be in the form of providing alternative access 		

	<p>routes via detours and/or the use of 1-way traffic flow control.</p> <ul style="list-style-type: none">• In the event of 1-way traffic flow control, trained personnel should be used to regulate the traffic to		
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IMPACT	SOCIAL ENVIRONMENT (This section deals with the social impacts that the new development will have on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	prevent severe delays at waiting points.		
Roads	<ul style="list-style-type: none"> • Road rehabilitation should take place during and once construction is completed. • Construction traffic should only make use of an approved route. • The number of trucks that pass through communities should be kept to a minimum and should be restricted to certain times of the day, i.e. avoid peak hours when community members are on their way to or from school and work. • Traffic signs should warn construction vehicles of the presence of pedestrians and school children along the road. • General road rules should be enforced. • Implement traffic flow controls where road closure or partial road closure is unavoidable. This can either be the form of providing alternative access routes via detours and/or the use of 1-way traffic flow control. • In the event of 1-way traffic flow control, 		

	<p>trained personnel should be used to regulate the traffic to prevent severe delays at waiting points.</p>		
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IMPACT	SOCIAL ENVIRONMENT (This section deals with the social impacts that the new development will have on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	transparent process.		
Influx of construction workers	<ul style="list-style-type: none"> • Raise awareness amongst construction workers about local traditions and practices. • Alert local businesses to the fact that construction workers will move into the area to enable local businesses to plan for the extra demand. • Ensure that the local community communicate their expectations of construction workers' behaviour with them. 		

Influx of job seekers	<ul style="list-style-type: none"> • Ensure that employment procedures / policy are communicated to local stakeholders, especially community representative organisations and councillors. • Have clear rules and regulations for access to the camp / site office to control loitering. Consult with the local Police to establish standard operating procedures for the control and/or removal of loiterers at the construction site. • Construction workers should be clearly identifiable by wearing proper construction uniforms displaying the logo of the construction company. Construction workers could also be issued with identification tags. 		
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IMPACT	SOCIAL ENVIRONMENT (This section deals with the social impacts that the new development will have on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
Outflow of labourers	<ul style="list-style-type: none"> • Implement methods (posters, talks, etc.) to create HIV and STI awareness amongst construction workers. • Develop skills transfer plans (e.g. portable skills training) that would enable a worker to move from one project to another project within the same area. • Payment should comply with applicable Labour Law legislation in terms of minimum wages. 		

IMPACT	SOCIAL ENVIRONMENT (This section deals with the social impacts that the new development will have on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
Indirect formal and/or informal employment opportunities for local individuals	<ul style="list-style-type: none"> • Develop a procurement policy that is easy to understand and ensure that local subcontractors also comply with the procurement policy and any other applicable policies. • Ensure that local subcontractors receive the necessary support in terms of resources. • Agree on specific performance criteria prior to appointment. • Identify the segment that might benefit from informal indirect opportunities, and assist them with skills development and subsidise initiatives that are sustainable. • Encourage construction workers to use local services. • Consider housing construction workers in local communities. 		

Attitude formation towards the project	<ul style="list-style-type: none">• Transparent information should be supplied to the community from the outset of the project.• The local community should play an active participatory role in the planning process, especially landowners of neighbouring properties. This could be achieved by means of establishing a community forum that meet quarterly or once a month to discuss issues		
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IMPACT	SOCIAL ENVIRONMENT (This section deals with the social impacts that the new development will have on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> Sufficient and transparent information should be supplied to neighbouring properties to enhance their sense of safety and thereby reducing the negative impact on sense of place. 		
Integration with local community	<ul style="list-style-type: none"> An aggressive STI and HIV/AIDS awareness campaign should be launched, which is not only directed at construction workers but also at the community as a whole. Condoms should be distributed by placing them at centrally located points and by ensuring that construction workers and community members are aware of the availability and location of condoms. The distribution of condoms should be approached with the necessary cultural sensitivity. Access at the construction site should be controlled to prevent sex workers from either visiting and/or loitering at the construction camp. Local women should be empowered. This could be achieved by employing them to work on the project. 		

Physical splintering	<ul style="list-style-type: none">• Provide a safe passage way for community members		
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Table 6.18: Visual impact

IMPACT	VISUAL IMPACT (This section deals with the visual impact that the new development will have on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Main Contractor, ELO, ECO	Monthly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<ul style="list-style-type: none"> • Soften impact by use of landscaping, planting trees • Fencing of the site will also aid in reducing the visual impact of construction. • Cluster construction activities on site. Storage facilities, elevated tanks and other temporary structures on site should be located such that they have as little visual impact on local residents as possible. • Material chosen to blend in with the surrounding environment • Unwanted material and litter should be removed on a frequent basis • Cordon off construction site with shade-cloth if necessary. • Lighting must be subtle and not disturb passing motorists and surrounding residents. • Lighting should be inward and downward facing. • The site shall be kept visually and aesthetically pleasing, especially in and around the Contractor camp. The ECO 		

	shall regularly inspect the site to ensure that it is neat and clean.		
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IMPACT	VISUAL IMPACT (This section deals with the visual impact that the new development will have on the site and surrounds)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Where required the campsite shall be screened by the Contractor to ensure that there is no unacceptable visual intrusion in the area of the site. Screening can be done by the use of shade cloth. • The exterior design in terms of buildings, fences and landscaping be planned in such a way that it will not distract travellers from visiting the site. • An information centre is advisable which could explain the technology and inform visitors of the advantages of solar power. 		
SITE SPECIFIC MITIGATION			
	<ul style="list-style-type: none"> • Reduce the construction period through careful planning and productive implementation of resources. • Restrict the activities and movement of construction workers and vehicles to the immediate construction site. • Ensure that the general appearance of construction activities, construction camps (if required) and lay-down areas are maintained by means of the timely removal of rubble and disused construction materials. • Restrict construction activities to daylight hours in order to reduce the visual impacts associated with lighting. 		

Table 6.19: Cultural and heritage artifacts

IMPACT	CULTURAL AND HERITAGE ARTEFACTS (This section deals with the impact that the new development has on potential archaeological artefacts of the site)	RESPONSIBILITY	FREQUENCY /MONITORING REQUIREMENTS
PHASE	CONSTRUCTION	Main Contractor, ECO, ELO	Monthly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<ul style="list-style-type: none"> • Any finds must be reported to the nearest National Monuments office to comply with the National Heritage Resources Act • Local museums as well as the South African Heritage Resource Agency (SAHRA) should be informed if any artefacts are uncovered in the affected area. • The contractor must ensure that his workforce is aware of the necessity of reporting any possible historical or archaeological finds to the ECO so that appropriate action can be taken. • Any discovered artefacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the South African Heritage Resources Association (SAHRA) should the proposed site affect any world heritage sites or if any heritage sites are 		

	<p>to be destroyed or altered.</p> <ul style="list-style-type: none">• Should any archaeological sites be uncovered during construction, their existence shall be reported to the Contractor and the ECO immediately.		
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7. ENVIRONMENTAL MANAGEMENT PLAN: OPERATIONAL PHASE

Table 7.1: Construction site decommissioning

IMPACT	CONSTRUCTION SITE DECOMMISSIONING	RESPONSIBILITY	FREQUENCY /MONITORING REQUIREMENTS
PHASE	OPERATION	Main Contractor, Developer, ECO, ELO	Weekly
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<p><i>Removal of equipment</i></p> <ul style="list-style-type: none"> • All structures comprising the construction camp are to be removed from site. • The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc, and these should be cleaned up. • All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines as set out in the section on Flora and Fauna that forms part of this document. 		

IMPACT	CONSTRUCTION SITE DECOMMISSIONING	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>services.</p> <p>A copy of all way bridge certificates from waste disposed are to be presented to the ECO.</p> <ul style="list-style-type: none"> • Temporary roads must be closed and access across these blocked. • All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO. <p><i>Associated infrastructure</i></p> <ul style="list-style-type: none"> • Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the Engineer. • All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. • All rubble is to be removed from the site to an approved disposal site as approved by the Engineer. Burying of rubble on site is prohibited. • The site is to be cleared of all litter. • The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials. 		

	<ul style="list-style-type: none">• Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless		
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IMPACT	CONSTRUCTION SITE DECOMMISSIONING	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>stipulated otherwise by the Engineer.</p> <ul style="list-style-type: none"> • All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer. • All leftover building materials must be returned to the depot or removed from the site. • The Contractor must repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to, damage caused by poor storm water management. <p><i>Borrow pits</i></p> <ul style="list-style-type: none"> • Borrow pits are to be closed and rehabilitated. 		

Table 7.2: Water management

IMPACT	WATER MANAGEMENT	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	OPERATION	Developer	Bi-Annually
ENVIRONMENTAL MANAGEMENT PLAN			
<p>MITIGATION / METHOD STATEMENT</p>	<p><i>Surface water</i></p> <ul style="list-style-type: none"> • Correct drainage of the site should ensure that contaminants do impact upon surface water. No sensitive surface water features are present on the site. <p><i>Management</i></p> <ul style="list-style-type: none"> • Management must ensure that solid waste collection and sanitation is managed effectively in order to avoid any chances of ground and surface water pollution. • All runoff water from fuel deposits, workshops, vehicles washing areas and other equipment must be collected and directed through oil traps to settlement ponds. These ponds must be suitably lined. • All water discharged from the works including effluent from wash water and stormwater from workshops and refuelling areas, as well as all runoff from areas with pollution potential will comply with national effluent standards. 		

	<ul style="list-style-type: none">• All chemical/hydrocarbon storage areas must be banded. This		
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IMPACT	WATER MANAGEMENT	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>bund water must be removed from site by a licensed contractor.</p> <ul style="list-style-type: none"> • All plant and chemical usage areas must be paved. • Potentially contaminated water must be directed to an oil/water separator. Oily water must be removed from the site by a licensed contractor. • Any run-off that is discharged from the site must be uncontaminated. • All vehicle transfers of materials must be conducted within a bunded area to minimise the potential for spills to enter the stormwater. • Spills of potential contaminants must be immediately cleaned up and neutralised. Such spills must be handled with consideration to health and safety considerations. • The use of water to clean up spills must be avoided except where absolutely necessary. • Movement of vehicles on and off site is to be through approved access points only. • Spill kits must be made available on site for the clean up of spills and leaks of contaminants. • Spill response procedures to include removal/disposal of 		

	potentially contaminated water and any used absorbent materials.		
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IMPACT	WATER MANAGEMENT	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • In the event of a major spill or leak of contaminants, the administering authority must be contacted immediately as per incident reporting procedures. • No ground water or surface water must be polluted by any activities on site. <p>Stormwater</p> <ul style="list-style-type: none"> • Any rehabilitation undertaken or future development should ensure that stormwater flows do not cause erosion to water courses in close proximity to the CSP plant and associated infrastructure. Accordingly excessive stormwater flows should not be directed into water courses. <p>Roads</p> <ul style="list-style-type: none"> • No roads related to operational maintenance of the site should be constructed through watercourses. <p>Monitoring and Reporting</p>		

IMPACT	WATER MANAGEMENT	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>project. The existence of these boreholes will assist in the early detection of any leakage of contaminants into the groundwater system.</p> <ul style="list-style-type: none"> • The optimum drilling positions for these boreholes must be selected by a professional hydrogeologist. It is important that the topographic setting, possible geological structures, etc, are considered during this phase • Groundwater levels can be measured on a monthly basis and initial water quality samples can be collected and analysed for reference purposes. Thereafter on-going sampling of groundwater can be conducted on quarterly basis. The chemical analysis of water must include the following determinants: pH; Conductivity; Calcium (Ca); Magnesium (Mg); Sodium (Na); Potassium (K); Bicarbonate (HCO₃²⁻); Chloride (Cl); Sulphate, SO₄;Nitrate(NO),Iron(Fe) 		

Table 7.3: Air quality

IMPACT	AIR QUALITY	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	OPERATION	Developer	Annually
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<p><i>Dust management</i></p> <ul style="list-style-type: none"> • Dust control mechanisms must be utilised to reduce the amount of dust being released. • Any dirt roads that are utilised by the contractor to access the site must be regularly maintained to ensure that dust levels are controlled. • The CSP plant's equipment must be performance tested during the commissioning phase to ensure that the manufacturer's standard has been delivered in respect of air emissions. 		

Table 7.4: Fauna

IMPACT	FAUNA	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	OPERATION	Developer	Annually
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<p><i>Fauna management</i></p> <ul style="list-style-type: none"> • A monitoring programme must be developed to monitor the impacts of the construction of the solar plant on Avifauna. • Monitor the movement of small and medium size mammals through fences. In the event that an animal becomes trapped within the facility, procedures need to be developed in order to facilitate their removal. 		

Table 7.5: Noise

IMPACT	NOISE	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>into the system.</p> <ul style="list-style-type: none"> • The design process is to consider, inter alia, the following aspects: <ul style="list-style-type: none"> a. The position and orientation of buildings on the site. b. The enclosure of noisy plant in buildings where possible and practical. c. The design of the buildings to minimise the transmission of noise from the inside to the outdoors. d. The insulation of particularly noisy plant and equipment. • All plant and equipment, including vehicles, must be properly maintained in order to minimise noise generation. • Observation of on-site noise levels by Safety, Health and Environment Officer. • A complaints register must be held, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon. • Corrective action is required to be undertaken immediately after a complaint is made or non-conformance is identified. 		

	<ul style="list-style-type: none">• Any complaints regarding noise must be investigated, sources identified and mitigation measures implemented. Feedback on resolution of the issue must be provided to the complainant.• The Safety, Health and Environment Officer will maintain an incident reporting system to records nonconformances		
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Table 7.6: Biodiversity

IMPACT	BIODIVERSITY (FAUNA AND FLORA)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	OPERATION	Developer	Monthly in rehabilitation phase, quarterly thereafter
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION / METHOD STATEMENT	<ul style="list-style-type: none"> • Indigenous vegetation must be maintained. • The active control of all alien invasive species by means of manual removal, ring-barking, chemical control or a combination of these methods. • The Developer will: <ul style="list-style-type: none"> • Ensure that a registered pest control operator applies or supervises the application of all herbicides. • Ensure that all herbicides are stored in a well-ventilated demarcated storage area. • Ensure that a register of all contents of the storage area is kept and updated on a regular basis. 		

IMPACT	BIODIVERSITY (FAUNA AND FLORA)	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Ensure that a daily register of all relevant details of herbicide usage is kept, and that such a register is maintained by the Developer. • All emergent seedlings must be removed by hand and re-sprouting from existing rootstock must be chemically treated in a continual monitoring and follow-up programme. • Implementation of a site rehabilitation and landscaping program. • Where possible re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. • Vegetative re-establishment shall, as far as possible, make use of indigenous or locally occurring plant varieties within a 20m radius of the site. • Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas during and following rehabilitation. • No faunal species must be harmed by maintenance staff during any routine maintenance at the site. 		

	<ul style="list-style-type: none">• Appropriate mitigation of bird collisions with trough mirrors need to be confirmed on an ad hoc basis through regular monitoring		
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Table 7.7: Waste management

IMPACT	WASTE MANAGEMENT	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	OPERATION	Developer	Monthly when conduction / and or maintenance is required
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<p><i>Waste management (if this is required on the site)</i></p> <ul style="list-style-type: none"> • Solid waste separation and recycling should take place for the duration of the operational phase for the development. • All structures and/or components replaced during maintenance activities are appropriately disposed of at an appropriate licensed waste disposal site or sold to a recycling merchant for recycling. • Ensure that care is taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation. • Waste handling, collection and disposal operations are managed and controlled by a waste management contractor • Wastewater: 		

	<ul style="list-style-type: none">• Water from bunds and oily water from oil/water separator must		
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	<p>be removed by a licensed contractor.</p> <ul style="list-style-type: none"> • Waste – Leaked oil and chemicals: <ul style="list-style-type: none"> • Appropriate disposal must be arranged with a licensed facility. • Waste must be stored and handled according to the relevant legislation and regulations. • General Waste: <ul style="list-style-type: none"> • Recycled where possible or disposed of properly to an appropriate landfill facility. • Hazardous Waste: <ul style="list-style-type: none"> • Separate hazardous and general waste and dispose hazardous waste to an appropriate hazardous waste disposal site. • Uncontaminated waste must be removed at least monthly for disposal. • Contaminated or regular wastes must be disposed of as necessary and in accordance with legislation. • An incident/complaint register must be established and maintained. • Visual inspection of the site must be carried out daily for evidence of litter or waste material that has been 		
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	<p>inappropriately disposed of by site personnel</p> <ul style="list-style-type: none">• Waste collection must be monitored on a regular basis• Waste documentation must be completed and available for inspection on request• A complaints register must be maintained, in which any		
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	<p>complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.</p> <p>16. Weekly and monthly reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the Safety, Health and Environment Officer. All appropriate waste disposal certificates accompany the monthly reports.</p>		
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Table 7.8: Health and safety

IMPACT	HEALTH AND SAFETY	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	OPERATION	Developer	Daily
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<p><i>Emergency evacuation plan</i></p> <ul style="list-style-type: none"> • Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency. • All permanent staff must undergo safety training. <p><i>Maintenance</i></p> <ul style="list-style-type: none"> • The water pipeline and powerline is to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept. <p><i>Fire safety</i></p> <ul style="list-style-type: none"> • Fire fighting equipment in the form of fire hydrants or fire extinguishers must be available on the site. These must be regularly maintained by an appropriate company. 		

	<p><i>Storage and handling and management of hazardous materials</i></p> <ul style="list-style-type: none">• Management strategies/operational procedures for the routine		
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IMPACT	HEALTH AND SAFETY	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<p>monitoring and inspection of fuel tanks, and other fuel related equipment will be compiled and implemented.</p> <ul style="list-style-type: none"> • The storage of flammable and combustible liquids such as oilswill comply with the relevant legislation. • The storage and handling of corrosive substances must be in accordance with the relevant legislation • The minimum amount of fuel required for efficient operation ofthe facility must be stored on site. • Any spills will be rendered harmless and arrangements made for appropriate collection and disposal, including cleaning materials, absorbents and contaminated solid in accordance with this EMP • Ensure that spill kits are available on site to clean up spills and leaks. • Obtain any permits and approvals necessary and comply withthe conditions attached to such permits ad approvals • Transport of all hazardous substances must be in accordancewith the relevant legislation. • Identify and maintain a register of all activities that involve the handling of potentially hazardous substances, as well as devise 		

	<p>and supervise the implementation of protocols for the handling of these substances. This will include all fuels, oils, lubricants and grease.</p>		
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IMPACT	HEALTH AND SAFETY	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Ensure that all hazardous substances are handled in accordance with the manufacturer’s specifications and relevant legal requirements. • Store all hazardous substances in a manner prescribed in the relevant Acts and Regulations (e.g. in a well-ventilated area). • Arrange and supervise the implementation of clean up operations and proper disposal of contaminated materials at a licensed hazardous waste disposal site. • Keep written records detailing the type of spill, the corrective and remedial measures implemented in the stopping or reduction of the spill, and the clean up of the spill. Such progress reporting is important for monitoring and auditing purposes and the written reports may afterwards be used for training purposes in an effort to prevent similar future occurrences. • All such tanks to be designed and constructed in accordance with a recognised code (international standard). • The rated capacity of tanks must provide sufficient capacity to permit expansion of the product contained therein by the rise in temperature during storage. 		

	<ul style="list-style-type: none">• Tanks must be situated in a bunded area the volume of which must be at least 110% of the proposed volume of the tank.• The floor of the bunded area must be smooth and impermeable, constructed of concrete or plastic sheeting with impermeable joints with a layer of sand over to prevent perishing. The floor of the bunded area will be sloped towards an oil trap or sump to enable any spilled fuel and/or fuel – soaked water to be removed		
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IMPACT	HEALTH AND SAFETY	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • The fuel delivery area must be bunded and an interceptor system or similar structure must be installed, with all drainage directed to an oil water separator. This will allow for the removal of free product from any surface run-off or spillages. The interceptor system must contain a holding tank that is used to contain any free product recovered. Free product must be removed from this separator, stored in a holding tank, and recycled or disposed of in an appropriate manner. • Internationally approved non-corrosive pipework systems must be installed (approved codes). • Antiflash nozzles must be installed at the end of the vent pipes and provisions must be made for overfill protection devices in the tank filling pipes to prevent tank overfills during filling operations. • Fuel must be dispensed via a system that has suitable leak detectors linked to the fuel lines if and where required. These leak detectors must form an integral part of the pumping system and allow for automatic cut-off of the fuel supply must a leak be detected. 		

IMPACT	HEALTH AND SAFETY	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
	<ul style="list-style-type: none"> • Any water that collects in the bund must not be allowed to stand and must be removed and the hydrocarbon digestion agent within must be replenished. • Spill and emergency response equipment must be accessible at chemical transfer/unloading points and refueling locations. • Bunds and storage facilities must be maintained to ensure design capacity is available. • Water which ponds within the bunded areas must be pumped to the oil/water separator as soon as possible after rain events cease. • Observation and supervision of chemical storage and handling practices and vehicle maintenance by the Safety, Health and Environment Officer throughout the CSP plant's operational phase. • Inspection of bunding integrity, stability and function. <p><i>Hazard and Risk</i></p> <ul style="list-style-type: none"> • All monitoring will occur according to the risk management and emergency response plan, guidelines and license conditions. 		

	<ul style="list-style-type: none">• A complaints register must be maintained, in which any complaints from the community must be logged.• Complaints must be investigated and, if appropriate, acted upon		
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Table 7.9: Visual impact

IMPACT	VISUAL IMPACT	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	OPERATION	Developer	Annually
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<ul style="list-style-type: none"> • The CSP plant and its unique technology has the potential of becoming a tourist attraction. It is therefore recommended that the exterior design in terms of buildings, fences and landscaping be planned in such a way that it will not deter travellers from visiting the site. • All lighting where practical, must be “down” to minimise the visual impact of the facility at night. Lighting must be directed towards the areas they are suppose to illuminate. • Use of light fixtures and the fitment of covers and shields designed to contain rather than spread light where practical The minimum amount of lighting must be used. • If a visually intrusive component of the site is identified, the procedures must be altered or updated to ensure effective management. • An incident reporting system will record and manage follow up of resolution of non-conformances. 		

Table 7.10: Traffic and access

IMPACT	TRAFFIC AND ACCESS	RESPONSIBILITY	FREQUENCY / MONITORING REQUIREMENTS
PHASE	OPERATION	Developer	Daily
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	<ul style="list-style-type: none"> • All drivers will be in possession of an appropriate valid driver’s license. • All maintenance vehicles travelling on public roads will adhere to the specified speed limits. • Moderate speeds will be employed and adhered to on all roads within the CSP plant area. • The movement of all vehicles will be controlled such that they remain on designated routes. • No member of the workforce will be permitted to drive a vehicle under the influence of alcohol or narcotic substances. • No deviation from approved access roads or transportation routes will be allowed. • Appropriate security measures must be established with regards to access into the CSP plant. • During fuel tanker delivery, the tanker driver and adequately qualified staff must be present at all times during product offloading. 		

8. ENVIRONMENTAL MANAGEMENT PLAN: DECOMMISSIONING PHASE

At this stage the date of decommissioning of the pipeline is not known and is unlikely to occur within 25 - 30 years of the commencement of plant operations. The mitigation measures mentioned below are thus very generic and will be refined once the said activity is required.

Table 8-1: Decommissioning mitigation measures

IMPACT	GENERIC DECOMMISSIONING MITIGATION MEASURES	RESPONSIBILITY	FREQUENCY /MONITORING REQUIREMENTS
PHASE	DECOMMISSIONING	Developer	Weekly for the duration of decommissioning
ENVIRONMENTAL MANAGEMENT PLAN			
MITIGATION	It is not anticipated that there will be any impacts during this phase.		
