

## 6.5 Discussion

From the impact assessment conducted, we deduced that the proposed development of Nambaza Service Station is suitable for the site assessed. None of the adverse impacts that were identified are regarded as impacts that cannot be mitigated to acceptable levels. The benefits of the proposed development outweigh any negative impacts identified, therefore, the no-go option was also discounted and thus omitted from discussion. It is clear that most of the SHES impacts identified can be mitigated to acceptable standards.

A summary of the main SHES impacts may be summarised as follow:

- If the proposed development is managed appropriately the Nambaza Service Station could have a significant impact on the socio-economic environment and could even have a positive impacts on the socio-economic environment; including improved visual impacts, economic benefits, skills development and indirect economic impacts from additional traffic. If measured over the long term it is expected that the development will outweigh the negative socioeconomic aspects.
- The biophysical environment will mostly be affected by construction activities that could result in excessive noise and dust, however during operation, we expect waste and noise to be generated.
- The geotechnical and geo-hydrological aspects of the study area are regarded as the most sensitive. The soils of the study area are very permeable and the corrosiveness of the soil also contributes to such sensitivities that must be taken into consideration.
- In terms of safety and health, most impacts are associated with operations and employee safety. These impacts are however not major.
- The proposed development will have a positive impact on the economy due to temporary employment opportunities. It will also have a positive impact on the social environment as there will be visible investment from the private sector within this undeveloped area.

Moving on, the development should now be planned, constructed and operated in strict accordance with the mitigation measures and an Environmental Management Plan (EMP) which must adhere to any and all requirement of any authorizations issued for the proposed development. The EMP is developed in the next Chapter.

## 7 ENVIRONMENTAL MANAGEMENT

This section outlines how the HSES Impacts identified and assessed in Section 6 can be incorporated and managed in the planning and design phases of the proposed Nambaza service station at Onankali village. It forms part of the Environmental Management Plan (EMP) wherein the HSES impact mitigation measures are proposed and considered. The EMP is structured so as to provide its various intended recipients (Developer, ER, consulting engineers and contractors) with mitigation measures immediately applicable to their respective scopes of work. The management requirements for the various recipients carrying out work for this project are divided according to the main project phases.

### 7.1 Planning and Design

During the phases of planning for future operations, construction and decommissioning of the facility, it is the responsibility of proponent to ensure they are and remain compliant with all legal requirements. The proponent must also ensure that all required management measures are in place prior to and during all phases, to ensure potential impacts and risks are minimized.

The following actions are recommended for the planning phase and should continue during various other phases of the project:

- Ensure that all necessary permits from the various ministries, local authorities and any other bodies that governs the construction (maintenance) activities and operations of the project remains valid.
- Ensure all appointed contractors and employees enter into an agreement which includes the EMP.
- Ensure that the contents of the EMP are understood by the contractors, subcontractors, employees and all personnel present or who will be present on site.
- Make provisions to have a Health, Safety and Environmental Coordinator to implement the EMP and oversee occupational health and safety as well as general environmental related compliance at the site.
- Furthermore, have the following emergency plans, equipment and personnel on site where reasonable to deal with all potential emergencies:
  - Risk management / mitigation / EMP/ Emergency Response Plan and HSE Manuals
  - Adequate protection and indemnity insurance cover for incidents;
  - Comply with the provisions of all relevant safety standards; Procedures, equipment and materials required for emergencies.
  - If one has not already been established, establish and maintain a fund for future ecological restoration of the project site should project activities cease and the site is decommissioned, and environmental restoration or pollution remediation is required.
- Establish and / or maintain a reporting system to report on aspects of construction activities, operations and decommissioning as outlined in the EMP.
- Keep monitoring reports on file for submission with environmental clearance certificate renewal applications where needed.
- Appoint a specialist environmental consultant to update the EA and EMP and apply for renewal of the environmental clearance certificate prior to expiry.

### 7.1.1 HSES Impact mitigation strategies

The following general mitigation strategies are recommended for the planning and design phase to reduce identified HSES impacts:

- Locate access routes and other infrastructure to avoid the removal of bigger trees (i.e. *Colophospermum mopane*) as far as possible.
- Design boundary fencing in such a way that small burrowing animals do not enter the project site.
- The intersection of the access road to the service station site must be designed by a professional engineer and submitted to the Roads Authority (RA) for approval. The proponent is required to notify RA well in advance as to when the actual construction phase will begin.
- Buildings must be designed such as to minimise the transmission of noise from the inside to the outdoors. In doing so, ensure that the facility is designed to take into account the maximum allowable equivalent continuous day and night rating levels of the potentially impacted sites outside the project boundary.
- Fuel tanks and fuel dispensers should be designed and installed in line with SABS and the manufacturer's recommendations. Installation should be done with care as damage can occur during installation.
- Ensure landscaping designs prohibits the planting of potentially alien invasive plant species (e.g. *Tecoma stans*, *Pennisetum setaceum*, etc.) for decorative purposes (e.g. around offices, etc.) and incorporates indigenous vegetation (especially the protected species such as *A. Erioloba*, *Albizia anthelmintica*, *B. albitrunca*, *B. foetida*, *Faidherbia albida*, *Parkinsonia africana*, *Ziziphus mucronata*) into the developments as far as possible (e.g. around offices, etc.).

### 7.1.2 Strategies to optimize Socio-Economic Benefits

The following mitigation measures are recommended for the planning and design phase to reduce the impact on the socio-economic aspects.

- The contractor should be required to employ local labour (i.e. from Onankali and surrounding villages) where possible. The requirements for employing local people should be formalised within the contractor's contract. Should a position be offered to non-local person the contractor should be able to prove that no local person qualifies for such a position, through advertising.
- A provision stating that all unskilled labour should be sourced from local communities should be included within tenders concerning the construction and/or maintenance of services infrastructure.
- Provisions promoting gender equality pertaining to recruitment should be included within tender documents concerning the construction and/or maintenance of services infrastructure.
- Women should be given preference for certain unskilled jobs (e.g. flag bearers).
- It is crucial that the project procurement criteria include requirements for training and skills development of the contractor's workforce by the contractor. The training should be able to capacitate the employees to apply for permanent positions during the operations of the solar power facilities.

- The proponent must follow up to ensure that the contractor is indeed following the guidelines as prescribed in this EMP.

## 7.2 Responsibilities

The responsibility for the implementation of the EMP ultimately lies with Namaza Investments cc (the proponent), who is also responsible for the eventual operation of these developments. The implementation of the EMP requires the involvement of several key individuals appointed by the proponent, each fulfilling a different but vital role to ensure sound environmental management during each phase of these developments. The following positions and their respective responsibilities are outlined below:

- Employer's Representative: to manage projects during different phases.
- Environmental Control Officer: to oversee the implementation of EMP
- SHES Officer: Construction and Operations and Maintenance).

### 7.2.1 Employer's Representative (ER)

The ER is appointed by the Developer to manage all contracts for work/services that are outsourced during all development phases. Any official communication regarding work agreements is delivered through this person. The ER should with the commencement of the project appoint a competent ECO who will represent the Developer on-site. He/she will have the responsibility regarding the implementation of this EMP to ensure the necessary legal authorisations have been obtained; and to develop, managing implementation of and maintaining all development.

### 7.2.2 Environmental Control Officer (ECO)

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

- Assisting the ER in ensuring that the necessary legal authorisations have been obtained;
- Maintaining open and direct lines of communication between the ER, Developer, the Construction and/or Operations and Maintenance Contractor, and Interested and Affected Parties (I&APs) with regard to this EMP and matters incidental thereto;
- Monthly site inspection of all construction and/or infrastructure maintenance areas with regard to compliance with this EMP;
- Monitor and verify adherence to the EMP (audit the implementation of the EMP) and verify that environmental impacts are kept to a minimum;
- Be fully conversant with the Environmental Management Plan.

### 7.2.3 Safety Health and Environmental (SHES) Officer

The SHES Officer should be a competent person to oversee safety, health and environmental affairs. He/she has the following responsibilities:

- Convey the contents of this EMP to the contractor and undertake inspection of the site to monitor compliance with the EMP.
- Report any non-compliance or remedial measures that need to be applied to the appropriate environmental authorities, in line with the requirements of the EMP.

- Submitting a report at each site meeting which will document all incidents that have occurred during the period before the site meeting.
- Be fully conversant with the Environmental Management Programme.

### 7.3 Monitoring

A monitoring programme will be in place not only to ensure compliance 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.

The following measures will be incorporated as part of the monitoring programme:

- 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 ECO/s for the duration of the construction phase – the ECO shall undertake this environmental monitoring with the audits considering compliance with the EMP, the EIA conditions, as well as the conditions of any permits and/or licences.
- On-going monitoring is to be undertaken by the Contractors' Environmental Manager/Officer – this will include notification to the ECO and proponent EO should an incident take place.
- External auditing may take place at unspecified times by the authorities and/or other relevant authorities.
- An independent, suitably qualified, auditor will need to be contracted to conduct an audit once the construction phase of the project is completed according to the provisions of the EMP.
- The Contractor's Environmental Officer must undertake regular site inspections (at least twice weekly) to ensure all legislative requirements are adhered to. Proof of such inspections shall be kept on file for ease of reference or for audit purposes.

#### 7.3.1 Contractor

The Contractor is responsible for the implementation of the EMP, on-site monitoring and evaluation of the EMP. It is envisaged that various contractors might be appointed at various periods for various tasks throughout the life cycle (construction through to decommissioning phase) of this project. In order to ensure sound environmental management, the relevant sections of this EMP should be included in all contracts of work outsourced thus legally binding all appointed contractors and sub-contractors.

Furthermore, all contractors shall ensure that adequate environmental awareness training of senior site personnel takes place and that all construction workers and newcomers are inducted on the environmental, health and safety issues related to the project as well as importance and implications of the proposed EMP. The induction process shall be conducted, as far as is possible, in the employees' language of choice. All environmental training sessions, including names, dates and the information presented should be recorded and be kept on site.

### 7.3.2 Environmental Specifications: Awareness, Training and Competence

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 minimisation 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 may typically 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 power station.
- Basic training in the identification of archaeological artefacts, and 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.

Records must be kept of those that have completed the relevant training. Training can be done both in a written or verbal format and in an appropriate language 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. A regular form of written or verbal testing will have to be designed.

### 7.4 The Construction Phase and Construction Mitigation Details

All activities involved in the development phases of the service station have been identified together with all aspects that may have potential impacts. The construction phase of the EMP aims to address environmental and social risk pertaining to the construction phase.

The following table provides the Environmental Management Plan and the EMP Implementation Strategy a large scale overview of all the major environmental management themes pertaining to the project activities.

Table 8: Environmental Management Plan (EMP)

Aspect	Impact	Mitigation	Indicator	Responsible Party
<b>Waste Management Plan</b>	There is a potential environmental contamination and degradation from waste on site.	The Contractor should compile a Waste Management Plan which should address as a minimum the mitigation measures included below	Correct handling of waste	Contractor and ECO
<b>Hazardous waste</b>	Impact on soil and water.	<ul style="list-style-type: none"> <li>All heavy construction vehicles and equipment on site should be provided with a drip tray.</li> <li>The drip trays should be cleaned daily and spillage handled, stored and disposed of as hazardous waste.</li> <li>Maintenance and washing of construction vehicles should be take place only at a designated workshop area.</li> <li>The workshop should have an oil-water separator for collected run-off from washing.</li> <li>Spilled cement and/or concrete (wet or dry) should be treated as hazardous waste and disposed of by the end of each day in the appropriate hazardous waste containers.</li> <li>All hazardous substances (e.g. fuel etc.) or chemicals should be stored in a specific location on an impermeable surface that is bunded.</li> </ul>	Correct handling, use and storage of materials, including hazardous material.	Contractor and ECO
<b>General waste</b>	The incorrect management of solid waste can result in the pollution of soil, groundwater and the general environment. Windblown litter can also contribute to a negative visual impact.	<ul style="list-style-type: none"> <li>The construction site should be kept tidy at all times. All domestic and general construction waste produced on a daily basis should be cleaned and contained daily.</li> <li>No waste may be buried or burned.</li> <li>Waste containers (bins) should be emptied regularly and removed from site to a recognised (municipal) waste disposal site. All recyclable waste needs to be taken to the nearest recycling depot.</li> <li>A sufficient number of separate bins for hazardous and domestic/general waste must be provided on site. These should be clearly marked as such.</li> <li>Construction labourers should be sensitised to dispose of waste in a responsible manner and not to litter.</li> <li>No waste may remain on site after the completion of the project</li> </ul>	Complaints from neighbours. No windblown waste. Contamination of the ground and water resources	Contractor and ECO

<b>Sewage and grey water.</b>	Incorrect management of sewage and grey waste may contaminate the soil, vegetation and underground water resources.	<ul style="list-style-type: none"> <li>• Sewage should not be discharged directly onto open soil.</li> <li>• All sewage must be removed regularly and disposed of at a recognised (municipal) sewage treatment facility.</li> <li>• Grey water that is not recycled should be removed along with sewage on a regular basis.</li> <li>• Separate toilets should be available for men and women and should clearly be indicated as such.</li> <li>• Portable toilets (i.e. easily transportable) should be available at the construction site:</li> <li>• Sewage needs to be removed on a regular basis to an approved municipal) sewage disposal site. Alternatively, sewage may be pumped into sealable containers and stored until it can be removed.</li> <li>• Workers responsible for cleaning the toilets should be provided with latex</li> </ul>	No sewage spills on site. No sewage and grey water pools on site.	ECO
<b>Open Fires</b>	Fire outbreak on communal lands.	No open fires may be made anywhere on site.	No sign of burnt material on site.	Contractor and ECO
<b>Environmental Training of workers</b>	Without proper training the health and safety of workers will be at risk and preventable environmental impacts could occur.	All construction workers are to undergo environmental induction (training) which should include as a minimum the following: <ul style="list-style-type: none"> <li>• Discussion of the potential environmental impacts of construction activities.</li> <li>• Employees' roles and responsibilities, including emergency preparedness.</li> <li>• Explanation of the mitigation measures that must be implemented when particular work groups carry out their respective activities.</li> </ul>	All employees adhere to the mitigation measures provided in this document.	MET and proponent
<b>Communication</b>	Inability to communicate the Environmental obligations effectively to responsible parties can result in unnecessary environmental degradation.	To ensure that the construction activities do not result in avoidable impacts on the environment by anticipating and managing the impacts. <ul style="list-style-type: none"> <li>• All site instructions pertaining to environmental matters issued by the Contractor are to be copied to the ECO.</li> <li>• All sub-contractors, employees, suppliers or agents etc. must be fully aware of the environmental management requirements detailed in this EMP.</li> <li>• Have a copy of the EMP and ECC available on site at all times for reference purposes.</li> </ul>	The ECO is aware of decisions taken by the engineer and contractors. All relevant stakeholders are kept in the loop of all activity taking place on site.	ECO, Contractor and proponent



<b>Socio-economic impact</b>	<p>The activity could benefit local Communities through job creation, however negative impacts are also possible and must be controlled.</p>	<p>Adhere to the legal provisions in the Labour Act (see Table 1) for the recruitment of labour (target percentages for gender balance, optimal use of local labour and SME's, etc.) in the Contract. The Contractor should compile a formal recruitment process including the following provisions as a minimum:</p> <ul style="list-style-type: none"> <li>• Recruitment should not take place at construction sites.</li> <li>• Ensure that all sub-contractors are aware of recommended recruitment procedures and discourage any recruitment of labour outside the agreed upon process.</li> <li>• Contractors should give preference in terms of recruitment of sub-contractors and individual labourers to those who are qualified and from the project area and only then look to surrounding towns.</li> <li>• Clearly explain to all job-seekers the terms and conditions of their respective employment contracts (e.g. period of employment etc.) – make use of interpreters where necessary.</li> </ul>	<p>Contribute to employment and capacity building in the local community. Creating awareness amongst employees and the public.</p>	<p>Contractor and ECO</p>
<b>Heritage Resources</b>	<p>Heritage resources can be impacted on during the site clearance, earthworks and the construction of the facility.</p>	<p>Should a heritage site or archaeological site be uncovered or discovered during the construction phase of the project, a “chance find” procedure should be applied in the order they appear below:</p> <ul style="list-style-type: none"> <li>• If operating machinery or equipment stop work;</li> <li>• Demarcate the site with danger tape;</li> <li>• Determine GPS position if possible;</li> <li>• Report findings to the construction foreman;</li> <li>• Report findings, site location and actions taken to superintendent;</li> <li>• Cease any works in immediate vicinity;</li> <li>• Visit site and determine whether work can proceed without damage to findings;</li> <li>• Determine and demarcate exclusion boundary;</li> <li>• Site location and details to be added to the project's Geographic Information System (GIS) for field confirmation by archaeologist;</li> <li>• Inspect site and confirm addition to project GIS;</li> <li>• Advise the National Heritage Council (NHC) and request written permission to remove findings from work area; and</li> </ul>	<p>No heritage artefacts are disturbed or destroyed on site and the NHC is informed should any heritage artefacts be discovered on site.</p>	<p>ECO, Proponent and Contractor</p>

		<ul style="list-style-type: none"> <li>Recovery, packaging and labelling of findings for transfer to National Museum.</li> <li>Should human remains be found, the following actions will be required: <ul style="list-style-type: none"> <li>Apply the chance find procedure as described above;</li> <li>Schedule a field inspection with an archaeologist to confirm that remains are human;</li> <li>Advise and liaise with the NHC and Police; and</li> <li>Remains will be recovered and removed either to the National Museum or the National Forensic Laboratory.</li> </ul> </li> </ul>		
<b>Ecological conservation</b>	Constructing the facility may have impacts on the fauna and flora. Additional pylon infrastructure to the substation areas is expected to be detrimental to larger avian species – i.e. potentially increase collision rates. Destruction of vertebrate fauna. Destruction of unique flora and special habitats	<p>To prevent unnecessary disturbance to natural flora and fauna:</p> <ul style="list-style-type: none"> <li>Prevent and discourage the setting of snares (poaching), illegal collecting of veld foods (e.g. tortoises, etc.), indiscriminate killing of perceived dangerous species (e.g. snakes, etc.) and the collection of wood in and surrounding the project area.</li> <li>Initiate a policy of capture, removal and relocation of fauna (e.g. slow moving species such as tortoises and chameleon) encountered serendipitously within the</li> <li>Avoid off-road driving and unnecessary nocturnal driving in the area.</li> <li>Prevent and discourage the setting of snares (poaching), illegal collecting of veld foods (e.g. tortoises, etc.), indiscriminate killing of perceived dangerous species (e.g. snakes, etc.) and the collection of wood in and surrounding the project area.</li> <li>Initiate a policy of capture, removal and relocation of fauna (e.g. slow moving species such as tortoises and chameleon) encountered serendipitously within the Avoid the removal of bigger trees (especially protected species – i.e. <i>Clospherpemum mopani</i> [Forestry Ordinance No. 37 of 1952) – during the construction phase(s) – including the development of access routes and other infrastructure developments.</li> <li>Prevent planting of potential alien species of plants.</li> </ul>	<p>No animals are injured.  No setting of snares  No employees enter the no-go areas.  No alien vegetation establishment.  Implement speed limits and temporary speed humps.  No off-road driving  No setting of fires  Establish an appropriate refuse removal policy.  No domestic pests on site</p>	ECO and Contractor
<b>Topsoil</b>	Top soil may be	To minimise the erosion of topsoil:	All topsoil	ECO and

	removed during the site preparation and excavation process, which could lead to land degradation.	<ul style="list-style-type: none"> <li>When excavating, topsoil should be stockpiled in a demarcated area.</li> <li>Stockpiled topsoil should be used to rehabilitate the nearest borrow area (existing borrow pits), if such an area is located less than 20 km from the stockpile eg. Sand pits in the Onankali area.</li> </ul>	removed is rehabilitated to its natural state at the end of the construction operations.	Contractor
<b>Stormwater runoff, erosion, and pollution of surface water and groundwater resources</b>	Contamination of stormwater runoff can impact on the surface and groundwater resources. The mismanagement of stormwater can furthermore result in erosion	<ul style="list-style-type: none"> <li>Prevent storm water from eroding the land and becoming contaminated.</li> <li>Should construction activities for the proposed infrastructure need to take place within the drainage features (i.e. linear development including roads and transmission lines) this must transect the streams at right angles and be limited as far as possible to ensure minimum disturbance of such areas.</li> <li>Demarcate a 100 m no-go zone from ephemeral watercourses during construction to prevent construction activities from occurring near the ephemeral watercourses to prevent further loss of vegetation, erosion and watercourse sedimentation.</li> <li>Any disturbed areas must be rehabilitated as Rubble, sand and waste material resulting from the construction activities must be cleared up but not disposed in any stream or drainage channels as it will impede on the flow in these channels.</li> <li>The abstraction of groundwater must be properly controlled within a prescribed water demand management plan and as required by the licence conditions.</li> <li>A critical groundwater level must be determined and the groundwater table must be maintained above such critical levels during water abstraction periods.</li> </ul>	Stormwater not contaminated by construction activities. Stormwater control measures are effective at regulating runoff from the site and erosion channels do not develop. Freshwater ecosystems are not unduly disturbed by construction activities within the drainage channels.	Contractor and ECO
<b>Traffic</b>	During the construction phase, it is expected that there will be regular movement of vehicle to and from the site for transportation of	To ensure that increased traffic volume is managed efficiently to minimise associated impacts: <ul style="list-style-type: none"> <li>Demarcate roads clearly.</li> <li>Off-road driving should not be allowed.</li> <li>All vehicles that transport materials to and from the site must be roadworthy.</li> <li>Drivers that transport materials should have a valid driver's</li> </ul>	Traffic is orderly, free flowing and controlled.	Contractor

	workers and materials.	<p>license and should adhere to all traffic rules.</p> <ul style="list-style-type: none"> <li>• Loads upon vehicles should be properly secured to avoid items falling off the vehicle.</li> <li>• Access road entrances must be demarcated, both at their exit point from existing roads and the entry point to the site.</li> <li>• Erect signage to warn motorists about construction activities and heavy vehicle movement where appropriate.</li> </ul>		
<b>Dust</b>	Dust generated from materials handling, roads and stockpiles can become a nuisance to neighbouring landowners.	<p>To avoid nuisance impacts caused by dust as far as possible:</p> <ul style="list-style-type: none"> <li>• A watering truck should be used on gravel roads with the most heavy vehicle movement especially during dry and windy conditions.</li> <li>• However, due consideration should be given to water restrictions during times of drought.</li> </ul>	No complaints received from public and or site staff.	Contractor and ECO
<b>Noise</b>	The increase in traffic and operation of equipment such as welding and fixing of the racks may result in noise becoming a nuisance.	<p>To ensure that noise from the construction activities do not exceed unacceptable levels:</p> <ul style="list-style-type: none"> <li>• Work hours should be restricted to between 08h00 and 17h00 where construction involving the use of heavy equipment, power tools and the movement of heavy vehicles is less than 500 m from residential areas. If an exception to this provision is required, all residents within the 500 m radius should be given 1 week's written notice.</li> <li>• Workers will be required to wear ear protecting devices whenever possible.</li> <li>• If the contractor needs to undertake activities outside the hours above, the residential and community receptors within audible range of the activity must be notified within 24 hours in advance of the planned activity.</li> </ul>	No noise complaints received.	Contractor and ECO

Table 9: Working Area Mobilization

<i>Aspect</i>	<i>Impact</i>	<i>Mitigation</i>	<i>Indicator</i>	<i>Responsibility</i>
<b>Demarcate the construction site</b>	Without proper demarcation, the public would be able to access the site and would be at risk.	It is of outmost importance to prevent the encroachment of construction areas into surrounding environments.	Proper fencing in place to demarcate the construction	<i>Contractor</i>
<b>Stockpiling of equipment and materials</b>	Incorrect storing of materials can result in water and soil contamination, dust and or erosion. Incorrect storage and handling of materials also pose a risk of environmental contamination and could jeopardise the safety of public / site staff.	<ul style="list-style-type: none"> <li>• Ensure that all materials and equipment handled and stored in a manner that environmental contamination and safety hazards are limited.</li> <li>• The IPP Contractor shall be advised by the Contractor of the housekeeping arrangements including areas intended for the stockpiling of materials.</li> <li>• Implement General Specifications as presented in this document.</li> </ul>	<ul style="list-style-type: none"> <li>• No public complaints or water/ soil contamination</li> <li>• Correct handling, use and storage of materials, including hazardous materials.</li> <li>• No incidents of environmental contamination.</li> <li>• No accidents or incidents related to the handling of materials.</li> </ul>	<i>Contractor and ECO</i>
<b>Ablution facility</b>	The lack of adequate ablution facilities and recess areas can compromise the health of site staff and result in environmental degradation.	To minimise the potential environmental impacts associated with workers on the site: Implement General Specifications	Adequate ablution facilities are in place.	<i>Contractors and ECO</i>
<b>Removal of vegetation</b>	If the removal of vegetation is done incorrectly it may leave the site prone to erosion and compromise rehabilitation requirements post construction.	To ensure that the site is not prone to erosion and any disturbed areas can be rehabilitated as necessary post-construction: Implement General Specifications.	Topsoil conserved in stockpiles for later use if necessary.	Contractor and ECO
<b>Excavations for bulk earthworks</b>	Created embankments (cut and fill) and retaining walls are required to level and stabilise the site. Excavations are also required to accommodate bulk services which might impact on the environment.	To limit the impact to the environment caused by excavations: Implement General Specifications	No heaps of materials left on site after the construction phase.	Contractor and ECO
<b>Removal of Equipment and temporary structures</b>	If the construction site is not decommissioned it can result in environmental degradation	It is very imperative to leave the impacted area in an acceptable state: Implement General Specifications.	The area impacted by the construction activities pose no threat to the environment	Contractor and ECO



## 7.5 Operations and Maintenance

The following mitigation measures should be complied with and carried out during any maintenance works associated with the services infrastructure within the planned development areas.

Table 10: SHES Mitigation during operation and maintenance

Aspect	Mitigation measure
<b>EMP Implementation</b>	If any construction is to be conducted as part of maintenance works for the services infrastructure within the project area reference must be had to the construction mitigation measures of this EMP.
<b>EMP and Procedures</b>	To ensure the operation of the facility does not result in avoidable impacts on the environment, and that any impacts are anticipated and managed. The proponent must appoint a suitably qualified independent ECO to monitor compliance and compile and environmental audit report. This must be coupled to a compliance audit with the provisions contained within the EMP.
<b>Socio-economic impacts</b>	To ensure the operation of the facility maximises positive impacts on the socioeconomic environment, the following must be done: <ul style="list-style-type: none"> <li>• Employ local labour for the operational phase, where possible, and particularly for day to day operations and maintenance.</li> <li>• Where possible encourage the use of local suppliers for procurement of goods, materials and services.</li> <li>• Implement training and capacity building programmes to enhance the ability of local community members to take advantage of available employment opportunities.</li> </ul>
<b>Protection of ecology</b>	To prevent unnecessary disturbance to natural vegetation and fauna. <ul style="list-style-type: none"> <li>• Any alien plants within the site footprint must be immediately controlled to avoid establishment of a soil seed bank.</li> <li>• Control measures must follow established norms and legal limitations in terms of the method to be used and the chemical substances used.</li> <li>• Ensure removal and control of existing invasive alien plant species (i.e. Prosopis sp.) onsite and within the surrounding 6 m wide fire break.</li> </ul>
<b>Stormwater runoff, erosion, and pollution of surface water and groundwater resources.</b>	<ul style="list-style-type: none"> <li>• Prevent stormwater from eroding the land and becoming contaminated.</li> <li>• The areas likely to contribute to contaminated runoff, such as the workshop must be designed to have hardened surfaces equipped with oil and grease traps to capture any contaminated runoff. These must be maintained during operation.</li> <li>• Should storm water infrastructure be required, a management plan must be in place to ensure as a minimum that the structures are visually monitored after large rainfall events to ensure that eroded areas do not develop.</li> <li>• Any refuse generated must be disposed of in suitable bins and removed from site at regular intervals.</li> <li>• Ensure proper groundwater abstraction Management strategies</li> </ul>
<b>Visual impact</b>	To protect the sense of place: Keep access roads clear and keep all lighting minimal, within the requirements of safety and efficiency.
<b>Noise impact</b>	To ensure that noise from the operational activities does not exceed unacceptable levels. <ul style="list-style-type: none"> <li>• All plant, equipment and vehicles must be kept in good repair.</li> <li>• When ordering plant and machinery, manufacturers must be requested to provide details of the sound power level. Where possible, those with the lowest sound power level (most quiet) must be selected.</li> </ul>
<b>Monitoring</b>	The ECO should monitor the implementation of the Property Development EMP: before, during and after construction

Table 8: Environmental Management Plan (EMP)

Aspect	Impact	Mitigation	Indicator	Responsible Party
<b>Waste Management Plan</b>	There is a potential environmental contamination and degradation from waste on site.	The Contractor should compile a Waste Management Plan which should address as a minimum the mitigation measures included below	Correct handling of waste	Contractor and ECO
<b>Hazardous waste</b>	Impact on soil and water.	<ul style="list-style-type: none"> <li>All heavy construction vehicles and equipment on site should be provided with a drip tray.</li> <li>The drip trays should be cleaned daily and spillage handled, stored and disposed of as hazardous waste.</li> <li>Maintenance and washing of construction vehicles should be take place only at a designated workshop area.</li> <li>The workshop should have an oil-water separator for collected run-off from washing.</li> <li>Spilled cement and/or concrete (wet or dry) should be treated as hazardous waste and disposed of by the end of each day in the appropriate hazardous waste containers.</li> <li>All hazardous substances (e.g. fuel etc.) or chemicals should be stored in a specific location on an impermeable surface that is bunded.</li> </ul>	Correct handling, use and storage of materials, including hazardous material.	Contractor and ECO
<b>General waste</b>	The incorrect management of solid waste can result in the pollution of soil, groundwater and the general environment. Windblown litter can also contribute to a negative visual impact.	<ul style="list-style-type: none"> <li>The construction site should be kept tidy at all times. All domestic and general construction waste produced on a daily basis should be cleaned and contained daily.</li> <li>No waste may be buried or burned.</li> <li>Waste containers (bins) should be emptied regularly and removed from site to a recognised (municipal) waste disposal site. All recyclable waste needs to be taken to the nearest recycling depot.</li> <li>A sufficient number of separate bins for hazardous and domestic/general waste must be provided on site. These should be clearly marked as such.</li> <li>Construction labourers should be sensitised to dispose of waste in a responsible manner and not to litter.</li> <li>No waste may remain on site after the completion of the project</li> </ul>	Complaints from neighbours. No windblown waste. Contamination of the ground and water resources	Contractor and ECO

<b>Sewage and grey water.</b>	Incorrect management of sewage and grey waste may contaminate the soil, vegetation and underground water resources.	<ul style="list-style-type: none"> <li>• Sewage should not be discharged directly onto open soil.</li> <li>• All sewage must be removed regularly and disposed of at a recognised (municipal) sewage treatment facility.</li> <li>• Grey water that is not recycled should be removed along with sewage on a regular basis.</li> <li>• Separate toilets should be available for men and women and should clearly be indicated as such.</li> <li>• Portable toilets (i.e. easily transportable) should be available at the construction site:</li> <li>• Sewage needs to be removed on a regular basis to an approved municipal) sewage disposal site. Alternatively, sewage may be pumped into sealable containers and stored until it can be removed.</li> <li>• Workers responsible for cleaning the toilets should be provided with latex</li> </ul>	No sewage spills on site. No sewage and grey water pools on site.	ECO
<b>Open Fires</b>	Fire outbreak on communal lands.	No open fires may be made anywhere on site.	No sign of burnt material on site.	Contractor and ECO
<b>Environmental Training of workers</b>	Without proper training the health and safety of workers will be at risk and preventable environmental impacts could occur.	<p>All construction workers are to undergo environmental induction (training) which should include as a minimum the following:</p> <ul style="list-style-type: none"> <li>• Discussion of the potential environmental impacts of construction activities.</li> <li>• Employees' roles and responsibilities, including emergency preparedness.</li> <li>• Explanation of the mitigation measures that must be implemented when particular work groups carry out their respective activities.</li> </ul>	All employees adhere to the mitigation measures provided in this document.	MET and proponent
<b>Communication</b>	Inability to communicate the Environmental obligations effectively to responsible parties can result in unnecessary environmental degradation.	<p>To ensure that the construction activities do not result in avoidable impacts on the environment by anticipating and managing the impacts.</p> <ul style="list-style-type: none"> <li>• All site instructions pertaining to environmental matters issued by the Contractor are to be copied to the ECO.</li> <li>• All sub-contractors, employees, suppliers or agents etc. must be fully aware of the environmental management requirements detailed in this EMP.</li> <li>• Have a copy of the EMP and ECC available on site at all times for reference purposes.</li> </ul>	The ECO is aware of decisions taken by the engineer and contractors. All relevant stakeholders are kept in the loop of all activity taking place on site.	ECO, Contractor and proponent



<b>Socio-economic impact</b>	<p>The activity could benefit local Communities through job creation, however negative impacts are also possible and must be controlled.</p>	<p>Adhere to the legal provisions in the Labour Act (see Table 1) for the recruitment of labour (target percentages for gender balance, optimal use of local labour and SME's, etc.) in the Contract. The Contractor should compile a formal recruitment process including the following provisions as a minimum:</p> <ul style="list-style-type: none"> <li>• Recruitment should not take place at construction sites.</li> <li>• Ensure that all sub-contractors are aware of recommended recruitment procedures and discourage any recruitment of labour outside the agreed upon process.</li> <li>• Contractors should give preference in terms of recruitment of sub-contractors and individual labourers to those who are qualified and from the project area and only then look to surrounding towns.</li> <li>• Clearly explain to all job-seekers the terms and conditions of their respective employment contracts (e.g. period of employment etc.) – make use of interpreters where necessary.</li> </ul>	<p>Contribute to employment and capacity building in the local community. Creating awareness amongst employees and the public.</p>	<p>Contractor and ECO</p>
<b>Heritage Resources</b>	<p>Heritage resources can be impacted on during the site clearance, earthworks and the construction of the facility.</p>	<p>Should a heritage site or archaeological site be uncovered or discovered during the construction phase of the project, a “chance find” procedure should be applied in the order they appear below:</p> <ul style="list-style-type: none"> <li>• If operating machinery or equipment stop work;</li> <li>• Demarcate the site with danger tape;</li> <li>• Determine GPS position if possible;</li> <li>• Report findings to the construction foreman;</li> <li>• Report findings, site location and actions taken to superintendent;</li> <li>• Cease any works in immediate vicinity;</li> <li>• Visit site and determine whether work can proceed without damage to findings;</li> <li>• Determine and demarcate exclusion boundary;</li> <li>• Site location and details to be added to the project's Geographic Information System (GIS) for field confirmation by archaeologist;</li> <li>• Inspect site and confirm addition to project GIS;</li> <li>• Advise the National Heritage Council (NHC) and request written permission to remove findings from work area; and</li> </ul>	<p>No heritage artefacts are disturbed or destroyed on site and the NHC is informed should any heritage artefacts be discovered on site.</p>	<p>ECO, Proponent and Contractor</p>

		<ul style="list-style-type: none"> <li>Recovery, packaging and labelling of findings for transfer to National Museum.</li> <li>Should human remains be found, the following actions will be required: <ul style="list-style-type: none"> <li>Apply the chance find procedure as described above;</li> <li>Schedule a field inspection with an archaeologist to confirm that remains are human;</li> <li>Advise and liaise with the NHC and Police; and</li> <li>Remains will be recovered and removed either to the National Museum or the National Forensic Laboratory.</li> </ul> </li> </ul>		
<b>Ecological conservation</b>	<p>Constructing the facility may have impacts on the fauna and flora. Additional pylon infrastructure to the substation areas is expected to be detrimental to larger avian species – i.e. potentially increase collision rates.</p> <p>Destruction of vertebrate fauna.</p> <p>Destruction of unique flora and special habitats</p>	<p>To prevent unnecessary disturbance to natural flora and fauna:</p> <ul style="list-style-type: none"> <li>Prevent and discourage the setting of snares (poaching), illegal collecting of veld foods (e.g. tortoises, etc.), indiscriminate killing of perceived dangerous species (e.g. snakes, etc.) and the collection of wood in and surrounding the project area.</li> <li>Initiate a policy of capture, removal and relocation of fauna (e.g. slow moving species such as tortoises and chameleon) encountered serendipitously within the</li> <li>Avoid off-road driving and unnecessary nocturnal driving in the area.</li> <li>Prevent and discourage the setting of snares (poaching), illegal collecting of veld foods (e.g. tortoises, etc.), indiscriminate killing of perceived dangerous species (e.g. snakes, etc.) and the collection of wood in and surrounding the project area.</li> <li>Initiate a policy of capture, removal and relocation of fauna (e.g. slow moving species such as tortoises and chameleon) encountered serendipitously within the Avoid the removal of bigger trees (especially protected species – i.e. <i>Clospherpemum mopani</i> [Forestry Ordinance No. 37 of 1952) – during the construction phase(s) – including the development of access routes and other infrastructure developments.</li> <li>Prevent planting of potential alien species of plants.</li> </ul>	<p>No animals are injured.</p> <p>No setting of snares</p> <p>No employees enter the no-go areas.</p> <p>No alien vegetation establishment.</p> <p>Implement speed limits and temporary speed humps.</p> <p>No off-road driving</p> <p>No setting of fires</p> <p>Establish an appropriate refuse removal policy.</p> <p>No domestic pests on site</p>	ECO and Contractor
<b>Topsoil</b>	Top soil may be	To minimise the erosion of topsoil:	All topsoil	ECO and

	removed during the site preparation and excavation process, which could lead to land degradation.	<ul style="list-style-type: none"> <li>When excavating, topsoil should be stockpiled in a demarcated area.</li> <li>Stockpiled topsoil should be used to rehabilitate the nearest borrow area (existing borrow pits), if such an area is located less than 20 km from the stockpile eg. Sand pits in the Onankali area.</li> </ul>	removed is rehabilitated to its natural state at the end of the construction operations.	Contractor
<b>Stormwater runoff, erosion, and pollution of surface water and groundwater resources</b>	Contamination of stormwater runoff can impact on the surface and groundwater resources. The mismanagement of stormwater can furthermore result in erosion	<ul style="list-style-type: none"> <li>Prevent storm water from eroding the land and becoming contaminated.</li> <li>Should construction activities for the proposed infrastructure need to take place within the drainage features (i.e. linear development including roads and transmission lines) this must transect the streams at right angles and be limited as far as possible to ensure minimum disturbance of such areas.</li> <li>Demarcate a 100 m no-go zone from ephemeral watercourses during construction to prevent construction activities from occurring near the ephemeral watercourses to prevent further loss of vegetation, erosion and watercourse sedimentation.</li> <li>Any disturbed areas must be rehabilitated as Rubble, sand and waste material resulting from the construction activities must be cleared up but not disposed in any stream or drainage channels as it will impede on the flow in these channels.</li> <li>The abstraction of groundwater must be properly controlled within a prescribed water demand management plan and as required by the licence conditions.</li> <li>A critical groundwater level must be determined and the groundwater table must be maintained above such critical levels during water abstraction periods.</li> </ul>	Stormwater not contaminated by construction activities. Stormwater control measures are effective at regulating runoff from the site and erosion channels do not develop. Freshwater ecosystems are not unduly disturbed by construction activities within the drainage channels.	Contractor and ECO
<b>Traffic</b>	During the construction phase, it is expected that there will be regular movement of vehicle to and from the site for transportation of	To ensure that increased traffic volume is managed efficiently to minimise associated impacts: <ul style="list-style-type: none"> <li>Demarcate roads clearly.</li> <li>Off-road driving should not be allowed.</li> <li>All vehicles that transport materials to and from the site must be roadworthy.</li> <li>Drivers that transport materials should have a valid driver's</li> </ul>	Traffic is orderly, free flowing and controlled.	Contractor

	workers and materials.	<p>license and should adhere to all traffic rules.</p> <ul style="list-style-type: none"> <li>• Loads upon vehicles should be properly secured to avoid items falling off the vehicle.</li> <li>• Access road entrances must be demarcated, both at their exit point from existing roads and the entry point to the site.</li> <li>• Erect signage to warn motorists about construction activities and heavy vehicle movement where appropriate.</li> </ul>		
<b>Dust</b>	Dust generated from materials handling, roads and stockpiles can become a nuisance to neighbouring landowners.	<p>To avoid nuisance impacts caused by dust as far as possible:</p> <ul style="list-style-type: none"> <li>• A watering truck should be used on gravel roads with the most heavy vehicle movement especially during dry and windy conditions.</li> <li>• However, due consideration should be given to water restrictions during times of drought.</li> </ul>	No complaints received from public and or site staff.	Contractor and ECO
<b>Noise</b>	The increase in traffic and operation of equipment such as welding and fixing of the racks may result in noise becoming a nuisance.	<p>To ensure that noise from the construction activities do not exceed unacceptable levels:</p> <ul style="list-style-type: none"> <li>• Work hours should be restricted to between 08h00 and 17h00 where construction involving the use of heavy equipment, power tools and the movement of heavy vehicles is less than 500 m from residential areas. If an exception to this provision is required, all residents within the 500 m radius should be given 1 week's written notice.</li> <li>• Workers will be required to wear ear protecting devices whenever possible.</li> <li>• If the contractor needs to undertake activities outside the hours above, the residential and community receptors within audible range of the activity must be notified within 24 hours in advance of the planned activity.</li> </ul>	No noise complaints received.	Contractor and ECO



Table 9: Working Area Mobilization

<i>Aspect</i>	<i>Impact</i>	<i>Mitigation</i>	<i>Indicator</i>	<i>Responsibility</i>
<b>Demarcate the construction site</b>	Without proper demarcation, the public would be able to access the site and would be at risk.	It is of outmost importance to prevent the encroachment of construction areas into surrounding environments.	Proper fencing in place to demarcate the construction	<i>Contractor</i>
<b>Stockpiling of equipment and materials</b>	Incorrect storing of materials can result in water and soil contamination, dust and or erosion. Incorrect storage and handling of materials also pose a risk of environmental contamination and could jeopardise the safety of public / site staff.	<ul style="list-style-type: none"> <li>• Ensure that all materials and equipment handled and stored in a manner that environmental contamination and safety hazards are limited.</li> <li>• The IPP Contractor shall be advised by the Contractor of the housekeeping arrangements including areas intended for the stockpiling of materials.</li> <li>• Implement General Specifications as presented in this document.</li> </ul>	<ul style="list-style-type: none"> <li>• No public complaints or water/ soil contamination</li> <li>• Correct handling, use and storage of materials, including hazardous materials.</li> <li>• No incidents of environmental contamination.</li> <li>• No accidents or incidents related to the handling of materials.</li> </ul>	<i>Contractor and ECO</i>
<b>Ablution facility</b>	The lack of adequate ablution facilities and recess areas can compromise the health of site staff and result in environmental degradation.	To minimise the potential environmental impacts associated with workers on the site: Implement General Specifications	Adequate ablution facilities are in place.	<i>Contractors and ECO</i>
<b>Removal of vegetation</b>	If the removal of vegetation is done incorrectly it may leave the site prone to erosion and compromise rehabilitation requirements post construction.	To ensure that the site is not prone to erosion and any disturbed areas can be rehabilitated as necessary post-construction: Implement General Specifications.	Topsoil conserved in stockpiles for later use if necessary.	Contractor and ECO
<b>Excavations for bulk earthworks</b>	Created embankments (cut and fill) and retaining walls are required to level and stabilise the site. Excavations are also required to accommodate bulk services which might impact on the environment.	To limit the impact to the environment caused by excavations: Implement General Specifications	No heaps of materials left on site after the construction phase.	Contractor and ECO
<b>Removal of Equipment and temporary structures</b>	If the construction site is not decommissioned it can result in environmental degradation	It is very imperative to leave the impacted area in an acceptable state: Implement General Specifications.	The area impacted by the construction activities pose no threat to the environment	Contractor and ECO



## 7.5 Operations and Maintenance

The following mitigation measures should be complied with and carried out during any maintenance works associated with the services infrastructure within the planned development areas.

Table 10: SHES Mitigation during operation and maintenance

Aspect	Mitigation measure
<b>EMP Implementation</b>	If any construction is to be conducted as part of maintenance works for the services infrastructure within the project area reference must be had to the construction mitigation measures of this EMP.
<b>EMP and Procedures</b>	To ensure the operation of the facility does not result in avoidable impacts on the environment, and that any impacts are anticipated and managed. The proponent must appoint a suitably qualified independent ECO to monitor compliance and compile and environmental audit report. This must be coupled to a compliance audit with the provisions contained within the EMP.
<b>Socio-economic impacts</b>	To ensure the operation of the facility maximises positive impacts on the socioeconomic environment, the following must be done: <ul style="list-style-type: none"> <li>• Employ local labour for the operational phase, where possible, and particularly for day to day operations and maintenance.</li> <li>• Where possible encourage the use of local suppliers for procurement of goods, materials and services.</li> <li>• Implement training and capacity building programmes to enhance the ability of local community members to take advantage of available employment opportunities.</li> </ul>
<b>Protection of ecology</b>	To prevent unnecessary disturbance to natural vegetation and fauna. <ul style="list-style-type: none"> <li>• Any alien plants within the site footprint must be immediately controlled to avoid establishment of a soil seed bank.</li> <li>• Control measures must follow established norms and legal limitations in terms of the method to be used and the chemical substances used.</li> <li>• Ensure removal and control of existing invasive alien plant species (i.e. Prosopis sp.) onsite and within the surrounding 6 m wide fire break.</li> </ul>
<b>Stormwater runoff, erosion, and pollution of surface water and groundwater resources.</b>	<ul style="list-style-type: none"> <li>• Prevent stormwater from eroding the land and becoming contaminated.</li> <li>• The areas likely to contribute to contaminated runoff, such as the workshop must be designed to have hardened surfaces equipped with oil and grease traps to capture any contaminated runoff. These must be maintained during operation.</li> <li>• Should storm water infrastructure be required, a management plan must be in place to ensure as a minimum that the structures are visually monitored after large rainfall events to ensure that eroded areas do not develop.</li> <li>• Any refuse generated must be disposed of in suitable bins and removed from site at regular intervals.</li> <li>• Ensure proper groundwater abstraction Management strategies</li> </ul>
<b>Visual impact</b>	To protect the sense of place: Keep access roads clear and keep all lighting minimal, within the requirements of safety and efficiency.
<b>Noise impact</b>	To ensure that noise from the operational activities does not exceed unacceptable levels. <ul style="list-style-type: none"> <li>• All plant, equipment and vehicles must be kept in good repair.</li> <li>• When ordering plant and machinery, manufacturers must be requested to provide details of the sound power level. Where possible, those with the lowest sound power level (most quiet) must be selected.</li> </ul>
<b>Monitoring</b>	The ECO should monitor the implementation of the Property Development EMP: before, during and after construction