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**ENVIRONMENTAL MANAGEMENT PLAN (EMP)**



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*FOR THE PROPOSED BITUMEN PROCESSING PLANT PROJECT, WINDHOEK*

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## **PROJECT DETAILS**

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**TITLE: ENVIRONMENTAL MANAGEMENT PLAN FOR THE PROPOSED BITUMEN PROJECT, WINDHOEK, NAMIBIA**

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## DECLARATION

I hereby declare that:

- a. I have the knowledge of and experience in conducting assessments, including knowledge of the Acts, regulations, and guidelines that are relevant to the proposed exploration project.
- b. I have performed the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.



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WINDHOEK, NAMIBIA

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## GLOSSARY

ENVIRONMENT	An interconnected system of natural and human-made elements such as land, water and air; all living organisms and matter arising from nature, cultural, historical, artistic, economic and social heritage and values.
ENVIRONMENTAL MANAGEMENT	A management process which seeks to ensure, as far as possible, that no avoidable impact is caused to the environment and that when this is unavoidable that the consequences are understood prior to the impact being caused and that the impact is then mitigated as far as possible
GROUNDWATER	Water located beneath the earth's surface in soil pore spaces and in the fractures of rock formations
HAZARDOUS WASTE	Waste that poses substantial or potential threats to public health or the environment.
MITIGATION	The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts.
NO-GO AREA	Areas where all construction activities and related matters are prohibited
POLLUTION	Any change in the environment caused by substances, radioactive or other waves; or noise, odors, dust or heat, emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.
REHABILITATION	Restoring the disturbed area to more or less the natural set up
SITE	An area of ground where the Bitumen Processing Plant is developed



## **1. ENVIRONMENTAL MANAGEMENT PLAN**

### **1.1. BACKGROUND**

Project Seven Trading cc is proposing to develop a Bitumen Processing plant in Windhoek, Khomas region. The area under planning is located on Portion L, M, N of Erf 7744, Windhoek North Industrial and it is as zoned "industrial". The proposed area measures about 5823m<sup>2</sup> and it is large enough to accommodate the proposed bitumen processing plant.

In line with the Environmental Management Act No.7 of 2007 and its Environmental Impact Assessment Regulation of 2012, the proposed project cannot be undertaken without an environmental assessment. Therefore, it is required that an environmental assessment is carried out for the proposed project, to ensure the protection of the environment and community members found in that particular vicinity of the proposed project area.

According to the City of Windhoek Environmental structure plan 2004, the study area falls within low environmental sensitivity zone. This means that the environmental consequences of the proposed development in that area are insignificant, however all known environmental and social risks will be minimized and managed through implementing preventative measures and sound management systems.

### **1.2. SUMMARY OF THE PROPOSED ACTIVITIES**

The Bitumen project will consist of a construction and operation phase.

The construction phase of the Bitumen Processing Plant entails:

- Land clearance
- Transporting relevant building material and equipment.
- Installation of associated electrical supply cables.
- Installation of associated water pipelines.
- Installation of associated sewer lines.
- Installation of Tanks
- Installation of storm water management system; and
- Roads construction

The operational phase will entail:

- Operation and maintenance. of the Bitumen Processing Plant and all associated bulk services.

### **1.3. WHAT IS AN EMP**

An Environmental Management Plan (EMP) can be defined as “*an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced*”. EMPs are therefore important tools for ensuring that the management actions arising from Environmental Impact Assessment (EIA) processes are clearly defined and implemented through all phases of the project life-cycle (construction, operation and decommissioning).

### **1.4. OBJECTIVES OF THIS EMP**

Objectives of this EMP are:

- Ensuring compliance with regulatory authority stipulations and guidelines;
- To formulate measures that will mitigate the adverse impacts of the proposed project on various environmental components, which have been identified during the environmental impact assessment.
- To formulate measures to protect environmental resources where possible.
- To formulate measures to enhance the value of environmental components where possible.
- Responding to changes in project implementation not considered in the EIA;
- Responding to unforeseen events; and
- Providing feedback for continual improvement in environmental performance.

### **1.5. SCOPE OF THIS EMP**

To achieve the above objectives, the scope of this EMP will include the followings:

- Definition of the environmental management objectives to be realized during the life of a project (i.e. Construction, operation and/or decommissioning phases) in order to enhance benefits and minimize adverse environmental impacts.
- Description of the detailed actions needed to achieve these objectives, including how they will be achieved, by whom, by when, with what resources, with what monitoring/verification measures, and to what target or performance level.
- Clarification of institutional structures, roles, communication and reporting processes required as part of the implementation of the EMP.
- Description of requirements for record-keeping, reporting, review, auditing and updating of the EMP.

### **1.6. WHAT ARE THE LEGAL IMPLICATIONS AND OBLIGATIONS UNDER THIS PLAN?**

The EMP will be sent to the Directorate of Environmental Affairs (DEA) of the Ministry of Environment, Forestry and Tourism (MEFT) for approval. Once the DEA is satisfied with the contents of the EMP, they will issue an Environmental Clearance Certificate (ECC) to the Proponent to carry out the proposed project. The ECC is linked with the recommendations of the Environmental Management Plan.

Once the ECC is issued, the EMP becomes a legally binding document and each role-player including contractors and sub-contractors are made responsible to implement the relevant sections of the EMP and is required to abide by the conditions stipulated in this document.

### **1.7. TRAINING AND INDUCTION**

PROJECT SEVEN TRADING cc is bound to be responsible for ensuring that environmental awareness education of all employees and contractors is done satisfactorily. PROJECT employees and contractors are made aware of PROJECT SEVEN TRADING cc should ensure that the environmental requirements of the project.

The EMP should form part of the Terms of Reference for all contractors, sub-contractors and suppliers. All contractors, sub-contractors and suppliers will have to sign an agreement to assure that they understood the EMP and that they will comply. All senior staff should familiarise themselves with the full contents of the EMP and its implications. Senior staffs (Foreman/Supervisor) are expected to train and assist the rest of the employees on the contents of the EMP.

#### **1.8. Environmental incident reporting**

All environmental incidents occurring at the proposed site will be recorded. The incident report will have to include time, date, location, and nature of the incident, extent of the incident, actions taken, and personnel involved.

All complaints received from the neighboring community should be directed to the Technical Manager / Environmental Officer of PROJECT SEVEN TRADING CC and channeled to the appointed Environmental officer. PROJECT SEVEN TRADING CC Management should be able to respond to the complainant within a week (even if pending further investigation). It is important that the issues raised are considered and that the complainant feels that their concerns have been addressed to and wherever possible actions taken to address these. All complaints should be entered in the environmental register and all responses and actions taken to address these should be recorded.

#### **1.9. ENVIRONMENTAL MONITORING**

Periodic environmental monitoring must be taken on a regular basis. Monitoring should be done in order to ensure compliance with all aspects of the EMP. Findings should be liaised with to all responsible officers as chain command

## **2. ANTICIPATED ENVIRONMENT IMPACTS AND THEIR MANAGEMENT/ ENHANCEMENT**

### **2.1. POSITIVE IMPACTS**

#### **2.1.1. EMPLOYMENT/JOB CREATION**

Unemployment still hampers most of the developing world and Windhoek is not an exception. The proposed project is likely to increase Job opportunities in Windhoek. The construction phase of the project will provide job opportunities, of which 80% are expected to be unskilled and semi-skilled people.

##### **2.1.1.1. ENHANCEMENT MEASURES FOR EMPLOYMENT/JOB CREATION**

- Where unskilled labor can be used, a 'locals first' policy should be considered by the proponent.
- It is proposed that local people, meaning the community members from Windhoek City, should be employed as far as possible, especially where no specific skills are required.
- The City of Windhoek could be requested to assist with the recruitment of construction workers.
- Both men and women should be granted the opportunity to be employed by this project.

#### **2.1.2. SUPPORT TO LOCAL RETAILERS SHOP**

##### **2.1.2.1. ENHANCEMENT MEASURES FOR SUPPORT TO LOCAL RETAILERS SHOP**

- The proponent and his employees are encouraged to purchase or support local retailers in Windhoek City unless the intended material/product to purchase is not available.

#### **2.1.3. EXPORT TAXES AND VAT PAYMENTS**

Export taxes and VAT payments contribute significantly to the national economic contribution. Thus, without these payments our government will not be able to roll out the project on infrastructure, being it water, road or electricity and also sanitation facilities nationwide.

### **2.1.3.1. ENHANCEMENT MEASURES FOR EXPORT TAXES AND VAT PAYMENTS**

- The proponent and his employees are encouraged to make these payments when applicable to support the economic growth of the country.

## **2.2. NEGATIVE IMPACTS**

### **2.2.1. LIQUID WASTE: USED OIL OR OIL SPILLAGE AND WASTEWATER IMPACT ON GROUND WATER**

#### **2.2.1.1. CONSTRUCTION PHASE**

##### **DESCRIPTION**

Possible Groundwater quality could be impacted through leachate of oil leakages, diesel, lubricants and grease from the heavy-duty equipment, and machinery utilised during construction phase. Care must be taken to avoid contamination of soil and groundwater. Drip trays must be used when removing oil from machinery.

Run-off from overflowing onsite sewage systems might transport the effluent to areas where geological structures are present. Inflow into these structures would cause a pollution thread. The presence of a north- south striking faults close to the project location should be noted and protected at all cost.

There is a slight potential health impact on groundwater users in the area. Potential impact on the natural environment from the polluted groundwater also exists. In general, impact on groundwater due to the construction of the bitumen plant is considered to be minimal through proper management practices

##### **PROPOSED MITIGATION MEASURES**

- Prevent spillages of any chemical or fuel. Use drip trays when doing maintenance on machinery. Maintenance should be done on dedicated areas with linings or concrete floor. No maintenance of machinery may be done at the project location. Implementation of sound and proper management practices

## **2.2.1.2. OPERATIONAL PHASE**

### **DESCRIPTION**

Spillages and/or leakages of various possible contaminants might occur due to failure of reticulation pipelines or storage tanks. Contaminated soil might pose a risk to surface water.

Potential impact on the natural environment from possible polluted groundwater also exists. The area is subjected to north-south structures, which might act as preferential pathways for any contaminants entering the saturated zone.

### **PROPOSED MITIGATION MEASURES**

- The risk can be lowered further through the use of suitable and adequate SANS approved piping material; and installation should be done by certified installers/technicians. All surface spillages and leakages must be cleaned up immediately.
- Proper containment structures should be constructed to avoid any possible leakages. The bund walls should be 110% of the largest tank in the bund.
- The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently.
- Accessibility to spill prevention and response equipment, such equipment should be visible and accessible to all employees at any given time.
- Spills will be cleaned up immediately to the satisfaction of the Regional Manager by removing the spillage together with the polluted soil and by disposing of them at a recognized facility.
- Designated waste collection tanks should be available on-site and away from waterways, and such isolation should be maintained at all times.
- Necessary response teams; such teams should be adequate to respond to possible risks of oil if it threatens fauna and flora.

## **2.2.2. LIQUID WASTE: USED OIL OR OIL SPILLAGE AND WASTEWATER IMPACT ON SURFACE WATER**

### **2.2.2.1. CONSTRUCTION PHASE**

#### **DESCRIPTION**

Spillages and/or leakages of various possible contaminants might occur due to failure of reticulation pipelines or storage tanks. Contaminated soil might pose a risk to surface water.

Potential impact on the natural environment from possible polluted groundwater also exists. The area is subjected to north-south structures, which might act as preferential pathways for any contaminants entering the saturated zone

#### **PROPOSED MITIGATION MEASURES**

- The risk can be lowered further through the use of suitable and adequate SANS approved piping material; and installation should be done by certified installers/technicians.
- All surface spillages and leakages must be cleaned up immediately. Proper containment structures should be constructed to avoid any possible leakages. The bund walls should be 110% of the largest tank in the bund.
- The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently

### **2.2.3. WASTE GENERATION**

#### **2.2.3.1. CONSTRUCTION PHASE**

#### **DESCRIPTION**

This can be in a form of rubble, cement bags, pipe and electrical wire cuttings. Contaminated soil due to oil leakages, lubricants and grease from the construction equipment and machinery may also be generated during the construction phase.



## **PROPOSED MITIGATION MEASURES**

- The oil leakages, lubricants and grease must be addressed. Contaminated soil must be removed and disposed of at the hazardous waste cell at Kupferberg Landfill.
- The contractor must provide containers on-site, to store any hazardous waste produced.
- Ensure that no excavated soil, refuse or building rubble generated on site are not placed, dumped or deposited on adjacent/surrounding properties or land.
- Waste disposal sites should be established on-site where paper, plastic and wire should be kept during exploration and operation period.
- For human waste, during the construction phase, the mobile toilet should be made available on-site for workers.

### **2.2.3.2. OPERATIONAL PHASE**

#### **DESCRIPTION**

Waste in the form of contaminated soil, rubble and domestic waste. Littering along access roads may also be produced during the operational phase.

#### **PROPOSED MITIGATION MEASURES**

- Management of solid waste generated during the operation phase would include collection, transportation, and disposal in a manner so as to cause minimal environmental impact.
- It will be made mandatory for waste to be segregated right at the source of waste generation. The collection of segregated waste would be made from the project site and amenity areas.
- Prior to the disposal of the above-mentioned waste by the Contractor/the proponent must enter into an agreement with Arandis or Usakos Town Council for permission to use their facility.
- Reusable and recyclable waste will be disposed of by selling to scrap dealers and private contractors for resale.

- Non-degradable waste will be transferred to the municipal solid waste management system.

## **2.2.4. HEALTH AND SAFETY**

### **2.2.4.1. CONSTRUCTION PHASE**

#### **DESCRIPTION**

Safety issues could arise from the earthmoving equipment and tools that will be used on site during the construction phase. This increases the possibility of injuries and the contractor must ensure that all staff members are made aware of the potential risks of injuries on site. The presence of equipment lying around on site may also encourage criminal activities (theft).

No open flames, smoking or any potential sources of ignition should be allowed at the project location. Signs such as 'NO SMOKING' must be prominently displayed in parts where inflammable materials are stored on the premises.

#### **PROPOSED MITIGATION MEASURES**

- Equipment and machinery operators should be equipped with ear protection equipment. Operations should be strictly between 07H00 to 19H00.
- First aid and safety awareness training for contractors.
- Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises.
- The staff must be properly trained on safety and health issues of the project. Workers should be fully equipped with personal protective equipment gear.

#### **2.2.4.2. OPERATIONAL PHASE DESCRIPTION**

The number of health and safety threats exist during operational activities of Bitumen Plant. Individuals in the community can suffer from noise from maintenance activities around the plant. Accidents on roads as a result of increased traffic and deterioration.

The contractors are advised to ensure that proper personal protective gear and first aid kits are available, at all times. Workers should also be properly trained in first aid and safety awareness.

#### **PROPOSED MITIGATION MEASURES**

- Operators and maintenance contractors must be properly trained on safety and health issues.
- Workers should be fully equipped with personal protective equipment gear

#### **2.2.5. TRAFFIC**

##### **2.2.5.1. CONSTRUCTION PHASE**

#### **DESCRIPTION**

Construction activities of the bitumen plant are expected to have a minor impact on the movement of traffic along Cullinan Street, could have an impact on traffic around the area. No diversion of traffic or closure of roads is expected.

Speed limit warning signs must be erected to minimise accidents. Heavy-duty vehicles and machinery must be tagged with reflective signs or tapes to maximize visibility and avoid accidents.

#### **PROPOSED MITIGATION MEASURES**

- It is recommended that if the need arises for traffic diversion or road closure,
- Project Seven Trading cc should liaise with the City of Windhoek.
- Speed limit and site warning signs must be erected to minimise accidents.

- Construction vehicles must be tagged with reflective signs or tapes to maximize visibility of the vehicles and avoid accidents.

#### **2.2.5.2. OPERATIONAL PHASE)**

##### **DESCRIPTION**

Traffic around the Bitumen Plant should be monitored, to avoid traffic congestion in the area. Speed limits and road signs as set out by City of Windhoek traffic department should be adhered to in order to minimize accidents.

##### **PROPOSED MITIGATION MEASURES**

- It is advisable that traffic lights be erected at the junction of Simmentaler street and Cullinan Street to ease traffic flow around the new township
- During operation avoid the creation of multiples roads strips, which could result in the disturbance of breeding sites for various mammals.

#### **2.2.6. AIR POLLUTION (IMPACT ON AIR QUALITY ON SITE)**

##### **2.2.6.1. CONSTRUCTION PHASE**

##### **DESCRIPTION**

Dust will be generated during the construction phase, and problems thereof are expected to be site specific. Dust is expected to be worse during the winter months when strong winds occur. Release of various particulates from the site during the construction phase and exhaust fumes from vehicles and machinery related to the construction of bulk services are also expected to take place. Dust is regarded as a nuisance as it reduces visibility, affects the human health and retards plant growth. Epidemiological studies indicate that workers exposed to construction process dust stand an increased risk of suffering from asthma symptoms, chronic bronchitis, nasal inflammation and impairment of lung function (Camici et al., 1978; Angotzi et al., 2005; Leikin et al., 2009).

##### **PROPOSED MITIGATION MEASURES**

- It is recommended that regular dust suppression be included in the construction activities, when dust becomes an issue.
- No unnecessary revving of engines or operation of vehicles is allowed.
- In general, the construction of the bitumen plant is envisaged to have minimal impacts on the surrounding air quality.

- The liberation of dust into the surrounding environment shall be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents.
- Transportation of raw materials required for construction will be carried out during non-peak hours.
- Dust covers will be provided on trucks used for transportation of materials prone to fugitive dust emissions.
- Covering scaffolding and cleaning of vehicles that can reduce dust and vapor emissions will be used.

**2.2.6.2. OPERATIONAL PHASE  
DESCRIPTION**

The plant and vehicles that will be accessing Bitumen Plant and Cullinan Street will contribute to the release of hydrocarbon vapours, carbon monoxide and Sulphur oxides into the air. The plant will have to be designed to enable environmental protection

**PROPOSED MITIGATION MEASURES**

- Measures such as the use of wet processes enclosure of dust-producing processes under negative air pressure (slight vacuum compared to the air pressure outside the enclosure),
- Exhausting air containing dust through a collection system before emission to the atmosphere, and exhaust ventilation should be used in the workplace.
- Use of personal protective equipment for proper dust control for respiratory protection and should be used only where dust control methods are not yet effective or are inadequate.
- Direct skin contact should be prevented by gloves, wearing respiratory protection during the cleanup
- Vehicle idling time shall be minimised by putting up educative signs.
- The developer is advised to reduce all harmful emissions

## **2.2.7. NOISE ON SITE**

### **2.2.7.1. CONSTRUCTION PHASE**

#### **DESCRIPTION**

An increase of ambient noise levels at the Bitumen Plant site is expected due to the construction activities. Noise pollution due to heavy-duty equipment and machinery will be generated. It is not expected that the noise generated during construction will impact any third parties.

#### **PROPOSED MITIGATION MEASURES**

- Sensitive construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used.
- Ensure engines of machinery are fitted with mufflers.
- Equipment and machinery operators should be equipped with ear protection equipment. Operations should be strictly between 07H00 to 19H00.
- Installation of proper sound barriers and (or) noise containments, with enclosures and curtains at or near the source equipment.
- Use of rubber-lined or soundproof surfaces on processing equipment (e.g. screens, chutes, transfer points, and buckets);
- Use of rubber-belt transport and conveyors;
- Optimization of internal-traffic routing, particularly to minimize vehicle-reversing needs (reducing noise from reversing alarms) and to maximize distances to the closest sensitive receptors;

### **2.2.7.2. OPERATIONAL PHASE**

#### **DESCRIPTION**

Noise pollution already exists around the site in the form of noise generated from vehicles frequenting the existing Cullinan Street. Noise pollution due to this projecting the operational phase is expected to be mainly from generators or pumps, road maintenance machinery during maintenance.

## **PROPOSED MITIGATION MEASURES**

- Ensure that generator engines are fitted with mufflers.
- Operators working in close proximity to the generators should be equipped with ear protection equipment, when noise becomes an issue.
- Observation of on-site noise levels by the Manager or Supervisor of Bulk Services Maintenance Department.

### **2.2.8. ECOLOGICAL IMPACTS**

#### **2.2.8.1. CONSTRUCTION PHASE DESCRIPTION**

The vegetation at the area is typically re-growth after disturbances. No red-listed species were encountered during the survey.

#### **PROPOSED MITIGATION MEASURES**

- Disturbance of areas outside the designated working zone is not allowed. Caution must be exercised to minimise damage to protected trees.
- It is strongly recommended that these trees should rather be factored into the development as far as possible, because they can be used for shade and can contribute positively to the general aesthetics of the proposed development.
- In addition, indigenous tree species are incredibly hardy and well adapted to Namibia's harsh and often unpredictable climatic conditions; and require significantly low amounts of water to grow & survive.

#### **2.2.8.2. OPERATIONAL PHASE DESCRIPTION:**

No impacts are expected as the proposed Bitumen Plant is in the operational phase. Vegetation in open spaces should not be disturbed or removed during the operational phase.

## **PROPOSED MITIGATION MEASURES**

- Minimize the area of disturbance by restricting movement to the designated working areas during maintenance

### **2.2.9. EROSION AND SEDIMENTATION**

#### **2.2.9.1. CONSTRUCTION PHASE DESCRIPTION**

Vegetation clearance and creation of impermeable surfaces could result in erosion in areas across the site. The clearance of vegetation will further reduce the capacity of the land surface to slow down the flow of surface water, thus decreasing infiltration, and increasing both the quantity and velocity of surface water runoff. The particles in suspension will be transported towards the north and could increase the sedimentation in the Aretaragas river tributary flowing in the northern direction.

The proposed development will increase the number of impermeable surfaces and therefore decrease the amount of groundwater infiltration. As a result, the amount of storm water during rainfall events could increase.

## **PROPOSED MITIGATION MEASURES**

- Implementation of proper storm water management measures should be conducted as to prevent negative impact on the water courses in the area.

### **2.2.10. FAILURE OF RETICULATION PIPELINES**

#### **2.2.10.1. OPERATIONAL PHASE DESCRIPTION**

Potential release of sewage, chemicals, storm-water, water, into the environment due to pipeline/system failure. As a result, the spillage could be released into the environment and could potentially be a health hazard to surface and groundwater.



## **PROPOSED MITIGATION MEASURES**

- Proper reticulation pipelines and drainage systems should be installed.
- Regular infrastructure and system inspection should be conducted

### **2.2.11. NUISANCE POLLUTION**

#### **2.2.11.1. CONSTRUCTION PHASE DESCRIPTION**

Aesthetics and inconvenience caused to persons using Cullinan Street road and surrounding areas.

#### **PROPOSED MITIGATION MEASURES**

The Technical Manager or Supervisor should maintain tidiness on site at all times. Take cognition when parking vehicles and placing equipment

### **3. ENVIRONMENTAL MANAGEMENT PLAN ORGANIZATION AND IMPLEMENTATION**

During the Construction phase, contractors, as well as site-in-charge, will be responsible for implementing all the mitigation measures mentioned above. In the operational phase, the work will be continued along with post monitoring. In the preceding sections, the environmental aspects which may be affected by the proposed project have been categorized into negative and positive impacts. As an extension of the preceding sections, this section summarizes the objectives, indicators to be observed, schedules to adhere to, and the roles and responsibilities of various stakeholders to the EMP. The following tables give the mitigation measure to be undertaken during the exploration & operational phase respectively with the agency responsible for implementation.

The following abbreviations are used to indicate who is responsible for what impact mitigation objective:

- **Contractor Environmental Coordinator** CENC
- **Site Foreman** SF
- **Project manager** PM
- **Project Proponent** PP
- **Environmental Commissioner** EC

**Table 1: Project Planning and Implementation**

<b>Objectives</b>	<b>Indicators</b>	<b>Schedule</b>	<b>Responsibility</b>
Establish a strong environmental protocol from project implementation to final closure to ensure the least possible impacts on the environment	Resources (Financial, human, equipment and safety gear) are provided for the awareness, meetings, monitoring, and reporting.	At the beginning of the operational phase.	PP
To maximize the economic spin-off into the local economy.	Expedite the appointment of a senior person to assume the responsibility of an environmental coordinator (ENC)	At the planning stage or at the beginning of the implementation phase of the operational phase	PP

**Table 2: Mitigation measures during the Construction phase**

No	Affected Environmental Parameters	Likely adverse impacts in the absence of mitigation measures	Nature of the impact	Proposed mitigation measures	
				Action to be taken	Implementing agency
1	Land Environment	Impact on fauna and flora	Significant and permanent if not controlled	Avoid construction within 20m of the main drainage line(s).  Avoid disturbance of marginal vegetation Remove (e.g. capture) unique fauna	<b>Contractor/CENC</b>
		Generation of solid waste and debris.  Aesthetically unpleasant. Health problems of laborers	Temporary	Segregation to facilitate reuse/recycling.  Recyclable wastes will be segregated and sent for recycling.  Adequate facilities for the storage of these waste materials on site	<b>Contractor/CENC</b>
2	Air Quality	Traffic congestion Increase air pollution risks	Significant and temporary	Idling of the trucks and dumpers on the roads will not be allowed.  Material will be brought in batches so that there is no	<b>Project manager/Contractor/CENC</b>

				<p>sudden increase of traffic volume at one particular time.</p> <p>On-site use of Concrete batching plant.</p> <p>Use of dust covers over construction material during transportation. Keeping all stationary equipment downwind.</p> <p>Stabilization of dust prone areas by sprinkling water</p>	
3	Noise Quality	Increase in noise levels causing a nuisance to the nearby Community Members/farm	Significant and temporary	<p>Prohibition for use of equipment emitting noise of greater than 90 dB (A) for 8 hour operation.</p> <p>Prohibition of noise from construction activities during night time.</p> <p>Provide workers on machinery with ear muffs/earplugs.</p> <p>Provision of temporary barricading</p>	<b>Project manager/Contractor/CENC</b>

				around site	
4	Water Environment	Surface and groundwater pollution due to fuel spillage. Turbidity and suspended solids due to soil erosion. Blocking of natural drains due to the deposition of construction materials.	Significant and temporary	Cleaning of drains on regular basis to avoid blockage. No accumulation of stagnant water	<b>Contractor/CENC</b>
5	Other Impacts	Soil erosion, additional exposure to noise/ air pollution	Significant and permanent	Construction of necessary scaffolding and retaining structure for protection from waste material and water.  Tree plantation to enhance bio aesthetic value.  Guidelines for planting saplings of trees to be strictly followed.	<b>Contractor/CENC</b>
6	Spillage of oil management	Contamination of surface and groundwater	Significant and permanent	Contain spillage and remove the contaminated soil. Accessibility to spill prevention and response equipment, such equipment should be visible and accessible to all	<b>Contractor/CENC</b>

				employees at any given time.	
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**Table 3: Mitigation measures during Operational phase**

No	Affected Environmental Parameters	Likely adverse impacts in the absence of mitigation measures	Nature of the impact	Proposed mitigation measures	
				Action to be taken	Implementing agency
1	Land Environment	Change in land use pattern due to the proposed project	Significant and permanent if not controlled	Controlled and planned implementation system	Project Proponent
		Contamination of soil by fuel and lubricants from construction equipment and vehicles. Increased solid waste generation in the area.  If not managed properly will affect the health of local residents.	Significant and temporary	Avoiding spillage of oil and fuel to prevent seepage into ground and reaching surface water bodies.  Waste management practices like waste segregation at source, recycling and reuse, mechanical composting etc. will be adopted  Provision of mechanical composting units within the site.  Regular collection of non-degradable solid waste from the site.  Provision of a well Engineered landfill site.	Project Proponent

4	Water Environment	<p>Water shortage within the area.</p> <p>Water flooding during rainy season.</p> <p>Increase in turbidity of water</p> <p>Reduced runoff due to increased paved areas.</p>	Significant and permanent	<p>Blockage of natural drains to be avoided and cleaning and maintenance to be carried out.</p> <p>Regular maintenance of stormwater drains, cleaning and effective soil erosion measures.</p> <p>Water harvesting to recharge on-site to be encouraged for use during the period of pumping failure.</p> <p>Prevent pollution from run-off.</p> <p>Sewage treatment plants to recycle domestic sewage and reuse for toilet flushing/</p>	<b>Project Proponent</b>
5	Public Health and Safety	Health problems to people staying within the plots.	Moderate and Permanent	<p>Road maintenance to prevent air/ noise pollution within site.</p> <p>Provision of adequate road safety like signage- posts/ road-crossings etc.</p> <p>Firefighting / Disaster Management Plan provisions for buildings.</p>	<b>Project Proponent</b>

#### 4. MONITORING EMP

Monitoring of the EMP performance for the proposed project by the Contractor emphasizes early dictation, reporting, and corrective action. It is divided into three parts, namely:

- Monitoring of project activities and actions to be undertaken by the Environmental Coordinator (ENC) appointed by the Contractor.
- The Environmental Coordinator (ENC) shall report all incidents and situations which have the potential of jeopardizing compliance of statutory provisions as well as provisions of this EMP to the Project Proponent.
- The Environmental Coordinator (ENC) shall take corrective prompt measures, adequate and long-lasting in addressing non-compliance activities or behavior.

To ensure compliance of the Contractor ENC to the implementation of the EMP, it is highly recommended that an External Environmental Expert is appointed by the proponent to ensure the implementation of the EMP. The tables (5-9) provided below are to be used for monitoring purposes by the Contractor's ENC.

**Table 4: Solid waste disposal: wire, paper, drill bits, and human waste**

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are disposal drums/bins available or full?					
Is there any litter around the site and its surroundings?					



**Table 5: Oil spillage or used oil**

<b>Mitigation</b>	<b>Compliance</b>	<b>Follow up Action Required</b>	<b>By Whom</b>	<b>When</b>	<b>Date Completed</b>
Are disposal drums available or full?					
Is there any oil spills around the site and its surroundings?					

**Table 6: Land and Soil Disturbance**

<b>Mitigation</b>	<b>Compliance</b>	<b>Follow up Action Required</b>	<b>By Whom</b>	<b>When</b>	<b>Date Completed</b>
Are there any deviations from the provisions of the EMP on land and soil disturbance?					
Are car track barricades in place?					

**Table 7: Dust generation on-site and gravel roads stretch**

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on dust pollution?					
Are the fume and particulate levels acceptable?					

**Table 8: Biodiversity (fauna and flora)**

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on biodiversity?					
It is traipses harvesting plant taking place feeding of animal or introduction of animals?					

**Table 9: Noise and vibrations on-site**

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on noise and vibration on-site?					
Are there any complaints from the surroundings neighbour about noise emanating from the sites or tracks transporting materials/produce?					

**Table 10: Compliance**

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on noise and vibration on-site?					
Are there any complaints from the surroundings neighbour about noise emanating from the sites or tracks transporting materials/produce?					

## 5. ENVIRONMENTAL CODE OF CONDUCT

The Code of Conduct outlined in this section of the EMP applies and is not limited to, subcontractors, visitors, permanent and temporal workers. Therefore, anybody who finds him or herself within the boundaries of the proponent must adhere to the Environmental Code of Conduct as outlined in this section of the EMP.

- The Contractor ENC will implement on-site environmental guidelines and has the authority to issue warnings as well as discipline any person who transgresses environmental rules and procedures. Persistent transgression of environmental rules will result in a disciplinary hearing and thereafter continued noncompliance behaviour will result in permanent removal from the construction sites.

### **Natural environment management guidelines**

- a. Never feed, tease or play with, hunt, kill, destroy or set devices to trap any wild animal (including birds, reptiles and mammals), livestock or pets. Do not bring any wild animal or pet to the construction sites;
- b. Do not pick any plant or take any animal out of the construction area EVER. You will be prosecuted and asked to leave the project area;
- c. Never leave rubbish and food scraps or bones where it will attract animals, birds or insects. Rubbish must be thrown into the correct rubbish bins or bags provided;
- d. Protect the surface material by not driving over it unnecessarily;
- e. Do not drive over, build upon, or camp on any sensitive habitats for plants and animals;
- f. Do not cut down any part of living trees/bushes for firewood;
- g. Do not destroy bird nest, dens, burrow pits, termite hills, etc. or any other natural objects in the area.

### **Vehicle use and access guidance**

- i. Never drive any vehicle without a valid license for that particular vehicle and do not drive any vehicle that appears not to be road-worthy;
- ii. Never drive any vehicle when under the influence of alcohol or drugs;
- iii. DO NOT make any new roads without permission. Stay within demarcated areas;
- iv. Avoid U-Turns and large turning circles. 3-point turns are encouraged. Do not ever drive on rocky slopes;
- v. Stay on the road, do not make a second set of tracks and do not cut corners;
- vi. DO NOT SPEED - 30 km per hour for normal vehicles and 20km per hour for heavy trucks on gravel roads and around the site;
- vii. No off-road driving is allowed;
- viii. Vehicles may only drive on demarcated roads;
- ix. Adhere to speed limits and drive with headlights switched on along any gravel road.

### **Control of dust guidance**

- a. Do not make new roads or clear any vegetation unless instructed to do so by your Contractor or the Environmental Coordinator or Site Manager;
- b. Do not try to disturb the surface of the natural landscape as little as possible.
- c. Do not speed on gravel roads and around the construction sites, and adhere to the speed limits.
- d. Apply water to suppress dust were the generation of the dust on either gravel roads or construction sites is beyond control.

### **Health and safety guidance**

- a. Drink lots of water every day, but only from the freshwater supplies;
- b. Take the necessary precautions to avoid contracting the HIV/ AIDS virus;
- c. Never enter any area that is out of bounds, or demarcated as dangerous or wander off without informing or permission of team leader;
- d. Never climb over any fence or trespass on private property without permission of the landowner or consultation with the Environmental Coordinator, Site Manager.
- e. Report to your Contractor if you see a stranger or unauthorized person in the construction area;
- f. Do not remove any vehicle, machinery, equipment or any other object from the construction campsite or along with the profile or at a seismic testing station without permission of your Contractor or Site Manager;
- g. Wear protective clothing and equipment required and according to instructions from your Contractor or Site Manager;
- h. Don not engages in sexual relations with minors and also adheres to zero tolerance to spread HIV/ AIDS.

### **Preventing pollution and dangerous working conditions guidance**

- I. Never throw any hazardous substance such as fuel, oil, solvents, etc. into streams or onto the ground;
- II. Never allow any hazardous substance to soak into the soil;
- III. Immediately tell your Contractor or Environmental Coordinator when you spill or notice any spillage of hazardous substance anywhere in the field or camp;
- IV. Report to your Contractor or Environmental Coordinator when you notice any container, which may hold a hazardous substance, overflow, leak or drip;
- V. Immediately report to your Contractor or Environmental Coordinator when you notice overflowing problems or unhygienic conditions at the ablution facilities, vehicles, equipment and machinery, containers and other surfaces.

### **Disposal of solid and liquid waste guidance**

- a. Learn to know the difference between the two main types of waste, namely: General Waste; and Hazardous Waste.
- b. Learn how to identify the containers, bins, drums or bags for the different types of wastes. Never dispose of hazardous waste in the bins or skips intended for general waste or construction rubble;
- c. Never burn or bury any waste on the camp or in the field;
- d. Never overfill any waste container, drum, bin or bag. Inform your Contractor or the Environmental Coordinator/ Site Manager if the containers, drums, bins or skips are nearly full;
- e. Never litter or throwaway any waste on the site, in the field or along any road.
- f. No illegal dumping;
- g. Littering is prohibited.

### **Dealing with environmental complaints guidance**

- a. If you have any complaint about dangerous working conditions or potential pollution to the environment, immediately report this to the Environmental Coordinator
- b. If any person complains to you about noise, lights, littering, pollution, or any other harmful or dangerous condition, immediately report this to your Contractor.

### **Environmental Personnel Register**

Table 11 presents the Environmental Personnel Register to be signed by every person who receives or attends the Environmental Awareness Training or who has the training material explained to him or her or in possession of the training material.

**Table 11: Environmental Personnel Register**

Date	Name	Company	Signature

**6. NON-COMPLIANCE**

Problems may occur in carrying out mitigation measures or monitoring procedures that could result in non-compliance of the EMP. The responsible personnel should encourage staff to comply with the EMP, and address acts of non-compliance and penalties.

PROJECT SEVEN TRADING CC is responsible for reporting non-conformance with the EMP, to the Contracted environmental coordinator. The management t of PROJECT SEVEN TRADING CC, in consultation with the Contracted environmental coordinator must, thereafter, undertake the following activities:

- Investigate and identify the cause of non-conformance.
- Report matters of non-conformance to City of Windhoek Environmental Department (depending on the severity of the incident).
- Implement suitable corrective action as well as prevent recurrence of the incident.
- Assign responsibility for corrective and preventative action.
- Any corrective action taken to eliminate the causes of non-conformance shall be appropriate to the magnitude of the problems and commensurate with the environmental impact encountered.



## **7. CONCLUSION AND RECOMMENDATIONS**

### **7.1. CONCLUSION**

The fundamental principle behind environmental assessments (EAs) is to ensure a balance in social, economic and environmental needs, particularly when proposed projects are of such a nature that they negatively affect some needs at the expense of the other. Ultimately, EAs should enhance proposed projects' propensity towards being more beneficial and important by suggesting measures, designing and implementing programs and plans to that effect.

Against this background, it is anticipated that this project will be beneficial and important to the proponent, national economy, the local social conditions, and the local economy if the guidelines and mitigation measures suggested in this EMP are implemented. However, it should be acknowledged that disturbance to the environment will be incurred, but that will be minimal and within legally acceptable levels.

This EMP should be viewed as a framework for integrating mitigation measures and applicable legal tools to ensure both compliance and sustainability. It is therefore very important that the proponent provides adequate resources (human, financial, tangible and intangible assets) for the implementation of the plan.

### **7.2. RECOMMENDATION**

The proposed Bitumen project may go ahead provided that all the provisions of the EMP, as well as all issued permits, are followed. Recommended actions to be implemented by the proponent as part of the management of the likely impacts through implementations of the EMP are:

- Contract an Environmental Coordinator / Consultant / suitable in-house resources person to lead and further develop, implement and promote environmental culture through awareness-raising of the workforce, contractors and sub-contractors in the field during the whole duration of the proposed project period;

- Provide with other support, human and financial resources, for the implementation of the proposed mitigations and effective environmental management during the planned activities;
- Develop a simplified environmental induction and awareness program for all the workforce, contractors and sub-contractors;
- Where contracted service providers are likely to cause environmental Impacts, these will need to be identified and contract agreements need to be developed with costing provisions for environmental liabilities;
- Implement internal and external monitoring of the actions and management strategies developed during the mineral exploration and possible project duration and a final Environmental Monitoring report be prepared by the Environmental Coordinator / Consultant / Suitable in-house resource person and to be submitted to the regulators and to end the proposed project;
- Develop and implement a monitoring program that will fit into the overall company's Environmental Management Systems (EMS) as well as for any future EIA for possible Bitumen projects.

It is hereby recommended that proponent take all the necessary steps to implement all the recommendations of the EMP for the successful implementation of the proposed Bitumen project in Windhoek city, Khomas Region, Namibia.

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