

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

**PROPOSED ESTABLISHMENT OF A FLEXIBLE LAND TENURE SCHEME FOR
ERF 2055, BENGUELA, NAUTILUS EXT 3, NAUTILUS EXT 4, LUDERITZ EXT
4, AREA 7, LUDERITZ EXT 5 TOWNSHIP ESTABLISHMENTS IN LUDERITZ,
//KHARAS REGION**



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1. INTRODUCTION AND BACKGROUND

This Environmental Management Plan (EMP) serves as a managing tool for the construction, operation and decommissioning of the township developments in Luderitz, //Kharas Region, under the establishment of a Flexible Land Tenure Scheme. The EMP is developed to outline measures to be implemented in order to minimise adverse environmental degradation associated with this development.

The Flexible Land Tenure System (FLTS) is a system for land registration. It regulates the surveying and registration of land rights to contribute to providing tenure security for the urban poor living in informal settlements

Luderitz Town Council, in conjunction with the Ministry of Agriculture, Water and Land Reform (MAWLR), hereafter referred to as the proponent is of the intention to establish Flexible Land Tenure Schemes for the following identified areas:

- **Erf 2055, Benguela**
- **Nautilus Extension 3,**
- **Nautilus Extension 4,**
- **Luderitz Extension 4,**
- **Area 7**
- **Proposed Luderitz Extension 5.**

The proposed development is listed as a project requiring an environmental assessment as per the listed activities in the Environmental Management Act no 7 of 2007 and its Guidelines (06 February 2012). The listed activities identified include the rezoning of land; project undertaken within the Atlantic Ocean catchment area; and the construction and installation of bulk services (servicing of land).

The EMP serves as a guiding tool for the contractors and workforce on their roles and responsibilities concerning environmental management on project site, and also provides an environmental monitoring framework for all project phases of the development. This environmental management plan aims to take a pro-active route by addressing potential problems before they occur. The EMP acts as a stand-alone document, which can be used during the various phases of the development.

In this report, the *Contractor (and its sub contractors)* refers to construction personnel responsible for the construction phase of the development, including maintenance activities.

The purpose of the EMP is to:

- ✓ Train employees and contractors with regard to environmental obligations.
- ✓ Promote and encourage good environmental management practices.
- ✓ Outline responsibilities and roles of Luderitz Town Council / MAWLR and the contractor in managing the environment.
- ✓ Describe all monitoring procedures required to identify environmental impacts.

- ✓ Minimise disturbance of the natural environment.
- ✓ Develop waste management practices.
- ✓ Prevent all forms of pollution.
- ✓ Protect the natural environment.
- ✓ Prevent soil and water erosion.
- ✓ Comply with all applicable laws, regulations and standards for environmental protection.

The construction and operational phases of the proposed township establishments:

- ✓ Site preparation and/or 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 storm water management system.
- ✓ Roads construction.
- ✓ Operation and maintenance of the sewer, water, electrical services and roads.
- ✓ Progressive rehabilitation.

Possible decommissioning phase of the township establishments:

- ✓ Removal of all infrastructure not reused during future use of land; and
- ✓ Rehabilitation of the land.

2. LEGISLATIVE FRAMEWORK

I. The Namibian Constitution

The Namibian Constitution has a section on principles of state policy. These principles cannot be enforced by the courts in the same way as other sections of the Constitution. But they are intended to guide the Government in making laws which can be enforced.

The Constitution clearly indicates that the state shall actively promote and maintain the welfare of the people by adopting policies aimed at management of ecosystems, essential ecological processes and biological diversity of Namibia for the benefit of all Namibians, both present and future.

II. Environmental Management Act No.7 of 2007

This Act provides a list of projects requiring an Environmental assessment. It aims to promote the sustainable management of the environment and the use of natural

resources and to provide for a process of assessment and control of activities which may have significant effects on the environment; and to provide for incidental matters.

The Act defines the term “*environment*” as 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.

The Environmental Management Act has three main purposes:

- (a) to make sure that people consider the impact of activities on the environment carefully and in good time
- (b) to make sure that all interested or affected people have a chance to participate in environmental assessments
- (c) to make sure that the findings of environmental assessments are considered before any decisions are made about activities which might affect the environment.

Line Ministry: Ministry of Environment and Tourism

III. The Water Act (Act No 54 of 1956)

The Water Act No. 54 of 1956 as amended, aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users.

The Act broadly controls the use and conservation of water for domestic, agricultural, urban and industrial purposes; to control, in certain respects, the use of sea water; to control certain activities on or in water in certain areas; and to control activities which may alter the natural occurrence of certain types of atmospheric precipitation.

IV. Water Resources Management Act of Namibia (2004) (Guideline only)

This act repealed the existing South African Water Act No.54 of 1956 which was used by Namibia. This Act ensures that Namibia’s water resources are managed, developed, protected, conserved and used in ways which are consistent with fundamental principles depicted in section 3 of this Act. Part IX regulates the control and protection of groundwater resources. Part XI, titled Water Pollution Control, regulates discharge of effluent by permit.

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry

V. Environmental Assessment Policy of Namibia (1995)

Environmental Assessments (EA’s) seek to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process, and that the term ENVIRONMENT (in the context of IEM and EA’s) is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.

All listed policies, programmes and projects, whether initiated by the government or the private sector, should be subjected to the established EA procedure as set out in Figure 2.

Line Ministry: Ministry of Environment and Tourism

Apart from the requirements of the Environmental Assessment Policy, the following sustainability principles need to be taken into consideration, particularly to achieve proper waste management and pollution control:

✓ **Cradle to Grave Responsibility**

This principle provides that those who manufacture potentially harmful products should be liable for their safe production, use and disposal and that those who initiate potentially polluting activities should be liable for their commissioning, operation and decommissioning.

✓ **Precautionary Principle**

There are numerous versions of the precautionary principle. At its simplest it provides that if there is any doubt about the effects of a potentially polluting activity, a cautious approach should be adopted.

✓ **The Polluter Pays Principle**

A person who generates waste or causes pollution should, in theory, pay the full costs of its treatment or of the harm, which it causes to the environment.

✓ **Public Participation and Access to Information**

In the context of environmental management, citizens should have access to information and the right to participate in decisions making.

VI. Draft Pollution Control and Waste Management Bill (*Guideline only*)

The proposed development, only applies to Parts 2, 7 and 8 of the Bill.

Part 2 stipulates that no person shall discharge or cause to be discharged any pollutant to the air from a process except under and in accordance with the provisions of an air pollution licence issued under section 23. It further provides for procedures to be followed in licence application, fees to be paid and required terms of conditions for air pollution licences.

Part 7 states that any person who sells, stores, transports or uses any hazardous substances or products containing hazardous substances shall notify the competent authority, in accordance with sub-section (2), of the presence and quantity of those substances.

Part 8 calls for emergency preparedness by the person handling hazardous substances, through emergency response plans.

VII. Atmospheric Pollution Prevention Ordinance of Namibia (No. 11 of 1976)

The Ordinance prohibits anyone from carrying on a scheduled process without a registration certificate in a controlled area. A certificate must be issued if it can be demonstrated that the best practical means are being adopted for preventing or reducing the escape into the atmosphere of noxious or offensive gases produced by the scheduled process. Best practice would be to notify the line Ministry about emissions but it is not a legal requirement.

Line Ministry: Ministry of Health and Social Services

VIII. Hazardous Substances Ordinance No. 14 of 1974

The Ordinance applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export and is administered by the Minister of Health and Social Welfare. Its primary purpose is to prevent hazardous substances from causing injury, ill-health or the death of human beings.

Line Ministry: Ministry of Health and Social Services

IX. Atmospheric Pollution Prevention Ordinance of Namibia (No. 11 of 1976)

The Ordinance prohibits anyone from carrying on a scheduled process without a registration certificate in a controlled area. A certificate must be issued if it can be demonstrated that the best practical means are being adopted for preventing or reducing the escape into the atmosphere of noxious or offensive gases produced by the scheduled process. Best practice would be to notify the line Ministry about emissions but it is not a legal requirement.

Line Ministry: Ministry of Health and Social Services

X. Soil Conservation Act (No.76 of 1969)

The Act advocates for the prevention and combating of soil erosion, conservation, improvement and manner of use of soil and vegetation, and protection of water resources.

XI. Public Health Act 36 of 1919 and Subsequent Amendments

The Act, with emphasis to Section 119 prohibits the presence of nuisance on any land occupied. The term nuisance for the purpose of this ESA is specifically relevant specified, where relevant in Section 122 as follows:

- ✓ any dwelling or premises which is or are of such construction as to be injurious or dangerous to health or which is or are liable to favour the spread of any infectious disease;
- ✓ any area of land kept or permitted to remain in such a state as to be offensive, or liable to cause any infectious, communicable or preventable disease or injury or danger to health; or
- ✓ any other condition whatever which is offensive, injurious or dangerous to health.
- ✓ Potential impacts associated with the upgrade and operations are expected to include dust, air quality impacts, noise nuisance and smoke emissions.

Line Ministry: Ministry of Health and Social Services

XII. Townships and Division of Land Amendment Act (No.28 of 1992

Article (1) of this Act stipulates that “Whenever any area of land constitutes, by reason of its situation, a portion of an approved township, or adjoins an approved township, the Executive Committee may, by proclamation notice in the Gazette and after consultation with the Board, extend the boundaries of the township to include such an area”. Thus the new township needs to be approved by the Namibian Planning Advisory Board and the Townships Board.

Line Ministry: Ministry of Regional and Local Government, Housing and Rural Development

XIII. Sewerage and Drainage Regulations (amendments) Local authorities act, section 23 (1992).

The regulations make provision for proper construction of pipelines in drainage lines. The regulations also stipulate the prevention of pollution and environmental damage caused by improper construction of sewerage and water pipelines in drainage lines.

Line Ministry: Ministry of Regional and Local Government, Housing and Rural Development

3. ENVIRONMENTAL MANAGEMENT PLAN

3.1 Responsibilities for environmental management

Luderitz Town Council will be responsible for environmental control at the project location during the construction and operational phase. The local authority will appoint a Project or Residence Engineer who is responsible to appoint various contractors for construction of various components of the development e.g. roads, water reticulation etc. Therefore, the Luderitz Town Council should appoint an Environment Control Officer (ECO), who will implement the EMP and also undertake the required training for all contractors and subcontractors on site. It is very important that a pre-work briefing

meeting be held at all times to reach an agreement on specific roles of various parties and penalties for non-compliance.

3.2 Training and induction

Luderitz Town Council is bound to be responsible for ensuring that environmental awareness education of all employees and contractors is done satisfactorily. The proponent should ensure that employees and contractors are made aware of 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 staff is expected to train and assist the rest of the employees on the contents of the EMP.

3.3 Environmental incident reporting

All environmental incidents occurring at the proposed site must 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 neighbouring communities should be directed to the Project Engineer/ Environmental Management Officers at the Luderitz Town Council and channelled to the appointed ECO officer. The local authority's 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. .

3.4 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.

3.5 EMP administration

Copies of this EMP shall be kept at the site office and should be distributed to all senior staff members, including those of the contractors.

3.6 EMP amendments

The EMP amendments can only be made with the approval of the ECO officer and ultimately the DEA. Amendments to the EMP should be liaised to all employees and contractors.

3.7 Non compliance of the EMP

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.

Luderitz Town Council is responsible for reporting non-conformance with the EMP, to the ECO officer. The Contractor, in consultation with the ECO officer must, thereafter, undertake the following activities:

- ✓ Investigate and identify the cause of non-conformance.
- ✓ Report matters of non-conformance to the Luderitz Town Council (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.

3.7 Environmental Register

An environmental register should be kept on site in which incidents related to actual impacts are recorded. This will include information related to incidents as spillages, dust generation and complaints from adjacent neighbours. It should also contain information relating to actions taken. Any party on site may complete the register, however, it is envisaged that the Project Engineer, the contractor and the ECO officer will be the main contributors, and who will also be the main parties involved in suggesting mitigation measures.

3.8 Environmental Control Officer

The Environmental Control Officer for the site can be an independent environmental consultant (e.g. Matrix Consulting Services) appointed by Luderitz Town Council / MAWLR to monitor and review the on-site environmental management and implementation of this EMP.

Duties of the ECO officer:

- ✓ The identification of potential environmental impacts, prior to the onset of decommissioning. A site visit may also be required prior to site development. This would be carried out in consultation with the Technical Manager.
- ✓ Providing of an environmental register at the site to be filled in by any person reporting an environmental incident, issue or concern and inspected by the ECO officer on a regular basis to check for issues raised and actions taken.
- ✓ Ensuring that the EMP conditions are adhered to at all times and taking action.
- ✓ Ensuring that environmental impacts are kept to a minimum.

- ✓ Reviewing and approving method statements in consultation with the Technical Manager.
- ✓ Reporting to Luderitz Town Council and the Project Engineer on a regular basis and advising of any major environmental impacts. Attending the site meetings (when necessary)
- ✓ Inspecting the site and surrounding areas regularly, and monitoring an ongoing environmental awareness program in conjunction with the Technical Manager.
- ✓ Requesting the removal of people and/or equipment not complying with the specifications of EMP.
- ✓ Keeping both a written and photographic record of progress on site from an environmental perspective, and an ad hoc record of all environmental incidents
- ✓ Undertaking continual review of the EMP and submitting a report to the relevant stakeholders.
- ✓ The ECO officer will submit all written instructions and verbal requests to Luderitz Town Council via the Technical Manager and Project Engineer.

3.9 Site Management

Areas outside this designated working zone shall be considered “no go” areas. The offloading zones must be clearly demarcated when offloading goods to enhance safety around the proposed development.

3.9.1 Access routes and work sites

Construction vehicles will access the proposed project site via existing roads. No new tracks/roads shall be established and only existing roads may be used. Work sites shall be clearly demarcated and road signs erected where needed. The general public should not have access to the work sites during construction.

Road access to the working face of the township development must be maintained at all times in a manner suitable to accommodate vehicles normally expected to use the facility. Roads must be regularly graded and wetted to control dust, where necessary.

Furthermore, on-going controls, such as fencing and policing, must be implemented.

3.9.2 Fire and safety management

All electrical installations, wiring and systems at the project location, must be approved by a qualified electrician who will issue a Certificate of Compliance.

Proper handling, storage, use and disposal of any hazardous waste (e.g. hydrocarbons, paint, batteries, condemned meat products, ink, colours, radioactive waste e.t.c) should be conducted. Hydrocarbons are volatile under certain conditions

and their vapours in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise.

No uncontrolled fire, whether for cooking or any other purpose, is to be made at the project location during both the construction and operation phases. The Contractor shall take all reasonable measures and active steps to avoid increasing the risk of fire through activities on site and prevent the accidental occurrence or spread of fire; and shall ensure that there is sufficient fire-fighting equipment on site at all times. This equipment shall include fire extinguishers. The Contractor should be prepared for such events.

3.9.3 Staff management

The Contractor must ensure that their employees have suitable personal protective equipment and properly trained in fire fighting and first aid. Training records must be kept for future references.

3.9.4 Waste management

Waste will be generated in the 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.

The oil leakages, lubricants and grease must be addressed. Contaminated soil must be removed and disposed off at a suitable hazardous waste disposal site. The contractor must provide containers on-site, to store any hazardous waste produced. Regular inspection and housekeeping procedure monitoring should be maintained by the contractor.

Waste in the form of solid waste from households, businesses and institutions will also be generated during the operational phase. Waste will be removed and disposed off at town's landfill site by waste removal contractors e.g. Rent-a-Drum, Kleen Tek etc.

The Town Council will have waste skips around the proposed township establishments like the rest of the suburbs in Luderitz.

3.9.5 Cement and concrete batching

Concrete mixing directly on the ground shall not be allowed and shall take place on an impermeable surface. All run-off from batching areas shall be strictly controlled, and cement contaminated water shall be collected, stored and disposed of at a licensed suitable waste disposal facility.

3.9.6 Hydrocarbons management

If any spillage occurs, contaminated soil shall be collected in a holding tray or drum and which will then disposed at a hazardous waste disposal site. Any spillage of more than 200 litres must be reported to the Ministry of Mines and Energy as per the Petroleum Products Act.

The Contractor shall take all reasonable measures to prevent surface or groundwater pollution from the release of oils and fuels.

3.9.7 Flood management

The township development will be designed in such a way that surface water run-off is well developed. Storm water management of the township development should be a key aspect of flood management at the township. All culverts should be kept clean to allow storm water to flow freely.

3.9.8 Flood management

Rehabilitation must commence as soon as possible on areas where construction has taken place or no further development is to take place, i.e. on completed excavations, soil/rock cutting hips, slopes etc.

3.9.9 Management of environmental aspects during all phases of the project

Surface and Groundwater

Construction/Decommissioning phase	
Description	<p>Groundwater quality could be impacted through leachate of petroleum, chemical, harmful and hazardous substances. In particular, oil leakages, diesel, lubricants and grease from construction vehicles, equipment and machinery utilised during the bulk servicing of the townships may occur. Care must be taken to avoid contamination of soil and groundwater.</p> <p>Any overflow of the temporary sewage systems available, may transport the effluent to nearby lagoons and Atlantic Ocean via drainage lines in the area. Although groundwater is not utilized in the area, geological structures (lineaments) present in the area may also act as preferential pathways for contaminants to groundwater.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Prevent spillages of any chemicals and petroleum products (i.e. oils, lubricants, petrol and diesel). Use drip trays, linings or concrete floors when evidence of leaks are observed on vehicles or equipment. ✚ No major servicing and maintenance of vehicles and/or equipment should be conducted at the project site. ✚ All fuelling, storage and chemical handling should be conducted on surfaces provided for this purpose. Drip trays and/or impermeable linings must be used when leaks become evident. ✚ Should portable toilet facilities be necessary, adequate containment systems should be erected at the site for use during the construction phase. ✚ Waste should be properly contained to avoid any leakages and/or spillages, and should regularly be disposed off at a suitable sewage disposal site. Run-off from these toilets due to overflows should be avoided at all cost. ✚ Proper environmental awareness and remedial response training of operators must be conducted on a regular basis. ✚ Implementation of sound and proper management practices.
Proposed Monitoring	Regular visual inspection.
Responsible Party	Luderitz Town Council / Contractors

Operational phase	
Description	<p>Spillages might also occur during maintenance of the sewer system. This could have impacts on groundwater especially in cases of large sewer spills.</p> <p>Although no groundwater users exist in the Luderitz area, potential impact on the natural environment from possible polluted groundwater exists. The area is subjected to geological structures which may act as preferential pathways for any contaminants entering the saturated zone.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Proper design of bulk installations and containment mechanisms installed should be able to contain any leakages that might occur during the operation and maintenance of the township developments. ✚ Maintaining the installation in good operating order is of paramount importance in preventing failure of bulk services. ✚ Proper containment response and readiness should be available during operations and maintenance. ✚ During maintenance operations, remove leaking vehicles and/or equipment from project location immediately. ✚ The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently. ✚ Ensure all stormwater drains or channels are clear of litter or obstructing material. ✚ Remove all excess sedimentation, rubble and any other waste material present in waterways and dispose of in a suitable manner to ensure proper drainage runoff. ✚ Ensure that stormwater management systems are regularly maintained and tested, and are in good working order ✚
Proposed Monitoring	Regular visual inspection.
Responsible Party	Luderitz Town Council

Air quality (including dust)

Construction/Decommissioning phase	
Description	<p>Dust will be generated during the construction phase and might be worse during the winter months when strong winds occur. Dust is regarded as a nuisance as it reduces visibility, affects the human health and retards plant growth.</p> <p>Release of various particulates and exhaust fumes from construction vehicles and machinery during construction activities is also expected to take place.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Ensure measures are in place to minimise dust generated during the construction phase. ✚ Use appropriate dust suppression measures when dust generation is unavoidable, e.g. dampening with water, particularly during prolonged periods of dry weather. ✚ Avoid excavation, handling and transport of materials which may generate dust under high wind conditions. ✚ Locate stockpiles of construction materials in sheltered areas where they are not exposed to erosive effects of the wind. ✚ Ensure all vehicle, plant and equipment are in good condition. ✚ Encourage reduction of engine idling.
Proposed Monitoring	Regular visual inspection.
Responsible Party	Luderitz Town Council / Contractors

Operational phase	
Description	Vehicles that will be accessing the township developments will contribute to the release of hydrocarbon vapours, carbon monoxide and sulphur oxides into the air. Possible release of sewer odour, due to sewer system failure or maintenance might also occur.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ All maintenance of bulk services of the township have to be designed to enable environmental protection. ✚ Regular air quality monitoring should be conducted at the project site.
Proposed Monitoring	Keep a complaints register regarding bad odour / smells at the township establishments; and act on it if becomes a regular complaint.
Responsible Body	Luderitz Town Council

Health and Safety

Construction/Decommissioning phase	
Description	Safety issues could arise from construction vehicles, earthmoving equipment and tools that will be used 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. Construction sites usually house construction building material and equipment on site which may attract criminal activities.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Display telephone numbers of emergency services at the project site. ✚ Provide suitable emergency and safety signage on site (manufactured of durable, weatherproof material). The signage signs should be placed at strategic locations to ensure awareness. ✚ Demarcate and barricade any areas which may pose a safety risk (including hazardous substances, deep excavations etc). These notices must be worded in English language. ✚ Enforce the use of appropriate Personal Protective Equipment (PPE) for the right task or duties at all times. ✚ Should a construction camp be necessary, it should be located in such a way that it does not pose a risk to the public. ✚ Equipment housed on site must be placed in a way that does not encourage criminal activities. ✚ For safety and security reasons it is recommended that the entire site (construction site and camp) be barricaded or fenced-off; and security personnel be employed to safeguard the project site and to avert criminal activities. ✚ Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles, equipment and/or machinery not being used. ✚ The contractor is advised to ensure that the team is equipped with first aid kits and that they are available on site, at all times. ✚ Proper barricading and/or fencing around the work sites should be erected to avoid entrance of animals and/or unauthorized persons. ✚ Adequate lighting within and around the construction sites should be erected, when visibility becomes an issue.
Proposed Monitoring	Monitor security, health and safety aspects at the townships.
Responsible Party	Luderitz Town Council / Contractors

Operational phase	
Description	<p>A number of health and safety threats exist during operational activities of township developments. Waste water from leaking pipes (if unattended) can lead to waterborne diseases such as cholera, dysentery, typhoid and diarrhea, which is a health risk to local communities. Severe noise pollution can also become a nuisance, which can result in dangerous confrontations and/or violence, depression, headaches etc. Accidents on roads could increase as a result of increased traffic; and deteriorated roads in and around the township developments.</p> <p>Safety issues could also arise from the vehicles, equipment and tools that will be used on during maintenance activities.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Residence / contractors must be made aware of safety and hazardous nature of powerline and electrical utilities, wastewater etc. ✚ Fire fighting equipment and first aid kits should be readily available and serviced regularly at the township developments. ✚ Keep lawn clippings and other flammable items in safe places. ✚ Avoid uncontrolled and unauthorised open fires at the township development. ✚ Display contact details of emergency services, informative and warning signage at relevant locations of the development. ✚ Demarcate and place signage on any areas which may pose a safety risk (including trenches, excavations etc). ✚ Maintenance personnel / contractors are advised to ensure that proper personal protective gear and first aid kits are available, at all times. Staff should be properly trained in first aid and safety awareness. ✚ Ensure that installations of bulk services at the township developments are installed and approved by relevant qualified personnel who will issue Certificates of Compliance.
Proposed Monitoring	Regular inspection ponds and perimeter fence; and incident monitoring report evaluation.
Responsible Body	Luderitz Town Council

Noise Pollution

Construction/Decommissioning phase	
Description	An increase of ambient noise levels at the construction site is expected due to construction activities. Noise pollution due to construction vehicles, heavy-duty equipment and machinery will be generated.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Ensure the use of construction vehicles and equipment that emit reduced noise levels. ✚ Ensure proper maintenance is conducted on vehicles to ensure the reduction of noise emission. ✚ The construction staff should be equipped with ear protection equipment. ✚ Audio equipment (if any) should not be played at levels considered intrusive by others. ✚ Construction activities will be limited to a period between 07h00 and 19h00.
Proposed Monitoring	Strict operational times. Regular inspection.
Responsible Party	Luderitz Town Council / Contractors

Waste Generation

Construction/Decommissioning phase	
Description	Waste material will be generated during the construction activities of the township developments. Waste in the form of rock cuttings, building rubble, pipe cuttings, oil spills or leakages of petroleum products may occur during the construction phase.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Ensure that sufficient weather- and vermin-proof bins / containers are present on site for the disposal of solid waste. Waste and litter generated during this phase must be placed in these disposal bins. ✚ Empty bins regularly as required. ✚ Contractor shall institute a waste control and removal system for the site. ✚ All waste shall be disposed off site at an approved landfill site. ✚ No disposal of /or burying of waste on site should be conducted.

Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ No waste should be burned on site. ✚ The hazardous waste storage is to be clearly marked to indicate the presence of hazardous substances, and the protocols associated with handling of such hazardous wastes shall be known by all relevant staff members. ✚ Solid and liquid hazardous waste shall be stored in separate containers. Hazardous waste should be disposed of at the approved hazardous waste disposal site. ✚ Regular inspection and housekeeping procedure monitoring should be maintained at all times. ✚ Awareness of the hazardous nature of various types of waste should be enforced.
Proposed Monitoring	Regular inspection and housekeeping procedure. Observation of site appearance by the manager.
Responsible Body	Luderitz Town Council / Contractors

Operational phase	
Description	<p>Waste in the form of solid waste from households, businesses and institutions will be generated. Waste will be removed and disposed off at a suitable waste disposal site by the Luderitz Town Council and its waste removal contractors (e.g. Rent-a-Drum, Kleen Tek etc).</p> <p>The Town Council will provide waste skips around the township developments like the rest of the suburbs in Luderitz.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Waste bins / containers must be readily available at the township development at all times. Ensure that the waste bins / containers are weather- and vermin- proof. ✚ Any waste generated must be contained and disposed off accordingly. ✚ No burning or burying of waste on site should be conducted. ✚ Empty bins regularly as required. ✚ All waste shall be disposed off site at an approved landfill site.
Proposed Monitoring	Regular visual inspection.
Responsible Body	Luderitz Town Council

Traffic

Construction/Decommissioning phase	
Description	<p>Construction related activities are expected to have a minimal impact on the movement of traffic along the roads/streets in the area, as construction vehicles will frequent the project sites periodically.</p> <p>A slight nuisance might be experienced by motorists in the area. This will most likely be caused by slow moving vehicles frequenting the construction sites.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Install and maintain official traffic signalling (where necessary) along the access roads / intersection in conjunction with local or national traffic regulations. ✚ Should diversion of traffic or closure of any road be necessary, the Luderitz Town Council and Traffic Department should be consulted in this regard. ✚ Speed limit warning signs must be erected to minimise accidents. ✚ Construction vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents. ✚ Where feasible, Construction vehicles should not travel to and from the site during peak times (07h00 to 09h00 and 16h00 to 18h00), to minimise impacts on traffic. ✚ Construction vehicles should not be allowed to obstruct the road, hence no stopping in the road, wholly or partially, but rather pull off the road or park on the roadside.
Proposed Monitoring	Observations of the traffic flow along access roads

Heritage impacts

Construction/Decommissioning phase	
Description	There are no known heritage areas envisaged to be impacted by the new development; however the contractor may come across archaeological features or objects that possess cultural values during construction activities.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ If such remains or objects with cultural values (e.g. bones, weapons, ancient cutlery, graves etc) are uncovered at the project location or surrounding, it should be barricaded off, and ✚ The relevant authorities (i.e. the local police and National Heritage Council of Namibia) should be contacted immediately.
Proposed Monitoring	Regular site inspection.
Responsible Party	Luderitz Town Council / Contractors

Ecological impacts

Construction/Decommissioning phase	
Description	The site is previously disturbed with very little fauna and flora observed. No conservation worthy vegetation is present at the project site.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Limit clearing of vegetation to those areas within the footprint of construction site. ✚ Disturbance of areas outside the designated working zone is not allowed. ✚ No vegetation should be removed outside the designated project area
Proposed Monitoring	Regular site inspection.
Responsible Party	Luderitz Town Council / Contractors

Operational phase	
Description	The operations of the development will have minimal impacts on fauna and flora; however vegetation control in and around the townships must be maintained.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Vegetation in open spaces should not be disturbed or removed during the operational phase. ✚ Minimise the area of disturbance by restricting movement to the designated working areas during Maintenance.
Proposed Monitoring	Regular site inspection.
Responsible Body	Luderitz Town Council

Erosion and Sedimentation

Construction/Decommissioning phase	
Description	Clearing of vegetation during earthworks is expected to take place and can make the project site susceptible to soil erosion especially during rainy seasons. The constant movement of heavy construction vehicles during construction also tend to compact the soil surface, which can reduce infiltration capability, and increase surface water runoff.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Avoid unnecessary removal of topsoil cover during construction. ✚ Ensure stockpiles are located within the boundary of the site and are protected from erosion. ✚ Stabilise cleared areas as soon as possible to prevent and control surface erosion. ✚ Limit clearing of vegetation to those areas within the footprint of construction. ✚ Minimise open areas and reduce the frequency of disturbance.
Proposed Monitoring	Regular visual site inspection.
Responsible Party	Luderitz Town Council / Contractors

Social-Economic Aspects

Construction/Decommissioning phase	
Description	Temporary employment opportunities are anticipated to be created during construction, both directly through construction workers and indirectly through suppliers, service providers, and informal traders attracted to the project site.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Construction contractor(s) should be sourced from Luderitz, and surrounding areas. ✚ Construction workers should be sourced from Luderitz, and surrounding areas. ✚ Suppliers of construction materials should be sourced from Luderitz, and surrounding areas. ✚ Locally source services required during the construction process, such as securities, rental of portable toilets, plant hire, etc. ✚ Designate an area outside the construction site for informal traders (if any), to allow them to trade.
Responsible Party	Luderitz Town Council / Contractors

Operational phase	
Description	The creation of new employment opportunities is eminent for maintenance activities; and is considered to be a positive impact. At this stage, it is unclear how many temporary and permanent employment positions will be created but jobs will be created.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Employment creation should be targeted at the immediate communities of the project site, or Luderitz. ✚ Maintenance contractors should be sourced from Luderitz, or the region at large. ✚ Locally source services required during the operational process, such as securities, plant hire, etc.
Responsible Body	Luderitz Town Council

4. CONCLUSIONS

If the above-mentioned management recommendations are properly implemented, it is anticipated that most of the adverse impacts on the environment can be mitigated. An appointed environmental officer/consultant will need to monitor or audit the site throughout construction to ensure that the EMP is fully implemented and complied with. The EMP caters for all project phases, but will need to be reviewed during all phases of project, especially when revisions are made to the project development plans.

The Environmental Management Plan should be used as an on-site tool during all phases of the proposed project. Parties responsible for contravention of the EMP should be held responsible for any rehabilitation that may need to be undertaken.

Should the township development be modified and/or extended to a different area, it is recommended that a different EIA be done for the probable new location.

Matrix Consulting Services

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