ENVIRONMENTAL MANAGEMENT PLAN (EMP) FOR THE PROPOSED CONSTRUCTION, OPERATION AND MAINTENANCE OF THE PROPOSED NEW OXIDATION PONDS AND A SEWER PIPE SYSTEM IN EPUKIRO POS 3, OMAHEKE REGION

Prepared for

Omaheke Regional Council
Private Bag 2277, Gobabis,
Namibia

Prepared by:
Green Gain Consultants cc
P.O. BOX 5303
Walvis Bay
Namibia

NOVEMBER 2025

DOCUMENT DESCRIPTION

PROJECT NAME	**CONSTRUCTION, OPERATION, AND MAINTENANCE OF THE PROPOSED OXIDATION PONDS AND SEWAGE PIPE SYSTEM**
LOCATION	**EPUKIRO POS 3, OMAHEKE REGION**
DOCUMENT	**ENVIRONMENTAL MANAGEMENT PLAN (EMP)**
CLIENT:	**Omaheke Regional Council**
EAP:	**Joseph Kondja Amushila**
APLICATION:	**APP006791**

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LIST OF ACRONYMS

DEA:	Directorate of Environmental Affairs
DWA:	Directorate of Water Affairs
EAP:	Environmental Assessment Practitioner
ECC:	Environmental Clearance Certificate
EIA:	Environmental Impact Assessment
EMA:	Environmental Management Act
EMP:	Environmental Management Plan
IAP:	Interested and Affected Parties
MAWLR:	Ministry of Agriculture Water, and Land Reform
MEFT:	Ministry of Environment, Forestry and Tourism
MoHSS:	Ministry of Health and Social Services
NAMPOL:	Namibian Police
ORC	Omaheke Regional Council

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

The Omaheke Regional Council (ORC) in collaboration with other stakeholders and authorities has proposed to construct new oxidation pond as well as a new 3.5 rising main pipe system. The current sewage system consisting of a pump station and 8 oxidation ponds is in a poor state, not properly functional and totally overloaded. The poor state of the sewage system is evident from overflow of raw sewage and overgrown vegetation covering the oxidation ponds.

In terms of the Environmental Management Act (EMA, No.07 of 2007) and regulations (No.03 of February 2012), Construction of industrial and domestic wastewater treatment plants and related pipeline systems may not be carried out without an Environmental Clearance Certificate being obtained.

Engeco Consulting Engineers has appointed Green Gain Environmental Consultant as an independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment (EIA), prepare the Environmental Management Plan (EMP) and apply for the Environmental Clearance Certificate from the Ministry of Environment, Forestry and Tourism (MEFT).

It is the core responsibility of the Omaheke Regional Council (ORC) to ensure the implementation and enforcement of this EMP and its requirements. Should there be any conflict between the EMP and project specifications, then terms herein shall be secondary. This EMP upon approval by the competent authority (MET/DEA) will be considered a legal bidding and any transgression is punishable by the law as prescribed.

1.2 Purpose of the EMP

This EMP has been compiled for the management of potential environmental impacts during the operation, and maintenance phases of the existing sewage treatment plant. The EMP also includes best practices for generic issues on the management during the operation of the plant.

The specific objectives of this EMP are:

- Present measures to avoid, lessen and mitigate adverse impacts on various environmental components, and enhance the value of environmental components where possible.
- Define the roles and responsibilities for the implementation of environmental management and mitigation measures.
- Explain the need for compliance with regulatory provisions and guidelines.
- Explain procedures for compliance monitoring and reporting to the relevant competent and regulatory authorities.

2. RESPONSIBILITIES

It is the core responsibility of the ORC to ensure the successful implementation of this EMP and any condition to be imposed by DEA. The implementation of the EMP also requires the involvement of various role players, each with specific responsibilities to ensure that the development is completed in an environmentally sensitive manner.

2.1 The Proponent: ORC

Responsibilities

The Proponent will play a pivotal role to ensure the successful implementation of this EMP. This can be achieved by designating an Environmental Control Officer (ECO) who should ensure the implementation of this EMP. In this case the Environmental Officer will act as the ECO and will work in collaboration with the responsible Town Engineer and the Plant Foreman in ensuring that:

a) That a copy of this EMP is always kept on site.
b) The objectives of the EMP are met.
c) That all employees involved in the operation and maintenance of the WTP are aware of this EMP and provide brief training, where necessary.
d) Take disciplinary actions in cases of transgressions and non-compliance.
e) That all environmental impacts are managed according to the environmental principles of avoiding, minimizing, mitigating, and rehabilitation as contained in this EMP.
f) Appropriate compliance monitoring is executed as outlined in Section 7 (7.1).
g) Handle grievances in the prescribed manners as outlined in Section 9.
h) Notify the Department of Water Affairs (DWA) and MEFT of any proposed changes to the scope of project and potential environmental impacts.
i) Review of the on-site environmental management and implementation of the EMP by the employees.
j) Conduct compliance monitoring as outlined in section 7 (7.2) of this EMP.
k) Keep a record of emergencies and take corrective actions as per Section 8.
l) Handle grievances in the prescribed manners as outlined in Section 9.

2.2 The Contractor and Sub-contractors

It is expected that various contractors and sub-contractors will be appointed at various times and for various tasks throughout the life cycle of this project. All appointed contractors shall ensure to comply with the EMP and its conditions, thus the ORC must ensure that a copy of the EMP is given to all contractors before commencement of any work at the project. The contractor upon receiving this EMP should ensure.

- To undertake their activities in an environmentally sensitive manner and within the context of this EMP
- To undertake good housekeeping practices during the duration of the activities
- To ensure that adequate environmental awareness training takes place in the language of the employees.

2.3 Authorities: Government Ministries (MAWF, MoHSS, MET etc)

Different government Ministries should provide supervisory and monitoring roles in order to ensure compliance with their respective regulations and laws by renewal or enforcement of respective laws i.e. MAWF-Waste Disposal Permit, MET-review of annual reports and renewal of the ECC, MoHSS-enforce the Public and Environmental Health Act etc. Line ministries should also provide necessary assistance, i.e. information, expertise, or materials/equipment as case maybe for the implementation of this EMP and sustainable operation of the project.

2.4 EAP

The EAP shall be responsible for the submission of Environmental Reports to the competent Authority (MET). The EAP should be available to provide information on this study whenever required by any party (IAP, Stakeholders, and Proponent etc). Lastly, the EAP may provide training on this EMP or make amendments as requested by the proponent.

3. LEGAL REQUIREMNETS

It is expected that the project comply with the following legislation at all times.

Table 1: Applicable legislation

LEGISLATION	PROVISION AND REQUIREMENTS
Water Resources Management act 2004	This act provides provision for the control, conservation and use of water for domestic, agricultural, urban and industrial purposes. In addition the Act clearly gives provision that pertain with license or permit that required abstracting and using water as well as for discharge of effluent. **The Town Council should ensure compliance with the conditions of the Waste Disposal Permit and also apply for renewal after the certificate has expired**
Environmental Management Act	Ensuring that the significant effects of activities on the environment are considered carefully and in time. To promote the sustainable management of the environment and the use of natural resources by establishing principles for decision making on matters affecting the environment. **Any changes to the current project should be subjected to an EIA and thus amendments to the Scoping Report and EMP should be made**
Draft Urban and Regional Planning Bill and Regulations	It is envisaged that the current system of land use planning and development controlled in Namibia will be comprehensively reformed by the enactment of the draft Urban and Regional Planning Bill and regulation. The Bill provides for the establishment of national, regional and urban structure plans, and the development of zoning schemes. It also deals with a variety of related land use control issues such as the subdivision and consolidation of land and the establishment and extension or urban areas. **This project should form part of the Town Structural Plan**
Pollution Control and Waste Management Bill	This Bill serves to regulate and prevent the discharge of pollutants to air and water as well as providing for general waste management. **This Bill will license discharge into watercourses and emissions into the air.**
Public Health and Environmental Act, 2015	The objectives of the PHE Act are to; • Promote public health and wellbeing • Prevent injuries, diseases and disabilities • Protect individuals and communities from public health risks • Encourage community participation in order to create a healthy environment • Provide for early detection of diseases and public health risks
Labour Act (No 11 of 2007)	To establish a comprehensive labour law for all employers and employees; to entrench fundamental labour rights and protections. Regulate basic terms and conditions of employment; ensure the health, safety and welfare of employees; to protect employees from unfair labour practices; to regulate the registration of trade unions and employers' organisations; to regulate collective labour relations; to provide or the systematic prevention and resolution of labour disputes; **Any employment provided whether by the Town Council or by contractor at this site i.e. Security Services must be in accordance with the Labour Act**.
Employment Service Act, 8 of 2011	To provide for the establishment of the National Employment Service; to impose reporting and other obligations on certain employers and institutions; to provide for the licensure and regulation of private employment agencies; and to deal with matters incidental thereto. **Any employment provided whether by the Town Council or by contractor at this site i.e. Security Services must be in accordance with the Labour Act**.
Sewerage and Drainage Regulations (amendments)	Affords the prevention of pollution and environmental damage caused by the improper construction of sewerage and water pipelines in drainage lines. **Any upgrading of the ponds must be in line with this bill and of the required standard**

4. ENVIRONMENTAL MANAGEMENT REQUIREMNTS

4.1 Environmental awareness training

All contractors and employees involved in management or any work at the project should be briefed on their obligation towards environmental protection and methodologies in terms of the EMP prior to work commencing. The briefing should be done by the Town Council prior to any work in the form of an onsite talk.

4.2 Record keeping

There should be an up-to-date filing system for the project whereby method statements, environmental incidents report, training records, audit reports and public complaints register are kept. It is advised that photographs of the site should be taken as a visual reference. These records should be kept for a minimum of **two (2) years** after completion of the project.

4.3 Non-compliance and penalties

In cases of transgressions and non-compliance to the EMP by the contractor, the contractor should be liable to a penalty fine (as per Engineering Standards or as applicable to the Town Council). Transgressions should be recorded in a dedicated register and be filed. The resident engineer or any person designated by the Town Council shall issue the penalties in terms of the severity on the environment.

Adherence to this EMP during operation of the project will ensure that the environmental impacts associated with the proposed development will be mitigated to a greater extent thus promoting sustainable development. The commitment and co-operation of the identified responsible person(s) will ensure effective implementation of the EMP; therefore, it is imperative that there is a file dedicated for Environmental Documentation.

4.4 Environmental Reports

The Town Council should appoint a responsible person who among others should be responsible for conducting regular monitor of general operation of the ponds. This monitoring report should then be compiled into annual reports to be submitted to the competent Authority (MEFT).

4.5 Enforcements

This EMP upon approval by MEFT shall be a legally binding document, thus, the commitment and co-operation of the identified responsible person(s) will ensure effective implementation of the EMP. Adherence to this EMP will ensure that the environmental impacts associated with the project will be mitigated to a greater extent thus promoting sustainable development. The EMP will be enforced in accordance with the provisions of Section 8 (j) of the Environmental Management Act 07 of 2007.

4.6 Method statements

The method statements are required especially during the construction phase to describe the scope of work intended by the contractor. This should be provided in a step-by-step description for the Town Engineer and ECO to understand the contractor's intentions. This will enable them to assist in devising any mitigation measures, which would minimize environmental impact during these tasks. The method statements should also clearly stipulate mitigation methods of the intended works, against which the contractor's performance will be measured. In this case, the following method statements will be necessary during the operation phase:

- Materials and equipment to be used.
- How and where materials will be stored.
- The containment of accidental leaks or spills as prescribed by this EMP (Section 8.3.2: Emergency Response Procedures).
- Timeline and location of activities; and
- Any other information deemed necessary by the ECO/Town Engineer

The contractor must submit the method statement two weeks before the commencement of any operation. Work may not commence until the method statement has been accepted by the Town Engineer and ECO and communicated to the workforce. The contractor shall, except in the case of emergency activities, allow 14 days for consideration and approval of the method statement. The Town Engineer or ECO may require changes to the method statement if the proposal does not comply with the specifications or if, the proposal may result in damage to the environment more than that permitted by the specifications. Approved method statements shall be communicated to all relevant personnel.

4.7 Non-compliance and disciplinary actions

In cases of transgressions and non-compliance to the EMP, the following actions may be taken against the transgressor.

- Disciplinary actions
- Legal actions
- Termination of contract

The ECO in collaboration with the Project Engineer will ensure that the EMP is fully complied with by the appointed contractor and employees during the operation and maintenance phases. The ECO shall issue disciplinary actions based on the severity of the environmental damages and the nature and extent of the transgression/non-compliance. In addition, the proponent may also institute legal actions against the transgressor i.e., withholding of the contract retention money from the contractor until the transgression is rectified or terminate the entire contract for non-compliance, in line with the Public Procurement Act 15 of 2015.

The Plant Manager will take disciplinary actions during the project operation and maintenance phase. Non-compliance or transgression shall result in disciplinary actions being taken against the transgressor. Transgressions should be recorded in a dedicated register and filed accordingly.

6. IMPLEMENTING THE EMP: ROLES AND RESPONSILITIES

This section provides a manner in which the EMP is to be implemented. It is the responsibility of the ORC to ensure that all parties involved perform their respective roles in accordance with this EMP.

Table 1: Management Plan during the Operation phase

ISSUE	OBJECTIVE	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY
1. Effluent Management			
1.1 Potential leakage or seepage of untreated wastewater from the WTP or sewer lines.	To maintain a closed system to prevent leakage or spillage	• Ensure systematic control over the technical maintenance of equipment and technological pipelines of the treatment plant. If necessary, appropriate corrective measures should be taken. • Insulating layer (clayey compacted soil) will be arranged within the territory of the treatment plant.	Plant Foreman
1.2 Exposure of people to untreated or semi-treated wastewater may could put people at risk of number of waterborne diseases i.e., *gastro-enteritis, diarrhoea, skin discoloration etc.*	Prevent pollution of environment from overflows	• Maintenance of the WTP embankment to control and prevent overflows. • A standby power source (e.g., generator) should be available to power the pumps during power failures. • The raw effluent should be screened of floating debris and sludge regularly. • It is also expected that the proposed agricultural activities will use up most of the • Maintain existing signage	Plant Foreman
1.3 No intractable or toxic waste shall be allowed to find its way into the WTP system	Treated wastewater to be used for irrigation must comply with MAWLR standards	• Treatment of wastewater must take place strictly according to the engineers' prescriptions to meet wastewater quality standards as set by MAWLR. • PE must be monitored on a regular basis to verify water quality	Plant Foreman

2. Public Health and Safety Risk			
2.1 Odour/Smell: Release of unpleasant odours associated with raw sewage and sludge, caused by methane and hydrogen sulphide. 2.2 Risk of drowning (accidental or suicidal) 2.3 The WTP can provide breeding sites for mosquitoes, flies or rodents if not properly maintained.	Minimize generation of unpleasant odours Avoid or reduce public health risks associated with the wastewater treatment plant Ensure public safety. Reduce occupational health risks	• PE must be kept clean of grits, debris to avoid scum formation. • The final effluent should be analysed twice per year for quality of which results are to be submitted to MAWLR; DWA. • The fence around the plant must be kept in good shape at all times. • Weatherproof warning notices indicating that the site is out of bounds and human consumption • Ensure gates are locked every time • No unauthorized persons must be allowed • Security services must be ensured (24hrs) • The area should be disinfected in case of suspected diseases outbreaks or rodents/pest infestation • The plant should be kept clean of Vegetation (reeds, trees) • All chemicals should be handling according to the Material Safety Data Sheet (MSDS) • All employees responsible or involved in the chemical applications must be provided with protective clothing. • Workers must be trained in proper, safe procedures in relation to activities involving sewage or sludge so that they do not unwittingly engage in hazardous practices.	Plant Foreman

2.4 Occupational health hazard associated with the operation of the WTP			
3. Soil contamination			
3.1 Leakage or spillage may result in pollution of surrounding soil.	• Ensure soil conservation	• Prevent or manage any leakage, seepage or overflows • Only effluent of the required standard may be discharged in the environment	Plant Foreman
3.2 Possible soil erosion Wastewater escape from the WTP may carry soil with and form erosion gullies		• Prevent soil erosion by installing erosion work in gullies formed by flowing wastewater. • It must be ensured that storm water around the site does not reach excessive speeds.	Plant Foreman

3.3 Other soil contamination can result form • Improper storage-usage of fuel and lubricants. • Improper management of solid wastes (contaminated wipes used for • equipment cleaning, dirty work gloves). • -Emergency situations (spillage of wastewater in case of damage of pipelines or other • infrastructures).		• Control of the fuel/oil storage and usage rules • Waste management plan provides the systematic supervision of fulfilling the measures • In case of fuel/oil spill, cleaning of the territory and withdrawal of the contaminated soil and ground for further remediation • Training of the personnel on environmental and safety issues during recruitment and then once a year • In process of repair works, implementation of the mitigation measures considered for the • construction phase.	Plant Foreman
4. Waste Management			
4.1 Improper Waste disposal may cause pollution	Safely and proper solid waste management	• Coarse material removed from the hand screen and grit channels must be disposed of at a dumpsite.	Plant Foreman

		• The small volume of general solid waste expected to be generated by the staff onsite (e.g., food packaging) must be kept in a closable refuse bin until such time as it is taken to the landfill site. • Littering (both on and around the site) must be strongly discouraged. • Special attention should be paid to the issues related to the management of the waste accumulated on the grille of the shield system, as well as to the removed sludge. • Sludge is currently milled and used as manure for garden maintenance purpose. Unused dry sludge/manure should be collected and disposed to the dumpsite	
5. Operational Management and Maintenance			
5.1 Inadequate management if site operator is ill / on leave or resigns	Ensure effective and efficient management of the plant	• At least two site operators must be fully trained in the operation of the site, so that one can stand in for the other in case of illness, leave, etc.	Plant Foreman
5.2 Lack of skills on the part of the plant operator		• The existing system requires only a moderate level of skill and technical expertise, which lowers the risk of malfunction due to lack of highly trained staff. • Plant operators must be appropriate skilled and experienced for the task at hand • Site operator/s must receive continuous training in all aspects of daily management of the plant (technical or administrative) • Technical support must be available to the sewage plant operator	Plant Foreman
5.3 Lack of proper and timely maintenance may compromise the functionality of the plant		• The sewage plant must be maintained regularly by replacing key components • A maintenance plan must be in place to ensure that planning, such as budget allocation or procurement of service providers, can be put into motion sufficiently ahead of time.	Plant Foreman
5.4 Document control and access to information	Readily available of records and information about the plant	• Plant manager must ensure that all reports are available onsite and easily accessible	Plant Foreman

5.5 Running the plant over its design lifetime could compromise functionality	The plant must not remain operational for longer than its design lifetime, unless relevant key components are replaced or upgraded, as approved by engineer.	• The engineer must advise on the operational or upgrading of the plant	Plant Foreman
6. Legislative requirement			
6.1 Lack of compliance with relevant legislations may cause transgression or conflicts with the law.	Operating within the requirements of the law	**The following compliance must be ensured** • Implement the conditions of the Wastewater Discharge Permit • Ensure renewal once the permit has expired**.**	Plant Foreman
6.2 lack of enforcement would me the potential impact associated with the plant could still exist		• Provide a commitment plan for improvement and corrective actions to remedy the existing and future challenges that could lead to serious environmental and public health impacts • Compile annual Environmental Performance Report which should be submitted to MEFT • This EMP must be updated every three years, concurrent with the renewal of the ECC.	Plant Foreman

Table 2: Mitigation Measures during Operation and Maintenance Phase

ISSUE	OBJECTIVE	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY
1. Effluent Management			
1.1 Potential leakage or seepage of untreated wastewater from the WTP or sewer lines.	To maintain a closed system to prevent leakage or spillage	• Ensure systematic control over the technical maintenance of equipment and technological pipelines of the treatment plant. If necessary, appropriate corrective measures should be taken. • Insulating layer (clayey compacted soil) will be arranged within the territory of the treatment plant.	Plant Foreman
1.2 Exposure of people to untreated or semi-treated wastewater may could put people at risk of number of waterborne diseases i.e., *gastro-enteritis, diarrhoea, skin discoloration etc.*	Prevent pollution of environment from overflows	• Maintenance of the WTP embankment to control and prevent overflows. • A standby power source (e.g., generator) should be available to power the pumps during power failures. • The raw effluent should be screened of floating debris and sludge regularly. • It is also expected that the proposed agricultural activities will use up most of the • Maintain existing signage	Plant Foreman
1.3 No intractable or toxic waste shall be allowed to find its way into the WTP system	Treated wastewater to be used for irrigation must comply with MAWLR standards	• Treatment of wastewater must take place strictly according to the engineers' prescriptions to meet wastewater quality standards as set by MAWLR. • PE must be monitored on a regular basis to verify water quality	Plant Foreman
2. Public Health and Safety Risk			
2.1 Odour/Smell: Release of unpleasant odours associated with raw sewage and sludge, caused by methane and hydrogen sulphide. 2.2 Risk of drowning (accidental or suicidal) 2.3 The WTP can provide breeding sites for mosquitoes,	Minimize generation of unpleasant odours Avoid or reduce public health risks associated with the wastewater treatment plant Ensure public safety.	• PE must be kept clean of grits, debris to avoid scum formation. • The final effluent should be analysed twice per year for quality of which results are to be submitted to MAWLR; DWA. • The fence around the plant must be kept in good shape at all times. • Weatherproof warning notices indicating that the site is out of bounds and human consumption • Ensure gates are locked every time	Plant Foreman

flies or rodents if not properly maintained. 2.4 Occupational health hazard associated with the operation of the WTP	Reduce occupational health risks	• No unauthorized persons must be allowed • Security services must be ensured (24hrs) • The area should be disinfected in case of suspected diseases outbreaks or rodents/pest infestation • The plant should be kept clean of Vegetation (reeds, trees) • All chemicals should be handling according to the Material Safety Data Sheet (MSDS) • All employees responsible or involved in the chemical applications must be provided with protective clothing. • Workers must be trained in proper, safe procedures in relation to activities involving sewage or sludge so that they do not unwittingly engage in hazardous practices.	

3. Soil contamination			
3.1 Leakage or spillage may result in pollution of surrounding soil.	• Ensure soil conservation	• Prevent or manage any leakage, seepage or overflows • Only effluent of the required standard may be discharged in the environment	Plant Foreman
3.2 Possible soil erosion Wastewater escape from the WTP may carry soil with and form erosion gullies		• Prevent soil erosion by installing erosion work in gullies formed by flowing wastewater. • It must be ensured that storm water around the site does not reach excessive speeds.	Plant Foreman
3.3 Other soil contamination can result form • Improper storage-usage of fuel and lubricants. • Improper management of solid wastes (contaminated wipes used for • equipment cleaning, dirty work gloves). • -Emergency situations (spillage of wastewater in case of damage of pipelines or other • infrastructures).		• Control of the fuel/oil storage and usage rules • Waste management plan provides the systematic supervision of fulfilling the measures • In case of fuel/oil spill, cleaning of the territory and withdrawal of the contaminated soil and ground for further remediation • Training of the personnel on environmental and safety issues during recruitment and then once a year • In process of repair works, implementation of the mitigation measures considered for the • construction phase.	Plant Foreman

4. Waste Management			
4.1 Improper Waste disposal may cause pollution	Safely and proper solid waste management	• Coarse material removed from the hand screen and grit channels must be disposed of at the dump site. • The small volume of general solid waste expected to be generated by the staff onsite (e.g., food packaging) must be kept in a closable refuse bin until such time as it is taken to the landfill site. • Littering (both on and around the site) must be strongly discouraged. • Special attention should be paid to the issues related to the management of the waste accumulated on the grille of the shield system, as well as to the removed sludge. • Sludge is currently milled and used as manure for garden maintenance purpose. Unused dry sludge/manure should be collected and disposed to the dumpsite	Plant Foreman
5. Operational Management and Maintenance			
5.1 Inadequate management if site operator is ill / on leave or resigns	Ensure effective and efficient management of the plant	• At least two site operators must be fully trained in the operation of the site, so that one can stand in for the other in case of illness, leave, etc.	Plant Foreman
5.2 Lack of skills on the part of the plant operator		• The existing system requires only a moderate level of skill and technical expertise, which lowers the risk of malfunction due to lack of highly trained staff. • Plant operators must be appropriately skilled and experienced for the task at hand • Site operator/s must receive continuous training in all aspects of daily management of the plant (technical or administrative) • Technical support must be available to the sewage plant operator	Plant Foreman
5.3 Lack of proper and timely maintenance may compromise the functionality of the plant		• The sewage plant must be maintained regularly by replacing key components • A maintenance plan must be in place to ensure that planning, such as budget allocation or procurement of service providers, can be put into motion sufficiently ahead of time.	Plant Foreman

5.4 Document control and access to information	Readily available of records and information about the plant	• Plant manager must ensure that all reports are available onsite and easily accessible	Plant Foreman
5.5 Running the plant over its design lifetime could compromise functionality	The plant must not remain operational for longer than its design lifetime, unless relevant key components are replaced or upgraded, as approved by engineer.	• The engineer must advise on the operational or upgrading of the plant	Plant Foreman
6. Legislative requirement			
6.1 Lack of compliance with relevant legislations may cause transgression or conflicts with the law.	Operating within the requirements of the law	**The following compliance must be ensured** • Implement the conditions of the Wastewater Discharge Permit • Ensure renewal once the permit has expired**.**	Plant Foreman
6.2 lack of enforcement would me the potential impact associated with the plant could still exist		• Provide a commitment plan for improvement and corrective actions to remedy the existing and future challenges that could lead to serious environmental and public health impacts • Compile annual Environmental Performance Report which should be submitted to MEFT • This EMP must be updated every three years, concurrent with the renewal of the ECC.	Plant Foreman

DECOMMISSIONING

Decommissioning of existing Ponds

- **Dewatering and Drying:** Ponds must be completely dewatered and allowed to dry out thoroughly.
- **Sludge Management:** Accumulated sludge, which may contain high levels of pathogens and nutrients, should be removed using mechanical scrapers or front-end loaders once dry.
- **Safety Securing:** Sites must remain enclosed by non-climbable fencing (at least 5 feet high) and locked gates to prevent unauthorized access by people or wildlife

Repurposing and reuse of the ponds

Old ponds or their effluents can be repurposed for productive uses provided they meet safety standards.

- **Agricultural Irrigation:** Treated effluent is highly appropriate for reuse in agriculture, particularly for crops not intended for direct human consumption, as it retains beneficial nutrients like nitrogen and phosphorus.
- **Aquaculture:** Ponds can be adapted for local production of animal feed (e.g., duckweed) or specific fish species.
- **Biogas Recovery:** For anaerobic ponds, covering them with a floating plastic membrane can allow for the collection of biogas, which can be used for heating, cooking, or small-scale electricity production.

Decommissioning of new oxidation ponds

7. ENVIRONMENTAL MONITORING

To ensure continual improvement in environmental performance and reduce adversity of potential negative impacts, it is advisable to keep monitoring the identified environmental receptors. The ECO must ensure that compliance monitoring is conducted at various intervals/frequencies throughout the operational life span of the oxidation ponds as indicated in the table below.

7.1 Operational Monitoring

Table 3: Aspects to be monitored during the operation phase

The issue to be monitored	Monitoring Objectives	What needs to be monitored	Frequency and means of Monitoring
Overflows	Prevent overflow of raw sewage.	-Overflows, leakages, pipe bursts, etc.	Daily/Weekly inspections and meter reading
Occupational health risks	Ensure health and safe working condition	Chemical exposure and presence of health hazards	Daily physical observations.
Purified Effluent quality	Supply of safe and quality PE in line with the Water Quality Guidelines of the Water Act.	-Physical quality of raw, settled, and treated water (*Chlorine level, N.T.U, pH, Conductivity, and Temperature*). -Microbiological/ bacteriological quality (*Free Chlorine, Heterotrophic Plate count, Total Chlorine, Coliforms & Faecal Coliforms).*	-Daily sampling and testing. -Once a month sampling and laboratory testing
Waste management	Prevent environmental pollution and contamination.	Litter chemical storage & handling, cleanliness, Chemical composition of sludge.	-Daily inspections and physical observation. -Quarterly sludge testing for chemical composition checks.
Implementation of the EMP	Ensure compliance to this EMP and adherence to the regulative measures.	Implementation of specified measures and compliance to the EMP and other relevant legal requirements.	Biannual environmental report to MEFT.

7.2 Effluent quality monitoring

The final effluent from the final settling ponds should be of the required standards as per the standards laid out in the Water Resource Management Regulations of 2013. The ORC should ensure regular monitoring of the effluent quality by analysing the parameters outlined in the Table below.

Table 4: Parameter for effluent quality analysis

Laboratory:	**Analytical Laboratory Services**		
Date sampled:			
Date analysed:			
Parameters	Inflow	Outflow	Recommended limits
BOD mg O/l			<20mg/l
Soluble Ortho Phosphate mg P/l			3-0
Oxygen Absorbed mg O/l			10
Nitrate (NO_3-N) mg N/l			<20
COD mg O/l			<75
TKN mg N/l			<3
Ammonia (NH_4 –N) mg N/l			10-0
Sodium mg Na/l			<50
Fat, Oil and Grease mg /l			Not Given
EC @ 25ºC mS/m			Not Given
Temperature ºC			Not Given
pH			5.5-9.5
Faecal Coliforms number/100 ml			0 coli/100ml
Suspended Solids mg /l			<25mg/l
Dissolved Oxygen as O_2			At least 75% saturation
Redox Potential			Not Given
Turbidity			Not Given
Total Dissolved Solids (det.)			Not Given
Sulphate as SO_4			Not Given
Chloride as Cl			Not Given
Kjeldahl Nitrogen as N			Not Given

8. EMERGENCY RESPONSE PLAN

8.1 Types and effects of emergencies

Emergencies can occur at any time or place during the construction, operation and maintenance phases. Some of the emergencies identified are as follows:

- Substance spillage i.e., oil, concrete, chemicals, etc.
- Construction accidents
- Fire outbreak
- Power failures
- Equipment failure

8.2 Sources of emergencies

The above-mentioned emergencies maybe occur as a result of accidents, faulty maintenance, and/or negligent operation. These emergencies may affect the operations and disrupt the sewage treatment process.

- **Accidents**

Accidents may occur during operation or maintenance works and can cause an unavoidable interruption to the construction works, personal injury, and/or property damage.

- **Faulty maintenance**

Faulty maintenance may cause unexpected breakdowns which may have a direct bearing on its operation and the life span of the infrastructure. Good maintenance will result in the infrastructure performing throughout the design period; however, poor maintenance or faulty maintenance will shorten the expected life of the infrastructure. Although some breakdowns can be repaired during a regularly scheduled repair program and probably do not represent an emergency, the regular occurrence of such breakdowns will affect the continued satisfactory operation of the oxidation ponds.

- **Negligent operation**

Certain operational procedures need to be followed to ensure the satisfactory performance of the WTP. Not following procedures correctly, results in the established procedures constituting negligent operation. The negligent operation may also result from a lack of knowledge to operate the components. Although the negligent operation may not be as readily noticeable as faulty

maintenance, the emergency condition resulting from it could be more severe because it could affect operations before being discovered.

8.3 Emergencies response procedures

- **Response priorities**

Depending on the nature of the emergency, the following response plan must be implemented as an integral part of the WTP routine operations to lessen the severity of the emergency. All response actions should be geared toward the following priorities in the order below.

- Safety of People (always First)
- Protection of the Environment
- Protection of Assets

Table 5: Emergency response procedures during operation and maintenance

NO.	Type of Emergency	Response actions	Responsible
1.	**Substance spill** i.e., concrete, oil, chemicals, etc.	- Cease operations and control the spill at the source first. - Contain the spillage/leakage with appropriate containers i.e., drip trays, sumps, etc., and in an approved manner to the satisfaction of the RE. - Clean the affected area with water or an approved cleaning product. - The contaminated soil should be removed and disposed of at the Landfill Site. - Repair vehicle or machinery with leakage. - If it cannot be repaired, such vehicle or machinery should not be used until it is safe to do so. - Report the incident to the RE and record it in the logbook. - A spill kit must be available at the WTP. There must be at least one person with appropriate authority who is trained in hazmat response. - Refuelling vehicles should be equipped with specific vehicle spill kits	- Plant Foreman
2.	**Power failure**	- Ensure there is an emergency power supply capable of maintaining minimum water treatment operations. - The emergency power equipment should be checked at least monthly to ensure that they remain in good operating condition. - Provide a log to document a monthly check of emergency power supply operation. - List name and number of power supplier. - In case of power loss. • investigate if the power failure is local (site) or the entire town. • If the entire town, contact NORED • If locally, inspect the source of power loss, restart the main switch. • If necessary, inform critical customers. • Record source of power shortage in the power supply logbook	- Plant Foreman

3.	**Fire outbreak**	- Follow the holistic Fire Approach as presented in Annexure 3	- Plant Foreman
4.	**Chemical leakage** i.e., chlorine leak	- In case of Chlorine or CO_2 gas leakage • Make sure storerooms are built according to legal requirements for the storage of chlorine with appropriate ventilation. • Wear a face mask with a B2P3 filter. • Evacuate all persons in the affected room. • Shut down all the dosage system valves. • Check information on the dosage system control panel. • Isolate the faulty dosage system and replace the gas cylinder with the leak. • Record in the incident report form.	- Plant Foreman
5.	**Accident** i.e., injury to a person	- The priority after a construction accident should be to seek medical attention for an injured person. - Assess the injured person's condition. - Notify the First Aid Person - Assist the First Aid Personnel - Record in the incident report form. - Report incident to the Plant Manager.	- Plant Foreman
6.	**Equipment failure** **i.e.,** pumps failure, loss of pressure, etc.	- The WTP is designed with limited automation, thus there should always be an Operator on duty. - In case of faulty pumps: • First analyses the source of emergency by checking information displayed on the SCADA system. • Check the flow rate of each pump to identify the fault. • Ensure that the standby pump is switched on.	- Plant Foreman

9. GRIEVANCE RESPONSE PROCEDURE

All grievances should be submitted through the completion of the grievance registration form as presented in Annexure 5 and submitted to the ECO.

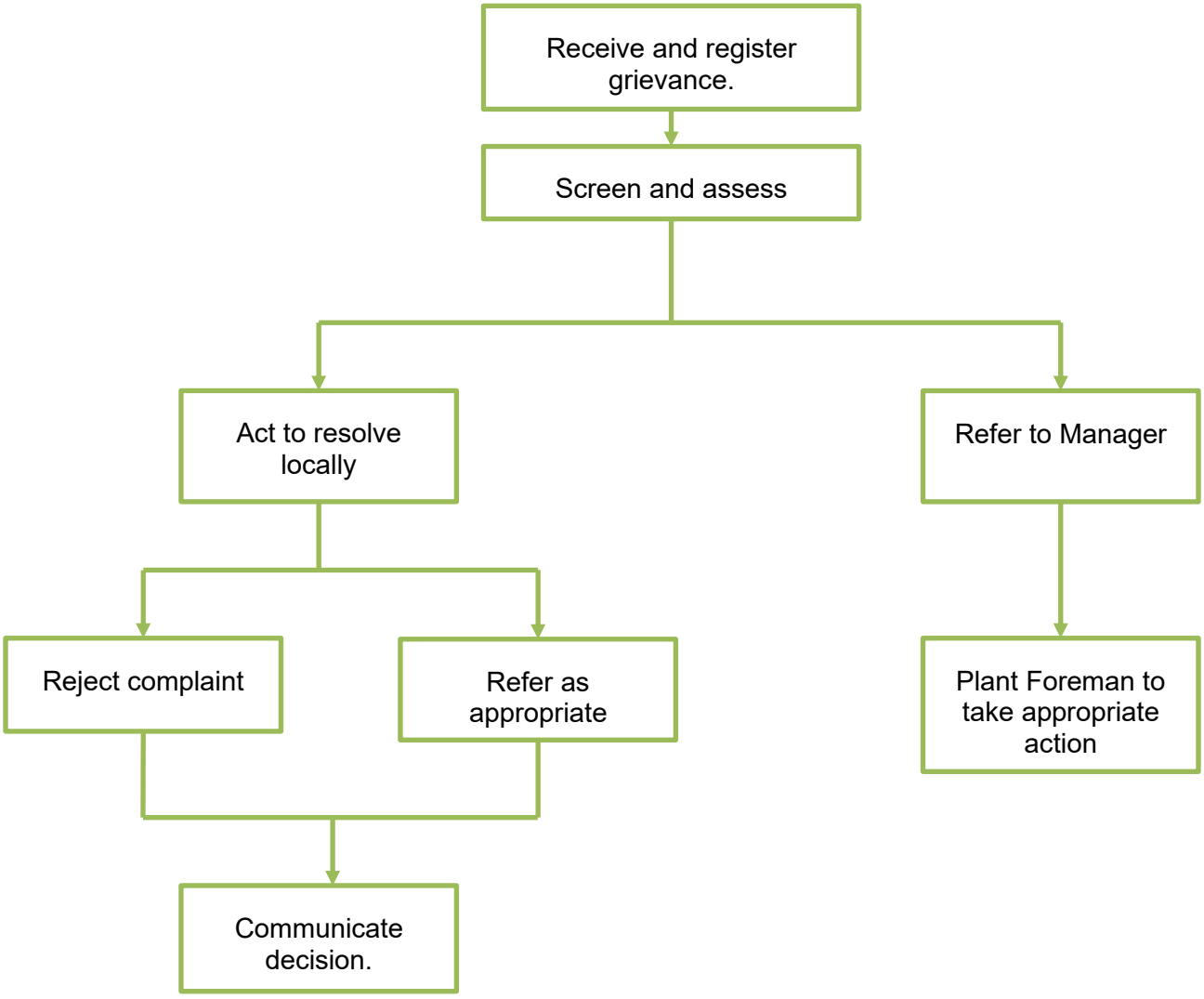

Figure 1: Grievance response procedure

Upon receipt of the registered grievance forms, the ECO shall screen and asses to either act to solve the grievance locally or refer it to head office. If the grievance is referred to the head office, the line manager should make the appropriate decision. If the grievance is to be solved locally, it should either be rejected or handled appropriately of which the decision should be communicated to the aggrieved person.

10. CONCLUSION

The preparation of this EMP is based on the current information provided, any changes or deviation with regards to the proposed pipeline route and /or the proposed ground level reservoir site shall trigger changes to this EMP. If all mitigation measures are implemented as outlined in the EMP, it is anticipated that the consequences and/or probability of the predicted negative impacts will be managed/reduced.

Although the implementation of this EMP requires a multitude of administration, ORC should play a pivotal role in the implementation as outlined in this report. The ECO should also ensure proper coordination with all parties involved in the project activities during all project phases. The ECO shall also ensure to avail necessary resources (i.e., human, financial, etc.,) and training to enable the full implementation of this EMP. Monitoring of certain environmental parameters must be conducted regularly as outlined in this EMP. Environmental biannual reports must be kept available for possible submissions to the MEFT and ensure the renewal of the project's ECC.

Upon approval by the MEFT, this EMP should be used as an on-site reference document for the proposed oxidation ponds and sewer pipe system, thus a copy of this EMP shall be kept onsite always. It is a legally binding document, thus, any deviation or transgression from this EMP is punishable by law as per the Environmental Management Act 07 of 2007. Parties responsible for transgressing may be held responsible for any rehabilitation that may need to be undertaken.