

Amendment to the Environmental Impact Assessment for the construction, operation, maintenance, and decommissioning of the proposed Outapi Water Treatment Plant (WTP) and associated infrastructure

Proponent

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UPDATED

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

DECEMBER 2022

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LIST OF ACRONYMS

DEAF:	Directorate of Environmental Affairs and Forestry
DWA:	Directorate of Water Affairs
DE:	Design Engineer
EAP:	Environmental Assessment Practitioner
ECC:	Environmental Clearance Certificate
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessments
EMA:	Environmental Management Act
EMP:	Environmental Management Plan
ER:	Resident Engineer
ERP:	Emergency Response Plan
HDPE:	High-Density Polyethylene
I&APs:	Interested and Affected Parties
MEFT:	Ministry of Environment, Forestry and Tourism
MoHSS:	Ministry of Health and Social Services
MSDS:	Material Storage Data Sheet
NORED:	Northern Regional Electricity Distributor
OTC:	Outapi Town Council
PPE:	Personal Protective Equipment
SCADA:	Supervisory Control and Data Acquisition
uPVC:	Unplasticized Polyvinyl Chloride
WTP:	Water Treatment Plant

1. INTRODUCTION AND BACKGROUND

1.1 Project Background

NamWater Ltd. was granted an Environmental Clearance Certificate (ECC 01734) issued on 11 November 2022, for the construction, operation, maintenance, and decommissioning of the proposed Outapi Water Treatment Plant (WTP) with a capacity of 283 m³/hr. During the initial Environmental Impact Assessment (EIA) study, concerns were raised about the design capacity of the proposed WTP and NamWater was requested to review the demands contained in the Knight Piesold report by taking into consideration the additional information on the population and economic growth of the supply area.

Upon several revisions of the proposed WTP design and control philosophy, following the newly proposed water demand revisions, a decision by NamWater's management was made to increase the design capacity of the proposed WTP from the initial 283 m³/hr. to 438 m³/hr. The decision to increase the design capacity for the proposed WTP will result in the construction of additional infrastructure that were not included in the initial EIA study. Consequently, this has caused the scope of works included in the approved Scoping Report and the ECC 01734 to change. In line with section 39 of the Environmental Management Act 7 of 2007, an amendment to the initial EIA study was undertaken to identify potential environmental, safety, health, and socio-economic impacts associated with the proposed additional works. The results of the amendment to the EIA study are contained in the amendment report. Moreover, the initial Environmental Management (EMP) was updated to include management and mitigation measures to address new issues arising from the proposed additional works for the proposed Outapi WTP. The updated EMP (this report), should be read in conjunction with the amendment report. Furthermore, the updated EMP should be implemented during the planning, construction, operation, maintenance, and decommissioning phases of the proposed Outapi WTP.

1.2 EMP Objectives

The objectives of the updated EMP remains the same as that of the initial EMP as follows.

- 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.
- Present procedures for the possible decommissioning and required environmental rehabilitations.

2. PROJECT DESCRIPTION

2.1 Project Locality

The proposed Outapi WTP will be constructed at the existing NamWater yard located west of the town central business district and can be found on the following coordinates 17°30'8.52"S and 14°58'42.57"E.

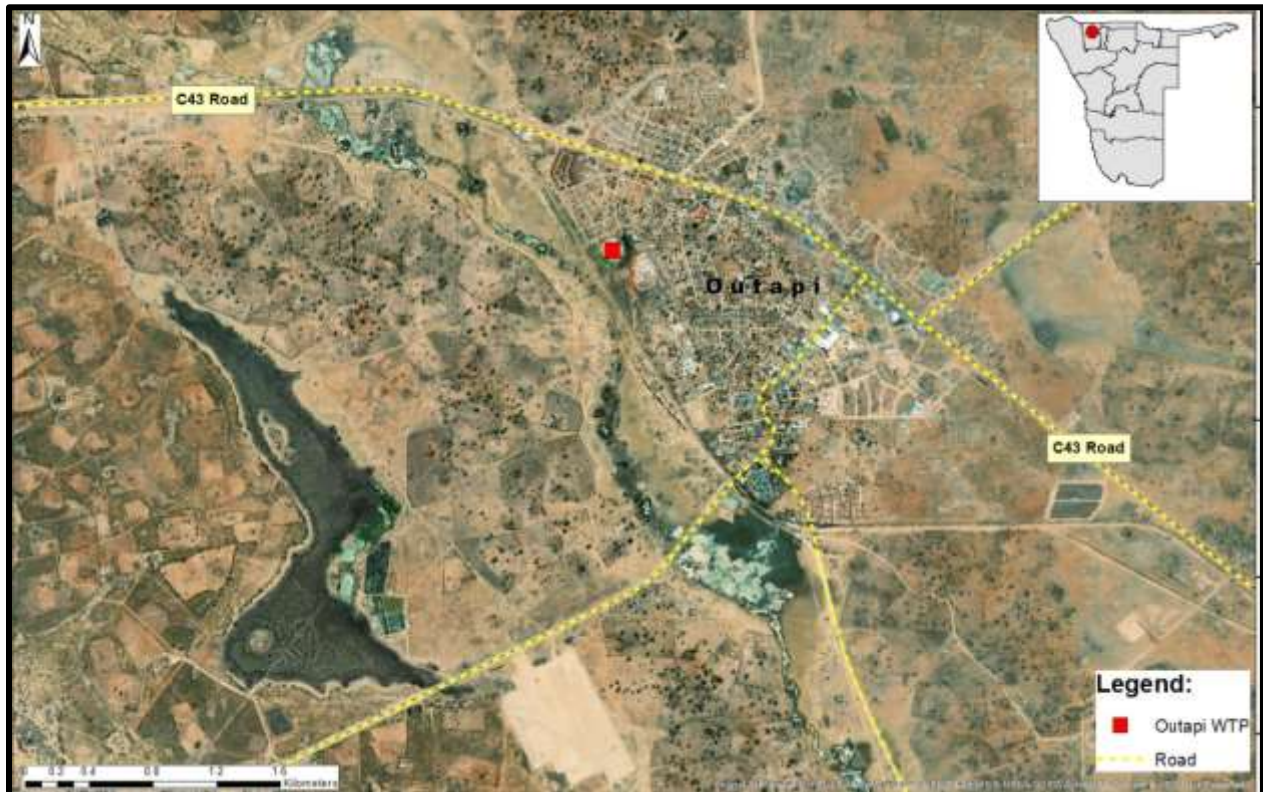


Figure 1: Project locality map

2.2 Scope of works

The existing Outapi WTP is to be replaced with a new conventional surface Water Treatment Works (WTW) to cater for the future 2030 – 2031 demand. The intention is for the plant to be always manned and it shall not be possible to be operated without the presence of an operator. The proposed works will include the upgrading of capacities for certain plant components to complement the envisaged WTP. The list of components to be upgraded and replaced is detailed under Sections 6.2.1 to 6.2.9 and 6.2.10 of the initial Scoping Report.

2.3 Additional works

Upon several revisions of the proposed WTP design and control philosophy, following the newly proposed water demand revisions, a decision by NamWater's management was made to increase the design capacity of the proposed WTP from 283 m³/hr. to 438 m³/hr. The decision to increase the design capacity for the proposed WTP will result in the construction of additional infrastructure as follows:

- Emergency raw water storage system.
- New inlet works and chemical dosing building.
- Chlorine contact tank and chlorine building.
- Two additional sludge ponds.
- Machine room, containing the backwash pumps, blowers, and new clearwater pumps to the reservoirs.
- Feed pipeline between the reservoirs and the four Grundfos clear water pumps feeding the Ombalantu North Rural Water Supply Scheme (ONRWSS).
- Refurbishing and enlarging the existing administration building.
- Maintenance roads, stormwater, and fencing.
- Maintenance and water supply workshops

3. ROLES AND RESPONSIBILITIES

3.1 Project involvement

The implementation of this EMP requires a multitude of administration of various role players, each with specific responsibilities to ensure that the WTP is planned & designed, constructed, operated, and maintained in an environmentally sound manner.

Table 1: Project team

NO.	SPECIFIC PROJECT ROLE	ADDRESS AND CONTACTS
1.	Proponent	<p>NamWater Ltd.</p> <p>Project Manager: Mr. Nangolo Ashipala Tel: +264 (61) 71-2010 Email: AshipalaN@namwater.com.na</p> <p>Environmental Department: Mrs. Jolanda Kamburona Tel: +264 (61) 71-2105 Email: KamburonaJ@namwater.com.na</p> <p>Scheme Superintendent Mr. Thomas Shiikwa Tel: +264 (65) 71-4531 ShiikwaT@namwater.com.na</p>
2.	Design Engineer	<p>Element Consulting Engineers Mr. AB Loftie-Eaton Tel: +264 61 309 416 loftie@element.com.na</p>
3.	EAP	<p>Green Gain Consultants cc Mr. Joseph Amushila Cell: +264811422927 Email: info@greengain.com.na</p>
4.	Contractors and sub-contractors (Civil, Electrical, others)	To be appointed

3.2 Responsibilities

3.2.1 The Proponent (NamWater)

The proponent shall play a pivotal role to ensure the successful implementation of this EMP. This can be achieved by designating a Resident Engineer (RE) and an Environmental Control Officer (ECO) who should take responsibilities to ensure the implementation of this EMP during planning & design, construction, and decommissioning phase. As such the RE in collaboration with the designated ECO shall ensure that:

- a) The objectives of the EMP are met.
- b) The Designing Engineer is aware of this EMP and have applied relevant proposed mitigation measures outlined in this EMP.
- c) Issue penalties in cases of transgressions and non-compliance. The penalties should be determined by NamWater in consultation with MEFT.
- d) That all environmental impacts are managed according to the environmental principles of avoiding, minimizing, mitigating and rehabilitation as contained in this EMP.
- e) Appropriate compliance monitoring is executed as outlined in Section 7 (7.1).
- f) Handle grievances in the prescribed manners as outlined in Section 9.
- g) Notify the DWA and MEFT of any proposed changes to the construction of the proposed WTP.

On the other hand, the Scheme Superintendent as the overall responsible official for the operation of Outapi WTP shall oversee the implementation of this EMP during the operation and maintenance phases. The Scheme Superintendent shall ensure:

- That a copy of this EMP is always kept on site.
- That all employees involved in the operation and maintenance of the WTP are aware of this EMP and provide a brief training (when necessary).
- Review of the on-site environmental management and implementation of the EMP by the employees.
- Conduct compliance monitoring as outlined in section 7 (7.2) of this EMP.
- Keep record of emergencies and take corrective actions as per Section 8.
- All operation and maintenance activities are in line with NamWater' s environmental code of conduct.
- Handle grievances in the prescribed manners as outlined in Section 9.
- Take appropriate disciplinary action against the WTP maintenance employees.

3.2.2 Design Engineer

The project Design Engineer (DE) is responsible for the completion of proposed project design layouts and drawings and for providing technical information to the EAP for EIA study and preparation of the project EMP. The DE shall be available to consider amendments to the initial project design in accordance with the EMP, with DWA as the competent authority and MEFT as a regulatory authority.

3.2.3 EAP

The EAP in collaboration with the NamWater Environmental team is responsible for the compilation of the Environmental Scoping report and EMP and submission of such reports to the competent authority (DWA) as well as the regulatory authority (MEFT). In addition, the EAP will make an application of the ECC on behalf of the proponent and make follow-ups on the application.

3.2.4 The contractor and sub-contractors

It is expected that various contractors and sub-contractors will be appointed at various stages and for various tasks during different phases of this project. All appointed contractors and sub-contractors involved in the project shall ensure compliance with the EMP and its conditions, thus the proponent must ensure that a copy of the EMP is given to all contractors involved. The contractor upon receiving this EMP should:

- Undertake their activities in an environmentally sensitive manner and within the context of this EMP.
- Undertake good housekeeping practices during duration of their activities.
- Ensure that adequate environmental awareness training takes place in the language of their employees.
- Liaise with the ECO to receive induction on the NamWater's environmental code of conduct.
- Keep record of emergencies and take corrective actions as per Section 8.
- Take appropriate disciplinary action against their employees in case of transgression.

4. ENVIRONMENTAL MANAGEMENT REQUIREMENTS

The successful implementation of this EMP will depend on various factors such as, training and awareness, enforcements, good record keeping and reporting.

4.1 Environmental awareness training

It is important to ensure that contractors, sub-contractors and all WTP employees have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and minimization of environmental harm.

To achieve this, all parties involved in any work at the WTP during the construction, operation, maintenance, and decommissioning phase should be briefed on their obligation towards environmental protection in terms of the EMP prior to work commencing. The training should also cover the actions outlined in the emergency response plan as well as the NamWater's environmental code of conduct.

4.1.1 Construction phase

As part of tender requirements, contractors are obliged to educate their employees on the implementation of the EMP and NamWater Code of conduct. Each contractor should provide training to their employees on issues related to construction. This training can be in the form of an onsite talk prior to the commencement of any work. Employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) should be placed at prominent locations throughout the site. Record of such trainings should be kept by the contractor and should be handed to the Resident Engineer.

4.1.2 Operation and maintenance phase

The Scheme Superintendent should ensure that WTP maintenance staff receive appropriate training on issues pertaining to the operation and maintenance of the proposed new WTP and to carry out their works in accordance with this EMP and NamWater's environmental code of conduct.

4.2 Record keeping

There should be an up-to-date filing system for the WTP, 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. The grievance register must be kept by the RE during the construction phase and by the Scheme Superintendent during the operation phases, respectively.

4.3 Enforcements

This updated 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. Moreover, 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 through a contract between NamWater and the contractor.

4.3.1 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 RE or 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 construction phase:

- Details of the construction camps.
- Construction procedures.
- 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 9.3.2: Emergency Response Procedures).
- Timeline and location of activities; and
- Any other information deemed necessary by the ECO/RE.

The contractor must submit the method statement two weeks before the commencement of any construction activity. Work may not commence until the method statement has been accepted by the RE 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 RE 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.

4.3.2 Transgressions and on-compliance

In cases of transgressions and non-compliance to the EMP, the transgressor should be liable to disciplinary actions or termination of contracts (in terms of contractors). The RE in collaboration with the designated ECO will ensure that the EMP is fully complied with by the appointed contractors and employees during the construction phase while the Scheme Superintendent will ensure compliance during the operation and maintenance phase.

Non-compliance or transgression shall result in disciplinary actions being taken against the perpetrator/s and transgressions should be recorded in a dedicated register and be filed. Actions to be taken will depend on the severity of the environmental damages and according to the nature and extend of the transgression / non-compliance. Transgressions should be recorded in a dedicated register and filed accordingly.

Such actions may take the form of (but is not limited to):

- Fines / penalties
- Legal actions
- Termination of contract
- Disciplinary actions

The RE shall issue the penalties in terms of the severity of the environmental damages while the disciplinary action shall be determined according to the nature and extend 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 and NamWater's contract agreement.

4.4 Environmental reports

The ECO shall prepare a completion report upon the completion of the construction phase. The completion report should indicate the environmental performance, compliance to the EMP, and matter of incidental.

Furthermore, the proponent shall ensure regular monitoring of project activities during all project phases and keep records. These records may be required by the competent authority when deemed necessary. The records will also be required when applying for renewal of the ECC and NamWater will also have to indicate how the EMP was adjusted to make provision for improved mitigation measures and action plans.

5. LEGAL REQUIREMENTS

In terms of legal compliance, there are no new issues arising from the proposed amendments. As such, the implementation of this updated EMP shall be guided by the legislative framework as outlined in the initial Scoping report and briefly presented here below.

Table 2: Applicable National Laws

LEGISLATION	PROVISION AND REQUIREMENTS
Constitution of the Republic of Namibia (1990)	<p>There are two clauses contained in the Namibian Constitution that are of relevance to sound environmental management practice, viz. articles 91(c) and 95(l). In giving effect to articles 91(c) and 95(l) of the Constitution of Namibia, general principles for sound management of the environment and natural resources in an integrated manner have been formulated. The formulation of these general principles resulted in the Namibia’s Environmental Assessment Policy of 1994. To give statutory effect to this Policy, the Environmental Management Act was approved in 2007, and gazette as the Environmental Management Act (Act No. 7 of 2007) As the organ of state responsible for management and protection of its natural resources, MEFT: DEA is committed to pursuing the 13 principles of environmental management that is set out by Part 2 of the Act.</p> <p>To summaries, Articles 91(c) and 95(l) refer to:</p> <ul style="list-style-type: none"> • Guarding against over –utilization of biological natural resources. • Limiting over-exploitation of non-renewable resources. • Ensuring ecosystem functionality. • Protecting Namibia’s sense of place and character. • Maintaining biological diversity; and • Pursuing sustainable natural resource use.
Pollution Control and Waste Management Bill, 2003	<p>This Bill serves to regulate and prevent the discharge of pollutants to air and water as well as providing for general waste management.</p> <p>The bill provide framework for a multitude administration on pollution control and waste management in the country.</p>
Environmental Management Act 07 of 2007	<p>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</p>

	<p>establishing principles for decision making on matters affecting the environment.</p> <p>Of relevance to this project are the following listed activities, as provided in Section 27 of this Act, which include:</p> <ul style="list-style-type: none"> • No. 2.1 The construction of facilities for waste sites, treatment of waste and disposal of waste. • No. 8.5 Construction of dams, reservoirs, levees, and weirs.
Public Health and Environmental (PHE) Act, 2015	<p>The objectives of the PHE Act are to:</p> <ul style="list-style-type: none"> • Promote public health and wellbeing. • Prevent injuries, diseases, and disabilities. • Protect individuals and communities from public health risks. • Encourage community participation to create a healthy environment. • Provide for early detection of diseases and public health risks.
Labour Act (No 11 of 2007)	<p>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.</p>
Employment Service Act 8 of 2011	<p>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.</p>
Water Act 54 of 1956 and Water Resources Management Act 2013	<p>The Water Resources Management Act 11 of 2013 is presently without regulations; therefore, the Water Act 54 is still in force. The Act provides for the management and protection of surface and groundwater resources in terms of utilisation and pollution.</p> <p>This Act further 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.</p>
Atmospheric Pollution Prevention Ordinance 11 of 1976	<p>To provide for the prevention of the pollution of the atmosphere, and for matters incidental thereto. The Ordinance deals with administrative appointments and their functions; the control of noxious or offensive</p>

	gases; atmospheric pollution by smoke, dust control, motor vehicle emissions; and general provisions.
Hazardous Substance Ordinance of 1974	<p>This Ordinance provides for the control of toxic substance and thus also relevant for pollution control. It covers for the manufacturing, sale, use, disposal, dumping, importing, and exporting of hazardous waste.</p> <p>Any use of hazardous substance must follow this ordinance</p>

6. MANAGEMENT OF IDENTIFIED IMPACTS

This section outlines the proposed mitigation measures to avoid, prevent and mitigate and/or enhance the identified potential impacts associated with the proposed Outapi WTP. It also outlines the responsibilities of each party involved in the project implementation under each phase (planning & design, construction, operational and decommissioning phase). The proposed mitigation measures that are meant to address potential impacts arising for the additional works that were not included in the initial EMP have been highlighted.

Table 3: Proposed mitigation measures during planning and design phase.

Environmental Issue/Impacts	Source of impact	Mitigation Measures	Responsibility
Sitting of WTP infrastructures (pump station)	<p>i). Pump station</p> <ul style="list-style-type: none"> - The area designated for the pump station is low-lying and maybe prone to flooding which might make site accessibility difficult during the rainy season or during flood occurrence. <p>ii). Maintenance workshop</p> <ul style="list-style-type: none"> - Positioning of the proposed maintenance workshop. <p>ii). Parking space</p> <p>Currently, there is no designated parking space for customers and staff members. This has caused disruption of the traffic flows in the streets adjacent to the Outapi WTP</p>	<ul style="list-style-type: none"> - Provision has been made for an access road which is above the flood level to ensure site accessibility and enable free flow of flood water during rainy season. - The pump station buildings should be above the high-water level to prevent flooding. - The maintenance workshop should be placed at high-water level to prevent flooding. - The maintenance workshop should be located far from the residential properties. - The floor space for the maintenance workshop should have impervious surfaces. - The proposed positioning of the parking bay indicated in final 	DE

	due to vehicles parking in the streets.	design layout is considered ideal.	
Stormwater management	The area between NamWater yard and the Canal is low-lying and prone to flooding from natural surface runoffs.	- The proposed stormwater system around the NamWater yard should follow the natural drainage channel to avoid flooding of nearby properties.	DE/Project Manager
Plant storage and treatment capacity	<ul style="list-style-type: none"> - The required raw water storage capacity which conforms to NamWater's 14 -day storage norm is of 80 000 m³. However, it was realized that a dam with the required capacity would take up almost the whole site and that there would be very little space left for any future expansion of the WTW. Therefore, it was decided that a storage dam with a capacity of 68 000 m³ be provided for a 7.8-day storage period. - Concerns were raised about the initial proposed design capacity of the WTP and NamWater was requested to review the demands contained in the Knight Piesold report. NamWater agreed to increase the design capacity of the proposed WTP from the initial 238 m³/hr. to 438 m³/hr. 	<ul style="list-style-type: none"> - The Scheme employees should sensitize that the storage capacity is only sufficient for a 7.8-day period, hence all emergency measures should be adjusted accordingly. - It is believed that the proposed design capacity of 438 m³/hr. has taken into consideration the additional information on the population and economic growth of the supply area. 	Project Manager

Electricity/Power availability and sufficiency	<ul style="list-style-type: none"> - The existing electricity transformer feeding the plant, has an output capacity of 200kVA whereas, the proposed WTP requires about 800kVA. Hence, the current power supply is not sufficient to accommodate the proposed WTP with the required capacity. 	<ul style="list-style-type: none"> - NORED will be requested to upgrade the current transformer from the current 200kVA to accommodate the energy requirements of the envisaged WTP. 	Project Manager
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Table 4: Proposed mitigation measures during the construction phase

Environmental Issue/Impacts	Source of impact	Mitigation Measures	Responsibility
Stormwater management	<ul style="list-style-type: none"> - Construction activities may cause pollution of stormwater if not properly located or handled, especially if the construction works is done during the rainy season. 	<ul style="list-style-type: none"> - Ensure free flow of stormwater around the site - Keep waste stream out of stormwater and drainage channels. - Concrete shall not be mixed directly on the ground. Impermeable protective materials such as boards, plastic sheeting, mixing trays etc., shall be used for this purpose. - The concrete batching works shall be always kept neat and clean. No batching activities shall occur on unprotected substratum of any kind. - Contaminated water from batching areas shall not be allowed to overflow but shall be 	Contractor

		<p>collected, stored, and disposed of at a site approved by the RE and ECO.</p> <ul style="list-style-type: none"> - Provide appropriate protection from rain and flooding, a method statement for contaminated water treatment on site is required. 	
Disturbance to local flora and fauna	<ul style="list-style-type: none"> - Construction activities such as site clearance, demolition and removal of onsite infrastructures may disrupt the local occurring flora and fauna. 	<ul style="list-style-type: none"> - Only vegetation that are directly affected by the project activities must be cleared. - Avoid the intentional hurt, trap, kill of animals and unnecessarily disturbance of their habitats i.e., bird nests etc. 	Contractor/s
Soil compaction and contamination	<ul style="list-style-type: none"> - The excavation, removal of topsoil and movement of earthmoving equipment may result in soil compaction. - Soil contamination may occur because of poor handling and spillage of lubricants and chemicals i.e., oil, grease released from construction 	<ul style="list-style-type: none"> - While soil compaction is a requirement for construction works, the disturbance must be limited to the construction site. - Ensure proper maintenance of construction vehicles and equipment. - All leakages and spills i.e., oil, grease etc, should be cleaned 	Contractor/s

	vehicles and equipment and during refuelling of machineries.	<p>up immediately and disposed of to the Outapi landfill site.</p> <ul style="list-style-type: none"> - Oil drip trays should be provided for vehicles and machines with leakages. - Oil or fuel spills should be cleaned up with approved/appropriate absorbent materials. 	
Disturbance of local geology	<ul style="list-style-type: none"> - The demolition and excavation of structures and development of foundations will disturb the surface geology. 	<ul style="list-style-type: none"> - The disturbance of soil and geology associated with the demolition and construction are inevitable. However, all site disturbances should be limited to the areas where structures will be constructed. - Recommendations from the geotechnical assessment should be adhered to. - Stockpiles generated onsite must be used as backfilling materials rather than regarded as waste materials. 	Contractor/s
Dust and air pollution	<ul style="list-style-type: none"> - Excavation and construction related activities will generate dust that will have a negative impact on surrounding areas or even beyond. - Trucks transporting construction material and construction residues to the dumping site will cause dust 	<ul style="list-style-type: none"> - Employ dust control measures such as: <ul style="list-style-type: none"> • Sprinkler all haulage roads and construction areas with water. • Mixing of cements should be done with a concrete 	Contractor/s

	<p>pollution to streets they would be passing through.</p> <ul style="list-style-type: none"> - Other atmospheric pollution may result from fumes and noxious gases released from vehicles and construction equipment i.e., hydrocarbon vapours, carbon monoxide and sulphur oxides released. 	<p>mixture or in an enclosed space.</p> <ul style="list-style-type: none"> • Trucks transporting construction materials such as sand and stones should be covered with a tarpaulin. • Ensure proper maintenance of vehicles and equipment to minimize the release of fumes and other pollutants in the air. • Open fires should be prohibited onsite. 	
<p>Nuisance</p>	<ul style="list-style-type: none"> - Construction activities have potential to cause different types of nuisances such as dust, vibration, noise etc. The major concern is when these nuisances occur during night hours or midday. - The process of transporting all construction debris may also constitute a nuisance to residents around the site and may not be aesthetically acceptable. 	<ul style="list-style-type: none"> - These impacts will only be temporary and can be mitigated by adhering to the instructions, as follows: <ul style="list-style-type: none"> - Limit construction works to normal working hours (08:00-17:00) and avoid operating during odd hours. - Construction workers should be provided with personal protective equipment (PPE) (i.e., earmuffs). - All machineries must be regularly serviced to ensure minimal noise production. - Generators must be fitted with soundproofing, where possible. 	<p>Contractor/s</p>

Traffic Impacts	<ul style="list-style-type: none"> - Normal traffic movement, especially in streets adjacent to the construction site may be slightly disrupted during the construction period. 	<ul style="list-style-type: none"> - Construction signage's must be erected at the construction site to minimize risks of accidents. - Construction vehicles must be driven by authorized drivers only and at the maximum speed limits of 40km/hr. in urban areas. - Heavy-duty vehicles and machineries must be tagged with reflective signs or tapes to maximize visibility and avoid accidents. - Limit the use of vehicles at the site and avoid unnecessary trips. - Revolving lights must be operational and switched on. 	Contractor/s
Migrant construction workers	<ul style="list-style-type: none"> - Migrant construction workers are likely to engage in casual relationships with locals. This may result in unplanned pregnancies, especially among school children and may contribute to the spread of HIV/AIDS. 	<ul style="list-style-type: none"> - Provide health education and awareness on the risk of STDs and HIV/AIDS. Training to be given before construction begins. 	Contractor/s
Occupational health and safety risks	<ul style="list-style-type: none"> - Construction workers at the site will be exposed to dust, high noise levels, sun exposure (sun stroke) and dehydration during summer months, and other potential hazards associated with the construction activities. 	<ul style="list-style-type: none"> - Construction workers must be provided with Personal appropriate PPE. - Employees must also be trained on the nature of their job and made aware of potential hazards at their workplace. 	Contractor/s

	<ul style="list-style-type: none"> - The safety of visitors, clients, staff, and public may be compromised by the construction activities. 	<ul style="list-style-type: none"> - Ensure there is always a safety representative equipped with a First Aid kit at the construction site. - The construction site must be barricaded and out of bound for the public and visitors. - All health and safety standards specified in the Health and Safety Regulations of the National Labour Act 11 of 1992 should be complied with. 	
Generation of waste	<ul style="list-style-type: none"> - The demolition / decommissioning of existing facilities e.g., buildings, pipelines will result in generation of different types of waste i.e., demolishing debris, building rubble, spoil material etc. 	<ul style="list-style-type: none"> - All general waste generated at the site must be gathered and disposed to the Outapi landfill site within a 5 day of generation. - Vehicles transporting waste should be covered with a tarpaulin to avoid waste from being blown away by wind. - Ensure that adequate waste handling/collecting facilities are available on site and create awareness among all employees on the importance of not littering. - Employ waste reduction measures such as: <ul style="list-style-type: none"> • Reduce construction mistakes. 	Contractor/s

		<ul style="list-style-type: none"> • Recycle and re-use items where possible. • Order in bulk i.e., bulk cement instead of bags 	
Generation of hazardous materials/waste	<ul style="list-style-type: none"> - The demolishing of certain existing WTP infrastructures i.e., pipeline, dosage system will result in generation of hazardous substances. 	<ul style="list-style-type: none"> - Record all hazardous substances on site. - Asbestos materials should be handled in accordance with the MoHSS, Asbestos Regulation of 1992. - Construction workers must be trained on the identification and handling of hazardous substances that maybe found onsite. 	<p>Project Manager</p> <p>Contractor/s</p>
Water requirements and consumption	<ul style="list-style-type: none"> - Construction activities will require substantial amount of water. 	<ul style="list-style-type: none"> - Raw water which meets the construction quality standard must be used in construction as much as possible. - Employ water saving measures such as <ul style="list-style-type: none"> • Re-use water for least important activities • Use water sparingly. • Avoid wastage, spillage, or contamination etc. 	<p>Contractor/s</p>
Visual and aesthetic intrusion	<ul style="list-style-type: none"> - Uncollected waste stockpile will reduce the visual appearance of the site. 	<ul style="list-style-type: none"> - Ensure the site is kept neat during construction period by 	<p>Contractor/s</p>

		tiding up daily and removal of waste weekly.	
Construction camps	<ul style="list-style-type: none"> - The establishment of temporary construction camps will result in generation of different types of waste. 	<ul style="list-style-type: none"> - Construction camps which include the batching plant, cement stores and sand and aggregate stockpiles must be established on a site with impervious surface. - The location of the construction camps shall be indicated on the site layout plan and approved by the RE and ECO. - Temporary ablution facilities should be provided at the construction camps. - The recommended ratio is 2 toilets for every 25 people and separate water-closet for male and female as per the general health Regulations (GN 121. 1969). - All wastewater resulting from the construction camps shall be disposed of via the wastewater management system. 	Contractor/s
Mixing of cements	<ul style="list-style-type: none"> - Pollution and contamination of environment may occur as result of improper handling of cements. 	<ul style="list-style-type: none"> - Concrete shall not be mixed directly on the ground. Impermeable protective materials such as boards, plastic sheeting, mixing trays etc., shall be used for this purpose. 	Contractor/s

		<ul style="list-style-type: none"> - The concrete batching works shall be always kept neat and clean. No batching activities shall occur on unprotected substratum of any kind. - Contaminated water from batching areas shall not be allowed to overflow but shall be collected, stored, and disposed of at a site approved by the RE and ECO. - Provide appropriate protection from rain and flooding, a method statement for contaminated water treatment on site is required. - Unused cement bags shall be stored in weatherproof containers to prevent windblown cement dust and water contamination during rainfall or runoff events. - Used cement bags shall be disposed of on a regular basis via the solid waste management system and shall not be used for any other purpose. - Care shall be taken to collect contaminated wash water from cleaning activities and dispose of it in a manner approved by the RE and ECO. - In case of bulk cement, suitable screening and containment 	
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		<p>shall be in place during storage, loading and batching to prevent wind-blown contamination.</p> <ul style="list-style-type: none"> - The contractor shall collect all contaminated water and fine material from exposed aggregate finishes and store it in sumps for disposal at an approved waste-disposal site. - All visible remains of excess concrete and aggregate shall be removed on completion of the plaster or concrete pour work and disposed of. 	
<p>Oil and fuel storage and refuelling.</p>	<ul style="list-style-type: none"> - There is a need for proper handling and storage of oil and fuel to ensure environmental protection. 	<ul style="list-style-type: none"> - The RE shall provide specification for storage of all oils and fuels (secondary containment etc.) and procedures for refueling vehicles, plant, and equipment. - Bunding wall should be created at fuel storage and transfer sites. The bunding should be big enough to contain 120% of the volume of the tank. - Fire extinguishers must be available at all refuelling sites. Staff should be trained to handle such equipment. - Above ground fuel tanks should be on an impervious floor with bunding walls 	<p>RE/Contractor</p>

<p>Fire outbreaks</p>	<ul style="list-style-type: none"> - Construction activities such as welding, cooking, burning etc., have potential to cause fire outbreaks. This can be aggravated by the presence of flammable and combustible items i.e., fuel, vegetation etc. 	<ul style="list-style-type: none"> - In terms of the Atmospheric Pollution Prevention Act (No. 45 of 1965), burning is not permitted as a disposal method. - Any fires that occur shall immediately be reported to the RE. - Ensure a designated smoking area far from fire hazard areas such as the workshop and fuel storage areas and any areas where the vegetation or other material is such as to make liable the rapid spread of an initial flame. - Cigarette butts must be disposed of in designated container. - There must be a competent fire safety officer who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedures to be followed. - Contractor shall be equipped with appropriate basic fire-fighting equipment (e.g., fire buckets, extinguishers, fire beaters, etc.) at all times. - Open fires for cooking purpose are not allowed, except within 	<p>Contractor</p>
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		the accommodation camp under controlled conditions.	
Criminal activities i.e., theft	- Construction materials and untended equipment kept onsite may attract criminals.	- Materials and equipment that will be stored in locked rooms or must be placed in a way that does not attract criminals.	Contractor/s
Emergency response	- Emergency may occur may time during the construction phase and may delay the project implementation if not handled timely.	- Emergencies shall be handled as per the Emergency Response Plan (ERP) presented in Section 8.	RE
Handling of complaints and grievances	- Grievance may be received from residents with regards to construction activities.	- All complaints and grievances shall be reported in the Form (Annexure 5) and submitted to the RE. - The RE shall handle the grievance as per the the Grievance response procedure presented in Section Error! Reference source not found.	RE

Table 5: Proposed mitigation measures during operation and maintenance phase

Environmental Issue/Impacts	Source of impact	Mitigation Measures	Responsibility
Stormwater management	<ul style="list-style-type: none"> - Leaks and spills of oil and gas from the maintenance workshop can cause pollution if get carried away by surface runoffs. - Although leaves and other plant debris can accumulate naturally in stormwater channel, lack of proper housekeeping can contribute to excess material accumulating in the stormwater channel. This may lead to blockages of the channel and pollution of stormwater. 	<ul style="list-style-type: none"> - The stormwater channel should be kept free from debris. - Remove blockages by ensuring proper and regular maintenance of the stormwater channel. 	Scheme Superintendent
Maintenance workshop	<ul style="list-style-type: none"> - Operational activities of the workshop could result in public and occupational health and safety risks i.e., fire, injuries etc. 	<ul style="list-style-type: none"> - All contaminants from the maintenance workshop should be kept out of the surface runoffs. - The floor space for the maintenance workshop should have impervious surfaces. - Spills must be moped/wiped when occurrence noted. - The workshop should have firefighting equipment - To ensure safety of workshop employees, any trip hazards such as trailing leads should be removed immediately. 	Scheme Superintendent
Nuisance	<ul style="list-style-type: none"> - The potential source of nuisance during the operation phase are the excessive noise from running pumps, especially if not properly maintained and bad odours from build-up sludge ponds. 	<ul style="list-style-type: none"> - The pumps are to be housed in one single room, hence the noise generated will not be emitted to the surrounding. - The combined noise produced in the pump station should not exceed 85dBA 	Scheme Superintendent

		as recommended by the National Labour Act.	
Property safety risks	<ul style="list-style-type: none"> - The proposed site for the new pump station building is outside the fenced and guarded area. The WTP infrastructure may be subjected to vandalism by the members of the public. 	<ul style="list-style-type: none"> - The existing fence will be extended to enclose the pump station. - Breaches in the existing fencing must be repaired immediately. - Existing security measures must be extended to the new pump station. 	Scheme Superintendent
Public health and safety risks	<ul style="list-style-type: none"> - The public and WTP maintenance staff are at risk of numerous risks such as. <ul style="list-style-type: none"> o Risk of falling and drowning. o Exposure to noxious gases emitted from the dosing system in cases of malfunctioning. o Presence of disease carrying vectors i.e., flies, mosquitoes 	<ul style="list-style-type: none"> - Maintenance staff must be made aware of potential occupational health hazards associated with their jobs. - Employees must be equipped with appropriate PPE suitable for each task undertaken. - Keep the area clean and tidy by removing waste i.e., sludge and unwanted vegetation. 	Scheme Superintendent
Exposure to chemicals and hazardous substances	<ul style="list-style-type: none"> - The operation and maintenance of the WTP will generate certain chemical substances i.e., <i>chlorine, flocculants, lime, carbon dioxide etc.</i> - The risk of exposure can be aggravated by factors such as lack of awareness, lack of protection, physical fatigue etc. 	<ul style="list-style-type: none"> - Compile an inventory of all hazardous substances at workplace and implement hazard control measures as follows. <ul style="list-style-type: none"> • All chemicals and disinfectants must be handled and stored in accordance with their respective MSDS provided by the manufacturers/suppliers. • Employees must be equipped with chemical resistant PPE when handling chemicals. • Provide training to all maintenance staff to create awareness on the danger of chemical exposure and possible response measures in case of accidents. 	Scheme Superintendent

		<ul style="list-style-type: none"> • First aid kit must be kept at the plant and must be accessible to all staff. • Ensure regular inspection on the disinfection system and storage rooms to detect and report leakages. • Empty containers which contained chemicals can be re-used for the same purpose or returned to authorized recycling companies and should not be thrown away as waste materials. • Warning signs must be placed at chemical storage rooms and chlorination rooms. 	
Waste generation	<ul style="list-style-type: none"> - The operation of the WTP will result in generation of different types of waste from different plant operational activities such as. <ul style="list-style-type: none"> • Debris from raw water screening and the inlet works. • General household waste from office operations and operator houses. • Wear-off parts from maintenance and repair of plant infrastructures, vehicles, and equipment. • Lubricants from maintenance of vehicles and equipment. • Building rubble from renovations • Sludge from sludge ponds • Empty containers and packaging materials. 	<ul style="list-style-type: none"> - Compile an inventory of all types and quantity of waste generated at the site. - Provide adequate and separate waste handling facilities for each waste type at the site and ensure regular collection and disposal. - Follow the waste management hierarchy in managing waste as follow: Avoid-Reduce- Reuse-Recycle- Recover-Treat- Dispose. - General household waste, debris from screening process, building rubble and worn-out non-metallic parts must be disposed of at the Outapi dumping site. - Metallic worn-out parts should be taken to the nearest scrap yards for recycling. - Dry sludge should be disposed of at the Outapi dumping site and should not be buried onsite. 	Scheme Superintendent

		<ul style="list-style-type: none"> - Empty containers which contained chemicals should be taken to recycling companies for re-use or deep cleansing. 	
Risk of fire	<ul style="list-style-type: none"> - Sources of fire outbreaks during operations could be electrical shocks and due to the presence of flammable and combustible items i.e., fuel. 	<ul style="list-style-type: none"> - Ensure that all firefighting devices are in good working order, and they are serviced. - A holistic fire protection and prevention plan is needed. This plan must include an emergency response plan, firefighting plan, and spill recovery plan. - Maintain regular site, mechanical and electrical inspections, and maintenance. - Clean-up and contain all oil spills / leaks. 	Scheme Superintendent
Traffic disturbances	<ul style="list-style-type: none"> - The movement of vehicles and machineries during the operation and maintenance of the WTP could disrupt traffic flow in the adjacent streets. 	<ul style="list-style-type: none"> - Provide maintenance traffic regulatory signage at the WTP entrance and adjacent streets. - All vehicles and machineries must be driven/operated by qualified operators and must adhere to traffic rules. 	Traffic (NAMPOL/OTC)
Limited skills to operate the new WTP	<ul style="list-style-type: none"> - The operation of the proposed WTP will require well skilled personnel. Lack of skill to operate the plant components could cause malfunctioning of the WTP and interrupt water supply process. 	<ul style="list-style-type: none"> - Employees must be trained on the operation and maintenance of the new WTP components. - Ensure regular inspection and develop a routine maintenance plan for the WTP components i.e., water meters, pipelines etc. 	Scheme Superintendent
Energy consumption	<ul style="list-style-type: none"> - The proposed WTP will require a substantial amount of energy (800kVA) to operate. Hence, insufficient power supply could result into malfunction of certain plant components. 	<ul style="list-style-type: none"> - Upgrade the current transformer (200kVA) to match the energy requirement of the propose WTP. 	Scheme Superintendent

		<ul style="list-style-type: none"> - Provision must be made for a standby generator to be used in case of power failure. 	
Visual Impact	<ul style="list-style-type: none"> - Improper handling of waste and uncontrolled vegetation around the site could deplete the aesthetic view of the place. 	<ul style="list-style-type: none"> - Ensure regular waste disposal, at least weekly. - Ensure good housekeeping and routine maintenance of infrastructures and surrounding. - Plant locally adaptable plants i.e., guava, mangoes, lemon etc. around the site to improve the aesthetic view. 	Scheme Superintendent
Increase in crime related issues.	<ul style="list-style-type: none"> - WTP infrastructures i.e., fences, storage dam, pumps etc. are at risk of vandalism from the member of the public. 	<ul style="list-style-type: none"> - Provide security around the site and ensure regular inspections for all plant infrastructures. - Ensure proper and regular maintenance of the perimeter fence around the site. - Breaches in the fencing must be repaired immediately. 	Scheme Superintendent
Emergency response	<ul style="list-style-type: none"> - Emergency may occur may time during the operation and maintenance phase and may affect the WTP operation and disrupt the quality and quantity of water supply to the area. 	<ul style="list-style-type: none"> - Emergencies shall be handled as per the ERP presented in Section 8. 	Scheme Superintendent
Handling of complaints and grievances	<ul style="list-style-type: none"> - Grievance may be received from residents, customers with regards to operation or maintenance. 	<ul style="list-style-type: none"> - All complaints and grievances shall be reported in the Form (Annexure 5) and submitted to the Scheme Superintendent. - The Scheme Superintendent shall handle the grievance as per the Grievance response procedure presented in Section Error! Reference source not found.. 	Scheme Superintendent

Table 6: Proposed enhancement measures for the envisaged positive impacts of the WTP

Environmental Issue/Impacts	Source of impact	Enhancement measures	Responsibility
Job opportunities	<ul style="list-style-type: none"> - About 30 temporary job opportunities will be created during the construction phase whereas, few more additional permanent positions will be created for the operation of the new WTP. 	<ul style="list-style-type: none"> - Local people should be recruited for temporary job opportunities. - Recruitment should include both man and women. 	Project Manager/Contractors
Business opportunities	<ul style="list-style-type: none"> - The construction and maintenance of the WTP has potential to create business opportunities for local contractors and suppliers. 	<ul style="list-style-type: none"> - Local companies must be given fair chances to tender/bid for construction and maintenance jobs. - Construction materials should be sourced locally to enhance local economy. 	Central Procurement Board of Namibia (CPB), NamWater internal Procurement Committee.
Water security	<ul style="list-style-type: none"> - The increased treatment capacity will improve the water security of the supply area and ensure a reliable supply of safe drinking water to the local communities. 	<ul style="list-style-type: none"> - Develop a water demand plan for the supply area. - A contingency plan must be in place to ensure water supply in case of emergency. 	Scheme Superintendent
Economic contribution	<ul style="list-style-type: none"> - The improved water security will attract economic activities in the area. 	<ul style="list-style-type: none"> - All major projects to be established in the supply area must be approved based on the water demand plan. 	Scheme Superintendent

7. DECOMMISSIONING AND REHABILITATION

7.1 Decommissioning of the existing WTP

The proposed amendments to initial proposed design capacity for the Outapi WTP will not result in existing plant components becoming obsolete, other than those components identified in the initial EIA study. Hence, the decommissioning of certain existing components identified in the initial EIA study should be carried as follow.

- Prior to the commencement of any decommissioning works, the conduct a thorough inspection around the site to assess all infrastructures to be decommissioned.
- Identify the types i.e., hazardous and determine the amount waste to be produced.
- Remove all unwanted (decommissioned) components.

7.2 Decommissioning of the proposed WTP

The decommissioning of the proposed plant is not foreseen in the immediate future. However, should the decommissioning of the proposed WTP or its components become pertinent at any stage, an EIA study should be undertaken and EMP should be prepared prior to the commencement of any decommissioning works. The EMP for the decommissioning works should entail the follow components.

- The nature of the envisaged decommissioning and rehabilitation process
- Types and nature of components to be decommissioned i.e., buildings, piping, etc.
- Types and quantity of waste to be produced i.e., hazardous waste and non-hazardous waste like building rubble, uPVC, HDPE, asbestos, concrete etc.
- Proposed waste management strategy.
- Responsibilities of each party to be involved in the decommissioning process.
- Envisaged environmental rehabilitation procedures.

7.3 Rehabilitation

Rehabilitation is defined as the process of taking all the necessary actions to repair the damaged environment in-order to make the land suitable for other uses or to simply beautify the affected area. In this case, the rehabilitation will entail clean-up, treatment, or restoration of contaminated areas (e.g., contaminated soils by oil or fuel spills, concrete spills, etc.) and refilling of excavated pits with the overburden.

Upon commencing of construction works, the ECO and RE shall conduct a site inspection and instruct the responsible contractor to do the following:

- Removal of all waste produced to be disposed of in an appropriate manner.
- Rehabilitate the disturbed areas and refill of excavations.
- Clean-up all spills and leave the area safe and tidy.

During the operation phase, the Scheme Superintendent shall conduct a site inspection after every maintenance work and ensure rehabilitation of disturbed areas. Rehabilitation measures during the operation phase will include:

- Clean up all soil polluted during maintenance work and disposal to an appropriate waste dump site.
- Remove all windblown litter once maintenance has seized.
- Remove all potential hazards (i.e., the sewerage pit) and ensure the area is left in a safe and neat manner.

8. 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.

8.1 Monitoring during construction phase

Monitoring of all activities during the construction period will be under the responsibility of the Contractor, whose environmental performance will be controlled by the RE and the ECO or NamWater's environmental Section.

Table 7: Monitoring plan during construction

Element	Location	Type of monitoring	Frequency of monitoring	Purpose of monitoring
Dust	In the construction sites	Visual monitoring	During periodic site visits	To ensure adherence to environmental protection requirements
Wastewater flows generated in the construction sites	In the construction sites	Visual monitoring	During monthly site visits	To ensure adherence to environmental protection requirements
Collection of solid waste	In the construction sites	Visual monitoring	During periodic site visits	To ensure adherence to environmental protection requirements
Use of dangerous materials (paints with heavy metals, lead compositions, asbestos-cement slabs, pipes, inflammable, and toxic substances etc.)	In the construction sites with right documentation	Visual monitoring and study of documentation	Each month	To ensure adherence to environmental protection requirements
Protective measures in the construction site	In the construction sites with right documentation	Visual monitoring	Each month	To ensure adherence to environmental protection and safety requirements
Earth restoration after excavation works	In the construction sites	Visual monitoring	At completion of construction works	To ensure adherence to environmental protection requirements
Noise & vibrations resulting from equipment work	Project area/close to settlements	Portative noise metering device	During periodic site visits, on daily basis	To ensure adherence to environmental protection requirements
Traffic operation /movement	In the construction sites	Visual monitoring of machinery and trucks carrying construction materials	During periodic site visits	To ensure adherence to environmental protection requirements
Vehicle and pedestrian safety when there is no construction activity	In the construction sites	visual monitoring by supervisor	On daily basis during	To ensure adherence to requirements

8.2 Monitoring during operation phase

During the operation phase the Scheme Superintendent must ensure that compliance monitoring is conducted at different interval/frequencies throughout the WTP operational life span as indicated in the table below.

Table 8: Monitoring plan during operation phase

Issue to be monitored	Monitoring Objectives	What need to be monitored	Frequency and means of Monitoring
Production and distribution losses	Prevent water wastage and ensure water conservation.	-Overflows, leakages, pipe bursts etc.	Daily inspections and meter reading
Public Health risks	Operate the WTP in an environmentally friendly and socially acceptable manner.	Reeds and overgrown vegetation Presence of mosquitoes, snakes, rodents etc.	Monthly inspections and physical observation.
Occupational health risks	Ensure health and safe working condition	Chemical exposure and presence of health hazards	Daily physical observations.
Water quality	Supply of safe and quality drinking water in line with the Water Quality Guidelines of the Water Act.	Physical quality of raw, settled, and treated water (<i>Chlorine level, N.T.U, pH, Conductivity and Temperature</i>). Microbiological/ bacteriological quality (<i>Free Chlorine, Heterotrophic Plate count, Total Chlorine, Coliforms & Faecal Coliforms</i>).	-every two hrs. sampling and testing. -Once a week sampling and laboratory testing
Water Balance	Ensure water security of the supply area.	Production figures vs. sales figures and demand management	Monthly water balance checks.
Waste management	Prevent environmental pollution and contamination.	Litter chemical storage & handling, cleanliness, Chemical composition of sludge.	Daily inspections and physical observation. -quarterly chemical testing
Implementation of the EMP	Ensure compliance to this EMP and adherence to the regulative measures during planning & design, construction, operation, and maintenance and decommissioning of the envisaged WTP.	Implementation of specified measures and compliance to the EMP and other relevant legal requirements.	Biannual environmental report to MEFT.

9. EMERGENCY RESPONSE PLAN

This section provides an emergency response plan which entails types and effects of emergencies associated with the proposed Outapi WTP as well as procedures and actions to be taken in case of emergency during the construction, operation, and maintenance of the WTP.

9.1 Types and effects of emergencies

Emergencies can occur at any time or place either during construction, operation, and maintenance of the WTP. These emergency situations may affect the WTP operation and disrupt the quality and quantity of water supply to the area. Some of the emergency situations which are associated with the proposed WTP are such as:

- Substance spillage i.e., oil, concrete, chemicals etc.
- Variation in water flow
- Construction accidents
- Chlorine gas or CO₂ leakages
- Fire outbreak
- Power failures
- Equipment failure
- Process upset

9.2 Sources of emergencies

The above-mentioned emergency situations maybe occur as a result of accidents, faulty maintenance, and/or negligent operation. These factors and their relationships to the construction, operation, and maintenance of the proposed WTP is detailed below.

9.2.1 Accidents

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

9.2.2 Faulty maintenance

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

9.2.3 Negligent operation

There are certain operational procedures that need to be followed to ensure a satisfactory performance of the WTP. Not following correctly, the established procedures constitute negligent operation. Negligent operation may also result from lack of knowledge to operate the plant. Although, negligent operation may not be as readily noticeable as faulty maintenance, the emergency condition resulting from it could possibly be more severe because it could affect more plant units of operation before being discovered. The Scheme Superintendent shall ensure routine maintenance of plant equipment, keep extra supply of parts that require frequent replacements and ensure to always stock enough chemicals to maintain operations for at least 30 days.

9.3 Emergencies response procedures

9.3.1 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

9.3.2 Emergency response procedures

Table 9: Emergency response procedures during construction, operation, and maintenance

NO.	Emergency	Response actions
1.	Substance spill i.e., concrete, oil, chemicals etc.	<ul style="list-style-type: none">- Stop and control the spill at the source first.- Contain the spill/leakage with appropriate containers i.e., drip trays, sumps etc., and in approved manner to the satisfaction of the RE.- Clean the affected area with water or approved cleaning product.- The contaminated soil should be removed and dispose of to the Outapi dump 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 in the logbook.
2.	Variation in water flow due to lack of or limited flow of	<ul style="list-style-type: none">- All consumers should be encouraged to always store enough potable water to meet their emergency needs.

	raw water, breakdown, and routine maintenance of the canal.	<ul style="list-style-type: none"> - In case of emergency, the following actions should be taken. <ul style="list-style-type: none"> • Keep the public well informed on the water supply situation and provide information on what customers can do to conserve and prepare for a large number of inquiries. • Isolate the raw water and emergency storage sump by closing sluice gates. • Ensure that the pumps on the feed pipeline is off. • The emergency raw water storage dam should be filled to cover for the next 7 days. • All reservoirs should always be fill up to 70% daily. • Make every effort to develop a fair and equitable system for allocating water to the customers. • Investigate alternative water supply measures to critically affected consumers such as schools, hospitals. For instance, hauling potable water by trucks or back-up supply from other WTPs.
3.	Power failure	<ul style="list-style-type: none"> - 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: NORED. - In case of power loss. <ul style="list-style-type: none"> • Check if power failure is local (site) or the whole suburb/town. • If the whole town, contact NORED. • If locally, inspect the source of power loss, restart main switch. • If necessary, inform critical customers. • Record source of power shortage in the power supply logbook
4.	Fire outbreak	<ul style="list-style-type: none"> - Follow the holistic Fire Approach as presented in Annexure 3
5.	Chemical leakage i.e., chlorine leak	<ul style="list-style-type: none"> - In case of Chlorine or CO₂ gas leakage <ul style="list-style-type: none"> • Wear a face mask with 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 leak. • Record in the incident report form. - Take note: <ul style="list-style-type: none"> ♣ all dosing systems shall shut down automatically when there is no raw water feed. - Chemical dosage rates must be set manually by the operator

6.	<p>Accident i.e., injury to a person</p>	<ul style="list-style-type: none"> - The priority after a construction accident should be to get medical attention for an injured person. - Assess the injured person situation by checking breath, pulse. - Notify the First Aid Person - Assist the First Aid Personnel - Record in the incident report form. - Report incident to the Scheme Superintendent
7.	<p>Equipment failure i.e., pumps failure, loss of pressure etc.</p>	<ul style="list-style-type: none"> - The WTP is designed with a limited automation, thus there should always be an Operator on duty. - According to the Design Engineer, a principle of N+ 1 redundancy shall be applied to all major equipment to ensure system availability in the event of component failure. - In case of faulty pump/s <ul style="list-style-type: none"> • First analyze the source of emergency by checking information displayed on the SCADA system. • Check flow rate of each pump to identify the fault. • Ensure that the standby pump is switched on. - In case of faulty backwash water recovery system. <ul style="list-style-type: none"> • A high-level alarm will ring and require an operator to initiate backwash of the longest running filter. • Increase raw feed by 10% and instantaneous flow to 311 m³ / h. - Report to the Scheme Superintendent and record in the incident report form.
8.	<p>Process upset or contamination. i.e., variation in physical water quality i.e., pH, NTU, chlorine levels etc.</p>	<ul style="list-style-type: none"> - In case of process contamination (exceeded levels): <ul style="list-style-type: none"> • First analyze the source of emergency by checking information displayed on the SCADA system. • Take appropriate action i.e., initiate backwash of the faulty filter, isolate or shut down the whole plant. • Inspect and clean filters. • Re-start the plant. • Continue monitoring quality level. • Record in the incident report form. • Report to the Scheme Superintendent

9.4 Grievance response procedure

All grievance should be submitted through the completion of the grievance registration form as presented in Annexure 5 and submitted to the RE during construction phase and to the Scheme Superintendent during the operation and maintenance phase.

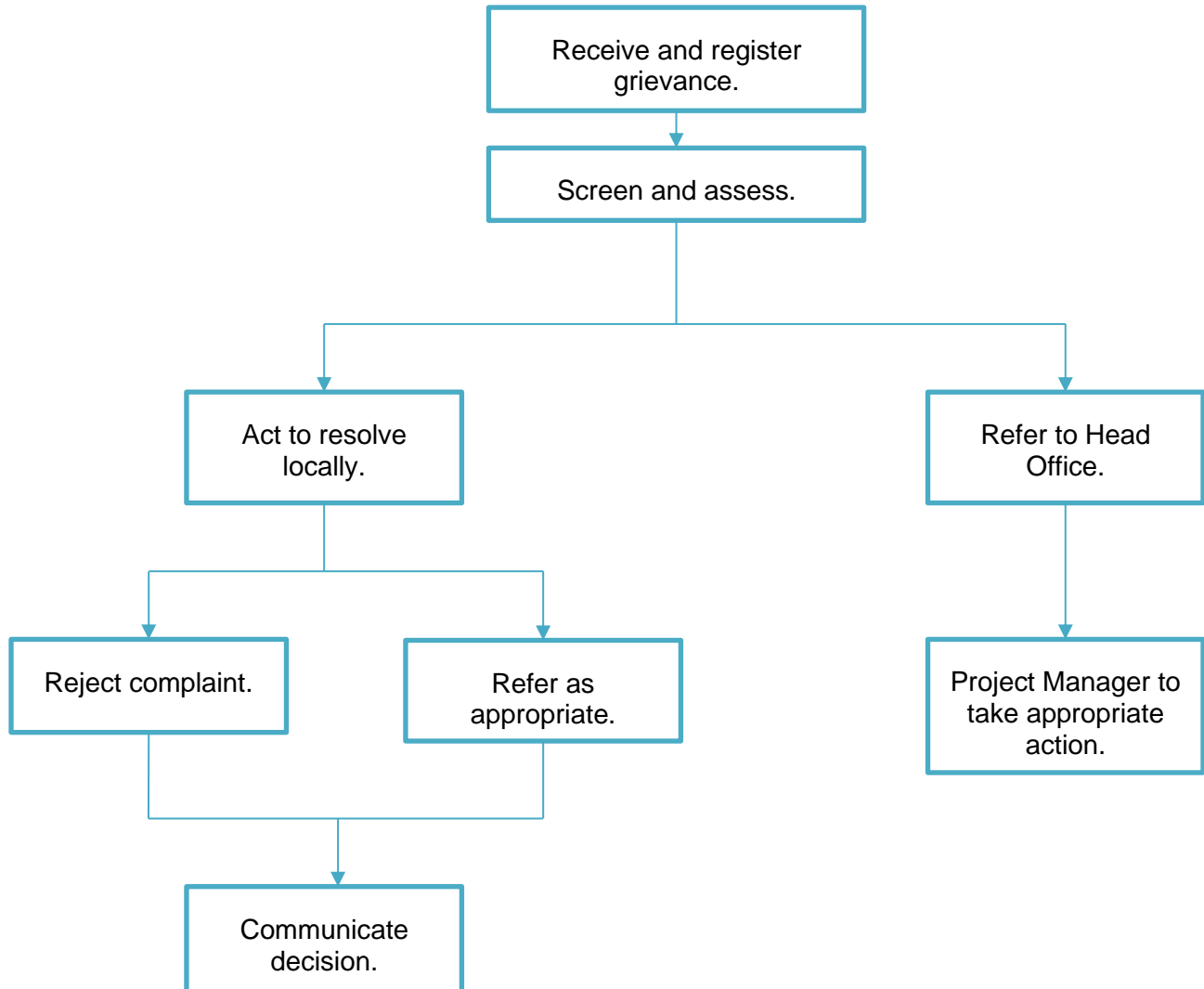


Figure 2: Grievance response procedure

Upon receipt of the registered grievance forms, the RE or Scheme Superintendent shall screen and assess 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 decide. 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 objective of the amendments to the initial the EIA study was to define the range of the impacts associated with the proposed additional works and propose mitigation measures to address the identified impacts. There were no fatal flaws identified during this assessment, hence, there is no need for a detailed EIA study. Thus, it is concluded that, 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. NamWater should play a pivotal role in the implementation of the EMP.

Upon approval by the MEFT, this updated EMP should be used as an on-site reference document for the proposed Outapi WTP, during planning & design, construction, operation and maintenance and decommissioning phase, thus a copy of this EMP shall be always kept onsite. It is a legally bidding 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.

The proponent should therefore ensure proper coordination with all parties involved in the project activities during all project phases. The proponent shall also ensure to avail necessary resources (i.e., human, financial etc.,) and provide training to all parties for the full implementation of the EMP. The implementation of the EMP can be combined with NamWater' s Environmental Code of Conduct. Monitoring of certain environmental parameters and preparation of biannual reports must be ensured as outlined in this EMP during the life span of the Outapi WTP.

11. ANNEXURE

11.1 Annexure 1: Environmental compliance monitoring checklist

11.2 Annexure 2: Emergency contacts

11.3 Annexure 3: Fire response procedures

11.4 Annexure 4: Incident / Accident report form

11.5 Annexure 5: Grievances register form

11.6 Annexure 6: NamWater's Environmental code of conduct

Annexure 1: Environmental compliance monitoring checklist

The following checklist should be used during the compliance monitoring.

PART 1: ADMINISTRATIVE INFORMATION

Project Title:		Date:
Project location:	Reporting period	Individual Preparing Checklist:
Region:		Department:
Scheme Superintendent :		Phone No.:

PART 2: ENVIRONMENTAL ASPECTS

ENVIRONMENTAL ASPECT/IMPACT	ENVIRONMENTAL COMPLIANCE (AS PER EMP REQUIREMENT?)		Remarks (specify location, good practice observed, causes of non-conformity and proposed action)
	YES	NO	
Waste management			
Water quality testing			
Water balance check			

PART 3: RECOMMENDATION

FOR EACH ITEM CHECKED IN PART 2, DESCRIBE THE CORRESPONDING CONTROLS TO BE IMPLEMENTED TO REDUCE POTENTIAL ENVIRONMENTAL IMPACTS (e.g., spill prevention, erosion controls, air emission controls including dust suppression, selection of materials, etc.). Provide details of the activities and impacts for each box and the proposed mitigations. Include attachments where appropriate. Use the same number system for your input.

ECO: Signature: _____ Date: _____

Scheme Superintendent: Signature: _____ Date: _____

Annexure 2: Emergency contacts

Emergency	Response Plan	Contact details
Fire outbreaks	Outapi Fire Brigade	065-251192
Chemical exposure	Outapi District Hospital	065 251 800
	Namibia Private Ambulance Services	081 9696
	Outapi Ambulance	065 251 022 061 251 800
Drowning	NAMPOL -Outapi	+264 65 – 251 850, Tel: +264 65 – 251 856,
	Outapi Ambulance	065 251 022 061 251 800
Injuries or loss of life	NAMPOL -Outapi	+264 65 – 251 850, Tel: +264 65 – 251 856,
Theft or Robbery	NAMPOL -Outapi	+264 65 – 251 850, Tel: +264 65 – 251 856,
Power Loss	NORED – Outapi	Tel: 083 282 240

Annexure 3: Fire response procedures

Things you must do if you discover a fire!!!



STEP 1

- Do not panic
- Press the nearest alarm button
- Rescue any person in immediate danger, if safe to do so



STEP 2

- If possible, commence fighting the fire
- Call fire brigade



STEP 3

- Leave the building by the nearest emergency exit
- Ensure all other personnel are warned along the way
- Do not stop to collect personal belongings
- Do not use lifts, use stair ways



STEP 4

- Report to the assembly point
- Do not return to the building until authorized to do so

Annexure 4: Incident / Accident report form

This form is to be completed in case of environmental incident and shall be forwarded to the Project's RE during construction phase and to NamWater's Environment Section during operation and maintenance phase.

Note: This form is not intended to replace other NamWater's internal reporting procedures.

Section 1. GENERAL DETAILS	
Date: Time: am / pm	Reported By: Name: Position: Company: Phone:

Section 2. RESPONSIBLE PARTIES	
Name:	Phone:
Company Name:	Email:
Witness Details (if applicable)	
Name:	Phone:
Witness Statement Taken? <input type="checkbox"/> Yes <input type="checkbox"/> No	

Section 3. INCIDENT DETAILS		
Type of Incident:	<input type="checkbox"/> Spill <input type="checkbox"/> Waste/rubbish <input type="checkbox"/> Wildlife disturbance <input type="checkbox"/> Vegetation disturbance/damage <input type="checkbox"/> Acid Sulphate Soils disturbance	<input type="checkbox"/> Cultural Heritage disturbance/damage <input type="checkbox"/> Chemicals / herbicide Use <input type="checkbox"/> Water pollution/contamination <input type="checkbox"/> Nuisance (noise, air quality) <input type="checkbox"/> Other:
Incident Description		
Immediate Response Actions Taken:		

Section 4. CONTRIBUTING FACTORS AND PREVENTATIVE ACTIONS**(to be completed by Manager/Supervisor)**

Cause, Circumstances and Contributing Factors:			
Measures that were in place to prevent this type of incident:			
Measures to be implemented to prevent/minimise this type of incident occurring again			
Comments:			
Name:			Position:
Company:	Signature:	Date:	

Section 5. NAMWATER ENVIRONMENT OFFICE ONLY

Assessed Level of Potential or Actual Harm:			
Is an Investigation Required? <input type="checkbox"/> Yes <input type="checkbox"/> No	Investigation Team:		
FOLLOW UP ACTION:			
COMMENTS			
Name:			Position:
Signature:			Date:

Annexure 5: Grievances register form.

Grievance Registration	
Case No:	Date:
Name of complainant:	Cell no:
	Email address:
Details of grievance: (Date, location, persons involved, frequency of occurrence, effects of ensuing situation, etc)	
Name of person recording grievance:	Cell number:
Proposed date of response:	
Signature of recording person:	Signature of complainant:
Date of redress:	
Decision and action:	

Annexure 6: NamWater Environmental code of conduct

What is an Environmental Code of Conduct?

It is a set of rules that everybody has to follow in order to minimise damage to the environment.

THE ENVIRONMENT

ENVIRONMENT means the surroundings within which people live. The ENVIRONMENT is made up of the **soil, water, plants, and animals** and those characteristics of the soil, water, air, and plant and animal life that influence **human health and well-being**. **People and all human activities** are also part of the environment and have to be considered during the drilling process.



Do these ENVIRONMENTAL RULES apply to me?

YES, The Environmental Rules apply to EVERYBODY. This includes all permanent, contract, or temporary workers as well as any other person who visits the drilling site. Every person will be required to adhere to the Environmental Code of Conduct.

ALL PERSONNEL must study and keep to the Environmental Code of Conduct

The Contractor will issue warnings and will discipline ANY PERSON who breaks any of the Environmental Rules. Repeated and continued breaking of the Rules will result in a disciplinary enquiry and which may result in that person being asked to leave the drilling site permanently.

What if I do not understand the ENVIRONMENTAL RULES?

ASK FOR ADVICE, if any member of the WORKFORCE does not understand, or does not know how to keep any of the Environmental Rules, that person must seek advice from the FOREMAN, CONTRACTOR'S REPRESENTATIVE or EMPLOYER'S REPRESENTATIVE. The PERSON that does not understand must keep asking until he/she is able to keep to all the Environmental Rules.



Safety and Security

1. Only enter and exit roadways and drilling areas at demarcated entrances.
2. Wear protective clothing and equipment as per signboards on site and according to instructions from your foreman.
3. Report to your CONTRACTOR'S REPRESENTATIVE if you see a stranger or unauthorised person in the drilling area.
4. Never enter any area that is out of bounds or that is demarcated as dangerous without permission of your CONTRACTOR'S REPRESENTATIVE.
5. Never climb over any fence or enter private property without permission of the landowner or your CONTRACTOR'S REPRESENTATIVE.
6. Do not remove any vehicle, machinery, equipment, or any other object from the drilling site without the permission of your CONTRACTOR'S REPRESENTATIVE.
7. Keep clear of blasting sites. Follow the instructions of your CONTRACTOR'S REPRESENTATIVE.
8. Never enter or work in the drilling area while under the influence of alcohol or other intoxicating substances.

9. Make your camp at a designated area. If possible, camp at already disturbed areas.
10. Campsites and work sites should not be on an archaeological site or sites of scenic or cultural interest. Camp sites and working sites must be clearly demarcated.
11. Keep drilling areas as small as possible.
12. All drilling areas and open trenches should be clearly demarcated.
13. All staff should know the emergency procedures in case of accidents.

Waste Disposal

14. Learn the difference between different types of waste, namely:
 - general waste, and
 - Hazardous waste.



Containers will be provided for different types of wastes.

General Waste includes waste paper, plastic, cardboard, harmless organic (e.g. Vegetables) and domestic waste

Hazardous Waste includes objects, liquids or gases that are potentially dangerous or harmful to any person or the environment. Sewage, fuel, tyres, diesel, oils, hydraulic and brake fluid, paints, solvents, acids, soaps and detergents, resins, old batteries, etc. are all potentially hazardous.

15. Learn how to identify the containers for the different types of wastes. Only throw general waste into containers, bins or drums provided for general waste.
16. Recycle drums, pallets and other containers.
17. Never bury or burn any waste on site, all waste is to be disposed in allocated refuse disposal containers, bins or bags.
18. Never overfill any waste container. Inform your CONTRACTOR'S REPRESENTATIVE if you notice a container that is nearly full.
19. Do not litter.
20. Do not bury litter or rubbish in the backfill trench.

Plants and Animals

21. **Do not ever pick any plants, or catch any animal.** People caught with plants or animals in their possession will be handed to the authorities for prosecution.
22. Never feed, tease, play with, or set devices to trap any animal or livestock. Wild animals are not to be domesticated.
23. Keep off the rock outcrops unless given specific permission by the EMPLOYER'S REPRESENTATIVE to be there.
24. Never cut down any tree or branches for firewood.
25. Never leave rubbish or food scraps or bones where it will attract animals, birds, or insects.
26. Rubbish must be thrown into allocated waste disposal bins/bags.
27. Always close the gates behind you.



Preventing Pollution

28. Only work with hazardous materials in banded areas.
29. Never discard any hazardous substances such as fuel, oil, paint, solvent, etc. into stream channels or onto the ground. Never allow any hazardous substances to soak into the soil.
30. Clean up spills immediately.



31. Immediately report to your CONTRACTOR'S REPRESENTATIVE when you spill, or notice any hazardous substance overflow, leak or drip or spill on site, into the streambeds or along the road.
32. Immediately report to your FOREMAN when you notice any container, which holds hazardous substances overflow, leak or drip. Spillage must be prevented.
33. Only wash vehicles, equipment and machinery, containers and other surfaces at work site areas designated by your CONTRACTOR'S REPRESENTATIVE.
34. Do not change oil on uncovered surfaces.
35. If you are not sure how to transport, store, use, or get rid of any hazardous substances ask your CONTRACTOR'S REPRESENTATIVE for advice.

Health

36. Drink lots of clean water every day.
37. Use toilets that have been provided.
38. Take the necessary precautions to avoid contracting HIV / AIDS. Condoms are available at most Clinics.
39. Inform your CONTRACTOR'S REPRESENTATIVE when you are sick.
40. Do not work with any machinery when you are sick.
41. If you are working in malaria areas you must take the necessary precautions.



Dust Control

42. Stockpile the top 20 cm of topsoil in small heaps and protect from wind erosion.
43. Do not make any new roads or clear any vegetation unless instructed to do so by your CONTRACTOR'S REPRESENTATIVE.
44. Keep to established tracks and pathways.
45. Keep within demarcated work areas.

Saving Water

- 47. Always use as little water as possible. Reduce, re-use and recycle water.
- 48. Never leave taps or hose pipes running. Close all taps after use.
- 49. Report any dripping or leaking taps and pipes to your CONTRACTOR'S REPRESENTATIVE.



Working Hours

- 50. Inform local authorities when the drilling process will commence.
- 51. You may only work on weekends and after hours with the consent of the CONTRACTOR'S REPRESENTATIVE.

Archaeological and Cultural Objects

- 52. If you find any archaeological, cultural, historical or pre-historical object on the drilling site you must immediately notify your CONTRACTOR'S REPRESENTATIVE.
- 53. Never remove, destroy, or disturb any cultural, historical, or pre- historical object on site.

Cultural and Historical Objects include old buildings, graves or burial sites, milestones, old coins, beads, pottery and military objects.

Pre-Historical objects include fossils and old bones, old human skeletal remains, pieces of pottery and old tools and implements.

Sensible Driving

- 54. Tracks and roads should be kept to a minimum. Where possible follow existing roads.
- 55. No off-road driving is allowed.

56. Never drive any vehicle without a valid licence for that vehicle class and do not drive any vehicle that is not road-worthy.
57. Never drive any vehicle when under the influence of alcohol.
58. **Always** keep your headlights on when driving on dusty roads.
59. Keep to the roads as specified by your CONTRACTOR'S REPRESENTATIVE. Vehicles may only be driven on demarcated roads. Drivers should always use three point turns, "u-turns" are not allowed. Do not cut corners.
60. Do not drive on rocky outcrops.

Noise

61. Keep noise levels as low as possible.
62. Do not operate noisy equipment outside normal working hours.

Fire Control

63. Do not make open fires, use a drum or tin and do not collect any vegetation to burn.
64. Do not smoke or make fires near refuelling depots or any other area where fuel, oil, solvents, or paints are used or stored. Fireplaces should be at a safe distance from fuel and explosive storage sites as well as vehicle parking sites.
65. Cigarette butts should always be thrown in allocated refuse bins. Make sure that the cigarette butt is out before throwing it into the bin.
66. Immediately notify your CONTRACTOR'S REPRESENTATIVE if you see an unsupervised fire at the campsite or drilling site.



Dealing with Environmental Complaints

67. If you have any complaint about dangerous working conditions or potential pollution to the environment, talk to your CONTRACTOR'S REPRESENTATIVE.
68. If any person complains to you about noise, lights, littering, pollution, or any harmful or dangerous condition, immediately report this to your CONTRACTOR'S REPRESENTATIVE.

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