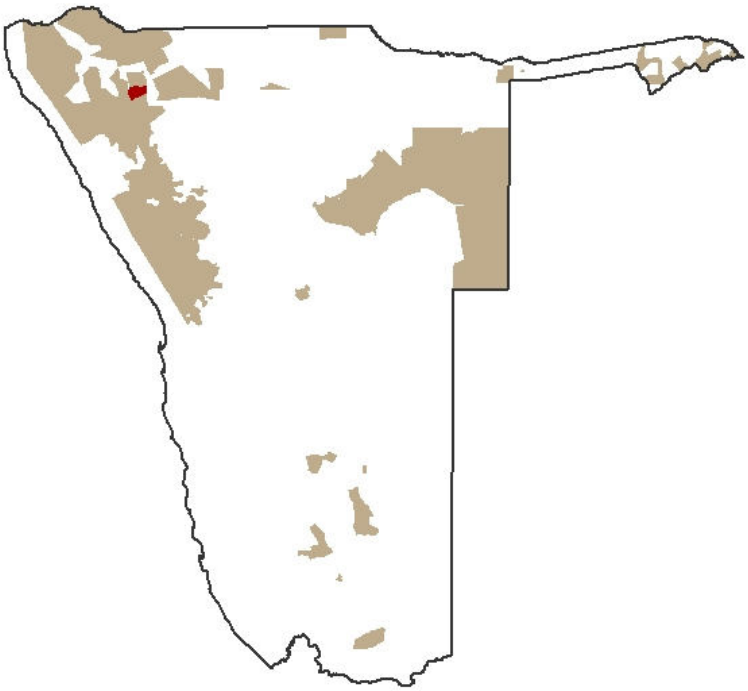
APP: 240929004746

Environmental Management Plan (EMP) for The Proposed Drilling of Boreholes for Water Supply at Otuzemba and Okahua-Kovarumentu in Otuzemba Conservancy, Erongo Region



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PROJECT TITLE	Environmental Management Plan (EMP) for The Proposed Drilling of Boreholes for Water
CLIENT	Otuzemba Conservancy
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Table of Contents

ACRONYMS

CCFN	Community Conservation Fund Namibia
DEA	Department of Environmental Affairs
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EMA	Environmental Management Act (No. 7 of 2007)
EMP	Environmental Management Plan
EMP	Environmental Management Plan
GRM	Grievance Redress Mechanism
HWC	Human Wildlife Conflict
IWRMP	Integrated Water Resource Management
KfW	Kreditanstalt für Wiederaufbau
m^3	Cubic meter
MAWLR	Ministry of Agriculture Water and Land Reform
MEFT	Ministry of Environment Forestry and Tourism
PPE	Personal Protective Equipment
RDC	Red-Dune Consulting CC
SM	Site Manager
WC	Wildlife Crime

1 THE ENVIRONMENTAL MANAGEMENT PLAN

1.1 Purpose of the EMP

This EMP is an output of the scoping study that was conducted for the project, consequently, the impact assessment are detailed in the scoping report. This EMP is a risk strategy that contains logical framework, monitoring programme, mitigation measures, and management control strategies to minimize environmental impacts. It further stipulates the roles and responsibility of persons involved in the project. These strategies are developed to reduce the levels of impacts for the projects. Lastly, the EMP further aims to develop mitigation measure of social and environmental risk that the project may cause as identified int eh Environmental Social Management Framework (ESMF) of the project.

1.2 Compliance to the EMP

This EMP is a legally binding document under the provisions of the Environmental Management Act, 2007 (Act No. 7 of 2007) (EMA). The Conservancy with support with from CCFN and contractors should adhere to the framework of this document.

1.3 Roles and Responsibility

1.3.1 Proponent

The proponent, Otuzemba Conservancy with support with from CCFN shall take overall responsibility for implementation of the EMP. It remains the responsibility of the proponent to appoint key personnel such as Site Manager and ensure that all employees and contractors are conversant with the EMP.

1.3.2 Site Manager

The Site Manager (SM) represents the proponent on site. He/she shall be responsible for daily activities in ensuring environmental protection. All communication with regard to the implementation of EMP must be channelled through the SM.

1.3.3 Employees

It shall be responsibility of employees to always adhere to the provision of EMP when on site

1.3.4 Environmental Compliance Officer

Compliance to EMP is enforced by the designated government officials.

1.3.5 Ministry of Agriculture Water and Land Reform

This ministry as mandated through the Water Resources Management Act 11 of 2013 to ensure adequate management, protection, development, use and conservation of water resources; to provide for the regulation and monitoring of water services and to provide for incidental matters. MAWLR will be responsible to ensure to that the allocated abstraction by the water permit is not exceeded to ensure a health aquifer.

1.4 Disciplinary Action

This EMP is a legally binding document, non-compliance to the EMP is punishable in accordance to the provision of EMA

2 THE EMP TABLE

This Environmental Management Plan (EMP) is divided into two parts: A) Construction and B) Operation. It addresses issues related to the socio-economic environment, bio-physical environment, pollution and waste generation, and heritage resources. This document is a living resource, subject to amendments as needed to ensure effective environmental protection. Consequently, aspects that may not have been covered during its initial development can be incorporated in the future.

2.1 Part A: Construction Phase

2.1.1 Socio-Economic Consideration

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
Awareness of the EMP	To ensure that employees /contractors are familiar with the requirements of the EMP	1. All employees must go through an induction course for the provision of the EMP. 2. Ensure that a copy of the EMP is kept on site	• Induction Minutes and Attendance Register, Physical verification of the EMP on site.	Contractor

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
Employment Socio-Economic advancement for local	To ensure that general work created during the project is reserved for local people	1. Ensure that all general work is reserved for local people 2. Fair compensation and labour practise as per Namibian Labour Laws must be followed	• Employee register • Wages for employee • Complains about payment	Contractor
Skill and Knowledge transfer	To build local capacity	1. Identify and train competent people (Preferable youth) to do basic maintenance of the borehole and its supporting infrastructure	• Training report	Contractor

2.1.2 Health and Safety of employees

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
HIV and AIDS, Alcohol and Drug abuse	Prevent alcohol and drug use at workplace. Provide awareness of	1. Provide awareness to the employees on dangers of HIV/AIDS, alcohol and drug abuse 2. Provide Condoms to employees.	• Monitor presence of alcohol at construction site • Awareness meeting attendance registers	Contractor

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
	dangers on HIV/AIDS	3. Ban the employees against the use of alcohol during working hours. 4. Provide awareness on the dangers and health impacts of alcohol and drug use. 5. All employees must be screen with the breathalyser to avoid intoxicated personnel on site. 6. Adopt a disciplinary system to discipline staff for non-compliance.	• Breathalyser report • Disciplinary reports • Physical assessment and logs of condom procurement	
Health	To ensure employees and community health	1. Abide to the Occupational Health and Safety and Labour Act of Namibia and other statutory requirements such as International Labour Practise Organization (ILO). 2. Ensure adequate first aid kit equipped with anti-venoms. 3. Supply clean drinking water to the site. 4. Adhere to the Labour act, non-toxic human dust exposure levels may not	• Complaints of health issues by employees • First aid kit available	Contractor

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
		exceed 5mg/m3 for respiratory dust and 15mg/m3 for total dust. 5. Supervisors must undergo an occupational health and first aid course, 6. 18. Provide gender segregated ablution facilities		
Safety	To ensure employees and community safety	1. Develop a safety plan. 2. Ensure that every employee goes through an induction course about safety. 3. Provide appropriate Personal Protective Equipment (PPE) which includes helmets, overalls, safety shoes, safety glasses, gloves, etc. 4. All drivers must be in possession of appropriated driver's licenses 5. All heavy vehicles must have a rotating flushing light installed for visibility. 6. Ensure that all vehicle are well serviced and roadworthy.	• Safety plan / pamphlets • Training minutes and attendance register • Physical verification of PP	Contractor

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
		7. Adequate safety signs must be put at designated places. 8. Tipper trucks carrying concrete stones and sand for construction must be covered to avoid flying stock and dust. 9. Train employee elephant behaviour and predators		
Noise Pollution	To prevent noise nuisance	1. Maintain low speed 2. All vehicles must be well serviced to prevent excessive noise 3. Do not hoot unnecessary 4. Do not rev the vehicle engines 5. Do not play loud music / radio	• Noise complaints / reports by tourist / community • Vehicle service books	Contractor

2.1.3 Safety of borehole / water infrastructures

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
Destruction of water infrastructure by elephant	To prevent destruction of boreholes and associated infrastructure by elephants.	1. Construct an elephant proof fence around the borehole and its supporting infrastructures	• Physical verification of elephant proof fence	Contractor

2.1.4 Bio-Physical Consideration

Environmental / Social Impact	Objective	Proposed Mitigation Measure	Monitoring Indicator	Responsibility
Biodiversity	To protect plant and animals (The proposed drilling sites are free of vegetation and animals (unless crawling animals)	1. Do not cut down trees unnecessary. 2. Do not kill animals. 3. Poaching strictly forbidden. 4. Do not destroy nests if found on site. 1.	• Physical verification • Report of poaching	Contractor

Environmental / Social Impact	Objective	Proposed Mitigation Measure	Monitoring Indicator	Responsibility
Land degradation Uncontrolled movement of drill rig at the project site may cause land degradation.	To prevent soil disturbance / erosion	1. Movement of vehicles / trucks must be well coordinated to ensure minimal soil disturbance	• Physical observation of tracks outside designated areas	Contractor
Water pollution Heavy vehicle and machinery may pollute water sources from leakages of oils, hydraulic fluids, lubricants, and greases.	To prevent surface and groundwater pollution	1. Fuelling of heavy vehicle on site must be well coordinated at designated places. 2. Stationary vehicles must be provided with drip tray to capture oil, lubricants, and hydraulic fluids leakages. 3. All vehicle and machinery must be well service to avoid leakages. 4. Provide and train employees on oil spill emergency response. 5. Soils contaminated with grease, oils and hydrocarbons must be collected and disposed of at an	• Physical observation of drip trays, oil marks etc • Vehicles service report / service books • Training report on emergency response • Reports of disposal of contaminated soils	Contractor

Environmental / Social Impact	Objective	Proposed Mitigation Measure	Monitoring Indicator	Responsibility
		approved site;		
General waste	To manage solid waste To prevent littering, pollution, contamination of water and general environmental health hazards	1. Maintain good housekeeping on site. 2. Designate a storage area for building rubbles. 3. Provide skip bins for construction waste. 4. Provide labelled household waste drums for household solid waste. 5. Used oil, grease and lubricants cans must be collected in appropriate drums and disposed of at an approved site 6. Provide well labelled waste drums. 7. No onsite burying / dumping or burning of waste material is	• Physical verification of waste drums • Report of waste disposal at approved sites	Contractor

Environmental / Social Impact	Objective	Proposed Mitigation Measure	Monitoring Indicator	Responsibility
		permitted. 8. Ensure appropriate waste collection and removal from the site and dispose at appropriate waste disposal site.		
Dust pollution	Land clearing, digging, and the movement of vehicles and heavy machinery on project sites, along with concrete work, transportation of sand and concrete stones, and cement mixing, can generate fugitive dust. Additionally, uncoordinated or reckless driving on gravel roads may reduce	1. Movement of heavy vehicles must strictly be restricted on site. 2. Adhere to the minimum speed limit of 30 or 40km/hour. 3. Do not excavate and/or offload sand during heavy winds. 4. Trucks carrying sand must be covered. 5. Sand stock piles must be covered or regularly water sprayed with water. 6. On site where soil is loosened by vehicle movement, apply dust a suppression method such as water	•	

Environmental / Social Impact	Objective	Proposed Mitigation Measure	Monitoring Indicator	Responsibility
	visibility for other road users	spraying. 7. Cement and concrete must be mixed with concrete mixers and not manually in the open. 8. Cement bags must be stored and disposed of properly and may not be shaken in the open.		

2.1.5 Heritage Resources

Heritage Resource	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Responsibility
Heritage and Archaeology	The proposed area does not have known Heritage site or archaeological material. Regardless and as standard practise, a chance find is developed. to ensure protection of artefacts, heritage and archaeological materials.	1. Employee must be trained on the possible find of heritage and archaeological material in the area. 2. Implement a chance find and steps to be taken for heritage and archaeological material finding (Heritage (rock painting and drawings), human remains or artefacts) are unearthed by; i. Stopping the activity immediately ii. Informing the operational manager or supervisor iii. Cordoned of the area with a danger tape and manager to take appropriated pictures. 3. Manager/supervisor must report the finding to the following competent authorities, National Heritage Council of Namibia (061 244 375) National Museum (+264 61 276800)	• Training records and attendance registers	Contractor

Heritage Resource	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Responsibility
		or the National Forensic Laboratory (+264 61 240461).		

2.1 Part B: Operational Phase

2.1.1 Human wildlife Conflict

Environmental / Social Aspect	Objective	Action Required	Monitoring Indicator	Party responsible
Reduced Human Wild-Life Conflict	The borehole at Okahua-Kovarumentu will ensure wildlife animals stay at wildlife sanctuary The borehole will make water readily available for wildlife even during drought season The elephant will less likely to come to communities and cause destructions of crops and water infrastructures similar to notorious hyenas			

2.1.2 Aquifer Conservation

Aquifer conservation refers to the sustainable management and protection of underground water resources to ensure their long-term viability. This aspect is critical part of this EMP owing to the low yield fractured aquifers and known over-abstraction which led to degraded water quality especially increase in salinity in the area. Therefore, this EMP put strong emphasis on monitoring to ensure the aquifer healthy.

Environmental / Social Aspect	Objective	Action Required	Monitoring Indicator	Party responsible
Water abstraction	To conserve the aquifer	1. Do not abstract more than what is allocated by the permit. 2. Develop and implement a ground water monitoring plan. 3. Install automatic measuring gauge to monitor abstraction. 4. Carry out periodic pumping yield to assess aquifer sustainability. 5. Monitor local vegetation and report their unusual health status. 6. Undertake systematic water quality assessment.	• Abstraction reports • Ground water monitoring plan • Report of test pumping • Physical verification of vegetation • Water quality	Proponent
Ecology	Rangeland Management	1. Monitor the vegetation health condition during abstraction and vice versa.	• Vegetation monitoring	Proponent
Skill and Knowledge transfer	To build local capacity	1. Identify and train competent people (Preferable youth) to do basic maintenance of the borehole and its supporting infrastructure.	• Training report	Proponent

Environmental / Social Aspect	Objective	Action Required	Monitoring Indicator	Party responsible
Risk of water infrastructure destruction buy elephant	To prevent infrastructure destruction by elephant	1. Build high and thick enough that will prevent elephants access to the water tank and solar infrastructures.	• Elephant incident report	Proponent
Conflict of water use buy the communities	To prevent conflict among communities of the borehole	1. Raise awareness of the indented purpose of the borehole. 2. Ensure no one is made to be entitled to owning or have controlling power on who should use the borehole 3. Implement the grievance procedures	• Community consultation and awareness raising report	Proponent
Corrosion of borehole metal casing	To ensure the casing are not corroded that could affect pump yields and water quality	1. Use non-corrosive casing.	• Corrosion monitoring reports	Proponent

2.1.3 Ground Water Monitoring Plan

The purpose of the groundwater monitoring plan is to ensure that appropriate procedures are in place to monitor and evaluate the response of the aquifer and the surrounding environment to the abstraction process. Additionally, the plan aims to manage the impacts of groundwater abstraction and contaminant loads, while also monitoring aquifer response and water quality. The proposed procedures will serve as an early warning system for potential over-abstraction.

2.1.3.1 Groundwater Quality

It is essential to monitor the quality of abstracted groundwater on a regular and realistic basis. This ongoing assessment will serve as an early warning system for any changes in water quality that may arise due to the abstraction process, natural factors, or pollution. Regular monitoring will help identify potential issues before they become significant problems, allowing for timely interventions.

To effectively achieve this, it is recommended to conduct intermittent water quality testing. This testing should include a comprehensive analysis of various parameters, such as chemical composition, microbial presence, and overall water quality indicators. By implementing a systematic approach to water quality testing, the project can ensure the sustainability of groundwater resources and protect both human health and the surrounding environment.

2.1.3.2 Groundwater Level Measurements

The level of groundwater in the aquifer plays a crucial role in assessing the relationship between water quantity and the rate of abstraction. This information is particularly important given the limited recharge rates due to low

rainfall in the area. To facilitate this monitoring, a provision has been included in the monitoring sheet for water meter readings provided by the Ministry of Agriculture, Water and Land Reform (MAWLR) to the borehole operator.

It is essential that baseline hydrological data on water levels is recorded to ensure consistent and time-variant data collection. This systematic approach to monitoring will not only help in managing water resources effectively but will also serve as compelling evidence of any discrepancies or errors when the MAWLR conducts periodic inspections. Establishing a robust framework for tracking groundwater levels, will result in a better understanding of the general groundwater resource in the area that will inform necessary actions to mitigate potential impacts.

3 DECOMMISSIONING AND REHABILITATION PLAN

Decommissioning is typically the reverse process of construction, involving the removal of all installed equipment and structures. In the context of groundwater supply, the aim is to maintain this resource over an indefinite timeframe. Unless there is an urgent national issue—such as significantly degraded water quality—that necessitates decommissioning, the borehole is intended to serve future generations.

As the equipment ages, it will require replacement and maintenance to ensure the continued smooth operation of the borehole. It is essential that maintenance is carried out by qualified Namibians, who possess the necessary skills and knowledge associated with borehole management.

Borehole casing are prone to corrosion, which can pose risks to the longevity and efficiency of the borehole. Therefore, it is critical to undertake periodic rehabilitation to ensure that the borehole's yield and water quality remains unaffected over time.

4 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusions

The Northwest landscape, the Erongo and Kunene Regions, are some of the driest areas in Namibia. Otuzemba Conservancy receives an average rainfall 200mm of rainfall annually. Surface water is only available in ephemeral rivers during periods of substantial rainfall inland. In general, the rocky formation of the area has low water storage capacity, hence, coupled with erratic recharge rates, there is concerns about the potential for over-abstraction of the aquifer.

The proposed drilling sites are devoid of vegetation and will not necessitate the construction of access roads, which minimizes environmental disturbance.

Mostly, this study was conducted with a high degree of certainty, and most potential impacts have been assessed and can be mitigated to insignificant levels. Based on the risk assessment outcomes and the proposed mitigation strategies, the project is not anticipated to have significant adverse effects on the environment. However, adequate monitoring of the borehole's performance is critical for assessing both the level and quality of groundwater.

4.2 Recommendations

It is recommended that the approving authority approves the issuance of the Environmental Clearance Certificate (ECC). A strong emphasis should be placed on safeguarding water quality and the health of the aquifer throughout the project's duration.

Ensuring high standards of water quality is crucial not only for the well-being of wildlife but also for the preservation of the ecological ecosystems that rely on

these water resources. Monitoring plans should be established to regularly assess water quality and aquifer conditions.

Additionally, the implementation of best practices in water management and conservation will be essential in maintaining the sustainability of the aquifer to foster a responsible and environmentally-freindly approach that supports ecological sustainability.