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Environmental Scoping Study For the Proposed Drilling of Boreholes for Water Supply at Mubana Village in Wuparo Conservancy, Zambezi Region

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ACRONYMS

CBNRM	Community Based Natural Resource Management
CCFN	Community Conservation Fund of Namibia
CEO	Chief Executive Officer
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
EC	Environmental Commissioner
ECC	Environmental Clearance Certificate
ECO	Environmental Compliance Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act (No. 7 of 2007)
EMP	Environmental Management Plan
ESI	Environmental Social Indicators
ESMF	Environmental and Social Management Framework
FDM	Frequency Domain Electromagnetic
FPIC	Free Prior Informed Consent
GPS	Global Positioning System
GRM	Grievance Redress Mechanisms
HWC	Human Wildlife Conflict
HWC and WC	Human Wildlife Conflict - Wildlife Crime
I&APs	Interested and Affected Parties
ILO	International Labour Organization
IRDNC	Integrated Rural Development and Nature Conservation
ISO	International Standard Organisation
IWRM	Integrated Water Resource Management
KFW	German Development Bank
L	Litre
m^3	Cubic

MAWLR	Ministry of Agriculture Water and Land Reform
MEFT	Ministry of Environment Forestry and Tourism
MM	Millimetres
Mm^3	Million Cubic
NACSO	Namibian Association of CBNRM Support Organizations
^oC	Degree Celsius
OMDEL	Omaruru Delta
PPE	Personal Protective Equipment
PPP	Public Participation Process
R	Reversible
RD	Red-Dune Consulting CC
SEMP	Social Environmental Management Plan
SM	Site Manager

EXECUTIVE SUMMARY

Before Namibia's independence in 1990, people living in communal areas had limited rights to access or use wildlife. After gaining independence, Namibia implemented policies and legal frameworks aligned with Article 95l of its Constitution, which allowed communities and private businesses to benefit from wildlife tourism and sustainable natural resource management. This approach is known as Community-Based Natural Resource Management (CBNRM).

i. The CBNRM Concept

The CBNRM concept is based on the idea that when rural communities have rights to use, benefit from, and manage natural resources, they are motivated to use them sustainably. By establishing Conservancies, the CBNRM program connects conservation with poverty reduction, fostering industries like conservation, hunting, and tourism. This drives economic growth, creates jobs, and improves the well-being of rural communities.

ii. Wuparo Conservancy and Human-Wildlife Conflict

Wuparo Conservancy, located in the southern part of the Zambezi Region, it borders Baylerwa Conservancy to the west and Dzoti Conservancy to the east. Additionally, it is adjacent to Nkasa Rupara National Park to the southeast and Mudumu National Park to the northwest. The proposed borehole will be drilled at Mubana Village.

Nestled between two national parks, the Conservancy is a migratory route to key wildlife animals including elephant, hyenas, lions, leopards, and wild dogs which destroy crops and attack livestock which lead to incidents of human-wildlife conflict.

iii. Addressing Human-Wildlife Conflict through Community Conservation Fund of Namibia (CCFN)

To address the HWC challenge, Wuparo Conservancy applied for a grant from the Community Conservation Fund of Namibia (CCFN) to be support with drilling of a water point at Mubana area.

iv. The Mubana Borehole

With funding from the German government through KfW Development Bank, CCFN is implementing the "Poverty-Oriented Support to Community Conservation in Namibia" project. This initiative aims to promote biodiversity conservation and rural development by establishing sustainable Human-Wildlife Conflict (HWC) management systems in communal conservancies. As part of this effort, CCFN is assisting the Sheya Shuushona Conservancy in drilling a borehole in the Iitapa area. The project focuses on developing long-term HWC management solutions and supporting conservancies in addressing these challenges in alignment with Namibia's national policies.

v. Environmental Compliance and the Role of Red-Dune Consulting CC (RDC)

Section 27 of the Environmental Management Act (EMA) lists the “Abstraction of groundwater” as an activity that may not be undertaken without an Environmental Clearance Certificate. To fulfil this statutory requirements, Red-Dune Consulting CC (RDC) was appointed to develop an Environmental Management Plan (EMP) to guide the drilling and operation of the proposed borehole.

vi. Project Impact and Groundwater Monitoring

The project's scale is relatively small, and its potential negative impacts are minimal. In fact, it has a positive socio-economic impact by addressing the challenge of Human-Wildlife Conflict (HWC). The boreholes will be drilled in areas that are free of significant biodiversity. However, excessive groundwater extraction, particularly over the long term, could lead to the deterioration of water quality and depletion of the water table. Therefore, it will be essential to implement groundwater monitoring measures to ensure sustainable management.

1 INTRODUCTION AND BACKGROUND

1.1 Poverty Oriented Support to Community Conservation in Namibia

The Community Conservation Fund of Namibia (CCFN) is a non-profit Association incorporated under Section 21 of Namibia's Companies Act of 2004. Using a foundation model, the CCFN is mandated to raise funds and manage various financial mechanisms such as endowments, sinking or revolving funds, to ensure the long-term sustainability of Community-Based National Resource Management (CBNRM) activities that are carried out by communal conservancies and other entities with a similar legal mandate.

1.2 Community Based Natural Resource Management

Prior to Namibia's independence in 1990, wildlife management in communal areas was characterized by significant restrictions. Residents had limited wildlife utilization rights, particularly regarding hunting. Wildlife, especially predators and foraging animals, were viewed primarily as threats due to their destructive impact on crop fields, potential for human attacks, livestock predation, and infrastructure damage. These conflicts often led communities to retaliate by killing wildlife, giving rise to what became known as Human Wildlife Conflict and Wildlife Crime (HWC-WC).

Following independence, Namibia underwent a fundamental shift in its approach to wildlife management, guided by Article 95l of the Constitution, which states: "The State to actively promote and maintain the welfare of the people by adopting policies aimed at the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future." This constitutional mandate led to the development of new policies, legal frameworks, and strategies to address HWC-WC.

A key innovation was the introduction of Community-Based Natural Resource Management (CBNRM), governed by the National Policy on Community Based Natural Resource Management.

This approach enables local communities and private businesses to benefit from wildlife-based tourism and sustainable resource management. The CBNRM concept operates on the principle that when natural resources hold substantial value for rural communities, and when communities are granted rights to use, benefit from, and manage these resources, they develop stronger incentives for sustainable resource management through conservancy establishment. This program effectively links conservation efforts with poverty reduction by developing conservation hunting and tourism industries, thereby contributing to the national Gross Domestic Product, creating employment opportunities, and improving the overall well-being and social development of rural communities.

1.3 Conservancies and Management

Conservancy establishment and operation is provided for under Section 24 of the Nature Conservation Ordinance 4 of 1975. This ordinance requires a conservancy to be composed of a committee which, is elected by their members. Overall, communal conservancies are self-governing, democratic entities, run by their members, with fixed boundaries that are agreed with adjacent conservancies, communities or landowners. Conservancies are recognised by the MEFT, but not governed by the Ministry, which does, however, have powers to de-register a conservancy if it fails to comply with conservation regulation[1]. Wildlife in the conservancies is managed through a wildlife management plan. Like many legal financial entities, conservancies conduct annual general meetings and prepare financial reports[2].

1.4 Human Wildlife Conflict (HWC) Challenge in Conservancies

The Community-Based Natural Resource Management (CBNRM) initiative has led to the remarkable recovery and increase in wildlife populations, including key predator species and internationally threatened or endangered species such as elephants and black rhinoceros[3]. However, this increased wildlife population resulted into their expanded foraging ranges into

[1] Nature Conservation Ordinance 4 of 1975
[2] https://www.meft.gov.na/services/conservancies/193/
[3] Republic of Namibia: Revised National Policy on Human Wildlife Conflict Management 2018-2027

communal and freehold farming arear resulting in an increased frequency and severity of Human Wildlife Conflict (HWC) especially involving elephants, feline predators, crocodiles and hippopotamus[4][5].

The conflicts include damage to crops, gardens and infrastructure (water points, fences, kraals, boreholes, etc.), loss of life or injuries to people and livestock mortalities. The situation is further complicated by climate change impacts on arid ecosystems, where limited environmental resources have intensified competition between livestock and wildlife populations for essential resources, particularly grazing areas and water sources.

To address these challenges, several mitigation strategies have been implemented, including the establishment of zonation systems in conservancies. These systems designate specific areas for farming, multiple-use activities, and dedicated wildlife zones for tourism and trophy hunting. Additional protective measures include enhanced livestock management through supervised herding, secure nocturnal enclosures, and the installation of protective infrastructure around gardens and water facilities.

2 WUPARO CONSERVANCY

Wuparo Conservancy was officially registered in December 1999. It covers an area of 148 km^2 and has a population of 987 people.

2.1 Location

[4] Brian T. B. J and Jonathan I. Barnes 2006., Human Wildlife Conflict Study Namibian Case Study
[5] Ailla-Tessa Nangula Iiyambula 2021., Identifying the Spatio-Temporal Distribution and Drivers Of Human-Carnivore Conflict In Epupa And Okanguati Conservancies, Erongo Region Namibia

The Wuparo conservancy is situated in the southern eastern part of Zambezi Region. It lies between Mudumu National Park in the north and Nkasa Rupara National Park in the south. Additionally, it borders Dzoti Conservancy in the east and Balyerwa Conservancy in west.

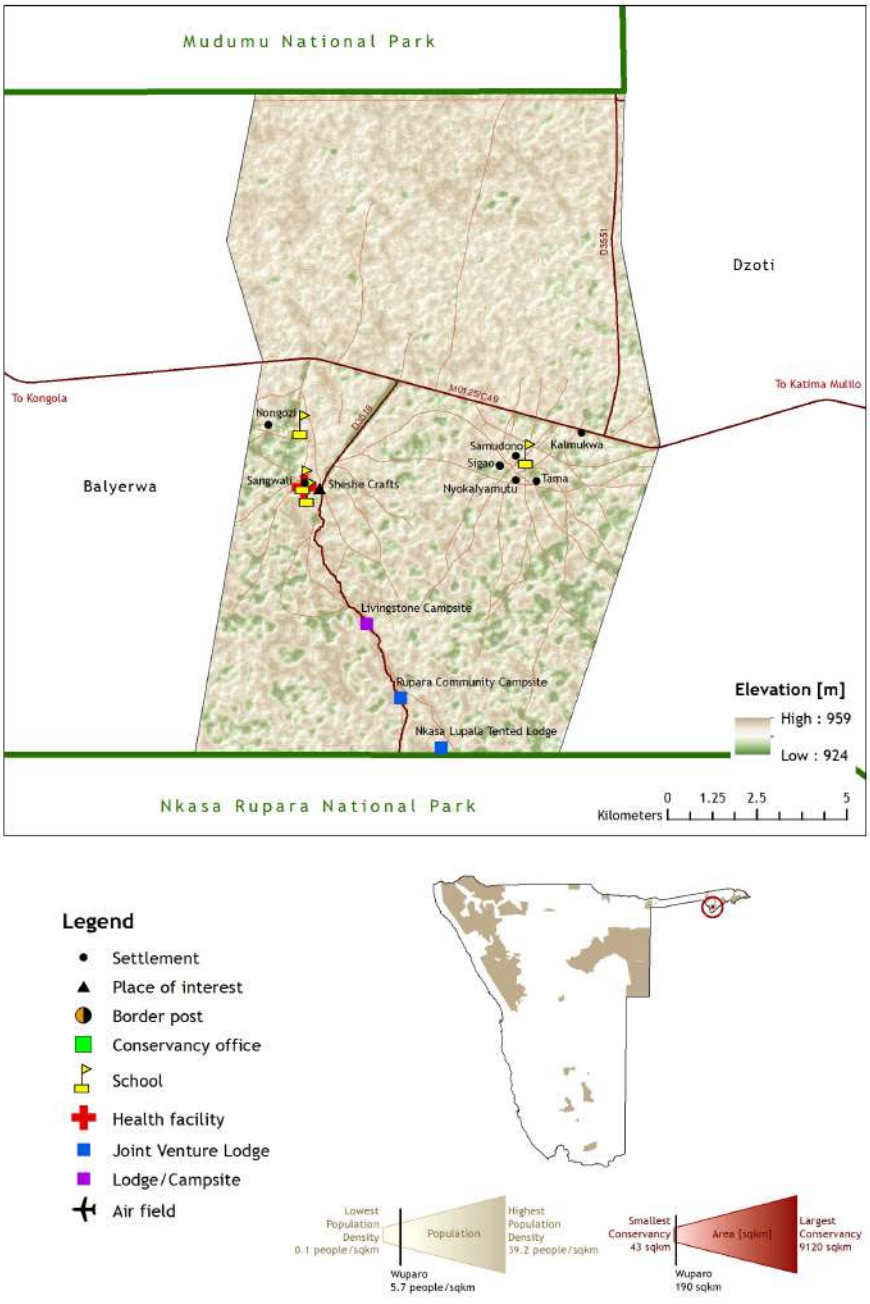

Figure 1. Map of Wuparo Conservancy (Source: NACSO, 2022)

The proposed borehole will be drilled at Mubana GPS coordinate -18.25083333° S, 23.63666667^{0} E **(***See Figure 2 below).*

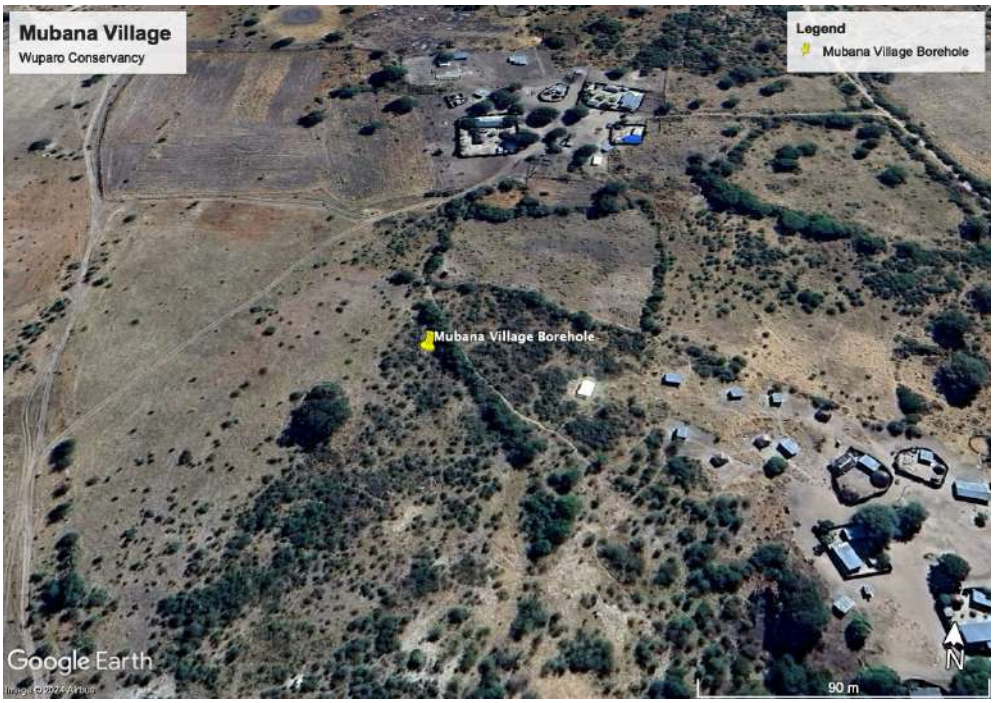

Figure 2. Borehole site at Mubana Village, Wuparo Conservancy

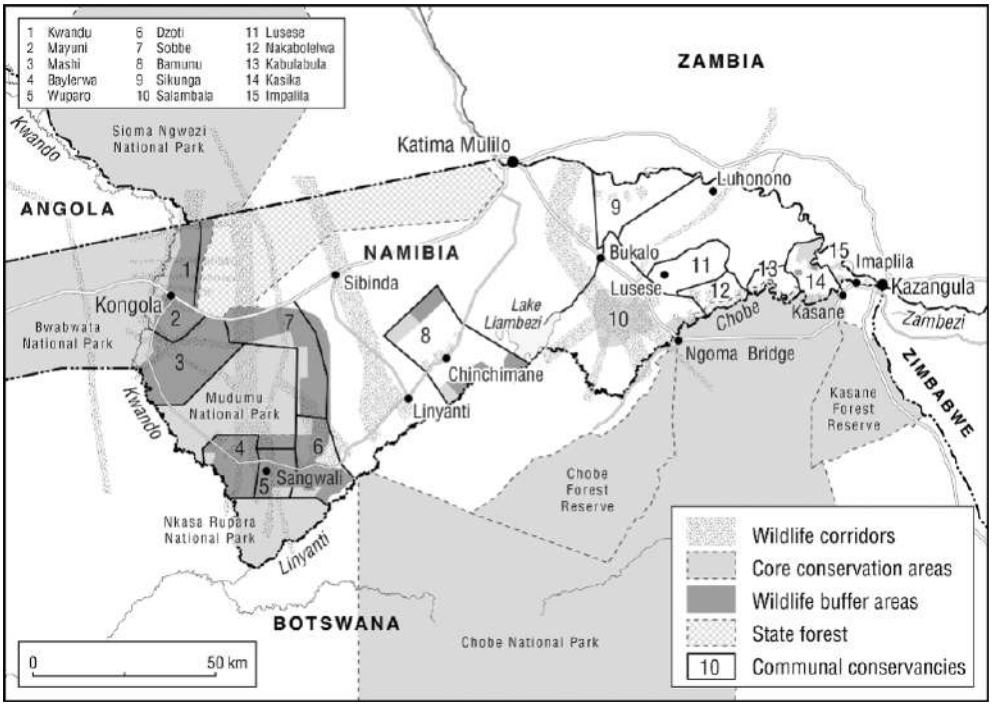

Figure 3. Conservancies in Zambezi Region

2.2 Physical Characteristics

Generally, the conservancy has a flat topography, made up of relatively thick forest **Figure 4.**

Figure 4. Area physical characteristics at Mubana Village (Source: Red-Dune Consulting 2024)

2.3 Support from Community Conservation Fund of Namibia (CCFN)

2.3.1 Human Wildlife Conflict (HWC)

Nestled between two national parks, the Conservancy is a migratory route to key wildlife animals including elephant, hyenas, lions, leopards, and wild dogs which destroy crops and attack livestock.

The charts in **Figure 5** below shows the type and total number of human wildlife conflict incidents each year, subdivided by species, grouped as herbivores and predators.

- **A,** total number of incidents each year, subdivided by species, grouped as herbivores and predators,
- **B**, the number of incidents per species for the last 3 years; the darkest bar (on the right) indicates the current year for each species

- **C,** the number of incidents per category for the last 3 years; the darkest bar (on the right) indicates the current year for each type.

It shows that, most HWC incidences are destruction of crops by herbivores (elephants, and antelopes), while hyenas and lions are responsible for livestock losses.

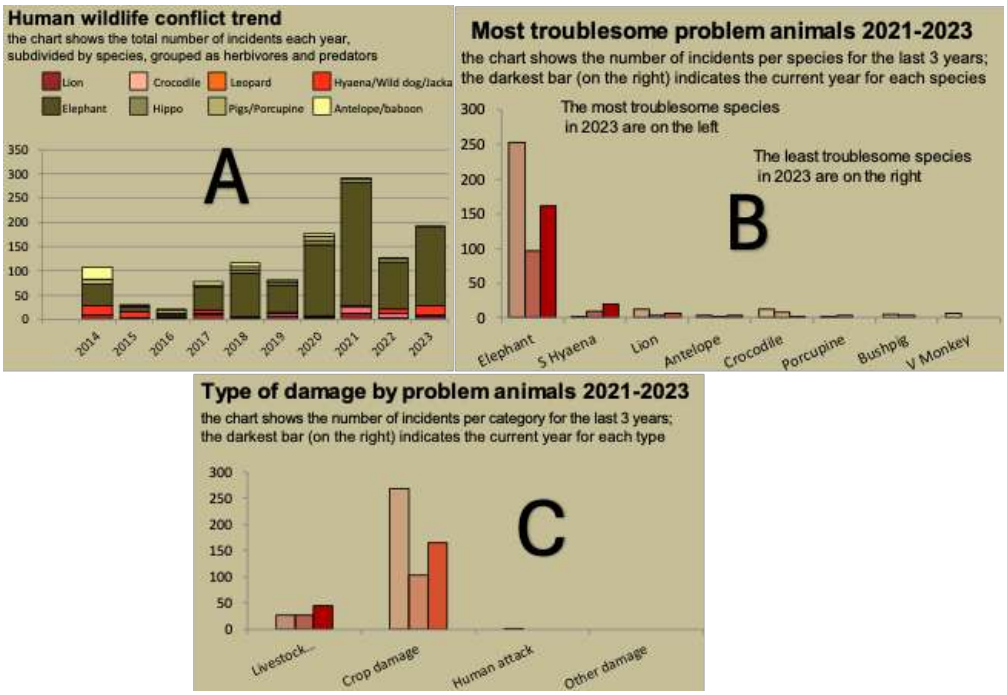

Figure 5. Total number of HWC incidents each year, subdivided by species and type of conflict (NACSO, 2022).

2.3.2 Mitigation of HWC

It has been observed that livestock loss frequently occurs when they access water points. In response, the Conservancy, through a proposal to CCFN, has requested assistance to develop and establish safer water access points to mitigate human-wildlife conflict by providing alternative, safe water supply points.

2.3.3 Support from Community Conservation Fund of Namibia (CCFN)

With financial support from the German Government through the KfW Development Bank, CCFN is implementing a project, *"Poverty Oriented Support to Community Conservation in Namibia"*. The project's main objective is to contribute to biodiversity conservation and rural development

through the establishment of sustainable Human-Wildlife-Conflict (HWC) management systems in Namibia's communal conservancies. In line with the project objectives, CCFN is supporting the Sheya Shuushona Conservancy in drilling a borehole in the Iitapa area for the community.

This intervention speaks to the project's objective of (i) working together with CBNRM partners[6] to develop and institutionalize long-term mechanisms and structures that make management of HWC part of the sustainability strategy of CBNRM (ii) providing targeted conservancies with the means to address the HWC challenges they face in line with the National Policies of Namibia, which is of relevance to this proposed intervention.

3 STATUTORY REQUIREMENTS

The protection of the environment is enshrined under Article 95l of the Namibia Constitution. The Environmental Management Act (Act No 7 of 2007) (EMA) and its Environmental Impact Assessment Regulation 2012, has listed Water Resource Developments activities not to be undertaken without an Environmental Clearance Certificate (ECC) as follows.

a) 8.1 The abstraction of ground or surface water for industrial or commercial purposes
b) 8.2 The abstraction of groundwater at a volume exceeding the threshold authorised in terms of a law relating to water resources.

To comply with these statutory requirements, Red-Dune Consulting CC (RDC) was appointed to develop an Environmental Management Plan (EMP) for the drilling of the borehole. In addition to the EMA, other statutory requirements must also be fulfilled. The Ministry of Agriculture, Water, and Land Reform, as the custodian of the Water Resources Management Act (No. 11 of 2013), requires that a permit be obtained prior to the commencement of any borehole drilling activities.

[6] IRDNC

4 TERMS OF REFERENCE

The scope to develop this EMP is guided by the Terms of References as provided in the EIA Regulation 2012, Section 9 (a-b) but, not limited to the following;

- Provide a comprehensive description of the proposed Project;
- Identify relevant legislation and guidelines for the project;
- Identify potential environmental (physical, biological and social) conditions of the project location and conduct risk assessment;
- Inform Interested and Affected Parties (I&APs) and relevant authorities about the proposed project to enable their participation and contribution;
- Develop an Environmental Management (EMP) that would be a legal guideline for the environmental protection by the project.

5 THE PROPONENT

Wuparo Conservancy is the proponent for this application with financial support from CCFN.

6 UNDERGROUND WATER IN ZAMBEZI REGION

The aquifers in the Zambezi region are known to have a thickness of up to 125m, formed by coarse grained, semi-consolidated to consolidated sandstone with underlying layer of basal / brackish to saline water **Figure 6[7].**

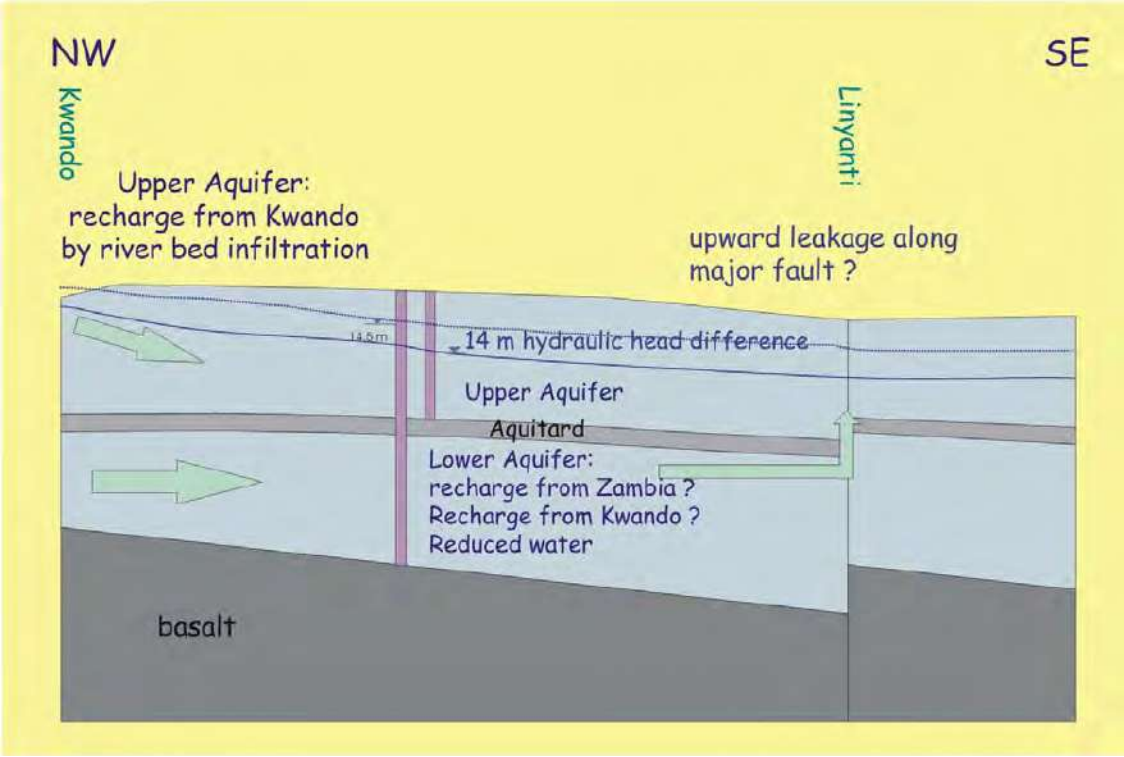

Figure 6. Schematic Concept showing the Structure of the Aquifer System in the Eastern Caprivi (Groundwater Investigations in the Eastern Caprivi Region, Main Hydrogeological Report pp46)

[7] Groundwater Investigations in the Eastern Caprivi Region, Main Hydrogeological Report pp46

7 PROJECT ALTERNATIVES

The EMA) requires an impact assessment to explore various project alternatives, ensuring that the chosen project component does not have a significant negative impact on the environment. Project alternatives can range from not implementing the project at all (the "no-go" alternative), particularly when environmental impacts are severe or there is a high degree of uncertainty. Other alternatives may involve changes to the project site, technology, or equipment to be used. The description of alternatives is given below.

7.1 No-go alternative

If a "no-go" option is considered, it would mean that the current situation would remain unchanged. During drought, HWC could escalate, potentially leading to greater challenges for the communities living within the conservancy and the surrounding areas. As HWC intensifies, the negative impact on both the local environment and the livelihoods of the people could undermine the conservation efforts in place.

Additionally, the cost-benefit balance of the conservation incentives provided to conservancy members could be threatened, as increased conflict with wildlife may reduce the perceived benefits of participating in conservation activities. This could discourage ongoing community engagement and cooperation, which are essential for the long-term success of conservation initiatives. Ultimately, the failure to address HWC could hinder the effectiveness of conservation strategies and destabilize the environmental and economic gains made by the conservancy members.

7.2 Alternatives

Generally, a combination of alternatives to drilling could be considered. These include rainwater harvesting and aquifer recharge, which can provide a more resilient and sustainable approach to water resource management. Ultimately, a holistic approach will need to be implemented, one that incorporates the use of renewable energy and the adoption of water conservation measures to ensure water security while protecting the environment.

8 DESCRIPTION OF THE RECEIVING ENVIRONMENT

8.1 Populational demography

The 2023 population census indicated that Zambezi region has total population of 142 373 people. Overall, 61% of the region population makes up the labour force whereby 62% and 32% of the labour force is employed and unemployed respectively. The region has 8 electoral constituencies as presented in **Table 1** below. Wuparo Conservancy falls within Linyati Constituency.

Table 1. Population distribution in constituencies of Zambezi Region (Census 2023)

Zambezi	142 373
Judea Lyaboloma	8 738
Kabbe North	12 253
Kabbe South	11 345
Katima Mulilo Rural	24 016
Katima Mulilo Urban	46 401
Kongola	12 069
Linyanti	10 425
Sibbinda	17 126

The average household size in the Zambezi Region was 4.4 people/household in 2015[8], with a relatively young population of approximately 39% of the total population to be less than 15 years old. Officially, employment rate for Zambezi Region is 62%[8] , which is closely like the national average of 63.1%. Most of the employable adults are engaged in the category of agriculture, forestry, and fishing as the main sources of household income. Tourism and wildlife management are an important growing component of the economy, providing jobs through accommodation establishments and conservation work.

8.2 Socio-economic profile

[8] Namibia Statistics Agency.2015. Namibia Household Income and Expenditure Survey Report

The community of Wuparo Conservancy are mostly subsistence farmers who rear crops and livestock. Tourism is one of the main incomes generating activity for the conservancy through trophy hunting concession. Often, meat from trophy hunting is distributed to residents.

8.3 Regional Geology and Topography

According to Mendelsohn *et al 2002*, Zambezi Region is formed up of the Kalahari Basin. The Kalahari Basin was formed from the split between Namibia and South America to form a broad coastal plain which is now the Namib Desert. The Kalahari Basin gradually filled up with sand and water borne deposit. These deposits of sands, clay and calcrete formed the Kalahari Group.

The soils are fluvisols that are derived from river deposits, and these loamy soils vary locally in the proportions of clay (distributed in the areas which experience frequent flooding) and sand (found mainly in the non-flood prone areas). While soils are naturally fertile and suitable to a range of crops, the sandy parts have poor soils with rather low nutrient levels, like other soils in the Kalahari Sandveld[9].

Generally, the Zambezi region is flat and sloping toward the eastern direction. This is because, the geology of the area was formed from the filling up of the coastal plain with Namib sand and water borne deposits. Flooding is frequent in the region because of direct rainfall and rise in the Zambezi River from Angolan inflows.

The lithology of the aquifer in surrounding areas is not well known. The geohydrology indicates that the aquifers are found in Kalahari Deposits where soils are clayey loam with low infiltration potentials and faced with evaporation rates higher than rainfall which consequently causes low potential of ground water recharge.

[9] Mendelsohn, J., Jarvis, A., Roberts, C., Robertson, T. (2002). Atlas of Namibia. A Portrait of the Land and its People. Cape Town (David Philip Publishers; New Africa Books (PTY) Ltd)

8.4 Climate

8.4.1 Rainfall

Generally, Namibia is an arid country, with a large part of country having a climatic condition characterized by high temperatures and, periodic low rainfall. Rainfall decrease from east to west, with Zambezi Region receiving the highest rainfall of 600ml/year to less than 25 ml in the Southwest and West of the country. The country experiences high climatic variability in the form of persistent droughts, unpredictable and highly variable rainfall patterns, temperatures and scarcity of water.

High solar radiation, low humidity and high temperatures lead to very high evaporation rates, which vary between 3800 ml per annum in the south to 2600 ml per annum in the north. In many areas, potential evaporation is about five times greater than the average rainfall. Surface water sources such as dams are subject to high evaporation rates.

Zambezi region has the highest average rainfall of about 600 mm which is like that of Wuparo Conservancy Figure 7.

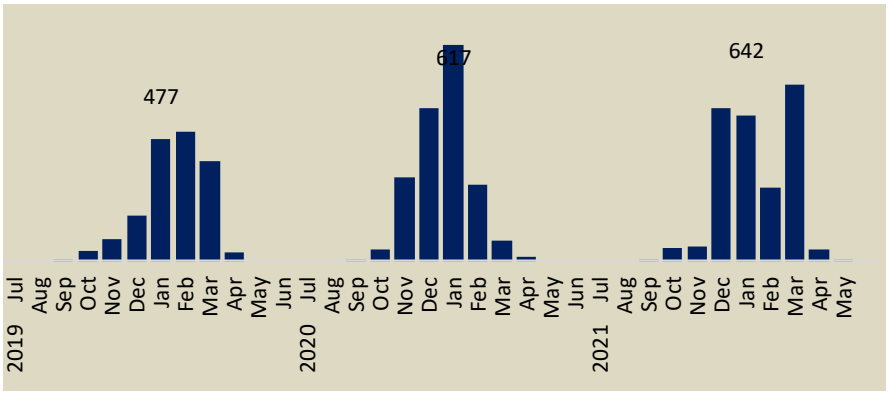

Figure 7: Rainfall trends in Wuparo Conservancy (Source: NACSO)

The Zambezi region's climatic condition is influenced by the Zambezi River, that of tropical nature with warm to hot temperatures. The warmest temperatures are from September to March, and the coldest between May to August. The dry season fall between April and October while the wet season falls between November and March. The region is known to experience frequent flooding. According to Mendelsohn et al 2002, the average summer temperature is 20ºC while during winter the average temperature is 5 ºC and the average maximum and minimum annual temperature is 35 ºC and 19 ºC respectively.

8.5 Biodiversity

8.5.1 Flora

Zambezi region is the most densely vegetated region in Namibia. Due to its tropical nature, the areas has a tropical forest covered by thick bush, shrubs mature trees which are predominantly Rose Wood and various species of Acacia trees and tall glass in the floodplain while non-flooded areas have trees of mopane *(Colophospermum mopane), Burkea Africana* and *Terminalia sericea*. Wuparo Conservancy is dominated by broad-leafed trees and shrub savannah.

8.5.2 Fauna

Bordering two national parks, the conservancy is home to a diversity of keystone wildlife species. Major wildlife includes Lion, elephant, leopard, buffalo, waterbuck, tsessebe, kudu, duiker, reedbuck, common impala, blue wildebeest, lechwe, hippo, crocodile, plains zebra, warthog, steenbok, high diversity bird species, various fish species in the Linyati River [10].

8.6 Surface Water

[10] NACSO 2022

The primary surface water in Namibia is found in dams in Ephemeral Rivers and Perennial Rivers which have a potential of 200 Mm^3 and 1,105Mm^3 per annum respectively. The Ephemeral Rivers in the interior flow during the raining season, where western flowing rivers drains into the Atlantic Ocean, Fish River drains into Orange River, Cuvelai system, which is not a defined River system but rather Iishanas or flood plain drains into Etosha Pan and partially contribute to Kavango, Kwando and Zambezi River.

Perennial River, which has permanent flow are all found on the border of the country. Zambezi in the northeast has a mean annual flow of 40,000 Mm^3, its flow per second, 180Mm^3, is about twice the overall Dams capacity in Namibia at 100Mm^3. The Kwando / Linyati / Chobe has an annual flow of 10,000Mm^3, Kunene 5,500Mm^3 and Orange River with 11,000Mm^3 flow. Wuparo Conservancy mostly depends on the Linyanti River for surface water.

8.7 Ground Water

Namibia highly relies on ground water. About 50-60% water is ground water which has a potential yield of 360Mm^3. Geologically, the main aquifers are the Karst, Otjwarongo, Omaruru Delta (OMDEL), Lower Kuiseb, Windhoek, Stampriet, Koichab and Ohangwena II. Groundwater quality in much of the Zambezi Region is generally good, especially within 5-20 km from the rivers, which recharge the aquifers[11].

8.8 Land use

The conservancy is zone into various uses as shown in figure 8 below.

[11] Groundwater Investigations in the Eastern Caprivi Region, Main Hydrogeological Report

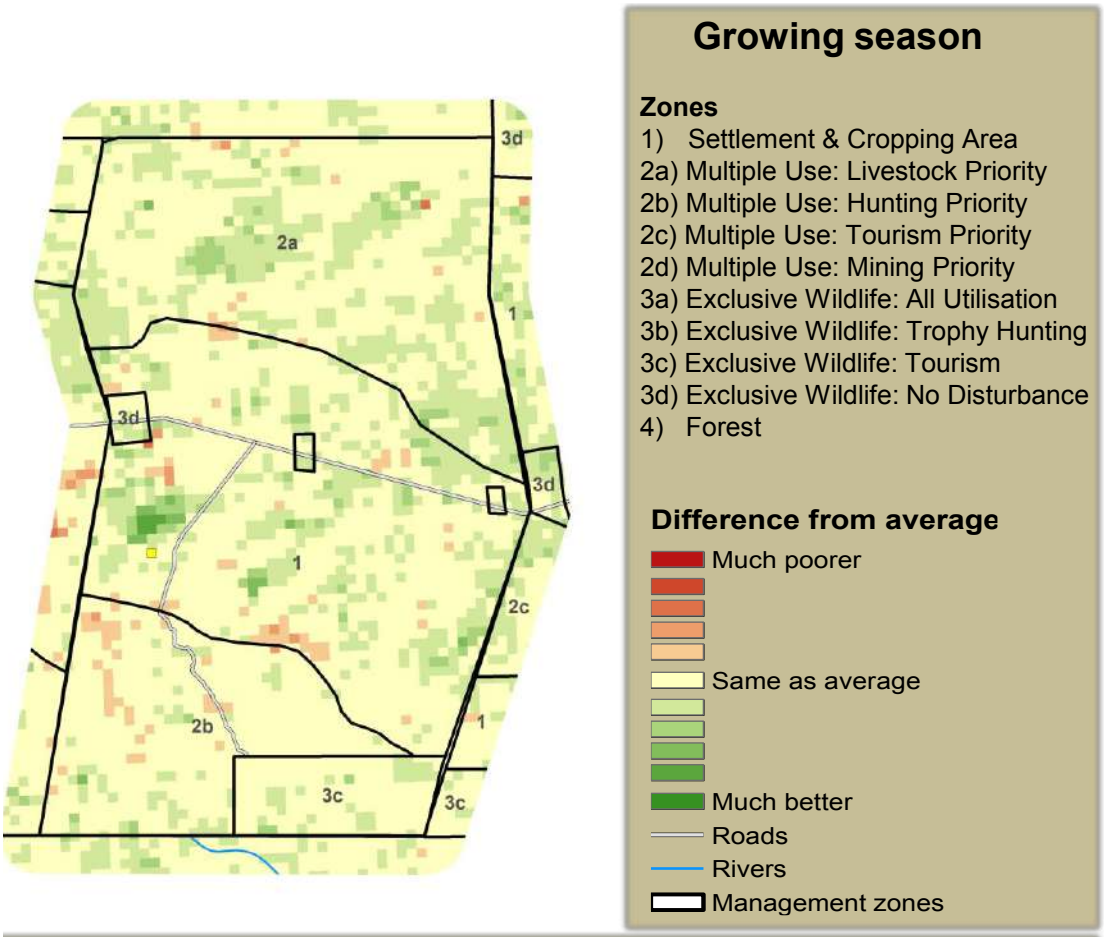

Figure 8. Conservancy Zones (Source: NACSO, 2022)

9 THE NEED AND DESIRABILITY OF THE PROJECT

The project aligns with the objectives of the Community-Based Natural Resource Management (CBNRM) programme, specifically in addressing the challenges of HWC while promoting wildlife conservation and fostering poverty reduction. By creating a sustainable solution to mitigate HWC, the project supports the well-being of local communities and provides long-term conservation incentives.

Furthermore, the project contributes to the broader goals of Namibia's Integrated Water Resource Management (IWRM) framework. IWRM is designed to ensure the sustainable management of the country's water resources, balancing the needs of social equity, economic efficiency, and environmental sustainability. The implementation of this borehole in the Iitapa area demonstrate

the IWRM principles by addressing water scarcity in rural communities while ensuring that water resources are used in a way that supports both human and ecological needs.

10 POLICY AND LEGAL FRAMEWORK

Namibia has developed a comprehensive set of policies, regulatory frameworks, and institutions designed to ensure the conservation, sustainable use, and equitable sharing of natural resources, biodiversity, and ecosystems *(Table 2)*. These efforts are in alignment with both international conventions and national legislation. In addition to its domestic policies, Namibia is a signatory to several international treaties, conventions, and multilateral agreements, which further guide its environmental governance. The country actively participates in various international standards, such as the United Nations Development Programme's Social and Environmental Standards (UNDP's SES) and engages in reviews and processes that are critical to the sustainable management of natural resources and the protection of basic rights, including access to a clean and healthy environment.

Table 2. Policy and Legal Framework

Legislation	Relevant authority	Applicability
The Namibia Constitution	**Government Republic of Namibia**	The Namibian constitution is the supreme law of the country and makes provision for environmental protection and sustainable development.
Environmental Management Act No. 7 of 2007	**Ministry of Environment, Forestry and Tourism**	The environmental management act No.7 of 2007 aims to promote the sustainable use of natural resources and provides the framework for the environmental and social impact assessment, demands precaution and mitigation of activities that may have negative impacts on the environment and provision for incidental matters. Furthermore, the act provides a list of activities that may not be undertaken without an environmental clearance certificate.

Legislation	Relevant authority	Applicability
Environmental Assessment Policy (1995)	**Ministry of Environment, Forestry and Tourism**	The Environmental Assessment Policy for Sustainable development and Environmental Conservation emphasize the importance of environmental assessments as a key tool towards implementing integrated environmental management. Sets an obligation to Namibians to prioritize the protection of ecosystems and related ecological processes. The policy subjects all developments to environmental assessment and provides guideline for the Environmental Assessment. The policy advocates that Environmental Assessment take due consideration of all potential impacts and mitigations measures should be incorporated in the project design and planning stages (as early as possible).
Pollution Control and Waste Management Bill (in preparation)	**MEFT, MHSS and others**	The Pollution Control and Waste Management Bill, intents to regulate and prevent the discharge of pollutants into the air and water as well as providing for general waste management.
Public Health Act (Act No. 36 of 1919)	**Ministry of Health and Social Services**	The Public Health Act aims to protect the public from nuisance and states that no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.
Water Resources Management Act (Act No. 11 of 2013)	**Ministry of Agriculture, Water and Land Reform**	This Act provides a framework for managing water resources based on the principles of integrated water resources management. It provides for the management, development, protection, conservation, and use of water resources.

Legislation	Relevant authority	Applicability
		Therefore, water abstraction should satisfy the provisions of the water act (water abstraction / borehole permit should be applied from the respective ministry).
Water Act No, 54 of 1956	**Ministry of Agriculture, Water and Land Reform**	This act states that, all water resources belong to the State. It prevents pollution and promotes the sustainable utilization of the resource. To protect these resources, this act requires that permits are obtained when activities involve the following: (a) Discharge of contaminated into water sources such as pipe, sewer, canal, sea outfall and (b) Disposal of water in a manner that may cause detrimental impact on the water resources
Soil Conservation Act No. 76 of 1969	**Ministry of Agriculture, Water and Land Reform**	This act promotes the conservation of soil, prevention of soil erosion. Prevent soil salinification.
National Heritage Act No. 27 of 2004	**Ministry of Urban and Rural Development**	The Act makes provision for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. Part V Section 46 of the Act prohibits removal, damage, alteration or excavation of heritage sites or remains, while Section 48 sets out the procedure for application and granting of permits.
Regional Councils Act, 1992 (Act No. 22 of 1992)	**Ministry of Urban and Rural Development**	The Regional Councils Act legislates the establishment of Regional Councils that are responsible for the planning and coordination of regional policies and

Legislation	Relevant authority	Applicability
		development. The main objective of this Act is to initiate, supervise, manage and evaluate regional development.

11 PUBLIC CONSULTATION

Section 21 of the EIA Regulation requires the undertaking of an Environmental Impact Assessment (EIA) to follows a robust and comprehensive public consultation. This is an important process, because it gives members of the public, especially the Interested and Affected Parties to comment or raise concerns that may affect their socio-economic or general environment because of the project. Further, it solicits crucial local knowledge that the Environmental Assessment Practitioner may not have.

The Public Participation Process (PPP) was focused on members of the conservancy. While competent and or regulatory authority such as Ministry of Environment Forestry and Tourism (MEFT), Ministry of Agriculture Water and Land Reform (MAWLR), where consulted during the project development phase for application for the ECC.

11.1 Mubana Village Consultation

A community meeting for Mubana Village was held on 28 September 2024 at Mubana Sub-Khuta (*see Figure 9 below).*

Figure 9. A community meeting for Mubana Village was held on 28th September 2024 at Mubana Sub-Khuta *(Source: Red-Dune Consulting, 2024*)

- The meeting was attended by 26 people with higher women representation (*see Appendix A*).
- Mr. Savage Simulebu of Red-Dune presented the background of CCFN support for the conservancy. He informed attendees that the proposed development of water points was a response to the conservancy's request for assistance in addressing the challenges of human-wildlife conflict (HWC). He assured the participants that the proposed water development is a community project and that no land would be allocated to individuals or institutions.
- He outlined the meeting objectives, particularly emphasizing the requirement for Environmental Social Safeguards (ESS) and the necessity for environmental impact assessments and community consultations.
- Attendees were informed that the proposed water point will be developed with funding from the Community Conservancy Fund of Namibia (CCFN), which received support from the KfW Development Bank to assist communal conservancies in mitigating HWC issues.
- KfW requires that funds be spent wisely and accounted for, ensuring that project implementing agencies adhere to the highest standards of Environmental and Social Safeguards (ESS) to promote environmental and social sustainability.
- HE informed the meeting that ESS does not support projects if they involve any of the following red flags:
    - Displacement of people
    - Destruction of heritage sites
    - Damage to critical biodiversity habitats
    - Causing conflict within communities
- Additionally, the meeting was informed that the proposed site must not be on occupied land.
- Participants were reminded that environmental protection is mandated under the Environmental Management Act (Act No. 7 of 2007) (EMA) and its Environmental Impact Assessment Regulation (2012), which states that water resource development activities, such as drilling boreholes, cannot proceed without an Environmental Clearance Certificate (ECC).
- To obtain an ECC, a Social and Environmental Impact Assessment must be conducted, which is a core component of the consultation process.
- Finally, it was explained that a consent letter is required for project implementation. This letter, known as ‘Free Prior Informed Consent’ (FPIC), represents the community's understanding and

agreement to the proposed water development project. The components of FPIC were explained as follows:

  - FREE: Consent is given voluntarily, free from coercion, intimidation, or manipulation.
  - PRIOR: Consent is sought sufficiently in advance of any authorization or commencement of activities.
  - INFORMED: The community is well-informed about the project and has access to all relevant information.
  - CONSENT: A collective decision made by the rights-holders, reached through customary decision-making processes of the affected communities.

- Free Prior Informed Consent was verbally obtained from the attendees by a show of hands, and an FPIC letter was read to the community and signed by the area Induna (village headman) in the presence of the community (see Figure 10, Appendix B).

Figure 10. Consent from Mubana Community

Comments from the community included:

Key Issues Raised	Responses
How strong is the drinking point facilities	The cattle trough will be built on rugged concrete slab, to ensure safety of livestock
Will the community pay for water	No, they won't pay for water.
Will beneficials pay for securities to protect the solar panels from theft	No, the project will build anti-theft mechanism to ensure projection of borehole infrastructures.
How long will it take to obtain environmental clearance certificate	It normally takes between three to four months, however we will motivate for conditional approval to speed up the implementation time, since this is a community project.

- The Induna expressed gratitude to the project team, welcoming the project with enthusiasm and deep appreciation. The meeting adjourned with a prayer, followed by a site assessment with the community.

11.1.1 Site Assessment

- The borehole site is free of vegetation, surrounded by shrubs of acacia (see Figure 11).

Figure 11. Borehole Drilling Site, Mubana Village (Source: Red-Dune Consulting, 2024).

12 ENVIROMENTAL AND SOCIAL IMPACT ASSESSMENT

12.1 Introduction

This chapter outlines the potential impacts (negative and positive) associated with drilling the borehole. The identified impacts are categorized into three components: impacts on the biophysical environment; Impacts on the health and safety; and impacts on socio-economic. It further provide the criteria used for impact assessment. The developed Environmental Social Management Plan (ESMP) for the project is a living document. Hence, impacts that could be identified during future maintenance or upgrade of infrastructures will require an amendment to the ESMP.

12.2 Impact Identification

Potential impacts were identified in accordance with the key Environmental Social Indicators (ESI)[12] and using literature review, site assessment and public participation process and experience for Red-Dune Consulting (*see Table 3*).

Table 3. Impact identification

Component	Impact	Description	Impact Type
CONSTRUCTION PHASE			
Bio-Physical Environment	Loss of habitat and Biodiversity	The clearing of land for site preparation and the occupation of the site itself can result in the direct loss of habitat for local flora and fauna. This may lead to a reduction in biodiversity, as species that depend on the specific habitat may be forced to relocate or face potential extinction. Furthermore, the presence of construction activities and increased human activities can inadvertently create	Negative

[12] Guidance Note UNDP Social and Environmental Standards Social and Environmental Assessment and Management July 2022

Component	Impact	Description	Impact Type
		opportunities for poaching of high valuable species such as Rhinos.	
	Dust emission	Land clearing, digging and excavation of trenches, movement of vehicles and heavy machinery on project sites, concrete work, transportation of sand to site and concrete stones, cement mixing may create fugitive dust. Uncoordinated / reckless driving on gravels roads could cause low visibility to other road users. Dust from construction and drilling can not only pose health risks to workers, leading to respiratory issues, but it can also affect nearby communities and vegetation, reducing air quality and the overall environment's health.	Negative
	Land degradation / Soil erosion	Site preparation activities, such as excavation and the movement of heavy machinery, can result in soil disturbance and degradation. This includes compaction, erosion, and loss of soil fertility. The removal of vegetation during site clearing can also leave the soil vulnerable to erosion, reducing the land's ability to support future vegetation growth and impacting local ecosystems.	Negative
	Noise and vibration	The operation of heavy machinery and drilling equipment can produce significant noise, which may disturb both wildlife and nearby communities. Prolonged exposure to high noise levels can have detrimental effects on the health of workers and the surrounding population, including hearing loss and increased stress levels. Furthermore, noise pollution can disrupt animal behaviours, particularly in sensitive species, leading to displacement or changes in habitat use.	Negative

Component	Impact	Description	Impact Type
	Traffic emission	The operation of vehicles and machinery, as well as drilling activities, can contribute to air pollution through the emission of exhaust gases of SO_2, CO_2, CO, NO_x and particulates.	Negative
	Waste generation	Construction produce significant amount of solid waste including, building rubbles, plastic and parts of equipment.	Negative
	Household waste	The generation of domestic solid waste from workers and operations on-site can lead to pollution if not properly managed. Improper disposal of waste, such as plastics, food scraps, and other materials, can contaminate the local environment and pose a risk to both wildlife and human health.	Negative
	Soil and water pollution	The use of heavy vehicles and drilling equipment involves the use of oils, grease, and lubricants that, if not properly managed, can leak into the ground and contaminate groundwater sources.	Negative
Health and Safety	Safety risk	Accidents from collision of construction vehicles, and occupational injuries.	Negative
	Health risks	Risks of hearing impairment from excessive noise, respiratory risks from dust inhalation. New social relationships are often a recipe for spreading of communicable diseases and sexually transmitted diseases such as HIV/AIDS. Furthermore, alcohol and drug use could be prevalent during construction and workers are susceptible to vector diseases such as malaria. Furthermore, the bush working environment makes workers to be prone to venomous insect and snake bites which may lead to fatalities. Other health risk include workers exposure to excessive noise and dust and injuries.	Negative

Component	Impact	Description	Impact Type
	Hazardous Impact	Heavy vehicles consume significant amounts of oil, and the handling of hydrocarbons will occur on-site. The area where grease, oils, lubricants, and fuel are managed must be properly designed to prevent soil contamination, which could potentially affect both the soil and underground water.	Negative
Social Environment	Visual impacts	Poor housing keeping on site, disturbance of surrounding view by the height of the hospital, uncoordinated painting.	Negative
	Employment creation	Namibia is facing high unemployment, particularly among the youth. However, the project will create employment opportunities during the construction phase and provide valuable skills development and knowledge transfer.	Positive
	Increase in local economy	Construction provides an opportunity for local people, especially women to sell their produce (food) to construction workers. The local economy will increase from procurement of construction materials and increased buying power.	Positive
	Heritage and Archaeological Resource	Digging and excavation have the potential to uncover archaeological materials. Therefore, raising awareness about the possibility of chance finds is necessary to prevent potential damage.	Negative
OPERATIONAL PHASE			
Water abstraction	Risk of underground over-abstraction water	Uncontrolled underground water abstraction can lead to over-extraction, which depletes water resources faster than they can be replenished. This over-abstraction can also result in the deterioration of water quality, as it may cause the intrusion of contaminants such as salts or pollutants into freshwater aquifers. Additionally, excessive extraction can disrupt the natural balance of groundwater systems, affecting ecosystems and potentially leading to	Negative

Component	Impact	Description	Impact Type
		land subsidence or other environmental issues. Therefore, it is crucial to implement sustainable water management practices to protect both the quantity and quality of underground water resources.	
Safety of borehole infrastructures	Theft	Theft of boreholes infrastructures such as pumps and solar panels.	Negative
	Destruction of water infrastructure by elephant	Potential destruction of boreholes and associated infrastructure by elephants.	Negative
	Corrosion of borehole metal casing	The use of poor-quality borehole casing could lead to short lifespan of the borehole casing	
Conflict of water use buy the communities	Claiming ownership of boreholes by nearest community members	The community near the borehole my claim ownership of the borehole which could cause conflict in the community	Negative

12.3 Criterial for impact assessment

The criteria used to assess the impacts and the method for determining their significance are outlined in Table 4 below. This process aligns with international best practices and adheres to the Environmental Impact Assessment (EIA) Regulations under the Environmental Management Act of 2007 (Government Gazette No. 4878).

The core principle of the impact assessment follows a mitigation hierarchy, which aims to first avoid negative impacts through preventative measures, then minimize those impacts to acceptable levels, and, if neither of these options is feasible, to remedy or compensate for the impact.

Table 4. Criteria for Impact Assessment

Risk Event	Rating		Description of the risk that may lead to an Impact
Probability	The probability that an impact may occur under the following analysis		
	1		Improbable (Low likelihood)
	2		Low probability
	3		Probable (Likely to occur)
	4		Highly Probable (Most likely)
	5		Definite (Impact will occur irrespective of the applied mitigation measure)
Confidence level	The confidence level of occurrence in the prediction, based on available knowledge		
	L		Low = limited information
	M		Medium = moderate information
	H		High = sufficient information
Significance	**Severity**	**Rating**	None (Based on the available information, the potential impact is found to not have a significant impact)
	Negligible	1	
	Low	2	Low (The presence of the impact's magnitude is expected to be temporal or localized, that may not require alteration to the operation of the project
	Medium	3	Medium (This impact is probable, limited in scale, expected to be of short term / temporary, can be avoided, managed and or mitigated with simple mitigation measures.)
	High	4	High (The impact is definite, mostly predictable, temporal, can be local, regional or national and in long term and reversible. These are impacts that may affect human rights, lands, natural resources, traditional livelihood, critical ecosystem services. The

Risk Event	Rating		Description of the risk that may lead to an Impact
			severity of these impact are more limited than sever impacts.)
	Severe	5	**Severe** (The impact is definite, it has significant adverse impacts on human population and or / the environment which are of large-scale magnitude and or spatial extend such as large geographic area, large number of people or transboundary nature. The impact duration is long term, permanent and often irreversible. Impacts include displacement of human, destruction of critical ecological systems and or cultural and heritage sites etc. The impact could have a no-go implication unless the project is re-designed or proper mitigation can practically be applied.)
Duration	Time duration of the impacts		
	1		Immediate
	2		Short-term (0-5 years)
	3		Medium-term (5-15 years)
	4		Long-term (more than 15 years
	5		Permanent
Scale	The geographical scale of the impact		
	1		Site specific
	2		Local
	3		Regional
	4		National
	5		International

12.4 Risk Assessment

The significance of the impact was determined using a risk matrix, as shown in Table 5. A five-by-five matrix was applied, where the severity of the impact was categorized and assigned scores ranging from 1 to 5: Improbable (1), Low (2), Medium (3), High (4), and Severe (5). Similarly,

the likelihood of the impact occurring was assigned scores as follows: Improbable (1), Low Likely (2), Probable (3), High Probability (4), and Definite (5). The overall impact rating was then calculated by multiplying the scores for impact severity and likelihood.

Table 5. Risk assessment matrix[13]

LIKELIHOOD						
	5 Definite	5 Low	10 Medium	15 High	20 Severe	25 Severe
	4 High Probability	4 Low	8 Medium	12 High	16 High	20 Severe
	3 Probable	3 Low	6 Medium	9 Medium	12 High	15 High
	2 Low	2 Low	4 Low	6 Medium	8 Medium	10 Medium
	1 Improbable	1 Negligible	2 Low	3 Low	4 Low	5 Low
		1 Negligible	**2 Minor**	**3 Medium**	**4 High**	**5 Severe**
		IMPACT SEVERITY / CONSEQUENCE				
		Negligible	Low	Medium	High	Severe

12.5 Mitigation Hierarchy

Best practises call for mitigation measures to follow a mitigation hierarchy that favours (i) avoidance of potential adverse impacts, and where avoidance is not possible, then (ii) minimization and reduction; where adverse residual impacts remain, then (iii) mitigation measures need to be applied, and, as a last resort, (iv) measures to offset impacts that cannot be appropriately mitigated (*see Figure 12 below*).

According to EIS regulations, the objectives mitigations are to;

- Find environmental ways of doing thing
- Promote environmental benefits of the project
- Avoid, Minimise or remedy negative impacts and
- Ensure that residual negative impacts are within acceptable levels,

[13] Risk Management Guideline for the BC Public Sector (Province of British Columbia Risk Management Branch and Government Security Office 2012)

Furthermore, during consideration of the mitigation measure, the following mitigation hierarchy was followed.

- Avoid the negative impact through preventative means,
- Minimise the negative impacts to acceptable low levels and,
- If the above two are not possible, remedy or compensate the impact.

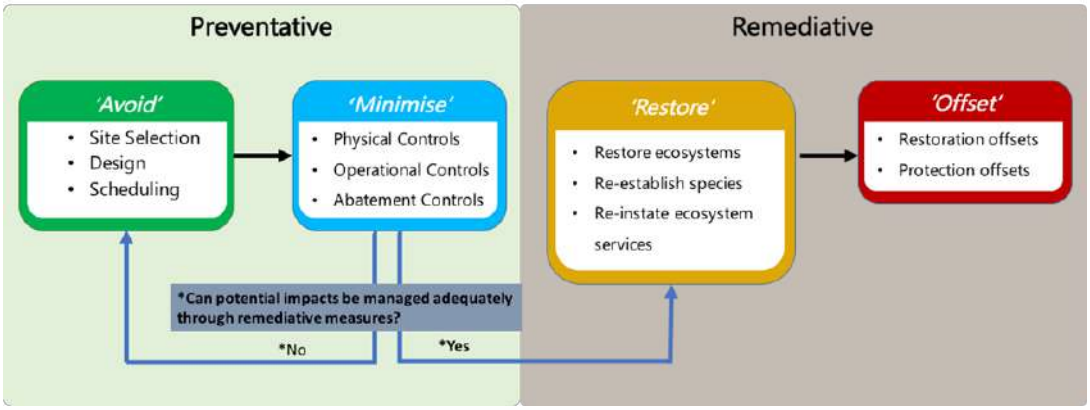

Figure 12. Mitigation Hierarchy Source [14]

12.6 Siting Phase: Impact Assessment

Typically, before drilling of a borehole, a site assessment undertaken to determine the optimum location for drilling a process called siting of a borehole. This process involve analysis of geohydrology property of the area using two main conventional methods; (i) electrical resistivity and (ii) ground conductivity. These methods use Frequency Domain Electromagnetic (FDM) operated by a highly trained geohydrologist.

During this phase, there will be no evasive activities that could cause harm to the physical environment. To ensure social cohesion with the siting team, it will be required for the locals, particularly the traditional authorities to be informed about the presence of the siting team in the area. This activity is usually undertaken by two people, who will carry handheld FDM. The sited location will be pinned for marking purposes.

[14] Cross-Sector Biodiversity Initiative (CSBI). (2015). A Cross-sector Guide for Implementing the Mitigation Hierarchy (p.9)

12.7 Drilling Phase: Impact Assessment

Drilling is the primary and most significant environmental threat during this phase. This stage involves the mobilization and transportation of drilling equipment to the drilling site, the construction of protective fences around boreholes, and the installation of solar panel platforms. If necessary, a campsite may be set up at the drilling site, complete with supporting infrastructure such as ablution facilities, and provisions for managing household and other solid waste.

During this phase, various occupational health and safety risks arise, including injuries from operating machinery, bites from insects (such as mosquitoes), snake bites, and the potential for oil contamination. Table 5 below outlines the assessment of potential impacts and the proposed mitigation measures for the drilling phase.

Table 6. Social Environment: Impact Assessment

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
Employment / Socio-Economic advancement of local	Possible exclusion of local communities from job opportunities and unfair compensation of workers. It is not anticipated that a	1. Ensure that all general work is reserved for local people, unless specialized skills are required.	+ve	2	2	4	Regional	Life of project	n/a	Low	High

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
	significant number of jobs will be created during the drilling phase.	2. Follow fair compensation practices and adhere to Namibian Labour Laws. 3. Facilitate skill transfer to local workers. 4. Use local suppliers for goods and services where possible.									

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
Health and Safety for Employees and the General Public	Job opportunities can lead to new social relationships that may contribute to the spread of diseases, particularly pandemics such as HIV/AIDS, and substance abuse. Hiring unlicensed employees to operate vehicles and machinery poses safety risks to themselves, co-workers, and the public. Additionally, employees are exposed to dust, noise pollution, and other occupational health and safety hazards	1. Raise awareness among employees about the dangers of HIV/AIDS, alcohol, and drug abuse. 2. Provide condoms on-site. 3. Develop a comprehensive safety plan. 4. Ensure all employees undergo an induction course on health and safety. 5. All drivers must possess	-ve	2	2	4	Site Specific and Local	Project Duration	n/a	Low	Hig h

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
		appropriate driver's licenses. 6. Install adequate safety signage at designated areas. 7. Provide personal protective equipment (PPE) such as overalls, safety boots, safety eyewear, gloves, and hard hats. 8. Adhere to the Labour Act, ensuring non-toxic dust exposure levels do not exceed									

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
		5mg/m³ for respiratory dust and 15mg/m³ for total dust. 9. Ensure noise levels do not exceed 85dB(A) over an 8-hour period. 10. Comply with the Occupational Health and Safety Act of Namibia and other international Abor standards (e.g., ILO). 11. Ensure first aid kits are available									

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
		on-site, including supplies for insect and snake bites. 12. Train supervisors in occupational health and first aid. 13. Supply clean drinking water, such as portable water tanks. 14. Use gendered mobile toilets. 15. Provide insect repellent, mosquito nets, and, if necessary, immunization to prevent diseases									

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
		like malaria.									
Heritage and Archaeology	Potential unearthing of archaeological material or damaging heritage resources	1. Employee must be trained on the possible find of heritage and	-ve	2	2	4	Site Specific	Construction / Drilling	R	Low	High

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
		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 3. Stopping the activity immediately i. Informing the									

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
		operational manager or supervisor ii. Cordoned of the area with a danger tape and manager to take appropriated pictures. iii. Manager/supervisor must report the finding to the following competent authorities, National Heritage Council of Namibia (061 244									

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
		375) National Museum (+264 61 276800) or the National Forensic Laboratory (+264 61 240461).									

Table 7. Bio-Physical Environment: Impacts Assessment

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
Biodiversity: Flora	Destruction of trees	1. Avoid cutting down mature and protected plant species. 2. Ensure that access roads are rehabilitated after use to enhance revegetation	-ve	2	2	4	Site Specific	Construction / Drilling	R	Low	High
Biodiversity: Fauna	Destruction of animal habitats such as bird nests, poaching, stealing of livestock	1. Do not kill animal, unless such animals pose eminent danger to humans 2. There must be ZERO tolerance to poaching to ensure this, no weapon and traps are allowed on site;	-ve	2	2	4	Regional	Construction / Drilling	R	Low	High
Surface and Ground Water Pollution	Heavy vehicle and machinery may pollute water sources from leakages of oils, hydraulic fluids,	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	-ve	2	2	4	Site Specific	Construction / Drilling	R	Low	High

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
	lubricants and greases. These pollutants may reach underground water through seepage. Further surface water may be polluted from surface run off soils that is polluted.	oil, lubricants and hydraulic fluids leakages 3. All vehicle and machinery must be well service to avoid leakages 4. Provide and train on oil spill emergency response 5. Servicing of vehicles and machinery must take place at designate places									
Waste Generation	General household pollution and littering such as used oil cans drums, metals, and household	1. Provide skip bins to collect waste and be disposed of at an approved disposal site 2. Provide labelled household waste drums for household solid waste. 3. Do not burry waste on site	-ve	2	2	4	Site Specific	Life of project	R	Low	High

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
	solid and liquid waste	4. Excavate a small biodegradable waste site that would be dump filled at the end of the project, alternatively, provide mobile toilets that will be disposed at an approved site and ensure separate ablution facilities for men and women. 5. Used oil, grease and lubricants cans must be collected in appropriate drums and disposed of at an approved site 6. Maintain good housekeeping on site. 7. Do not burry waste on site									
Dust Pollution	Land clearing, digging, excavation of trenches, drilling,	1. Movement of heavy vehicles must strictly be restricted on site.	-ve	2	2	4	Local and Site Specific	Immediate	R	Low	High

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
	movement of vehicles and heavy machinery in site, transportation of material to site, will create fugitive dust which could be a nuisance to the surrounding.	2. Adhere to the minimum speed limit of 30 or 40km/hour when on farm roads. 3. On site where soil is loosened by vehicle movement, apply dust a suppression method such as water spraying. 4. During drilling, use water to suppress the dust									
Land degradation and pollution	Uncoordinated movement of heavy vehicles and uncoordinated land clearing could lead to soil erosion. Possible	1. Movement of heavy vehicles must be coordinated and restricted to be on access roads 2. Normally, public gravel roads are meant for light vehicles drilling vehicles have the potential to damage the access roads. Hence proper road maintenance must be	-ve	2	2	4	Site Specific	Life of project	R	Low	High

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
	spill and leakages of fuel and lubricants from vehicle and machinery could pollute the soil and eventually the ground water resource.	implemented to ensure that the roads are left on good state 3. Fuelling of heavy vehicles on site must be well coordinated at designated places 4. Servicing of vehicles and machinery must take place at designated sites 5. Stationary vehicles must be provided with drip tray to capture oil, lubricants and hydraulic fluid leakages 6. All vehicles and machinery must be well serviced to avoid leakages 7. Provide and train on oil spill emergency response.									

12.8 Operational Phase:

The main activity during the operational phase of the borehole is water abstraction. If not properly monitored, this could lead to over-abstraction, which may result in the deterioration of water quality and potential negative impacts on vegetation due to a deepening water table. Additionally, the borehole could lead to social conflicts, as surrounding communities might claim ownership of the borehole and prevent other communities from accessing it. Table 8 below outlines the potential impacts during the operational phase and the proposed mitigation measures.

Table 8. Operational Phase Impact Assessment

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
Reduced Human Wild-Life Conflict	The borehole operation will ensure wildlife animals stay at wildlife sanctuary The borehole will make water readily available for wildlife even during drought season										
Over abstraction of underground water	High and unsustainable water abstraction which could affect ground water quality	1. **Adhere to Permitted Water Abstraction Limits:** Ensure that water abstraction does not exceed the volume specified in the permit. This helps prevent over-extraction, which can lead to the depletion of	-ve	2	2	4	Local	Life of project	R	Low	High

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
		groundwater resources and the deterioration of water quality. 2. **Install Automatic Monitoring Systems:** Where feasible, install automated measuring gauges to continuously monitor water abstraction levels, helping to ensure that it stays within permitted limits and enabling prompt corrective action if necessary. 3. **Periodic Water Level Monitoring:** Regularly monitor the water table levels in the borehole to detect any significant drops that might indicate over-abstraction or other negative impacts. This monitoring should be carried out at consistent intervals to track trends and allow for early									

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
		intervention if water levels begin to decline. 4. **Conduct Periodic Pumping Yield Tests:** Carry out regular pumping yield tests to assess the sustainability of the aquifer. These tests measure how much water the aquifer can supply over time without causing long-term depletion. Based on the results, adjustments to water abstraction rates may be necessary to ensure the aquifer's health is maintained. 5. **Systematic Water Quality Assessments:** Regularly perform comprehensive water quality assessments to detect any changes in the chemical composition or contamination of the water. These									

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
		assessments should include tests for common pollutants, such as heavy metals, salts, and bacteria, to ensure that the water remains safe for use and that the quality does not degrade over time due to over-extraction or other factors.									
Risk of water infrastructure destruction buy elephants	Elephant are notorious known for damaging water points in search for drinking water	1. Construct an elephant proof fence around the borehole and its supporting infrastructures 2. Build high and thick enough walls that will prevent elephants access to the water tank and solar infrastructures.	-ve	2	2	4	Local	Life of project	R	Low	High
Conflict of water use buy villagers	Claim of ownership of water point / borehole by some community members	1. Raise awareness of the indented purpose of the borehole 2. Ensure no one is made to be entitled to owning or have	-ve	2	2	4	Local	Life of project	R	Low	High

Project-Environment Interaction	Description	Mitigation Measures	Impact type	Likelihood occurrence	Severity	Impact Rating	Geographical Extend	Duration	Reversibility (R)	Significance	Confidence Level
		controlling power on who should use the borehole									
Theft of borehole infrastructures	There are reported cases where boreholes infrastructure such as solar panel are stolen	1. Construct theft proof fence to protect solar panels	-ve	2	2	4	Local	Life of project	R	Low	High

13 GRIEVANCE PROCEDURE

The Grievance Procedures will be a process to facilitate for an easy and smooth process in which stakeholders are able to submit their complaints about the project activities or its consequences i) free of charge ii) without fear of retribution iii) anonymously and iv) user friendly channels.

It is important to emphasise that the Grievance Procedure will not address HWC incidents per se, because those are not caused by the Project. Grievances that are eligible are, for instance, cases where a party is disadvantaged as a result of a Project activity, or as a result of negligence on the part of the Project to follow its procedures thoroughly or fairly. Complainants may be by actual or potential beneficiaries of the Project, or any members of the public.

In generally, the grievances process will follow six (6) Grievance Redress Mechanism (GRM) value chain, namely; i) Receive and log grievance, ii) Acknowledge grievance, iii) Assess and Investigate iv) Grievance Resolution, iiv) Sign-off on grievance and iiiv) Monitor and continuously evaluate the effectiveness of the GRM.

Grievances will be addressed through the channels in the institutional structure presented in Figure 13 below, in an efficient, effective and consistent manner.

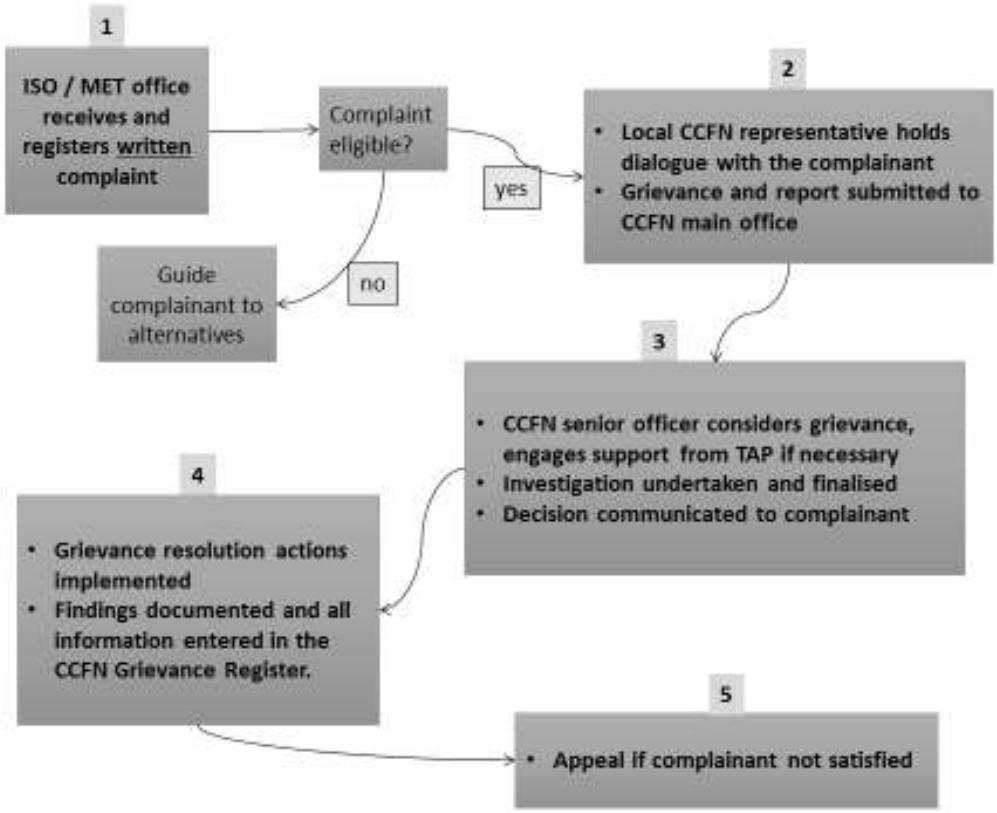

Figure 13. GRM flow chart (Source: ESMF_ Poverty Oriented Support to Community Conservation in Namibia)

The eligibility of the grievance will be assessed at the level where it is first received, at a local MEFT / ISO office (Step 1) and the following actions / steps will be undertaken. The grievance will be discussed with the complainant, with the objective of understanding the problem and giving the complainant a fair hearing (Step 2). The local CCFN representative will submit the grievance, and any notes of their own, to the CCFN head office for higher-level input to the issue (Step 2). The CCFN senior officer will investigate the substance of the grievance (Step 3). If necessary, assistance may be sought from the TAP. Further dialogue with the complainant and others affected by the grievance might also be necessary. The CCFN senior officer will compile a written report on the grievance and communicate the outcome to the complainant.

Any actions necessary to resolve the grievance will be implemented by the relevant parties, under the direction of the CCFN (Step 4). Resolution of the grievance will be documented and entered into the Grievance Register. Under normal conditions, a grievance will be resolved, and redress actions commenced within 30 days of receiving a complaint. A complainant is permitted to appeal against the decision by the CCFN, to the CCFN CEO (Step 5). In such a

case the CEO must present the grievance and the CCFN decision to the Board, for reconsideration.

14 DECOMMISSIONING AND REHABILITATION PLAN

Decommissioning is normally the reverse of construction where all installed equipment / structure must be removed. Supply of water to the community is aimed to be a life-long intervention unless of a pressing issue that would necessitate decommissioning. Aging equipment that requires replacement should be done by qualified Namibians to ensure smooth operation and constant water supply.

15 CONCLUSION AND RECOMMENDATIONS

15.1 Conclusion

With the available information, the following conclusions were made:

1. The area is known to have high yield aquifer.
2. Over-abstraction of water has been not been reported in the area.
3. The area receives the highest rainfall in the country which increases potential of recharge.
4. HWC is critical in the area, and water is the main contributing factor.

15.2 Recommendations

1. **Issuance of the Environmental Clearance Certificate (ECC):** It is recommended that the approving authority proceed with the issuance of the Environmental Clearance Certificate (ECC), subject to the implementation of the proposed mitigation measures to ensure sustainable water management and environmental protection.
2. **Continued Support for Wuparo Conservancy**: The CCFN or the responsible government agency / ministry should support for Wuparo Conservancy to ensure regular testing of water quality, obtaining the necessary fitness-for-use approvals, and monitoring the performance of the borehole. These actions will help maintain the

sustainability and safety of the water supply, while also ensuring that the community can rely on consistent, safe access to water in the long term.

16 ANNEX 1. GROUNDWATER MONITORING PLAN

The purpose of the Groundwater Monitoring Plan is to establish appropriate procedures for monitoring and assessing the response of the aquifer and surrounding environment to the water abstraction process. The plan aims to manage the impacts of groundwater extraction and contaminant loads, while also tracking changes in aquifer response and water quality. Additionally, the monitoring system will serve as an early warning mechanism for detecting potential over-abstraction or other issues that could arise over time.

16.1 Groundwater Quality

Regular monitoring of the groundwater quality is essential to detect any changes that may occur because of abstraction, natural processes, or contamination. This monitoring should be conducted on a consistent basis to provide early warnings of any deterioration in water quality, which could affect both human consumption and ecological health. Periodic water quality testing should include key parameters such as pH levels, salinity, total dissolved solids (TDS), and the presence of pollutants (e.g., heavy metals, nitrates, or microbial contamination). This information will allow for prompt corrective action if the water quality begins to degrade, ensuring the continued safety and reliability of the water supply.

16.2 Groundwater Level Measurements

Monitoring the groundwater levels in the aquifer is a critical component of managing water resources, as it helps track the balance between the water available in the aquifer and the rate of abstraction. This is particularly important in regions with low or irregular rainfall, where natural recharge rates are minimal or non-existent. Regular water level measurements will provide valuable data on the changes in groundwater levels over time, enabling operators to identify any signs of over-extraction or potential depletion.

These measurements will be recorded through the water meter readings provided by the Ministry of Agriculture, Water, and Land Reform (MAWLR) to the borehole operator. It is important that baseline hydrological data such as the initial water level before abstraction begins is recorded to track changes over time. Regular monitoring will help ensure that water

levels remain within sustainable limits and will serve as a key reference point for evaluating the overall impact of abstraction activities. This monitoring system will also provide clear evidence of any discrepancies or errors when the MAWLR conducts periodic inspections of the site.

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18 APPENDICES

18.1 Appendix A. Attendance Register Mubana Village

MEFT

german cooperation

KFW

CCFN

STAKEHOLDER CONSULTATION FOR ENVIRONMENTAL SCOPING STUDY AND DEVELOPMENT OF ENVIRONMENTAL MANAGEMENT PLAN(s) FOR THE DRILLING OF WATER POINT AT SANGWALI VILLAGE IN WUPARO CONSERVANCIES IN ZAMBEZI REGION."

Place: Sangwali Village

Date: 28 September 2024

Time: 14:00PM-16:00PM

No	Name	Gender	Organization	Position	Cell:	Email	Signature
1	Namubbi Lungro	F	Wuparo	Member	0813278007	Nlungro@gmail.com	Nlungo
2	Seya Benson	M	Wuparo	Member	N/A		
3	Sanga Lydiah	F	WuParo	Member	0813181339	Lywanga.Sanga@gmail	SL
4	Saiti Esther	F	wuparo	Member			Saiti E
5	Meruna Tusano	F	wuParo	member	0818585697		mt
6	Maruna Naluful	F	wuparo	member			mN
7	Mary Sananda	F	Wuparo	member	0812864891		
8	mulelwa Njalai	F	cmc	member	0813565464		
9	malamo mwaka	F	wuparo	member	0813419554		
10	maruna pitros	m	wuparo	member	0817212626		
11	SANYAmbe Tobert	M	CMC	member	0813172623		
12	matiti m	f	Wuparo	member			m.R

13	Sanimombo Yauyo	F	Wuparo	member	0814430712		SY
14	John Mavuna	M	Wuparo	Member			JOHN
15	Sanimombo M	M	Wuparo	Member	0817258022	Sanimombocouilly@gmail.com	[illegible]
16	Musutela Brutus	M	Wuparo	Member	0818955142		[illegible]
17	Manyuwe Benson	M	Wuparo	member	0813891240		M.B.
18	Sanimombo Susan	F	Wuparo	Member	0816195893		[illegible]
19	Sikongo Matilda	F	Wuparo	Member			
20	Sanimombo Wendy	F	Wuparo	Member			[illegible]
21	Mulonga Swalisano	M	Wuparo	member	0812664858		[illegible]
22	Muketela Sanimombo	M	Wuparo	Member	0817887319		[illegible]
23	Sayago Simuleb	m	RED D		0812946992		[illegible]
24	Kamaya Lettie	F	Wuparo	member	0817415836		[illegible]
25	Kamaya Phostic	F	Wuparo	member			KPM
26	Kulatau Moses	M			0813087638		mKK
27							
28							

5181503
E 02383312

T.P.S / S. 18150503 / E 023 38 312 /

18.2 Appendix C: Consent letter: Mubana Village

To Whom It May Concern:

28 September 2024

Dear Sir / Madam

SUBJECT: FREE PRIOR INFORMED CONSENT FOR THE DRILLING OF WATER POINT AT MABUNA VILLAGE, IN WUPARO CONSERVANCIES OF ZAMBEZI REGION.

The above subject bears reference,

At a community meeting held on Thursday 18th September 2024, at MABUNA Village, the community of NSHESHE Village were fully informed about the proposed support for drilling a water borehole by the Community Conservation Fund of Namibia (CCFN).

The community and the Traditional Authority fully understood the project and its benefits. The drilling of water borehole does not interfere with our traditional norms and culture, instead it will uplift our community livelihoods and assist with the challenge of Human Wildlife Conflict. We welcome it and encourage adequate consultation during its implementation.

This letter serve as a Free Prior Informed Consent for the project.

Yours Sincerely

SANGWALI Alex Mbwee

Village Headman **Signature** **Stamp**

NSHESHE **Village**

SANGWALI SUB KH **Traditional Authority**

Wuparo Conservacny

SANGWALI SUB-KHUTA
P.O. Box 2466
Ngweze, Katima Mulilo
28 SEP 2024
BATSHARA BA TSAPI
REPUBLIC OF NAMIBIA