Environmental and Social Impact Assessment (ESIA) Study for the Katima-Ngoma Phase 3-4 and the Reservoir Rural Water Supply Schemes in the Zambezi Region, Namibia

Environmental & Social Scoping Report (ESSR) and Environmental and Social Management Plan (ESMP)

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Client	Ministry of Agriculture, Water and Land Reform (MAWLR) Enquiries: Mr. Victor Slinger Tel No.: +264 81 140 0086 Email: Victor.Slinger@mawlr.gov.na
Design / Consulting Engineer	Element Consulting Engineers Enquieries: Mr. James Turner Tel No.: +264 61 309 416 Email: james@element.com.na
Lead Environmental Consultant	D&P Engineers and Environmental Consulting CC Enquiries: Mr. T. E. Kasinganeti / Ms. F. N Shagama Tel No.: +264 61 302 672 Email: info@dpe.com.na
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	Name	Signature	Date
Author	Ms. Fredrika N. Shagama		11 August 2023
Contributing Authors	Ms. Kristian Shiwayu &		11 August 2023
	Mr. Adiel Mudzanapabwe		11 August 2023
Reviewer	Mr. Tendai E. Kasinganeti		21 January 2023

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ACRONYMS

Terms	Definition
AASHTO	American Association of State Highway and Transportation Officials
AfDB	African Development Bank Group
BID	Background Information Document
CBOs	Community-Based Organizations
DCP	Dynamic Cone Penetration
DEAF	Department of Environmental Affairs & Forestry
DPE	D&P Engineers and Environmental Consultants
DWSSC	Directorate of Water Supply & Sanitation Coordination
EAP	Environmental Assessment Practitioners
EC	Environmental Commissioner
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA (R)	Environmental Impact Assessment (Report)
ESIA	Environmental and Social Impact Assessment
ESR	Environmental Scoping Report
ESSR	Environmental & Social Scoping Report
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
GCM	General circulation model
GHGs	Greenhouse Gases
GRM	Grievance Redressal Mechanism
GRN	Government of the Republic of Namibia
HDPE	High Density Polyethylene
I&APs	Interested and Affected Parties
IFC	International Finance Corporation
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
KAZA TFCA	Kavango-Zambezi Trans frontier Conservation Area
kN/m	Kilo newton-meter
kPa	Kilo Pascal
m/s	Meter per second
MAWLR	Ministry of Agriculture Water and Land Reform
MCC	Motor control centres
MEFT	Ministry of Environment, Forestry and Tourism
NC4	Namibia's Fourth National Communication (on climate change)
NHBRC	National Home Builders Registration Council
NDP5	Namibia's 5th National Development Plan
NGL	Normal Ground Level
NGOs	Non-governmental Organisations
NHC	National Heritage Council
NEMA	Namibia Environmental Management Act

Terms	Definition
NWSSP	Namibia Water Sector Support Program
OS	Operation Safeguard
PCDP	Public Consultation and Disclosure Plan
PLC	Programmable Logical Controller
PV	Photovoltaic (solar)
RTU	Remote terminal unit
SCADA	Supervisory control and data acquisition
SESA	Strategic Environmental & Social Assessment
SLS	Serviceability limit state
ToR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
VDCs	Village Development Committees
VSD	Variable speed drives

DEFINITION OF TERMS

Alternative - A possible course of action, in place of another that would meet the same purpose and need of the proposal.

Baseline - Work done to collect and interpret information on the condition/trends of the existing environment.

Biophysical - The part of the environment that does not originate with human activities (e.g., biological, physical and chemical processes).

Consultant (Environmental Assessment Practitioner) – this refers to the team that is conducting the ESIA and the preparation of the EMP for the development, i.e., D&P Engineers and Environmental Consultants.

Cumulative Impacts / Effects Assessment - In relation to an activity, means the impact of an activity that in it may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Decision-maker - The person(s) entrusted with the responsibility for allocating resources or granting approval to a proposal

Ecological Processes - Processes which play an essential part in maintaining ecosystem integrity. Four fundamental ecological processes are the cycling of water, the cycling of nutrients, the flow of energy and biological diversity (as an expression of evolution).

Economic displacement – the loss of land, assets, access to assets, income sources, or means of livelihood as a result of involuntary acquisition of land, or obstructed access to resources (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas.

Environment - As defined in Environmental Management Act - the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, including – (a) the natural environment that is land, water, and air; all organic and inorganic matter and living organisms and (b) the human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values.

Environmental Management Plan (Draft EMP) / Environmental & Social Management Plan (ESMP) - As defined in the EIA Regulations (Section 8(j)), a plan that describes how activities that may have significant environments effects are to be mitigated, controlled, and monitored.

Interested and Affected Party (I&AP) - In relation to the assessment of a listed activity includes - (a) any person, group of persons or organization interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity.

Involuntary Resettlement - The physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or means of livelihood) as a result of project-related land acquisition or restriction of access to natural resources.

AfDB also defines involuntary resettlement as Resettlement is involuntary when it occurs without the consent of the PAPs or if they give their consent without having the power to refuse resettlement.

Fauna and Flora - The animals and plants/vegetation found in an area.

Mitigation - The purposeful and practical implementation of decisions or activities that are designed to reduce the undesirable impacts of a proposed action on the affected environment.

Monitoring - Activity involving repeated observation, according to a pre-determined schedule, of one or more elements of the environment to detect their characteristics (status and trends).

Proponent – as defined in the Environmental Management Act, a person who proposes to undertake a listed activity. In other words, this refers to the institutions/departments that are directly involved in the implementation of the project or it can be defined as the organization (private or public sector) or individual intending to implement a development proposal, i.e., the Ministry of Agriculture, Water and Land Reform (MAWLR).

Public Consultation/Involvement - A range of techniques that can be used to inform, consult or interact with stakeholders affected by the proposed activities.

Public disclosure – the act of making information available for reviewing and commenting by all the interested and affected parties in public. In this instance, the disclosed information will be the project ESIA documents on the findings and conclusions made thereto**.**

Project Affected Persons (PAPs) - persons physically living on the project site or those who will be displaced or risk no longer having access to resources or losing their livelihood or spiritual links attached to the site as a result of the project.

Protected Area - Refers to a protected area that is proclaimed in the Government Gazette according to the Nature Conservation Ordinance number 4 of 1975, as amended.

Resettlement Action Plan (RAP) - The document in which a project sponsor or other responsible entity specifies the procedures that it will follow and the actions that it will take to mitigate adverse effects, compensate losses, and provide development benefits to persons and communities affected by an investment project.

Resettlement Entitlements - with respect to a particular eligibility category, these are the sum total of compensation and other forms of assistance provided to displaced persons in the respective eligibility category. It includes a range of measures comprising compensation, income restoration, transfer assistance, income substitution and relocation which are due to affected people, depending on the nature of their losses, to restore their economic and social base.

Scoping - An early and open activity to identify the impacts that are most likely to be significant and require specialized investigation during the EIA work. Can, also be used to identify alternative project designs/sites to be assessed, obtain local knowledge of site and surroundings, and prepare a plan for public involvement. The results of scoping are frequently used to prepare a Terms of Reference for the specialized input into full EIA / ESIA.

Sexual Exploitation, Abuse and Harassment (SEAH) – according to the AfDB, SEHA is a term used to refer to abuses of a sexual nature, perpetrated by those employed or funded through development assistance resource flows (grants, loans and equity). It is a violation of human rights and therefore of AfDB's values. When perpetrated within AfDB's resource flows, it undermines the very values the Bank supports – acting contrary to development goals and principles.

Significant impact - means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Stakeholders – this refers to the people, organisations, NGOs that are directly or indirectly affected and interested by the project.

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT

This Environmental and Social Scoping Report (ESSR) follows the Scope of Work delineated by the MAWLR for the proposed rural water supply scheme in the Zambezi Region. The rural water supply project will also be associated with other activities such as the abstraction of water and usage of public roads. Existing information and input from commenting authorities, Interested and Affected Parties (I&APs) were used to identify and evaluate potential environmental impacts (both social and biophysical) associated with the proposed project.

Environmental flaws associated with the proposed project were identified through an Environmental Scoping Assessment. A conscious decision was made based on the recommendations and guidelines by the Directorate of Environmental Affairs (DEA) Environmental Impact Assessment (EIA) guidelines in order to assess both significant and less significant environmental and social impacts proposed by the development. The developed ESIA Report with Environmental and Social Management Plan (ESMP) for the proposed listed activities will have to be effectively implemented by the client, to ensure that adverse environmental impacts are considered.

The detailed assessment of the anticipated impacts was undertaken with the purpose of highlighting any sensitivities regarding the proposed project during its construction, and operation. In addition, an independent sensitivity mapping analysis was undertaken. This analysis characterised the development site on the significant environmental aspects in order to reflect the site's suitable and unsuitable (no-go) development footprint areas. This action guided the final footprint of the proposed project.

This ESSR has been compiled in accordance with the regulatory requirements stipulated in the Environmental Assessment Regulations (2012), promulgated in terms of the Namibian environmental legislation Environmental Management Act (No. 7 of 2007).

The ESIA aims to:

- Provide an overall assessment of the social, physical and biophysical environments of the area affected by the proposed water infrastructure upgrade project;
- Undertake a detailed environmental and social assessment, in terms of environmental criteria and impacts (direct, indirect and cumulative), and recommend a preferred location for the water infrastructures (pipelines, reservoir) sites, and water abstraction based on environmental and social sensitivity);
- Identify and recommend appropriate mitigation measures for potentially significant environmental and social impacts;
- Undertake a fully inclusive Public Participation Process (PPP) and Disclosure of information;
- GIS sensitivity mapping was conducted to identify potential impacts, propose mitigation and inform the sensitivity analysis.

A systematic approach was adopted to complete the ESIA in line with the regulated process.

ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations underpin the approach to this EIA study:

- The information received from the stakeholders, desktop surveys and baseline assessments are current and valid at the time of the study;
- A precautionary approach was adopted in instances where baseline information was insufficient or unavailable;
- Mandatory timeframes will apply to the review and adjudication of the reports by the competent authority and other government departments; and
- No land claims have been registered for the proposed site at the onset and registration of the study.

NB: *The EAP does not accept any responsibility in the event that additional information comes to light at a later stage of the process. All data from unpublished research utilised for the purposed of this project is valid and accurate. The scope of this investigation is limited to assessing the potential biophysical, social and cultural impacts associated with the proposed project.*

EXECUTIVE SUMMARY

OVERVIEW

The Government of Namibia is implementing the Namibia Water Sector Support Program (NWSSP), a project that is co-financed and supported by the African Development Bank. The executing agency is the Ministry of Agriculture, Water and Land Reform (MAWLR) Directorate of Water Supply & Sanitation Coordination (DWSSC). As part of the 25 sub-projects under the NWSSP, the upgrade of rural water supply network (scheme) under Katima-Ngoma Phase 3 & Phase 4 and Reservoir in the Zambezi Region receive funding to construct various water infrastructure including new extended pipeline, booster pumps, tanks and submains and other small, related water services such as meters (details of the exact infrastructure is provided in the ESIA report).

The aim of the project is to address the growing climate impacts on water resources which are threatening livelihoods of Namibians through limiting the available potable water. This undermines the country's development agenda expressed in different key national and international documents including the country's Vision 2030, the Constitution of Namibia, National Development Plans, Sustainable Development Goals and other international treaties such as the UN Right to Water. Thus, the Namibia's economic, environmental and social development agenda is continued to be threatened by water insecurity affecting the country. The proposed project is therefore, aimed to cover critical, urgent water supply infrastructure development and sanitation activities in different parts of the Zambezi Region. The main aim is to provide potable water to thousands of Namibians in the project area.

At the completion of the project, the expected outcome is the increased water access in Zambezi Region, addressing poverty and improve living standards and livelihoods of thousands of people through the provision of equitable, clean and accessible water. This achieves the national water security aim and the SDG 6 and regional goals.

Contextual Framework for the ESIA Summary

The Katima-Ngoma Phase 3&4 Project stretches from Katima Mulilo to Ngoma, with the Phase 3 starts from Bukalo via Kabbe, Lusese to Ikumwe and Phase 4 starts from Bukalo and stretches towards southerly direction to Muyako and via Ibbu to Ngoma.

The summary Environmental and Social Management Plan (ESMP) will also be disclosed in accordance with the Bank's requirements as stipulated in the ISS/ESAP. In consideration of the project's likely impacts on the physical, biological and socioeconomic environment, in 2023, the MAWLR, Directorate of Water Supply & Sanitation Coordination of the Government of the Republic of Namibia (GRN) prepared an Environmental and Social Impact Assessment (ESIA) encloses the Environmental and Social Management Plan (ESMP) for the project. The two reports were prepared within the ambit of the Namibian regulatory framework and clearly identified the impacts and proposed measures that sought to avoid, minimize and offset adverse impacts while strengthening the project's socio-economic impacts.

According to the AfDB Environmental and Social Assessment Procedures (ESAP) embedded in the Integrated Safeguards System (ISS), the project has been categorized as a Category 1, which would thus require a full ESIA. In that respect therefore, the current ESIA report has been aligned to both the in-country environmental and social assessment requirements for the Project and the ADB's ISS for a robust environmental and social assessment of the lender's risk and the management thereof.

Scope of Works

The summary description of the project activities for Phase 3 & 4 of the project are presented below:

Phase 3: Comprises the extension of the rural water supply network between Katima Mulilo and Ngoma, on the Botswana border in the Zambezi Region. This Phase comprises an area of approximately 1,220km^2, stretching from Bukalo to Ngoma including an area of 10km on either side of the road (D3510) from Bukalo via Kabbe, Lusese along the road (D3512) to Ikumwe. The total length of the pipe will be 60km of bulk feeder lines, with 83km of branch feeders. Approximately 545 manifolds will be installed, providing water to approximately 12,900 people.

Phase 4: Comprises the extension of the rural water supply network between Katima Mulilo and Ngoma on the Botswana border in the Zambezi Region. The Phase comprises the final section of the total project area, an area of approximately 1160km2 and stretches from Bukalo in a southerly direction to Muyako and further along road (D3507) via Ibbu to Ngoma. The total length of pipe will be approximately 61km of bulk pipelines and 153km of branch pipelines. Approximately 350 manifolds will be linked to the system that will provide an estimated 8,700 people with potable water.

Reservoir: The Katima Mulilo Reservoir has originally been planned to provide for additional load that the rural water supply schemes would add to the existing Katima Mulilo Bulk water supply schemes.

The detailed scope of work for Katima-Ngoma Phase 3 are:

A. Bulk Water Storage

Extensions to the bulk storage infrastructure comprises additional storage to be supplied at Bukalo, as part of the bulk supply to Bukalo as well as the associated rural water supply for both phases 3 and 4 as both phases are fed from Bukalo as a central distribution point.

A 200mm diameter scour pipe, 300mm diameter overflow pipe and a “fishbone” sub-floor drain of 100mm diameter will be installed on the bulk water storage infrastructure. The drain will be installed just below a 200mm thick no-fines concrete layer under the floor surface bed. Both these pipes will drain to a manhole situated such so that water can drain away under gravity. All piping connected with the reservoir will be Grade 316 stainless steel, except of course the sub-floor drain.

B. Elevated Tank Storage

The provision of elevated tanks with composite manifolds to enable water supply to individual water users and will comprise the following:

- Optimised Locations
- 5x new Elevated tanks, 25m high, constructed from sectional steel panels, which includes the replacement of the existing elevated tank at Bukalo.
- The existing elevated tank at Bukalo will accordingly be replaced by a new tank with a capacity of 100m^3.
- All other newly planned elevated tanks shall have a capacity of 40m^3.

C. Pipelines

The distribution network comprises a system feeding directly into demand nodes, as well as filling the tanks based on level-control mechanisms in the tanks.

The pipework will be optimised by balancing life-cycle costs with capex, rendering an optimal network with flow velocities varying between 1.0m/s to 1.6m/s. The optimal pipe network comprises a combination of diameters from 200dia uPVC Class 9 to 75dia HDPE Class 10 as shown on the general layout.

D. Manifolds Distribution Points

All manifolds will be fed directly from the single direct distribution network when the pumps are running or via the same network feeding back from the newly planned elevated tower tanks via a common floor level in/outlet. The pressures at the manifolds will accordingly vary between 2.5bar and 9bar depending on its relative location to the main feeder pump stations. All manifolds with their associated valves and water meters will be in a lockable cage on a concrete slab. Each user will have a valve with a valve lock on the outside of the cage to control his water usage.

E. Pump Stations

The Bukalo pumps station will ultimately supply water to the three main distribution network lines namely Bukalo-Lusese line, Bukalo-Ngoma line and Bukalo-Muyako line. Required provision will be made in the pump station for the Bukalo-Muyako line but the pumps will only be installed during Phase 4.

The pumps shall have a VSD-driven motors and shall either be vertical-multistage pumps or end suction close coupled single stage pumps. The duties for the pump station to the three respective distribution lines, are complex as it comprises two distinct components:

- Feeding into direct beneficiary nodes.
- Filling elevated tanks.

The detailed scope of work for Katima-Ngoma Phase 4 are:

The upgrade of the bulk conveyance capacity from Katima Mulilo to Bukalo comprises a review of the total potable water demand since the previous Phases 1 and 2 upgrades:

a. Pipelines

The distribution network comprises a system that will be feeding directly into demand nodes, as well as filling the elevated tanks based on level-control mechanisms in the tanks. The pipework will be optimised balancing life-cycle cost with capex, rendering an optimal network with flow velocities varying between 0.7m/s to 1.5m/s. The optimal pipe network comprises a combination of diameters from 200dia uPVC Class 9 to 75dia HDPE Class 10.

b. Elevated Tank Storage

The provision of elevated tanks with composite manifolds to enable water supply to individual water users and are as follows:

- Optimised Locations
- 2x 25m prefabricated GMS Elevated Towers with $40m^3$ sectional steel tanks
- Composite manifolds.
- Lockable taps with associated water meters.

c. Manifold Distribution Points

All manifolds will be fed directly from the single direct distribution network when the pumps are running or via the same network feeding back from the newly planned elevated tower tanks via a

common floor level in/outlet. The pressures at the manifolds will accordingly vary between 2.5bar and 9bar depending on its relative location to the main feeder pump stations.

The manifolds positioned were determined to provide households within the project area with domestic water within a range of not more than 500m. Only households who applied for water were taken into account when determining the positions of the manifolds. Each manifold consists of six (6) off-takes to supply six (6) households.

Provision for additional off-takes will be allowed at each manifold. All manifolds with their associated valves and water meters will be in a lockable cage on a concrete slab. Each user will have a valve with a valve lock on the outside of the cage to control this water usage.

Project Alternatives.

Two broad project alternatives were considered: (a) "no go" alternative and (b) upgrade of the existing pipeline and construction of storage reservoir infrastructure. For the second alternative, design alternatives (technology, water sources, pipelines routes) was considered. The "No-Go" alternative was the option of not proceeding with the project activities, which typically implies a continuation of the status quo. This undermines the country's social and economic development agenda and the global and regional effort to increase water access. Due to the project upgrades being done mainly along an existing infrastructure (for the second alternative), it is unlikely that design alternatives will significantly change to potentially impact the environment. The following characteristics was applied for the location alternative analysis for pipeline routing in new areas:

- Ecological Considerations: Less ecological disturbance through vegetation clearing.
- Possible permits required: pipeline route with less permits requirements should be prioritised.
- Land use suitability: The land, particularly the topography (flat ground) in the project area is suitable for the project infrastructure establishment.
- Considerations of the concerns of communities and stakeholders priorities. Water access is their top priority.
- Cost-Benefit analysis: A cost-benefit analysis for the project done by the Design Engineer and is deemed feasible.

Alternative one (no go) is clearly not recommended given challenges associated with lack of access to reliable potable water in the project area (health challenges, gender issues, socio-economic challenges). Alternative two for the upgrade of the existing pipeline to serve more people is supported by the proponent.

PROJECT AREA ENVIRONMENTAL AND SOCIAL BASELINE

Description of the Project Area

The project will increase water supply access to the Zambezi region of Namibia. It is located in the north-eastern part of the country. It is largely concurrent with the major Zambezi River after which it was named. The region has eight constituencies and its capital is the town of Katima Mulilo. The self-governed village Bukalo is also situated in this region. According to the 2011census, the total population in Zambezi region was 90,596 people with majority of them being female (51.3%) and 48.7 for males.

The physical characteristics of the Zambezi Region and Project Area are as follows:

Climate

The Region is characterized as tropical with high temperatures and good rainfalls. The annual temperatures range between 20 and 22°C, minimum temperature between 4 and 6°C, and maximum arranging between 34 and 36°C. The coldest months are July and August while the hottest months are September and October. The Zambezi Region receives an average rainfall of more than 600mm per year between the months of December and March.

Hydrology

Surface water resources: In terms of hydrology, the Region contains three perennial rivers, namely the Zambezi, Kwando, Chobe and Linyati Rivers. The Zambezi-Kwando-Linyanti Basin includes the intra-Namibian surface catchments of the Zambezi, Kwando and Linyanti rivers.

Groundwater resources: Groundwater is an indispensable source for local water supplies in the Zambezi Region. Groundwater is pumped from a large number of wells using solar installations, fuel-operated power generators or hand pumps. The Zambezi Region falls under the Caprivi Strip hydrogeological region with groundwater mainly tapped from the Kalahari Sequence which forms a porous aquifer. The variable yields from 0 to more than 20 m^3/hour are recorded. The project located in an area characterized by porous aquifers, i.e., primary aquifers. These primary aquifers consist mainly of unconsolidated to semi-consolidated sediments of the Kalahari Sequence (sands, and gravel) that occur in the area shown in the geology map above.

Water quality: groundwater composition and quality in Zambezi is highly variable throughout the region. High salinity caused by evaporation before infiltration (known as evapo-concentration) and the dissolution of evaporates such as halite and gypsum along the flow path is a major concern. Locally, high iron, sulphate or fluoride content can restrict the use of groundwater as a potable water source

Flora and Fauna

Fauna: The Zambezi Region including the project sites is blessed with a rich diversity of mammals and reptiles, showcasing the region's unique ecological significance and diverse habitats. The project area is located within the boundaries of the Kavango-Zambezi Trans frontier Conservation Area (KAZA TFCA) which has been demarcated to allow the free movement of migratory animals between international borders. Thus, the region has extensive biodiversity with protected mammal species, birds and snakes.

Flora: The Zambezi Region falls within the broader Tree-and-Shrub Savanna biome and forms part of the Broadleaved Tree-and -shrub Savanna sub-biome. The Broadleaved Tree-and -shrub Savanna sub-biome is characterized by many species of tall trees that often form thick canopies. The Zambezi Region boasts a diverse array of grasses and trees, each uniquely adapted to its semi-arid to sub-humid climate and varying ecological niches. In the Region's floodplains and along the Zambezi River, lush vegetation thrives, including aquatic grasses, papyrus reeds (*Cyperus papyrus*), and water lilies (*Nymphaea* spp.), creating essential habitats for aquatic life and bird species. Transitioning into the savannah woodlands, one encounters a mix of grass species, such as finger millet (*Eleusine coracana*) and buffalo grass (*Panicum maximum*), which serve as primary forage for livestock and support local agriculture.

Socio-economic characteristics

Economy and Labour: The labour force (15+ years old) was reported at 61% with 62% employed and 38% unemployed. The main sources of household income comprised of farming (21%), wages & salaries (30%), cash remittance (6%), business, non-farming (29%) and pension making up 15%. The Region depend on the wooded forests for poles, tubers, medicinal uses (for sale and income).

High agricultural activities for pastoral and commercial purposes, i.e. maize, millet and Kalimbeza Rice Farm. Furthermore, the economy of the Region is centred on business opportunities mainly through game farming and lodges; tourism industry (most popular for the Impalila Island, Mamili National Park and the Chobe and Zambezi Rivers).

Archaeology and Cultural Heritage

Regionally, the Zambezi Region has a relatively short archaeological sequence representing the introduction of agricultural resettlements to the area within the past two thousand years. The archaeological and cultural heritage specialist study for this report identified two sites which have significance archaeological record. First, on the west bank of the Kwando River at Kongola, the dune cover overlies a calcareous tufa-like deposit with a dense hump of root casts from what appear to be reeds and sedges. The upper surface of the tufa-like deposit represents the former water level of the adjacent wetland. The second site is of recent alluvial deposits north of Kasheshe, near Katima Mulilo. They indicate shifts in the course of the middle Zambezi River in the Quaternary Period. A few artefacts including sub-fossil bones and freshwater molluscan shells were found.

Locally, in the project areas surveyed, most of the findings from the specialist study were the graves and burial places. These regardless of their age and contexts, are considered to be sacred and deserve high attention and respect. Of all the traversed areas and villages, nothing of archaeological significance was either recorded or identified.

POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

Namibia Policy, Legal and Administrative Framework

The ESIA was prepared with reference to key legal national instruments including the Constitution of the Republic of Namibia, the Environmental Assessment Policy (1995) and the Namibia's Environmental Management Act of 2007 and the EIA Regulations of 2012. All these pieces of legislation collectively promote sustainable social and economic development through the sound management of the environment and natural resources. Both the Environmental Assessment Policy (1995) and the Namibia's Environmental Management Act of 2007 recognize the trade-offs between economic development and environmental degradation and calls for the use of EIA and environmental monitoring as tools for minimizing impact of development on environment. The upgrade of water infrastructure project in Zambezi will integrate the principles of the environmental policy into the project so that work is done in an environmentally responsible manner. Other policies and guidelines of relevance to the project include Water Resources Management Act 2004, the Forest Act 12 of 2001, the 5th National Development Plan (NDP5), all of which provide sectoral frameworks for the mainstreaming of thematic areas into the development process.

Other Applicable Namibian Legislation

Other Namibian legislation of direct relevance to the Project are summarized in Table 1 below. Also given in this table are the Project specific implications of each relevant piece of legislation.

Table 1: List of Legislation Applicable to the Project.

Statute	Provisions	Project Implications

Forest Act 12 of 2001	Provision for the protection of natural vegetation. No regulations promulgated yet. Section 22(1): It is unlawful for any person to "cut, destroy or remove: i. Any living tree, bush or shrub growing within 100 meters from a river, stream or watercourse on land that is not part of a surveyed erf or a local authority area without a sense. ii. Vegetation which is on a sand dune or drifting sand or on a gully unless the cutting, destruction or removal is done for the purpose of stabilizing the sand or gully.	Permits should be obtained from Department of Forestry for the removal of protected trees.
Atmospheric Pollution Prevention Ordinance 45 of 1965	Part IV - dust control, and Part V - air pollution by fumes emitted by vehicles	Application for an Air Emissions permit from the Ministry of Health and Social Services (if required).
National Heritage Act 27 of 2004	Heritage resources to be conserved in development.	All archaeological sites to be identified and protected.
Soil Conservation Act 76 of 1969	Prevention and combating of soil erosion; conservation, improvement and manner of use of soil and vegetation, and protection of water sources. The Minister may direct owners or land occupiers in respect of inter alia water courses. No Regulations exist to this effect.	Removals of vegetation cover to be avoided and minimized at all costs. Soil pollution to be avoided.
Water Management Act 24 of 2004	Section 32 states that no person may abstract or use water, except in accordance with a license issued under this Act. Abstraction of water including open waters, aquifer, brackish or marine water. Section 46 states that any drilling to be conducted or enlargement of an existing borehole can only be conducted under a permit issued under the Act. Section 56 states that a person may not discharge any effluent directly or indirectly to any water.	Obligation not to pollute surface water bodies. The following permits are required in terms of the Water Act: Water abstraction permits that will form part of the contract obligations.
Public Health Act 36 of 1919	Provides for the prevention of pollution of public water supplies.	A general obligation for the Contractor not to pollute the water bodies in the area.

Hazardous Substances Ordinance 14 of 1974	Control of substances which may cause injury or ill-health or death of human beings because of their toxic, corrosive, irritant, strongly sensitizing or flammable nature, and for the control of certain electronic products and radioactive material. Does not regulate the transport or dumping of hazardous substances. Regulations only relate to the declaration of certain substances as hazardous substances.	The handling and storage of hazardous substances on the Project Site should be carefully controlled. Disposal of hazardous substances needs to be carefully controlled.
Preservation of Trees and Forests Ordinance	Protection to tree species.	The Contractor will require a permit to remove any protected trees.
Nature Conservation Ordinance 4 of 1975	Requires a permit for picking (the definition of "picking" includes damage or destroy) protected plants without a permit.	In case there is an intention to remove protected species, then permits will be required.

African Development Bank

The project shall be implemented in compliance with the Bank's Environmental and Social Assessment Procedures. The design, implementation and monitoring and evaluation modalities for the project have been informed by the Bank's environmental and social policies and guidelines. Considerations are premised on expectations for assessing and addressing environmental and social impacts in line with the Bank's Integrated Safeguards System (ISS) (2013): Based on the projects scoping report, all the five Operational Safeguards (OS) embedded in the ISS were considered and only four were triggered, and these are;

- *Operational Safeguard* 1: Environmental and social assessment, which is the overarching Operational Safeguard that mainstreams environmental and social considerations in all Bank operations
- *Operational Safeguard* 3: Biodiversity, renewable resources and ecosystem services which reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote the sustainable management and use of natural resources.
- *Operational Safeguard 4*: Pollution prevention and control, hazardous materials and resource efficiency, which is intended to achieve to achieve high quality environmental performance, efficient and sustainable use of natural resources, over the life of a project
- Operational Safeguard 5: Labour conditions, health and safety that basically protects workers right.

Operational Safeguard 2 which provides for involuntary resettlement land acquisition, population displacement and compensation was considered but not triggered because the project does not have direct displacement of individuals and/or communities.

Other Bank policies that were closely examined include; Climate Action Plan, Policy on Poverty Reduction, the Policy on the Environment, the Gender Policy, the Policy on Disclosure and Access to Information and the Cooperation with Civil Society Organizations – Policy and Guidelines.

International Conventions and Protocols

Below are some of the key multilateral environmental agreements that are most relevant for the project and were considered during the Environmental and Social Assessment.

The Stockholm Declaration on the Human Environment, Stockholm 1972
The declaration refers to the fact that natural resources of the earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate. The declaration also states that countries have a special responsibility to safeguard and wisely manage the heritage of wildlife and its habitat, which are now gravely imperilled by a combination of adverse factors. Nature conservation, including wildlife, must therefore receive importance in planning for economic development. The other component being that states shall take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

Convention on Biological Diversity, Rio de Janeiro, 1992
Namibia is accordingly now obliged under international law to ensure that its domestic legislation conforms to the CBD's objectives and obligations which requires ESIA's for projects that are likely to adversely affect biological diversity. It further requires that the EIA be aimed at avoiding or minimising such effects and where appropriate, allow for public participation in the assessment.

POTENTIAL IMPACTS DURING DIFFERENT PROJECT PHASES

Potential impacts (positive and negative) were identified, and their significance were established. Inputs from stakeholder consultation and field assessments augmented by literature review were used to identify the project impacts.

List of identified Impacts.

Impact Category	Project Phase	Impact List
Positive	Construction	• Employment creation and income generation • Skills transfer • Empowerment of local businesses • Economic boost of the local economy
	Operation Phase	• Economic benefits from improved safe, easily accessible clean water • Health benefits from improved potable water access • Gender equality benefits • Water Infrastructure development and betterment of the communities • Climate change adaptation • Employment creation and income generation

Negative (adverse)	Construction	• Physical disturbance of the soil • Biodiversity loss: domestic and wild fauna as well as flora • Impact on Land Use Change (Aesthetic value) • Impacts on surface and groundwater resources (abstraction, and pollution) • Waste generation • Culture, heritage and archaeological impacts • Occupational and community health and safety risks/hazards. • Displacement of properties • Air quality (emissions of GHG) • Noise generation • Dust generation • Vehicular traffic safety • Impact on local road use • Increases the climate risk. • Community conflicts • Potential labour issues • Threats of Sexual Exploitation, Abuse and Harassment (SEAH)
	Operational phase	• Occupational and community health and safety risks/hazards. • Water access and operations conflicts among communities.
	Decommissioning Phase	• Soil disturbance • Disturbance to traffic • Air pollution • Noise pollution • Waste generation • Occupational health and safety

Impact significance assessment

The identified impacts were assessed to establish their significance. The significance of impacts was determined by calculating five characteristics of impact description. The significance of the impact "without mitigation" was the main determinant of the nature and degree of mitigation required. Table 2 shows the impact significance of several social and biophysical components.

Table 2: Results of impact significance assessment.

Impact / Activity	Affected Environmental And Social Components														Project phase	Duration	Magnitude with project	Extent / Spatial scale	Type	Probability	Significance without mitigation
	Fauna and Flora	Water Quality	Water Quantity	Land Use	Soil and Slope Stability	Visual Intrusion	Air Quality	Human Settlements	Public Nuisance	Infrastructure & Services	Agriculture	Archaeology, Culture & Heritage	Occupational and Public Health & Safety	Source of Income							
Vegetation Clearing	√	√	√	√	√	√	√		√		√	√	√	√	C O	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Air pollution	√	√	√	√			√	√	√				√	√	C O	Short	Moderate	Local	Direct	Medium 25 - 75%	Minor (-)
Soil pollution	√	√	√	√	√	√	√		√	√	√			√	C O	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Soil erosion	√	√	√	√	√	√	√		√	√	√			√	C O	Short	Small	Local	Direct	Medium 25 - 75%	Major (-)
Water resources pollution	√	√	√	√				√		√	√		√	√	C O	Moderate	Moderate	Local	Direct	Medium 25 - 75%	Major (-)
Water resources depletion	√	√	√	√	√			√		√	√			√	O	Permanent	Moderate	International	Direct	High >75%	Major (-)
Solid waste Generation	√	√	√	√		√	√	√	√	√	√		√	√	C O	Permanent	Moderate	Local	Direct	Medium 25 - 75%	Major (-)
Vehicular Movements	√			√	√		√	√	√				√		C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Hazardous Substances storage and handling	√	√			√		√						√		C O	Permanent	Moderate	Local	Direct	Medium 25 - 75%	Major (+)
Excavation of pipeline trenches	√	√	√	√	√	√	√		√	√			√	√	C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Construction camps establishment	√	√	√	√	√	√	√		√	√			√	√	C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Vehicular traffic	√			√	√		√			√			√		C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Water Supply		√	√	√				√		√	√		√	√	O	Permanent	Moderate	Regional	Direct	Medium 25 - 75%	Beneficial Minor (+)
Social Aspects Proliferation						√		√	√	√	√	√	√	√	C	Short	Small	Local	Direct	Low <25%	Beneficial Minor (+)
Boost in water reliant activities	√	√	√	√	√	√		√		√	√		√	√	O	Permanent	High	Regional	Direct	High >75%	Beneficial Minor (+)

Impact / Activity	Affected Environmental And Social Components														Project phase	Duration	Magnitude with project	Extent / Spatial scale	Type	Probability	Significance without mitigation
	Fauna and Flora	Water Quality	Water Quantity	Land Use	Soil and Slope Stability	Visual Intrusion	Air Quality	Human Settlements	Public Nuisance	Infrastructure & Services	Agriculture	Archaeology, Culture & Heritage	Occupational and Public Health & Safety	Source of Income							
Employment Creation	√			√	√			√		√	√		√	√	C O	Permanent	High	Regional	Direct	High >75%	Beneficial Major (+)
Livelihoods Development				√									√	√	O	Permanent	Moderate	Regional	Direct	High >75%	Beneficial Minor (+)
Climate Resilience	√	√	√	√				√			√				O	Permanent	Moderate	Regional	Direct	Medium 25 - 75%	Beneficial Minor (+)
Inclusion of Women and Children	√	√	√								√		√	√	C O	Permanent	Moderate	Regional	Direct	Medium 25 - 75%	Beneficial Minor (+)
Sanitation and Health Improved		√	√							√	√		√		O	Permanent	High	Regional	Direct	High >75%	Beneficial Major (+)
Skills transfer				√									√	√	O	Permanent	Moderate	Regional	Direct	High >75%	Beneficial Minor (+)
Economic benefits from improved safe, easily accessible clean water				√									√	√	O	Permanent	Moderate	Regional	Direct	High >75%	Beneficial Minor (+)
Developed Water administrative system		√	√								√		√		O	Permanent	High	Regional	Direct	High >75%	Beneficial Minor (+)
Land Use change	√	√	√	√	√	√		√	√		√	√		√	C O	Permanent	Medium	Local	Direct	Medium 25 - 75%	Minor (-)
Occupational Hazards													√		C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Pressure on local services and Resources	√		√	√	√			√	√	√	√			√	C O	Short	Medium	Local	Indirect	Medium 25 - 75%	Minor (-)
Noise	√	√	√	√	√	√	√		√	√	√			√	C	Short	Small	Local	Direct	Medium 25 - 75%	Major (-)
Air quality issues (dust)	√	√	√	√	√	√	√		√	√	√			√	C	Short	Small	Local	Direct	Medium 25 - 75%	Major (-)
Community health and safety													√		C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Impacts on water supply	√	√	√	√	√	√		√	√		√	√		√	C O	Permanent	Medium	Local	Direct	Medium 25 - 75%	Minor (-)
Labour													√		C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)

Impact / Activity	Affected Environmental And Social Components														Project phase	Duration	Magnitude with project	Extent / Spatial scale	Type	Probability	Significance without mitigation
	Fauna and Flora	Water Quality	Water Quantity	Land Use	Soil and Slope Stability	Visual Intrusion	Air Quality	Human Settlements	Public Nuisance	Infrastructure & Services	Agriculture	Archaeology, Culture & Heritage	Occupational and Public Health & Safety	Source of Income							
Water Supply requirements	√	√	√	√	√	√		√	√		√	√		√	C O	Permanent	Medium	Local	Direct	Medium 25 - 75%	Minor (-)
Sexual Exploitation, Abuse and Harassment (SEAH)	√	√	√	√	√	√		√	√		√	√		√	C O	Permanent	Medium	Local	Direct	Medium 25 - 75%	Minor (-)

STAKEHOLDER/COMMUNITY CONSULTATIONS

Stakeholder/community engagement and consultations was thoroughly conducted and guided by both the national regulations/requirements and the bank operational safeguard standards. Several activities were conducted to ensure that all the stakeholder concerns, feedback and comments are taken into consideration to improve the environmental and social management of the project.

Stakeholder identification: this was the initial step. It involved identifying through various approaches the interested and affected communities and parties.

Communication with stakeholders/communities: A mix of approaches were used to communicate with I&APs. This consisted of newspaper adverts, in-person delivery of project material and notices, local radio announcements, site notices and word of mouth with various stakeholders.

The following activities were undertaken during communication and engagement with stakeholder:

- Building a Stakeholder Database: A stakeholder database for the project was compiled with pre-identified key stakeholders throughout the ESIA Study. During the advertisement of the project (though public notices in local newspapers), the list was augmented as I&APs registered, and contact information of stakeholders updated.
- Circulation of the Background Information Document (BID) which contained brief descriptive of project information on proposed activities circulated with identified and registered I&APs.
- Placement of newspaper adverts (ESIA Study public notifications) in two different newspapers. The adverts were placed in the *New Era* and *Windhoek Observer* newspapers dated 30 June 2023 and 07 July 2023 respectively. The project details were briefly explained in the newspapers and inviting members of the public to register as I&APs.
- Radio announcements for the ESIA Study's consultation meetings were made to the communities via the Zambezi Regional Council's local constituency offices (Katima Mulilo Rural, Kabbe North, and Kabbe South Constituencies). The letter of notification and consultation schedule was shared with the Office of the Chief Regional Officer for the Zambezi Regional Council on the 29th of June 2023.
- Site notices were placed throughout the study area in strategic positions where it can reach as many local communities as possible.
- Consultation meetings: consultation meetings were held with stakeholders, local leadership and communities in Zambezi Region (project areas). These took place between 07 and 12 July 2023. A total of 167 people were consulted in different communities. Given how potable water issues are gender sensitive especially in the provision of rural potable water, a gender responsive stakeholder consultation was carried out. Issues from women who are mostly responsible for water collection and management at domestic level were prioritised and the identified project impacts and corrective measures took into consideration these issues.

Key issues from stakeholder consultation: several and critical social, environmental, economic and other relevant issues were raised during community meetings. These are summarised below:

Table 3: key issues noted throughout the consultation period (consultation meetings).

Aspect	Comment	Response
Land Use	- Need for compensation of properties affected by the water infrastructure such as pipelines crossings. - Community members emphasized on consultative engagements. - The Muyako-Ngoma area has an issue of houses erected close to the road and subsequently the pipeline planned along the route.	- The project will avoid property impacts by all means through prioritising public servitudes and informal servitudes or boundaries. - The Engineering consultant has indicated that they will design the pipeline in a way that avoids significant properties, should the right of way affect a property, compensation for the impact will be quantified, costed, and settled.
Economic	- Emphasis on the employment of locals along the project route. - Management and handling of labour associated with the project, in terms of recruitment. - The urgent need for clean (good water quality) and accessible water supply - Affordability of water and non-payment of accounts for water during operational phase.	- The Zambezi Regional Council indicated that they would ensure that appointed contractors will employ locals for all semi-skilled labour. - The issue of water affordability will be put into consideration by NAMWATER.
Environmental	- Protected tree species were mentioned to be important, and compensation should be ensured. - Provision of troughs for animals, and not only human consumption - Water infrastructures passing through conservancies to minimize human-wildlife conflicts.	- A Resettlement and Compensation Plan will be drafted after the final designs have been drafted, - This will be drafted in collaboration with the consulting Engineer. - The project right of way will not affect any conservancies, however during construction, minimal impacts will be anticipated to natural environments and wildlife sanctuaries in proximity.
Social	- Issue of water affordability (water given for free and when you start charging, conflict will start). - Water infrastructure care (how will the community maintain the infrastructures). - Stakeholder Disclosure and continued engagement throughout the project planning and implementation. - The urgency of the project (access to clean and safe) for the community as the current water is of poor-quality water since 1990. - Groundwater (borehole water) quality issues (poor water quality (salty)), making the water unfit for human consumption. - Aspect of pipeline crosses through a graveyard/cemetery (archaeology). - Elders (senior citizens) travelling about 3km from their households to water supply points. - The issue of water supply promises over the years and nothing materializes. Expediting the process to address the water needs at Ngoma. - Vandalism of water infrastructures such as meters by some community members. Installation of water meters should be close to the community/people for protection.	- Addressed above. - NAMWATER will manage all bulk water infrastructure, whilst Rural Water Supply and Sanitation will maintain community water supply lines. - The project will not use any borehole water. - The project engineer will ensure that graveyards and cemeteries will be avoided. All potential sites have been mapped out. - MAWLR is implementing this project to address the water supply challenge in the Zambezi region. - The Zambezi Regional Council will communicate with the local chiefs and headmen to ensure protection of the waterlines. Namibian Police was present during the meeting, and they guaranteed that they will ensure security of powerlines.
Others	- Existing system of community payment for the operation and maintenance of water infrastructure support such as generators. - The need to access water 24 hours (always) as at times there is no water. Thus, requesting for a main reservoir and backup reservoir for security. This is also because where there is a damage in the infrastructure (pipeline) for a certain period at Bukalo, these interrupts supply to the area until the repair's works are completed.	- The community will not be expected to pay for pipeline and associated infrastructure's maintenance, except for their rates. - The project will construct a reservoir in Bukalo.

MITIGATION/ENHANCEMENT MEASURES

The ESMP incorporated all the issues raised by communities and key stakeholders to address the environmental and social impacts associated with project development. Comments and feedback from the stakeholders were vital for informing some of the corrective and management measures suggested in this ESMP.

INSTITUTIONAL ARRANGEMENTS AND CAPACITY BUILDING REQUIREMENTS

ESMP Implementation Roles and Responsibilities

As the Proponent, MAWLR is ultimately responsible for the implementation of the ESMP, but they may delegate this responsibility or part of it to someone else at any time, as they deem necessary. The transfer of responsibility should be clearly communicated and recorded. MEFT as the regulator (through the EC) is responsible for implementation of the Environmental Management Act, and MAWLR as the project Proponent are entirely responsible for the implementation of the project's ESMPs. The EC advises organs of state on the preparation of environmental plans, receives and records applications for ECCs and the overall management, protection, reviewing of the assessment report and enforcement of monitoring and implementation of environmental plans in accordance with the EMA.

To manage the ESMP implementation, copies of the approved ESMP shall be given to all relevant departments, kept at the site office and will be distributed to all senior contract personnel. All senior personnel shall be required to familiarize themselves with the contents of this document.

Table 4: The roles and responsibility for implementing the ESMP.

Role	Responsibilities
MAWLR: **The Implementing Agency and Project Proponent**	MAWLR, as the implementing agency, will be responsible for: - Managing the implementation of this ESMP and updating and maintaining it when necessary. - Ensuring that the environment is rehabilitated to its natural state as far as possible. MAWLR shall ensure that all employees attend an Environmental, Awareness Training Course to increase compliance and reduce the environmental impact of the project activities. - The training course shall be structured to ensure that trainees/employees are capacitated with appropriate knowledge to: i. Become familiar with the environmental, health, and safety controls contained in the ESMP. ii. Be aware of the importance to conserve water and minimise waste to ensure sustainable development. iii. Be aware of MAWLR's Code of Conduct. iv. Be aware that a copy of the ESMP is readily available as a reference at the site office and that all staff are aware of the location and have access to the document. v. Ensuring that there are employee information posters outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) will be placed at prominent locations throughout the site.
Proponent's Project Manager	- Ensuring that the objectives of this ESMP are achieved at the various project lifecycle phases. - Work together with ECO to ensure that this ESMP is implemented and that penalties and fines for non-compliances are enforced onsite. - Ensuring that all identified environmental impacts are managed according to the environmental principles of avoiding, minimizing, mitigating and rehabilitation. This will be achieved by the successful implementation of the ESMP. - Managing and monitoring of individuals and/ or equipment on-site in terms of compliance with this ESMP and issuing fines for contravening ESMP provisions.

Role	Responsibilities
	- Ensuring that appropriate environmental monitoring and compliance auditing is done and that biannual reports are submitted to the MEFT.
Contractor (Site / Construction Manager): **To be appointed by MAWLR.**	- The Contractor and / or its agents will be responsible for environmental management on site during the construction phases of the project. For the purpose of this document: "the Contractor" (and its sub-contractors) refers to construction personnel responsible for construction activities planned for this project. - The Contractor will appoint an Environmental Site Officer (ESO) who will be responsible for ensuring that the ESMP requirements are implemented on-site on behalf of the Contractor. - The contractor shall ensure that all construction staff, sub-contractors, suppliers, etc. are familiar with, understand and adhere to the ESMP. Failure by any employee of the Contractor, Sub-contractor, and Suppliers etc. to show adequate consideration to the environmental aspects of this contract shall be considered sufficient cause for the ESO to instruct the EM to have the employee removed from the site. - A pre-construction meeting is recommended to reach agreement on specific roles of the various parties and penalties for non-compliances with the ESMP. In addition, surrounding residents, landowners or occupiers of land must be notified in advance of any potentially disturbing activities.
Environmental Site Officer (ESO): **To be appointed (as part of the Construction Contractor Team)**	The ESO is expected to administer and control all environmental matters during the construction phase. The ESO will be responsible for the following among others: i. Identify non-compliance and recommend corrective measures in consultation with MAWLR's Project Manager, the EM and the ECO as required. ii. Ensure that environmental problems are remedied timeously and to the satisfaction of the Project Manager, and the ECO as required; iii. Set up activity-based method statements prior to the start of relevant construction activities and submit these to the Project Manager, the EM and the ECO as required; iv. Perform ongoing environmental awareness training of the Contractor's site personnel as and when required. v. Ensure implementation of the ESMP. vi. Always ensure safe keeping and easy accessibility of correct environmental records. vii. Ensure accurate and timely communication of ESMP requirements to relevant project, contractor and sub-contractor personnel as required for ESMP implementation. viii. Monitor compliance of ESMP implementation and compliance of all contractors and sub-contractors onsite. ix. Facilitate environmental induction of all project staff and either deliver or coordinate delivery of all such training that would be required for the effective implementation of the ESMP. This includes identifying additional project training requirements and implementing the training programme. x. Update and maintain training records for all project personnel including contractors. xi. Maintain environmental incidents and stakeholder complaints register. xii. Undertake environmental system reviews, site inspections, audits and other verification activities to assure that the ESMP implementation is at an optimal level. xiii. Report significant incidents internally and externally as required by law and the conditions of authorization. xiv. Investigate incidents and recommend corrective and preventative actions. xv. Provide support and advice to the contractor and all sub-contractors in the implementation of environmental management procedures and corrective actions. xvi. Ensure that monitoring programs, which assess the performance of the ESMP, are implemented. xvii. Ensure maintenance of site document control requirements. xviii. Assess the efficacy of the ESMP and identify possible areas of improvement or amendment required within the ESMP.
Environmental Control Officer (ECO): **D&P Environmental Consultants**	The ECO for the site is an independent environmental consultant to monitor and review the on-site environmental management and implementation of this ESMP on the construction site. The duties of the ECO are to: - Ensure that all construction or decommissioning activities on site are undertaken in accordance with the ESMP. - Conduct environmental compliance audits and reporting as required by law. - Provide support and environmental advice to the project team, contractors, and all subcontractors in the implementation of environmental management procedures and corrective actions. - Report significant incidents internally and externally as required by law and the ECC conditions.

Role	Responsibilities
	- Ensure that ESMP performance monitoring programs are implemented. - Assist in incidents and non-conformances investigations and implementation of effective corrective and preventive measures. - Assess ESMP effectiveness and identify possible areas of improvement. - Facilitate the amendment of the ESMP in liaison with the Environmental Manager. - Provide environmental training for key project personnel (in liaison with Environmental Manager). i. Conducting site inspections of all areas with respect to the implementation of this ESMP (monitor and audit the implementation of the ESMP). ii. Advising the Proponent or Site Manager on the removal of person(s) and/or equipment not complying with the provisions of this ESMP. iii. Making recommendations to the Proponent with respect to the issuing of fines for contraventions of the ESMP. iv. Undertaking an annual review of the ESMP and recommending additions and/or changes to this document.
Public Relations Officer (PRO): **To be appointed by MAWLR or form part of the Construction Contractor Team**	The key primary responsibility of PRO is implementation of Grievance Regress Mechanism (GRM). PRO will be specifically responsible for the following: - Liaising between the stakeholders, public (communities) and the Proponent. - Ensure effective communication with stakeholders, media (if necessary) and the public. - Organising and overseeing public relations activities, Managing public relations issues. - Preparing and submitting public relations reports, if required. - Collaborating with personnel and maintaining project-related open communication among personnel.

Corrective, Mitigation and Management Measures

Since the project's negative impacts to the receiving environment are experienced in all phases of project development, the management, mitigation and corrective measures also follows same structure to ensure that impacts are well managed for all the four phases (planning & design, construction and post-construction), operations & maintenance and decommissioning).

Table 5: Enhancement/Mitigation Measures for bio-physical environment

Component/Issue	Objective	Management Measures	Responsibility/ Partnerships
Planning and Design Phase			
Ineffective communication of the project's GRM that limits transparency and participation of affected parties.	To sensitise the communities about the GRM for affected persons to be able to openly share their concerns or issues regarding project activities at different project development phases	i. Establish GRM and clarify roles and responsibilities (see GRM section of ESMP) ii. Provide contractor with GRM contact details to be used for: a. GRM sign boards; b. GRM Contact Cards for Affected People iii. Erect sign boards at the construction site entrance with: a. Project details. b. GRM procedures and contact details. iv. Print 'GRM Contact Cards' for all workers to give to complainants and keep cards with all vehicles, machinery and site managers/foremen. v. Affected People Training. Contractor to raise awareness of all workers on how to respond when an affected person or member of the public has a complaint i.e., direct the person to the most senior site manager present	Implementing Agency / Contractors / Supervising Consultant
Construction Phase			
Health and social pathology.	To prepare the receiving communities where outsiders project people will be received to carry out project activities.	i. Prior to commencing construction, the risk of an increase in the spread of HIV/AIDS should be explained to regional health authorities and partners be identified amongst all stakeholders to formulate a joint programme to limit the spread of HIV during the construction period. ii. Particular provisions shall be worked into the tender documents for the contractor to approach the Ministry of Health and Social Services to co-opt a health officer to facilitate HIV/AIDS education programmes periodically on site.	Contractors/ Implementing Agency. Partnership with National and Regional HIV task forces and NGO's working in the field.
Conflicts	To reduce conflicts between workers in the camp sites and between workers and the receiving communities.	i. A meeting should be arranged with the local community once the contractor has been appointed. ii. The contractor shall appoint an ESO from the construction team to take responsibility for the implementation of all provisions of this ESMP. iii. One meeting for site-handover and to introduce the local community and farmers to the Contractor. iv. A system for the on-going management of the communication between the Contractor and local communities, which should include; a means for lodging a complaint concerning construction activity, provision of feedback to the plaintiff from the Contractor stating how the issue is	Contractors

Component/Issue	Objective	Management Measures	Responsibility/ Partnerships
		being addressed, report back on issues raised and how addressed from the Contractor to the Project Manager and Proponent, and detailed construction programme should be presented during a meeting with the local communities and stakeholders.	
Vegetation loss	To prevent indiscriminate loss of vegetation due to project activities.	i. The routes for the planned facilities such as pump stations, reservoirs, pipeline routes should be located at the early stages of the project (before construction) and ensure that they are placed where there are no trees or minimum number of trees. ii. Make use of existing linear infrastructure such as roads to lay the pipelines alongside and make use of existing access roads. iii. Position new pipelines in such a way to follow existing access roads in the project area. iv. Avoid unique and special habitats or culturally protected areas. v. Create buffers from special, sensitive and ecologically important habitats.	Planning & Design Engineer Contractor
Wildlife poaching	To prevent the poaching of wildlife by the construction workers thus protecting the biodiversity in the project area.	i. Commit to creating awareness among the project workers and the impact of such crimes on the host environment and country at large. ii. Report any suspicious activities related to wildlife crime to the nearest Police. iii. To minimize the risk of poaching by outsiders, commit to hiring more locals for jobs that they can do, as they are likely to appreciate the importance of conserving wildlife in their areas. iv. Incorporate a No-tolerance rule for poaching in every employment contract and ensure that the workers understand the seriousness of this. In other words, there is no tolerance for poaching or to wildlife crime.	Contractor ESO
Soil erosion and compaction	To reduce soil erosion and other associated land degradation from the excavations for pipeline installation and other infrastructure such as boost pump house and storage tanks.	i. Stockpiled topsoil and materials should be used to backfill the excavated and disturbed site areas such as borrow pits. ii. Topsoil stripped from certain site areas to enable project works and can be returned to its initial position, should be returned. This is to avoid unnecessary stockpiling of site soils which would leave them prone to erosion. iii. Vehicles/machinery should stick to access roads provided and not to unnecessarily create further tracks on and around the site by driving everywhere resulting in soil compaction and erosion. iv. Unnecessary off-road onsite and neighbouring areas is strictly prohibited. Stick to approved site access roads.	Contractor.

Component/Issue	Objective	Management Measures	Responsibility/ Partnerships
Soil pollution	To minimise soil pollution from cement, concrete, sewage, chemicals, fuels, oils or any other objectionable or undesirable material, fuel leaks, heavy vehicles/ movement of vehicles across site.	i. Hazardous waste should be disposed of in the prescribed manner in order to prevent contamination of soils. ii. In case of accidental spills, the contaminated soil must be suitably disposed of in a container for hazardous waste. iii. If fuel is stored at the construction camp, fuel tanks must be properly bunded. The volume of the bunded area must be sufficient to hold twice the capacity of the storage tanks. The floor of the bunded area must be impermeable and the sides high enough to achieve the twice holding capacity. iv. Drip trays should be available for all equipment that is intended to be used during construction. These trays should be placed underneath each vehicle while the vehicles are parked. The drip trays should be cleaned every morning and the spillage handled as hazardous waste. v. Under no circumstances should cement be mixed on open soil. A designated metal container should be made available for this purpose. vi. All cleaning of equipment should take place within the construction site and the water from washing operation should be collected in a tank and disposed of in agreed manner. vii. The movement of vehicles to and across the site should be controlled. Construction material required should be moved to where it is needed by means of wheelbarrows (when possible) instead of trucks thereby minimizing the impact on the soil. viii. For the safety of the homestead residents and immediate community members who utilize the existing access path, the contractors should create safer routes to be used by the road construction vehicles only and avoid the existing community paths.	Contractor ESO
Loss of biodiversity - (fauna and flora)	To prevent loss of biodiversity from illegal hunting of wildlife in the project area, uncontrolled or unauthorized removal trees, especially protected tree species may lead to that species in the area	i. Refrain from disturbing or killing wildlife found on and around the project sites. ii. Breeding sites for animals and birds occurring on and around the project pipeline route should not be destroyed nor disturbed. iii. Pipeline trenches should be secured (temporary fencing/ covering) and backfilled and capped after sampling is completed to prevent animals from falling into trenches. iv. Incorporate Environmental awareness and biodiversity preservation into the employment contracts of all workers. v. Avoid unnecessary removal of vegetation to promote a balance between biodiversity and the project.	Contractor ESO

Component/Issue	Objective	Management Measures	Responsibility/ Partnerships
		vi. Vegetation found on the site, but within the footprint of the infrastructure route or access route should be left undisturbed/avoided. vii. Barricading tape (to indicate working areas) should be established. viii. Vehicle movement should be restricted to existing roads and tracks to prevent unnecessary damage to the surrounding vegetation. ix. No onsite vegetation should be cut or used for firewood. x. Access roads should be created in a manner that disturbs minimal vegetation. xi. Environmental awareness on faunal and floral biodiversity preservation should be provided to the workers and contractors. This should be incorporated into the workers' contracts. xii. - Clearing of protected tree species should obtain permit first, tress should be replanted somewhere in the areas. Implement a re-vegetation plan after project construction activities.	
Dust Generation	To prevent dust generation in the construction area and communities through movement of heavy vehicles and earthworks mostly excavation for the pipelines and water infrastructure installation.	i. Vehicles should not be driven at a speed more than 40 km/h to avoid dust generation in the project area mostly in gravel roads. ii. At dust sources onsite, a reasonable amount of water should be used by using regular water sprays to suppress the dust that may be emanating from such sites. iii. Dust masks, eye protective glasses and other respiratory personal protective equipment (PPE) such as face masks should be provided to the workers on site excavation-based areas, where they are exposed to dust as well as heavy machinery operators. iv. Machines, and vehicles should be regularly maintained to ensure efficiency and reduce dust generation and harmful gaseous emissions.	
Generation of Waste	To prevent waste generation from incorrect or infrequent disposal of building rubble, construction waste blown by wind (e.g., cement bags), domestic waste from campsites.	i. Construction waste should be stored in skips and should regularly be removed off the site for disposal at an applicable municipal waste disposal site. ii. Empty cement bags, plastics, wrapping waste, strapping, etc. to be secured in containers for general waste to prevent wind-blown waste. iii. Waste shall be separated according to cardboard/paper materials, plastic, bottles and tins. iv. The various waste types shall be disposed of at appropriate municipal and recycling facilities. v. Appropriate containers shall be placed on site for waste separation and the workforce trained sensitised accordingly.	Contractor ESO

Component/Issue	Objective	Management Measures	Responsibility/ Partnerships
		vi. Only the general waste, which cannot be recycled shall be disposed of at the municipal waste disposal facility. vii. The workforce must be sensitised to dispose of waste in a responsible manner and not to litter, not at the construction site and not at the campsite. viii. Sufficient waste bins should be supplied. ix. No waste should be burned nor buried onsite. x. Domestic waste which cannot be recycled should be stored in a skip and removed via truck once a week.	
Noise generation.	To reduce or minimise noise from vehicles and construction activities.	i. Inform communities the schedules for operation of heavy noise machinery. ii. All machinery should be calibrated and maintained regularly. iii. No construction activities should be done during night-time hours, i.e., between 18h00 to 07h00 and over weekends. iv. Construction hours should be restricted to between 07h30 and 17h00 to avoid noise generated by construction equipment and the movement of vehicles before or after hours	Contractor ESO
Community health and safety	To avoid or minimise lack of safety and health measures in the community during construction may lead to minor and serious injuries	i. Heavy vehicle, equipment and fuel storage site should be properly secured, fenced off and away from public exposure and access. ii. Trenches should be temporarily fenced off during sampling, and once completed, they should be backfilled thereafter. iii. An emergency preparedness plan should be compiled, and all personnel appropriately trained. iv. Ensure that goods and projected loads are securely fastened to vehicles to avoid falling and injure people or animal along the project route. v. Warning signage should be erected at hazardous site areas such as open trenches. The site areas that are considered temporary risks should be equipped with "danger" or "cautionary" signs clearly written in English and local languages .	Contractor ESO

Institutional Capacities and Strengthening Plan.

The Implementing Agency for the Project is the Directorate of Water Supply & Sanitation Coordination in Ministry of Agriculture, Water and Land Reform (MAWLR). Whereas the Ministry of Agriculture, Water and Land Reform is institutionally experienced to manage the implementation of major infrastructure projects, it lacks sufficient technical capacity in the Directorate of Water Supply & Sanitation Coordination to allow a dedicated and specialised environmental and social management function. The monitoring functions shall be practiced by an independent consultant and addressed through the project management structures such as technical committees, project steering committee and site meetings. In addition the permit conditions of the environmental clearance will be monitored by the relevant Ministry of Environment, Forestry and Tourism staff. In general terms the institutional capacity to effectively manage social and environmental matters is required through outsourcing from the consultant.

Monitoring Program

It is planned that the environmental and social impacts and their designed mitigation measures shall be monitored during implementation and operation phases of the project. The roles and responsibilities for monitoring the environmental and social impacts and mitigation measures in Table 4.

The monitoring of the environmental and social impacts for the project will be guided by the development of a comprehensive planning, construction and operational phases of the ESMP. Responsibilities under the ESMP are currently envisaged to be allocated between MAWLR, its contractors and certain units with the Ministry of Environment and Tourism. MAWLR intends to augment its capacity through use of consultancy services in order to meet the environmental and social obligations that will be required of it for the purposes of this project. Monitoring activities which will consist of baseline monitoring, site inspections, monthly reporting and internal audits. The monitoring program is further elaborated in the Table 6.

Table 6: The summary of the monitoring program.

Issue	Parameter	Location	Frequency	Implementation	Supervision
Waste management	Evidence of waste collection and disposal. Provisions of bins in camp sites.	Construction corridor Contractors camp	Immediate	Contractor	Supervision consultant
Dust generation	Visual assessment during the works – daily inspection, Apply receptor sensitivity approach in proximity to sensitive receptors and general continual monitoring of excessive dust deposition and/or airborne occurrence, when and where construction active and especially under windy conditions and/or near to residential areas	Construction sites	Daily	Contractor	Supervision consultant/ MAWLR
Noise levels	Noise levels on dB; PPE Provided to workers. Communication with local communities. Inspection through rough assessment by answering the question: "Do you have to raise your voice to talk to someone respectively 1 m and 2 m away?"	Construction corridor Adjacent communities	As directed by the supervision consultant	Contractor	Supervision consultant
Soil and land resources	Monthly checking against mitigation measures specified in this EMP	Quarries, Borrow and Spoil Disposal Sites	Monthly	Contractor	Supervision consultant/ MAWLR
Oil spills/ soil contamination	Oil spill marks	Construction corridor Equipment yard (construction) Refuelling points within stations and workshops	As directed by the supervision consultant	Contractor	Supervision consultant/ MET/ MAWLR
Accidents	Safety training of the workers, accident log sheet/book/ reports, community consultations	Construction corridor	Monthly	Contractor	Supervision consultant
Health	Signs, posters displayed, first aid kits, HIV/AIDS Awareness campaigns, health checks for workers	Social impact assessment reports	Monthly	Contractor	Contractor/ Supervision consultant
Benefits to local communities	Employment wage levels Equity in water access	Reports on survey on local economy.		Contractor/ Supervision consultant	MAWLR/ Supervision consultant/ Other GRN Departments
Chance finds of Physical Cultural Resources	Awareness about and efforts to follow Physical Cultural Resources				

Monitoring will include: Visual observations; Selection of environmental parameters at specific locations; Sampling and regular testing of these parameters.

Costs for Environmental Management and Monitoring

Costs of certain items associated with environmental management and monitoring will be an integral part of specific items incorporated in overall project budgets, and no separate budget is necessary to cover these aspects. Such items comprise;

- Marginal costs of the contractor to be incurred in complying with environmental protection clauses in the construction contract are incorporated in unit rates and bill items and will thus be included as construction costs. It should be noted that no significant increase in construction costs is expected in connection with requiring compliance with environmental protection clauses, since these merely require the contractor to behave in a responsible manner in relation to the environment, in accordance with good construction practice.

- Environmental monitoring carried out by the Supervising Engineer's staff including inputs by the Environmental Specialist recruited by the Consultant is an integral part of general supervision duties/responsibilities and will be covered by normal construction supervision cost estimates and contract.

Costs which will be incurred by the various departments of the GRN in connection with management duties such as supervision and monitoring of the project also covering the implementation of the ESMP are classified as administrative costs.

Conclusion

Evaluation of ESIA/ESMP, it is evident that the proposed project is associated with both positive and negative impacts during construction, operation and decommissioning phases of the project. The following recommendations are made to enhance the viability of the project:

- The proposed mitigation and enhancement measures (the ESMP) should be implemented in order to minimize and/ or avoid the identified adverse environmental and social impacts of the proposed project. The ESMP should be provided as part of the Contractor's contract.
- The EMP should also be implemented to track the effectiveness of mitigation measures and hence further improvement of the mitigation plan. Monitoring will be used as a means of ensuring compliance with national or international standards.
- MAWLR of Namibia will be required to embark on a monitoring program as part of the construction to ensure that the project is not in any way causing adverse environmental and social impacts.

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1. INTRODUCTION

1.1. Overview

Namibia is currently facing water supply and sanitation problems, and to address the challenge, the Government of the Republic of Namibia (GRN) through the Ministry of Agriculture, Water and Land Reform (MAWLR) embarked on implementing the Namibia Water Sector Support Program (NWSSP) supported by African Development Bank (AfDB). The program is aimed at increasing access, quality and sustainability of water supply and sanitation services in Namibia facilitating the realisation of the Sustainable Development Goal 6 of the United Nations. The NWSSP has been designed to cover critical and urgent water supply and sanitation activities across Namibia.

Water scarcity continues to be a serious constraint in achieving the economic, environmental and social development agenda in Namibia. With highly variable and unpredictable rainy seasons in the country, the priority is given to water for domestic purposes including livestock; and the second priority given to water for economic activities such as mining, industries and irrigation. The NWSSP is designed to cover critical, urgent water supply infrastructure development and sanitation activities as prioritised by the Technical Committee of Experts (TCE) supporting the Cabinet Committee on Water Supply Security (Kasinganeti et al., 2019).

Furthermore, there is a need for National Administrators' will, commitment and on-going endorsement of the NWSSP, as this is crucial for the success and effective implementation of the project, and to prioritize water supply and sanitation development in the Zambezi Region and Namibia at large.

In addition, Vision 2030 of the GRN aims at eradicating poverty, reduce unemployment, provide housing, potable water, health services and quality education, hence the NWSSP will go a long way in addressing most of the goals of the Vision 2030.

The Fifth National Development Plan 2017-2021, (NDP5) published by the National Planning Commission (NPC) is more specific about tackling poverty, skills and health. The NDP5 pitches sanitation highly, with a desired outcome that by 2022, access to improved sanitation will increase from the current estimated status of 28% to 40% in rural areas and from 77% to 87% in urban areas.

According to Kasinganeti et al (2019), the NDP5 will also be delivered through the achieving of the Harambee Prosperity Plan; The HPP outlines two key desired outcomes with regard to water supply security; namely to increase access to water for human consumption to 100% by 2020 and ensure sufficient water supply for business activity during the HPP period. It is as thus in all justification, that the proposed NWSSP will allow for the provision of potable water, improve sanitation, create employment as well as stabilise the social pressure on women and children in terms of poor water quality and erratic supply.

Consequently, the MAWLR (hereinafter referred to as the Proponent)'s Directorate of Water Supply & Sanitation Coordination (DWSSC) among other similar projects in the country, proposes to upgrade the water supply network (scheme) under Phase 3 & Phase 4 and Reservoir in the Zambezi Region.

1.2. Project Location and Background

The proposed project route is located in the Zambezi Region starting from Katima Mulilo to Ngoma, whereby the project's Phase 3 starts from Bukalo via Kabbe, Lusese to Ikumwe. Phase 4 starts from Bukalo in a southerly direction to Muyako and via Ibbu to Ngoma as shown on the map in Figure 1.

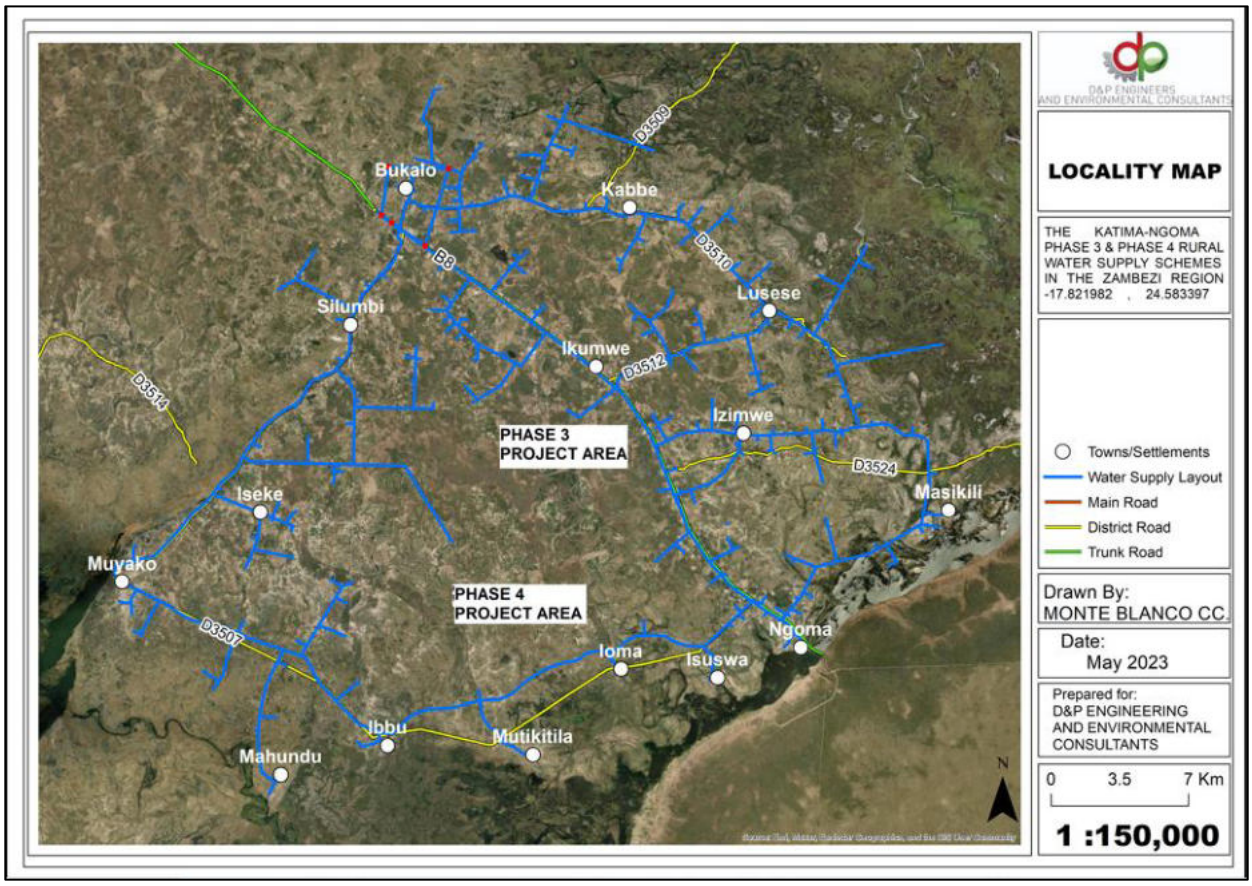


Figure 1: Locality of Katima-Ngoma Phase 3 & Phase 4 Rural Water Supply Schemes in Zambezi Region

The summary of the Phase 3 and Phase 4 of the project are presented below and explained in details under chapter 2.

- Phase 3: Comprises the extension of the rural water supply network between Katima Mulilo and Ngoma, on the Botswana border in the Zambezi Region. This Phase comprises an area of approximately 1,220km^2, stretching from Bukalo to Ngoma including an area of 10km on either side of the road (D3510) from Bukalo via Kabbe, Lusese along the road (D3512) to Ikumwe. The total length of the pipe will be 60km of bulk feeder lines, with 83km of branch feeders.
  Approximately 545 manifolds will be installed, providing water to approximately 12,900 people.
- Phase 4: Comprises the extension of the rural water supply network between Katima Mulilo and Ngoma on the Botswana border in the Zambezi Region. The Phase comprises the final section of the total project area, an area of approximately 1160km^2 and stretches from Bukalo in a southerly direction to Muyako and further along road (D3507) via Ibbu to Ngoma. The total length of pipe will be approximately 61km of bulk pipelines and 153km of branch pipelines. Approximately 350 manifolds will be linked to the system that will provide an estimated 8,700 people with potable water.
- Reservoir: The Katima Mulilo Reservoir has originally been planned to provide for additional load that the rural water supply schemes would add to the existing Katima Mulilo Bulk water supply schemes.

1.3. Need and Desirability of the Project

Water scarcity continues to be a serious constraint in achieving the economic, environmental and social development agenda in Namibia. With highly variable and unpredictable rainy seasons in the country, the priority is given to water for domestic purposes including livestock; and the second priority given to water for economic activities such as mining, industries and irrigation. The proposed project is therefore, aimed to cover critical, urgent water supply infrastructure development in these parts of the Zambezi Region.

Furthermore, the project is aimed at addressing the water issues in areas with no access to clean water due to no access to clean and safe water for the communities (the current water quality is poor, i.e., borehole water is salty, making the water unfit for human consumption). In addition, some areas may have water but they are far from communities, especially by vulnerable members of the communities such as elderlies, young girls, and women as well as disabled members of the communities.

The availability of clean water will boost in local economy and promote investment capacity in the areas (‘*’where there is water, there is life and eventually economic opportunities*’’). Moreover, access to safe drinking water reduces the burden on women and girls from looking after sick children or siblings due to unsafe drinking water and from water carrying over ling-distances, giving them more time for productive endeavours, (adult) education and leisure. Furthermore, water sources closer to home reduce the risk of assault for women, girls, marginalised and vulnerable groups when collecting water (UNESCO-WWAP, 2006). Improved health from the availability of water and reduced water-carrying burdens improve school attendance, especially among girls. The time lost because of long-distance water collection and poor health contributes to poverty and reduced food security (Kasinganeti, et al, 2019).

1.4. Aim of the ESIA Study

The proposed water supply infrastructure schemes upgrade and its associated activities, such as pipelines, reservoirs and boreholes are listed activities that cannot be undertaken without an Environmental Clearance Certificate. are listed activities that cannot be undertaken without an Environmental Clearance Certificate (ECC) in accordance with the Namibia’s Environmental Assessment Policy, Environmental Management Act (EMA) No. 7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulations. In this respect, proposed development and associated activities require a specific Environmental and Social Impact Assessment (ESIA) Study prior to implementation.

The relevant listed activities that trigger the ESIA Study are as follows:

<u>Listed Activity 8. Water Resource Developments</u>

- 8.1 The abstraction of ground or surface water for industrial or commercial purposes.
- 8.2 The abstraction of groundwater at a volume exceeding the threshold authorized in terms of a law relating to water resources.
- 8.3 Any water abstraction from a river that forms an international boundary.
- 8.4 Construction of canals and channels including the diversion of the normal flow of water in a riverbed and water transfer schemes between water catchments and impoundments.
- 8.5 Construction of dams, reservoirs, levees and weirs.

Listed Activity 10. Infrastructure

- 10.1 The construction of - (a) oil, water, gas and petrochemical and other bulk supply pipelines, (b) public roads

Associated Listed Activities will include:

Listed Activity 4: Forestry Activities

- 4.0 The clearance of forest areas, deforestation, afforestation, timber harvesting or vegetation on a sand dune that requires authorisation in terms of the Forest Act, 2001 (Act No. 12 of 2001).
  Applicability: potential clearing of vegetation to make way for the pipelines and associated infrastructures.

Listed Activity 5: Land Use and Development Activities

Applicability: potential use of land to make way for the pipelines and associated infrastructures.

Subsequently, an ESIA Study for the proposed water infrastructure upgrade and construction needs to be conducted by an independent Environmental Consultant to ascertain potential environmental and social risks and impacts (both positive and negative) and establish how to improve or mitigate these impacts.

The ESIA study will present the description and analysis of the physical and biological shall address relevant environmental, socio-economic and climate change issues within this area, including any changes anticipated before project implementation. The description shall also integrate human conditions including population characteristics and trends, revenue disparities, gender differences, health problems, natural resource access and ownership and land use patterns biophysical and socio-economic baseline investigations relating to the proposed project.

All identified impacts will be described and addressed in the Environmental and Social Impact Assessment report and mitigated in the Management Plan (ESMP) - Appendix A. These will be in compliance with the Environmental Management Act (EMA) No. 7 of 2007, the Environmental Assessment regulations of 2012 (Government Notice (GN) 30 in GG 4878 of 6 February 2012), the African Development Bank (AfDB) Environmental and Social Assessment Procedures (ESAP) 2015 and the Integrated Safeguards System (ISS).

In this respect, this document forms part of the application to be made to the Environmental Commissioner's at the DEAF for an Environmental Clearance Certificate (ECC) for the proposed project. The document is compiled in accordance with the guidelines and statutes of the EMA No.7 of 2007 and the environmental impacts assessment regulations.

1.5. Terms of Reference and Scope of Work for the ESIA Study

This ESIA Study was carried out in accordance with the Environmental Management Act (EMA) (7 of 2007) and its 2012 EIA Regulations (Government Gazette (GG) No. 4878 GN No. 30).

The scope entails the process to be followed in pursuit of obtaining an ECC for the proposed project (development) which are phased in two stages, namely the scoping stage, and detailed ESIA stage. These will be carried out in accordance with the existing, relevant and governing standards. The scope of work for the ESIA entails the following, as also presented in the Terms of the Reference for this project's ESIA Study:

- Environmental Baseline Assessment and Mapping
- Public and Stakeholders Consultation and Disclosure
- Environmental Scoping Report (with specialist inputs)
- Institutional, policy and regulatory framework review
- Environmental aspects identification and impacts ranking, and determine the need for specialists
- Detailed/Full Environmental and Social Impact Assessment (DESIA) with specialist inputs
- Conduct Specialist Assessments where required (Socio-economic, hydrogeological, archaeological, land use planning/resettlement)
- Capacity Building Framework
- Gap Analysis (institutional and technical)
- Develop a Grievance Redressal Mechanism (GRM)
- Develop a Resettlement and Compensation Action Plan
- Develop a costed Environmental and Social Management Plan (ESMP)
- Develop an Environmental and Social Monitoring Framework
- Monitoring, Evaluation, Assessment and Learning Framework.

Furthermore, the scope of work for the ESIA and ESMP development will includes the applicable standards enshrined in the AfDB Integrated Safeguards System (ISS) policies and as per the EMA No. 7 of 2007 and the 2012 EIA Regulations as the overarching guideline documents.

ESIA and ESMP development will also be guided by the following guides and standards:

- International Finance Corporation (IFC) Environmental and Social Standards, and
- International Conventions and Protocols to which the Namibian Government is a Signatory such as the UN Framework Convention on Climate Change, etc., and International Convention on Biological Diversity.

After submitting an application for ECC to the DEAF, the first stage in the ESIA process is to submit an Environmental & Social Scoping Report. This report provides the following sections/chapters (Table 1 below):

1.6. Structure of the ESIA Report

Table 1: Sections within Scoping Report

Description	Section of the Report
Introduction	Chapter 1
Project Location and Background	Sub-Chapter 1.2
The need and desirability of the proposed project	Sub-Chapter 1.3
Aim of the ESIA Study	Sub-Chapter 1.4
Environmental Assessment Practitioner / Consultant	Sub-Chapter 1.5
Terms of Reference (TOR) and Scope of Work for the ESIA Study	Sub-Chapter 1.6
Approach and Methodology for the ESIA Study	Chapter 2
Description of Project Activities	Chapter 3
Alternatives considered for the proposed project in terms of no- go option, design, route and service and infrastructure	Chapter 4
The applicable legal framework (laws, policies and guidelines) pertaining to the project	Chapter 5
Description of the receiving environment: biophysical and social environments in which the proposed activity will be carried out	Chapter 6
The public consultation and engagement process followed (as described in Regulation 7 of the EMA Act) whereby I&APs and relevant authorities are identified, informed of the project and provided with a reasonable opportunity to give their concerns and opinions on the project	Chapter 7
The identification of potential impacts, impact assessment methodology, impacts description, and assessment. The management and mitigation measures are provided in the ESMP.	Chapter 8
Recommendations and conclusions to the report	Chapter 9
Data Sources (List of References)	Chapter 10

For successful execution of the ESIA Study which leads to the issuance of the ECC, the methodology applied is provided under the next chapter.

2. APPROACH AND METHODOLOGY FOR THE ESIA STUDY

The ESIA Study is done to ensure that environmental and social issues are taken into consideration during the development and implementation of all project activities, i.e., planning, design, construction and operational phases. The ESIA is carried out as required by the EMA, its 2012 EIA Regulations and the AfDB Environmental and Social Safeguards. The Study used a participatory approach involving wide consultations with interested and affected stakeholders and or parties, non-governmental organizations (NGOs, line ministries, local authorities, the implementing agency (MAWLR) and primary beneficiaries and their political and traditional representatives. This was done to ensure that the locals from the project communities in the areas are included in the process.

In addition, the D&P Environmental Consultants has been involving the Planning Engineers (Element Consulting Engineers) throughout the ESIA process to provide guidance on important considerations in design that may relate to environmental and social risk factors identified.

To ensure successful completion of the ESIA Study and obtain the ECC for the proposed project, the overview of the adopted ESIA process is shown in Figure 2.

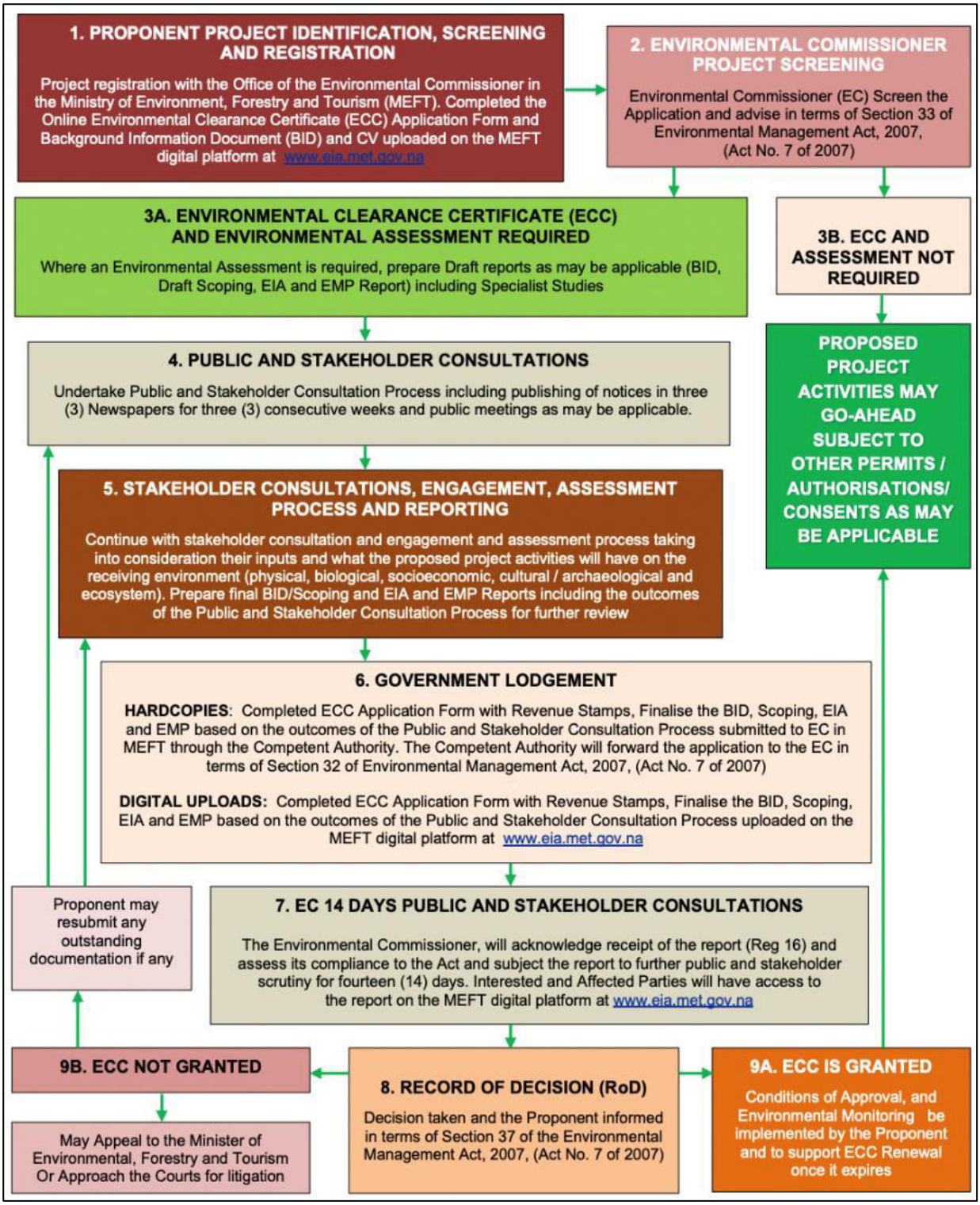


Figure 2: The EIA Process in Namibia to be followed for the project ESIA Study

According to the Environmental and Social Management Framework (ESMF) for the NWSSP prepared by Kasinganeti et al (2019) specifies that the NWSSP activities (i.e., projects such as the Katima-Ngoma Phase 3 & 4) were re-categorized or re-classified in 2022 to Category 1 given the potential resettlements impacts and the nature of the project, under the AfDB Operational Safeguards System on environmental and social assessments. This means that these projects' impacts are likely to have detrimental site-specific environmental

and / or social impacts. Thus, requirements to minimize identified and evaluated significant impacts by undertaking a scoping assessment.

2.1. ESIA Study Inception

The key kick-off meetings were held with the Proponent who is also the project implementing agency (MAWLR) as well as the Planning Engineer. These meetings were aimed at confirming the project participants and teams, as well confirmation of the ESIA Study schedule and agreement on milestone dates. The meeting with MAWLR also served as a clarification opportunity for certain aspects of the technical proposal for the ESIA Study, and set up liaison and communication procedures. The inception meetings also allowed for pre-identification of key stakeholders for consultation and set procedures, venues, and dates for public consultation processes.

Some correspondences were exchanged prior to the meeting wherein deliverables and preparatory documentation have also been pre-discussed and presented at the meeting including the agenda.

The available latest background information on the project were obtained from the MAWLR, and these included the following:

- Proposed infrastructure location and maps;
- Preliminary design (received by the Environmental Consultant from Element Consulting Engineers);
- Relevant project information and past reports (also provided by Element Consulting Engineers).

The Environmental Consultant prepared the meeting minutes and distributed these to the participants for comments before adopting the contents of the discussion as mutually agreed.

2.2. Preliminary Assessment and Desktop Review (Project Screening and Baseline Assessment)

The various relevant existing latest data including those received at the start-up meeting will be studied in preparation for the site visits. This data will include inter alia:

- Aerial photographs (of sufficient clarity to decipher details at the appropriate scale)
- Flood line and rainfall data and maps
- Community information
- Sensitivity mapping
- Census data and statistics
- Applicable water supply master plans
- Cadastral maps of towns and settlements
- Planned development initiatives in the project area
- AfDB manuals and guidelines
- Namibian legal and policy frameworks.

The data above has been analysed in an integrated manner and multiple requirements incorporated in the most feasible possible way. Following this, options will be able to be devised for detail investigation and anticipate potential risks and strategies to mitigate their impacts.

2.2.1. Literature Review

Various related documents such as reports, maps and publications pertaining to the project site area and region at large on the topography, climate, land use, and socio-economic setup of the project site has been reviewed

to gather information on the baseline, alternatives, how to mitigate the impacts, decommissioning, and rehabilitation plan. The literature review helped in undertaking components and areas that would deserve attention during field assessment.

2.2.2. Site Reconnaissance Visit

The site reconnaissance visit is a vital component of the project and was undertaken concurrently with the data collection and analysis. This was done for the Environmental Consultants with the project environments, and carry out a site baseline inspection. The key environmental fatal flows had been noted to help with preparation of preceding processes such as public consultation. For this project, all project site for infrastructure such as existing reservoirs, pump stations and other facilities were assessed. The Environmental Assessment Practitioner (EAP) visited the anticipated pipeline right of way and supply sites to identify environmental fatal flaws, displacement of properties/infrastructure, and loss of land supporting livelihoods as well as establish the need for a resettlement and compensation action plan.

The site reconnaissance visit was combined with the public consultation meetings trip, i.e., the site visit was preceded by the consultation meetings. The site visit comprised of project members and task leaders for the various components. The objectives of the following among others are as follows:

- Familiarisation of the project team with the project environment
- Confirm and review early assumptions from the desktop studies
- Investigation and traversing of route alignment options from desktop analysis
- Identify community focal points and consultative areas
- Initiate the environmental scoping for the EIA process
- Identify any major/key environmental fatal flaws
- Investigate locations of required offtakes

2.2.3. Legislative Frameworks Compilation

A preliminary Policy, Legal and Administrative review was conducted during the initial stages of the Study. This was done to ensure that any preceding activities and assessment are conducted in compliance to the required legal frameworks and AfDB standard guidelines and policies. The legal compilation was put together for the assessment guiding document which include but not limited to:

- Relevant national (and institutional) laws
- AfDB standards of ESIAs.

2.2.4. Identification and mapping of Environmental sensitivities

A rapid environmental screening was conducted at the project site to identify any key environmental and social fatal flaws that may be triggered by the proposed project. Preliminary sensitivity mapping was also used to identify any major fatal flaws that may significantly affect assessment plan and structure.

2.3. Public and Stakeholders Consultation and Disclosure

The consultation process is crucial in this assignment as it establishes the stakeholders and Interested and Affected Parties' (I&APs) engagement procedures. All pre identified stakeholders were notified during and afforded an opportunity to register and provide comments to the Study. Apart from MAWLR and NamWater, the EAP identified other key stakeholders such as Regional and local leaders in the region, as well as specific interest groups that would benefit or be affected by the project were consulted as summarized in Table 2.

Table 2: Summary of consultation activities conducted for the Katima-Ngoma ESIA

Consultation Activity	Consultation Level	Date or Period of Activity
First Engagement with the Regional Stakeholders to notify them of the commencement of the ESIA Study	Regional and Local (Constituency)	21 - 23 June 2023
Newspaper notifications (*New Era* and *Windhoek Observer*)	National	29 June & 06 July 2023
Circulation of information to stakeholders for the upcoming ESIA Study engagement meetings and notifications of meetings to the public/communities	Regional	28 June – 03 July 2023
Stakeholders' Meeting: Zambezi Regional Council, MAWLR's Directorate of Water Supply & Sanitation Coordination (DWSSC) and NamWater in Katima Mulilo	National and Regional	07 July 2023
Four (4) Public / Community Consultative Meetings in Muyako Khuta, Ngoma Khuta, Kabbe Constituency Office, Lusese Khuta as well as a one-on-one project briefing and interactive session in Katima Mulilo	Local (engagement meetings with local stakeholders and communities)	10 - 11 July 2023 (meetings) 12 July 2023 (one-on-one) session with neighbouring household to the water reservoir site in Katima Mulilo)

The stakeholders/I&APs were consulted through the following means (as detailed under the Public Consultation Participation and Engagement section, i.e., Chapter 7):

2.3.1. Public Consultation and Disclosure

A Public Consultation and Disclosure Plan (PCDP) is required for the ESIA Study, which will be used to (i) describe local requirements for consultation and disclosure; (ii) identify key stakeholder groups; (iii) provide a strategy and timetable for sharing information and consulting with each of these groups during various phases of the project; (iv) describe resources and responsibilities for implementing the PCDP activities; and (v) detail reporting/documentation of consultation and disclosure activities. This methodology is outlined below and under the Consultation/Participation and Engagement Chapter.

2.3.2. Detailed Stakeholders Mapping and Analysis

The EAP provided an inventory of key stakeholder groups who were informed and consulted about the project. Key stakeholders can be affected communities, local organizations, NGOs and government authorities, politicians, commercial and industrial enterprises, labour unions, academics, religious groups, national social and environmental public sector agencies and the media.

The stakeholders mapping exercise will be participatory through using data from the reconnaissance site visit and consultation with MALWR on key stakeholders, implementing agencies and past engagements. The main stakeholders and interested & affected parties (I&APs) are as follows:

- MAWLR: Directorate of Water Resources Management
- MAWLR: Directorate of Water Supply and Sanitation
- NamWater
- Ministry of Environment, Forestry and Tourism and representatives

- Regional and local authorities; Zambezi Regional Council, Constituency Offices, Town Council, Settlements offices, and respective Traditional Authority
- Village Development Committees (VDCs)
- NGOs and, CBOs
- Primary beneficiaries / community representatives.

To ensure that there is adequate circulation of project information, public meetings and project development proposals, a series of notification processes were held/conducted. Therefore, to effectively reach out to all stakeholders and Potentially Interested and Affected Parties (I&APs), the modes of information sharing and notification during the ESIA Study are listed below:

2.3.3. Newspaper Announcements

As per the Environmental Management Act No. 7 of 2007, notification to Interested & Affected Parties (I&APs) were notified through advertised notices for two weeks in *The Namibian* and *New Era* newspapers (in English Language).

2.3.4. Site Notices, Radio and Community Announcements

Site notices were erected within the project area and at strategically located information places. The site notices (A2) will be erected along the pipeline route, reservoir construction sites and administrative offices. The notices informed the I&APs about the ESIA process, and provided details of the public meetings and commenting period. The EAP coordinated with local community traditional leadership and constituency councilors to spread information about the project and consultative exercises. The notices were prepared in English for conveying in local languages such as Subiya and Silozi by the leaders (constituency councilors through radio announcements).

2.3.5. Background Information Document (BID)

A Background Information Document (BID) with detailed information on proposed project containing information on preliminary investigations, processes to be followed, and explain how I&APs can become involved in the project. The document was distributed to all pre-identified Interested and Affected Parties prior to consultation meetings and copies of the BID were also distributed in consultation meetings.

2.3.6. Public and Stakeholders' Consultation Meetings

Consultation meetings were conducted with stakeholders and the affected communities at large along the project route. These were held in a form of face-face meetings, questionnaires (attached to the BIDs), interviews and focus group discussions, depending on their nature, interests and roles and responsibilities in the project area. The statistics and tools or means used for the consultation and engagement process are provided under section of the Report (Chapter 7). The public consultation process also ensured that feedback meetings are held in target areas and affected areas to ensure that the scoping phase and reports are aligned to issues discussed and identified as provided under the respective chapters, i.e., public consultation and engagement (Chapter 7) and environmental and social impacts (Chapter 8). The issues raised during the consultation meetings will aid in the finalization of the project design by the engineer and confirm which ideas/alterations/improvements need to be incorporated into the final designs.

2.3.7. Feedback Meeting and Reports Validation

The draft Scoping Assessment report, ESMP and specialist assessments/inputs will be shared with the MAWLR, AfDB, project engineers, and the receiving communities for review and comment.

2.4. Environmental Scoping Phase

The Environmental Management Act No. 7 of 2007 requires that initial Environmental Scoping Report (ESR) / Environmental & Social Scoping Report (ESSR) is developed and submitted to the Environmental Commissioner (EC) in the Directorate of Environmental Affairs of the MEFT. The ESR will be informed by desk review of existing literature and previous ESIA reports including the 2019 SESA report and its ESMF prepared for the NWSSP.

Furthermore, the AfDB has outlined 5 safeguard requirements that clients are expected to meet when addressing social and environmental impacts and risks which include:

- Operational Safeguard 1 - Environmental and social assessment
- Operational safeguard 2 – Involuntary resettlement: land acquisition, population displacement and compensation
- Operational safeguard 3 – Biodiversity, renewable resources and ecosystem services
- Operational safeguard 4 – Pollution prevention and control, hazardous materials and resource efficiency
- Operational safeguard 5 – Labour conditions, health and safety.

The ESR also further provides a detailed description of the receiving environment, covering biophysical, social, economic and political issues surrounding the project area as detailed in the NWSSP' SESA.

Climate resilience and gender issues has also been articulated to ensure that climate sustainability and gender inclusion are key to the project implementation. Pre-identification of environmental and social aspects of the project is conducted during the scoping phase, to ensure that any affected aspects are clearly articulated and documented. Consequently, environmental impact assessment has been conducted. Using the IFC regulated Environmental and Social impact Assessment matrix, 2012.

2.4.1. Data and information Sources

The ESSR's successful completion will be informed by the collection of the following data, such as:

- General site layout, designs and routes
- Local authority planning maps, schemes and strategic development documents
- Demographic data, population distribution and growth estimates
- Waste quantities and characteristics
- Current needs and challenges (gender, youths, climate, socio-economic)
- Water resources
- Fauna and flora
- Archaeological and cultural heritage
- Sensitive receptors-GIS mapping and remote sensing analysis

The scoping study has addressed basic project information including: the general features and parameters of the proposed project; a basic outline of the required project scope and anticipated benefits and potential adverse impacts; and the status of technical issues. The study also identified what areas would require further detailed

and / or specialist studies (hydrological, environmental, ecological waste management, social impact assessment (including possible resettlement action plan), socio-economic impact assessment, geohydrological study, air quality assessment, noise and vibration studies, cultural/archaeological assessment, etc. and would provide an assessment of the completeness and level of confidence in existing data.

This scoping Report provides information to the public and stakeholders to aid in the decision-making process for the proposed project. The objectives of the scoping report are to:

- Provide a description of the proposed project and the site on which the activity is to be undertaken, and the location of the project on the site
- Provide a description of the baseline environment that may be affected by the activity based on literature review (i.e. desk study)
- Identify the laws and agreements that could impact on the project (or vice versa) and that have been considered in the assessment and preparation of this report
- Provide details of the public consultation process (comments and response trail)
- Describe the need and desirability of the activity
- Provide a high level of environmental and social impact assessment on feasible alternatives that were considered
- Report the assessment findings, identifying the significance of potential impacts and which potential impacts warrant further investigation
- If necessary, compilation of ToRs for the specialist studies to be conducted during execution of the Detailed/full ESIA.

2.4.2. Environmental Scoping Report

The guide from the NWSSP' SESA and ESMF were some of the documents used to inform these decisions, as the strategic assessment conducted previously for the platform gives a clear -cut cross impacts and aspects matrix. Scoping has been used to identify which potential impacts are relevant/significant to assess. The extent or depth of assessment will be (based on legislative requirements, international conventions, expert knowledge and public involvement), to identify alternative solutions that avoid, mitigate or compensate adverse impacts on biodiversity (including the option of not proceeding with the development, finding alternative designs or sites which avoid the impacts. Identification of safeguards and incorporating grievance redressal mechanisms in the design of the project, or providing compensation for adverse impacts) will also be included. The final derivation of the terms of reference for the environmental and social impact assessment will also be based on these findings.

Project risks and opportunities in the areas of technical, environmental, social, and other concern will also be identified and analysed based on the following, but not limited to:

- Current water supply and sanitation services status quo in the project area
- Gaps, shortfalls and challenges related to the above
- Demographics of the project area
- Socio-economic status of the project area
- Institutions' roles and capacities in the project area
- Site and route selection and alternatives

- Possibility of people's displacement and resettlement
- Site clearance and fencing
- Bulk earthworks and civils
- All mechanical and electrical work
- Chemicals to be used for treatment processes
- Solid and liquid waste disposal, including opportunities for recycling
- Air emissions (dust during construction)
- Bulk water pipelines
- Water infrastructure access and alternatives
- Housing (temporary)
- Construction yard, workshops and laydown areas
- Construction workforce and permanent workforce
- Sustainability of groundwater abstraction
- Review and evaluation of recommended groundwater abstraction rates
- Any other issue not listed above but identified as a concern.

The ESR also details the proposed mitigation options for all identified impacts. The resultant ESR will be shared with the Design/Planning Consulting Engineers (Element Consulting Engineers), MAWLR's Project Manager for the construction phase and for operations, NamWater's Project Manager, MAWLR environmentalist and AfDB for review and comments. The final ESR with inputs from MAWLR and AfDB will be shared with public, I&APs and stakeholders for review and commenting.

2.4.3. Environmental & Social Management Plan (ESMP)

The finalised ESR will determine the need for further specialist assessments, where there is no need for further assessments (Specialists) a detailed practical and concise ESMP will be developed.

The objective of the ESMP ensures compliance with the EMA No. 7 of 2007, AfDB Environmental and Social Safeguards, Equator Principles, the IFC Performance Standards on Environmental and Social Sustainability. The Environmental Consultant / EAP will develop an ESMP which follows on environmental flaws associated with the proposed project, which were identified through the Environmental Scoping Report. The Environmental (&Social) Management Plan (ESMP) will stipulate the organizational structure, planning and monitoring for environmental protection at the proposed farm area development and other areas of its influence. The aim is to ensure that the proponent maintains adequate control over the project operations to:

- Prevent negative impacts where possible
- Reduce or minimise the extent of impact during project life cycle
- Prevent long-term environmental degradation
- Ensure public safety and health is protected.

The ESMP will fully articulate the need to clearly outline the roles and responsibilities of all stakeholders to ensure that the EMP is fully implemented, this will ensure full compliance and monitoring of the project implementation during construction and operational phases. The ESIA and ESMP documents will be submitted as follows:

- HARDCOPIES: Completed ECC Application with Revenue Stamps, final BID, Scoping report, ESIA and ESMP based on the outcomes of the ESIA process. All documents are submitted to the Environmental Commissioner at MEFT through the identified competent Authority (MAWLR).
- DIGITAL UPLOADS: Completed ECC Application with Revenue Stamps, final BID, Scoping report, ESIA and ESMP based on the outcomes of the ESIA process. All documents are uploaded on the MEFT portal at www.eia.met.gov.na
- As regulated by the EMA No. 7 of 2007, where the ESR is not sufficient in addressing and detailing all identified impacts, a full/detailed ESIA is to be commissioned. The full ESIA combines all previous findings in the ESR since it follows similar procedures and requirements. However, in addition to the ESR there will be additional specialist assessment reports that may include vertebrate fauna and flora study, hydrological assessment, geohydrological assessment, archaeological impact assessment, resettlement action plan, traffic impact assessment, avian impact assessment and grievance address plan if required. The findings and recommendations from any commissioned specialist assessment is reviewed and incorporated into the Environmental and Social Management plan (ESMP) that has been developed for the proposed project.

The ESMP will also further provide a framework for compliance monitoring during the project implementation phase (construction). The consultant will undertake environmental monitoring and this ESMP will cover all potential impact identified the ESIA and it will guide on environmental and social monitoring program covering the following:

- Internal monitoring of the project
- External monitoring of the project
- Implement the grievance accounting mechanism
- Fostering a joint monitoring mechanism
- Identify all possible institutions, institutional arrangements and responsibilities for the ESMP implementation.

2.5. Detailed Environmental and Social Impact Assessment

A DESIA will be conducted by the Consultant and a DESIA Report will be compiled, as a stand-alone document, which can be included in the overall bankable feasibility study report for the project. The draft DESIA Report will be submitted to MAWLR for review and comments prior to submitting it to the public.

The DEISA stage of the work will include:

- On-going public participation and stakeholder engagement
- Close liaison with the project design team to refine alternatives and options for sites, routes, technologies etc. with the aim of minimizing negative impacts and maximizing opportunities.

2.5.1. Specialist Assessments

D&P Engineers and Environmental Consultants (the Environmental Consultant) shall assess the environmental acceptability of the proposed project and associated infrastructure. Additionally, the Consultant shall optimize the project site and pipeline routes, taking into consideration all aspects of the environment and shall indicate all possible mitigation measures. The consultant shall undertake specialist studies at the onset of the project as follows:

A. Fauna and Flora (Specialist assessment)

A fauna and flora study will be commissioned and species likely to occur in the area will be assessed. Field transacts and GIS maps will be conducted to establish vegetation types, plants, mammals, arthropods, reptiles and bird's species. The survey will provide information on general occurrence of species diversity and identify species of conservation concern. The assessment will:

- Describe the natural environment in terms of climate, basic geology/soil conditions, topography, water drainage features, ecology and any other environmental conditions
- Undertake a desktop assessment to identify potential priority species, habitats, ecological corridors, and protected areas, including international, national, regional and local datasets and plans
- Undertake a field survey and identify all species observed in the study area fauna (including avifauna) and flora
- Provide a description of each habitat type including dominant, indicator, threatened, protected and rare (including regional and local endemic) species, vegetation communities and or habitats
- Compile a list of invasive species, Red List, protected and/or endemic species for each flora and fauna (including avifauna) community
- Document the status of all relevant species (e.g. IUCN Red List, national or local protection status, regional and local endemism etc.)
- Identify and assess all ecological impacts (direct, indirect and cumulative) of the construction and operational activities of the proposed development on flora, fauna (including avifauna)
- An impact summary table must be provided, discussing expected impacts before and after mitigation
- Propose mitigation measures considering ecological impacts identified including monitoring indicators. Ensure that mitigation measures are practical and measurable
- List specific legislation and permit requirements that are relevant construction and operation of the Northern Electricity Distributor (NORED) Substation.

B. Culture and Heritage sites (specialist assessment)

The Heritage and archaeological impact assessment will be to identify and locate sensitivities of heritage resources within the limit of the project area that could be negatively affected by the project development.

The assessment will also establish heritage significances of possible resources and their vulnerability, estimate the extent of possible impacts, establish cumulative impacts and suggest practical management actions for heritage resources conservation (if any is identified).

C. Socio-economic Assessment

The approach to the Social Impact Assessment Study is based on IFC Principles on Environmental and Social Safeguards. These guidelines are based on international best practices. The key activities in the SIA process are to be detailed as follows:

- The Consultant will conduct public consultation process this process as per requirements set out in the Environmental Management Act, 2007 of Namibia and Environmental Impact Assessment Regulations of 2012
- The consultant will be responsible for all the documentation, communication and facilitation of the public consultation process

- Identify and describe the characteristics of the receiving social environment in terms of but not limited to; demographic profile, education, healthcare, housing, water, sanitation, electricity and employment profile
- Advertise the project and the Public Consultation Process (PCP) in all major local newspapers and other media as appropriate
- Identify, arrange and facilitate public meetings to be held as well as the venues for these meetings
- Compile minutes of the meetings and send to all participants
- Describing and obtaining an understanding of the proposed intervention (type, scale, location), the settlements and communities likely to be affected by the proposed project
- Collecting baseline data on the current social and economic environment
- Identifying and collecting data on the key potential social issues associated with the proposed project through consultation with affected individuals and communities
- Assessing and documenting the significance of social impacts associated with the proposed intervention; and Identifying alternatives and mitigation measures. In this regard the study involved
- Review of project related information, including other specialist studies.

D. Surface and Groundwater

A surface and groundwater study will be conducted to establish the current setting of the receiving environment. This will allow identification of sensitive environment to water pollution, overuse of water as well as transboundary water resources issues. Aspects water supply and sanitation will be included in the study, to ensure that water supply issues are adequately addressed and mainstreamed into the project. The study will detail the following:

- Drainage and Hydrology sensitivity
- Groundwater sensitivity
- Rainfall dynamics, Catchment assessment, Flood Encroachment Mapping
- Pollution risk analysis
- All specialist studies identified in the scoping study.

E. Climate Change Assessment

Mainstreaming of climate change impacts would be conducted to provide baseline data on climate variability impacts on the project. The Environmental consultant will:

- Analyze potential in-combination effects of both project and future climate change on receiving environment with a focus on location and operational impacts
- Analyze Greenhouse Gases (GHGs) performance
- Analyze resilience of project design features, construction materials and planned operational processes to the predicted consequences of climate change
- Recommend mitigation, compensation, enhancement and monitoring related to projects predicted in-combination impact with climate change
- Recommend mitigation, compensation or monitoring related to project GHGs emissions.

2.5.2. Deliverable-DESIA

As regulated by the EMA No. 7 of 2007, where the ESR is not sufficient in addressing and detailing all identified impacts, a full Detailed Environmental and Social Impact Assessment (DESIA) is to be commissioned. It is anticipated that for this proposed development, a DESIA will combine all previous findings in the ESR since it follows similar procedures and requirements. However, in addition to the ESR there will be additional specialist assessment reports as detailed above, these will include intrinsic details such as vertebrate fauna and flora study, hydrological assessment, geohydrological assessment, archaeological impact assessment, resettlement action plan, traffic impact assessment, avian impact assessment and grievance address plan, if required. The findings and recommendations from any commissioned specialist assessment is reviewed and incorporated into the ESMP that has been developed for the proposed project.

A. Deliverable – ESMP: The objective of the ESMP will be to ensure compliance with the Environmental Management Act No. 7 of 2007, and the AfDB Environmental and Social Safeguards, as well as the Equator Principles, and the IFC Performance Standards on Environmental and Social Sustainability. The Environmental Consultant will develop an ESMP which follows on environmental flaws associated with the proposed project, which were identified through the Environmental Scoping Report. The ESMP will stipulate the organizational structure, planning and monitoring for environmental protection at the proposed farm area development and other areas of its influence. The aim is to ensure that the Project Proponent (implementing agency) maintains adequate control over the project operations to:
    - To prevent negative impacts where possible
    - Reduce or minimise the extent of impact during project life cycle
    - Prevent long-term environmental degradation, and ensure public safety and health is protected.

Environmental and Social Management Plan (ESMP) is a tool utilised to mitigate and/ or enhance the potential impacts of the proposed water supply scheme. Therefore, a project specific and practical Environmental and Social Management Plan (ESMP) has been developed by the Environmental Assessment Practitioner after the consultation and public participation process. The objective of the ESMP will be to ensure compliance with the EMA No. 7 of 2007, AfDB Environmental and Social Safeguards, Equator Principles, the IFC Performance Standards on Environmental and Social Sustainability. The aim is to ensure that the proponent maintains adequate control over the project operations. To ensure that the ESMP is effectively implemented and full compliance of the ESMP, an Environmental Control and Monitoring (ECM) is also developed. The ESMP fully articulates the need to clearly outline the roles and responsibilities of all stakeholders to ensure that the ESMP is fully implemented, this will ensure full compliance and monitoring of the project implementation during construction and operational phases.

MAWLR will ensure that the stakeholder/public consultation, grievance redressal and community-MAWLR/NamWater liaison, periodic compliance monitoring, auditing and reporting will be conducted by the Environmental Consultant, together with the appointed Environmental Control Officer (ECO) for the contractor responsible for the construction and upgrading of the water supply infrastructure.

The ESMP will also further provide of a framework for compliance monitoring during the project implementation phase (construction). The Environmental Consultant will undertake environmental monitoring and this ESMP will cover all potential impacts identified the ESIA and it will guide on environmental and social monitoring program covering the following:

- Internal monitoring of the rural water supply scheme
- External monitoring of the project
- Implement the grievance accounting mechanism
- Fostering a joint monitoring mechanism
- Identify all possible institutions, institutional arrangements and responsibilities for the ESMP implementation during construction and operational phases
- The Environmental and Social control will allow for monthly environmental compliance inspection during the construction phase, development of bi-annual reports and the subsequent renewal of the ECC.

B. Report Submission: The full detailed ESIA, ESMP, specialist assessment reports and competent authority letters for studies such as heritage and archaeological assessment will be submitted to MEFT for review as follows:

- HARDCOPIES: Completed ECC Application with Revenue Stamps, final BID, ESIA, specialist assessment reports and ESMP based on the outcomes of the ESIA process. All documents are submitted to the EC in MEFT through the identified competent Authority.
- DIGITAL UPLOADS: Completed ECC Application with Revenue Stamps, final BID, ESIA, specialist assessment reports and ESMP based on the outcomes of the ESIA process. All documents are uploaded on the MEFT portal at www.eia.met.gov.na.

The description of project activities, ranging from designs and technology as well as services and infrastructure requirements for the implementation of the project are provided under the next chapter.

3. PROJECT DESCRIPTION

As presented under Chapter 1, the proposed water supply network upgrade in the Zambezi Region will comprise of certain activities and associated infrastructures as provided by Element Consulting Engineers per project phase (Phase 3 and Phase 4). These project activities are provided under this chapter (subchapters/sections). The project activities will be carried for the construction/upgrading of the water supply scheme (under MAWLR) in preparation for the operational and maintenance phase (by NamWater).

3.1. Current Status of the Water Infrastructure along the Project Area

The overview of the visited areas of the project route and some existing water infrastructures and associated/supporting infrastructure (road) in the areas are shown in Figure 3 and Figure 4 below.

Figure 3: The general overview of the project route with some old water infrastructure, associated road infrastructure and floral diversity along the road servitude

Figure 4: The overview of the visited project route with private properties along or falling within the planned pipeline around the Siyoka and Silumbi areas

The properties above are within the road edge (at 17°44'10" S 24°32'25" E) and homestead yard at 17°44'10" S 24°32'25" E within 12m of the road reserve area (recommended for use). Therefore, this will trigger requirements for compensation and resettlement, thus, liaison will need to be made with Roads Authority so that people's homesteads can be avoided.. Therefore, this would trigger requirements for compensation and resettlement. In the final design, the Engineering team will revise the pipeline routes passing too close to people's homes and exclude these from the design, thus, avoiding property displacement and resettlement plan and compensation policy.

3.2. Phase 3: Description of the Activities

This phase of the project comprises the extension of the rural water supply network between Katima Mulilo and Ngoma, on the Botswana border in the Zambezi Region. The project area for Phase 3 comprises an area of approximately 1,220km^2 and stretches from Bukalo to Ngoma including an area of 10km on either side of the B8 and D3510 road from Bukalo via Kabbe, Lusese along the D3512 road to Ikumwe.
The total length of the pipe will be 117km of bulk feeder lines, with 150km of branch feeders. Approximately 667 manifolds will be installed, providing water to approximately 18,500 people.

In terms of activities anticipated for this phase, these are presented below as sourced from the information provided by the Planning Engineer.

3.2.1. Civil: Structural/Hydraulic Design

The outline of the resulting design parameters obtained for each of the hydraulic/structural components identified, planned and designed as part of the implementation of this project are as follows:

F. Bulk Water Storage

The relative location of the reservoir has been determined in accordance with the following parameters:

- Relative position with regards to planned pump directions to Muyako and Ngoma.
- Availability of power for pump station

G. Dimensioning and Design

Extensions to the bulk storage infrastructure comprises additional storage to be supplied at Bukalo, as part of the bulk supply to Bukalo as well as the associated rural water supply for both phases 3 and 4 as both phases are fed from Bukalo as a central distribution point.

The circular reservoir shape is by far the best to achieve effective water circulation to prevent “dead zones”. To further aid circulation, both the inlet and outlet pipes end in elbows placed parallel to the reservoir walls in order to cause a circular flow in the reservoir. The elbows face opposite directions so that the pull of the outlet and the push of the inlet are in the same direction.

The invert level of the outlet pipe is positioned 150mm above the reservoir floor level, to minimize the intake of sludge accumulating on the bottom. This means that the reservoir has a dead zone of 150mm, or (4.6%-5.6% of capacity), which is an acceptable figure.

A 200mm diameter scour pipe, 300mm diameter overflow pipe and a “fishbone” sub-floor drain of 100mm diameter will be installed. The drain will be installed just below a 200mm thick no-fines concrete layer under the floor surface bed. Both these pipes will drain to a manhole situated such so that water can drain away under gravity. All piping connected with the reservoir will be Grade 316 stainless steel, except of course the sub-floor drain. The round reservoirs with the sizes mentioned above were structurally analysed.

The structurally advantageous “ring in tension effect” transpired in these sized reservoirs, with wall hoop maximum horizontal tensile forces of N = 573kN/m and 830kN/m respectively, and a maximum vertical bending moment at top of foundation M = 101kNm/m and 174kNm/m respectively was calculated as design forces.

The tensile stresses required 400mm and 350mm thick reservoir walls respectively. A maximum concrete crack width of 0.2mm as adopted as the design requirement in accordance with the BS8007 Code to evaluate the reinforcement quantity, and that was found to be largely the dominant design criteria in determining the reinforcement quantities in all elements of the reservoir.

Considering the planned size of the reservoir as determined above, it is foreseen that a circular reservoir will be the most cost-beneficial, with the dimensions being summarised in Table 3 below:

Table 3: Bukalo Reservoir Dimensions (Element Consulting Engineers, 2023a)

Component	Dimension
Volume (m^3)	1,600
Diameter (m)	19.25
Height (m)	5.5

Levels

Final operational levels are subject to a detail contour survey of the area, but have provisionally been determined to be as shown in Table 4 below.

Table 4: Bukalo Reservoir Operational Levels (Element Consulting Engineers, 2023a)

Component	Dimension
Full Supply Level (m)	945.41
Floor Level (m)	939.91
Non-overflow Level (m)	945.56

Geotechnical

A Geotechnical Consultant and laboratory will be commissioned as part of the Detail Design Stage to conduct a geotechnical investigation and report at the reservoir sites to establish founding conditions and other soil characteristics. Investigations shall be made by means of test holes to be excavated by hand to investigate the soil horizons and gather samples for soil classification purposes, and dynamic cone penetrometer (DCP) tests will also be conducted.

From the DCP results the in-situ soils' bearing capacities will be established to determine what soil improvements will be required given the calculated footing bearing of between 103-107kPa. If low to moderate differential settlements (e.g., NHBRC Site Class C, <5mm) are found, foundations will need to either be founded on engineered backfill in foundation trenches, or within the expected consolidated silty sandy gravels layers at depth at an appropriate depth.

Provisionally, for preliminary design purposes, we allowed for excavation in the in-situ soil to about 1.0m depth below the NGL and replace with an imported G5 (PI<8) quality material to 150mm above ground level, compacted in layers not exceeding 150mm thick (compacted layer thickness) to a minimum of 95% of Mod. AASHTO density to reach a design bearing capacity of about 250kN/m^2, compared to the calculated maximum bearing of about 110kN/m2 under Serviceability Limit State (SLS) conditions.

H. Elevated Tank Storage

The provision of elevated tanks with composite manifolds to enable water supply to individual water users and will comprise the following:

- Optimised Locations
- 5x new Elevated tanks, 25m high, constructed from sectional steel panels, which includes the replacement of the existing elevated tank at Bukalo.
- The existing elevated tank at Bukalo has been assessed and will not be rehabilitated due to the degree of deterioration, and limited height of 10m.
- The existing elevated tank at Bukalo will accordingly be replaced by a new tank with a capacity of 100m3
- All other newly planned elevated tanks shall have a capacity of 40m^3

I. Pipelines

The distribution network comprises a system feeding directly into demand nodes, as well as filling the tanks based on level-control mechanisms in the tanks.

The pipework has been optimised by balancing life-cycle costs with capex, rendering an optimal network with flow velocities varying between 1.0m/s to 1.6m/s. The optimal pipe network comprises a combination of diameters from 200dia uPVC Class 9 to 75dia HDPE Class 10 as shown on the general layout in Figure 5

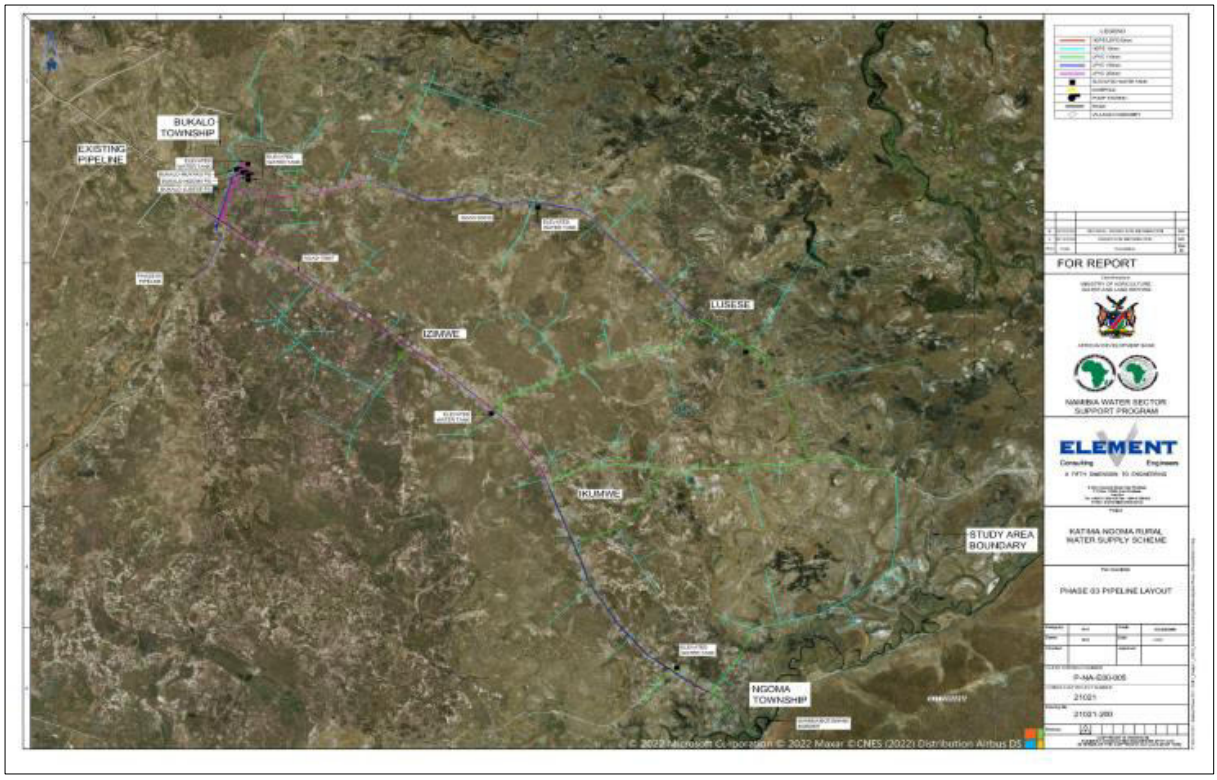
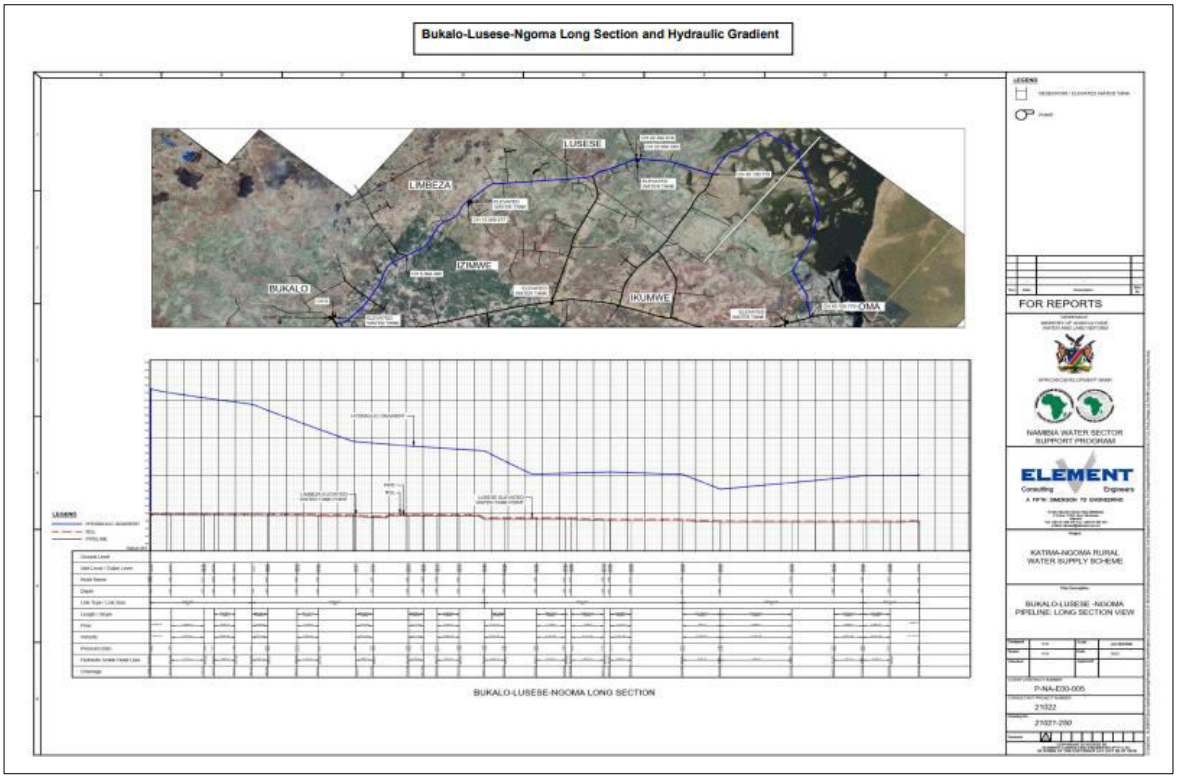


Figure 5: The general pipeline layout for Phase 3 (Element Consulting Engineers, 2023a)

Hydraulic gradients have been produced for the main feeders, indicating the residual heads throughout the scheme as shown in Figure 6.



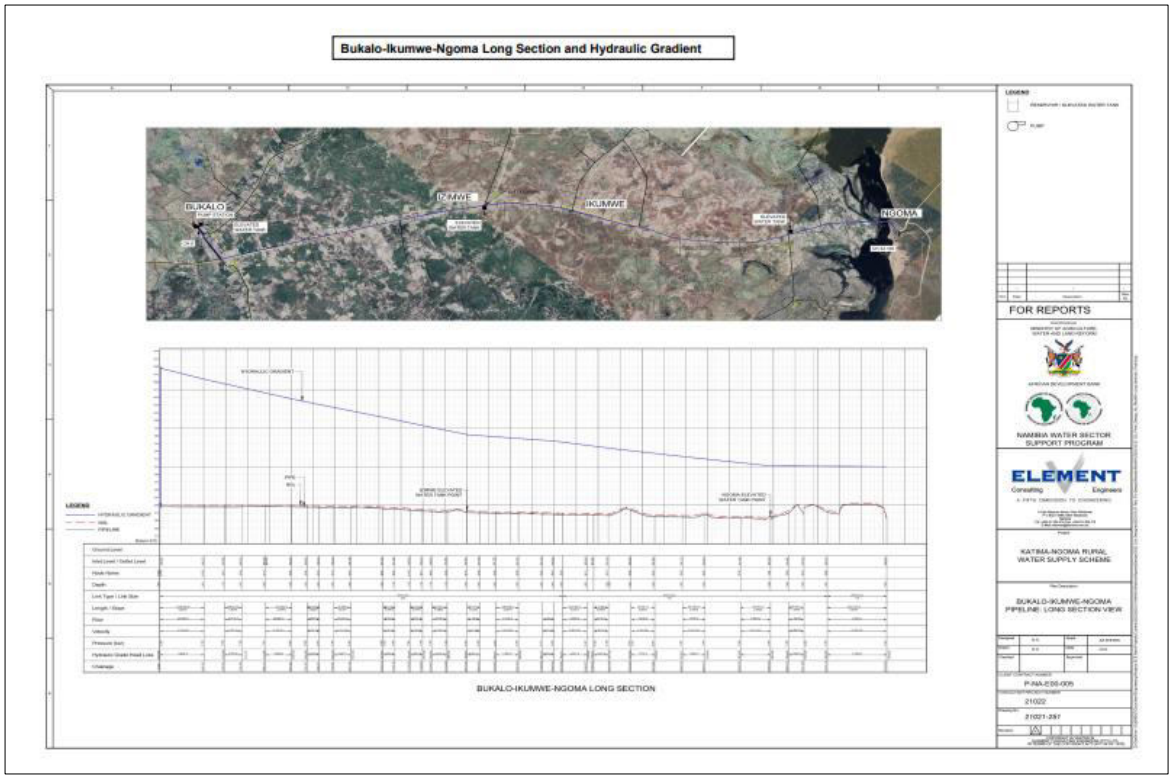


Figure 6: The long sections and hydraulic gradients for Phase 3 (Element Consulting Engineers, 2023a)

J. Manifolds Distribution Points

All manifolds are fed directly from the single direct distribution network when the pumps are running or via the same network feeding back from the newly planned elevated tower tanks via a common floor level in/outlet. The pressures at the manifolds will accordingly vary between 2.5bar and 9bar depending on its relative location to the main feeder pump stations.

The manifold's positions were determined to provide households within the project area with domestic water within a range of not more than 500m. Only households who applied for water were considered in determining the positions of the manifolds. Each manifold consists of six (6) off-takes to supply six (6) households. Provision for additional off-takes will be allowed at each manifold.

All manifolds with their associated valves and water meters will be in a lockable cage on a concrete slab. Each user will have a valve with a valve lock on the outside of the cage to control his water usage.

An investigation into a vandal-proof design of the cages has been carried our rendering the following outcome:

- The current design pertaining to vulnerability to vandalism is inadequate.
- Several alternatives, comprising the following, have been considered:
    - Bigger/stronger steel profiles and associated mesh than the current specification of Mentis Florex Ref 72 Mesh Screen, welded to 40 x 40 x 5mm equal leg angle iron profiles. In this regard it is planned to use Mentex Ref 1/300D or equivalent General-Purpose Mesh. The angle iron profiles considered are similar to the existing profiles
    - Concrete manholes with heavy duty cover to have the water meters inside the manholes. The taps were planned to be installed inside small cages protruding from the walls on the outside of the manhole. In this regard access to and reading of the water meters would pose a challenge for both the consumers and the water meter readers

- A vault-like room with a standard door and roof with water meters locked inside and taps protruding from the walls to the outside. Similar to the manholes, the taps have been regarded to be lock into smaller cages fitted against the wall.

- Having considered these options on the criteria of functionality, durability, longevity and cost, it has been decided to opt for the stronger-design mesh cages as described above

K. Pump Stations

The Bukalo pumps tation will ultimately supply water to the three main distribution network lines namely Bukalo-Lusese line, Bukalo-Ngoma line and Bukalo-Muyako line.

Required provision will be made in the pump station for the Bukalo-Muyako line but the pumps will only be installed during Phase 4.

The pumps are selected based on the pump duties as determined for direct nodal demands in the distribution network as well as the fill the elevated tanks. The pumps shall have a VSD-driven motors and shall either be vertical-multistage pumps or end suction close coupled single stage pumps.

The duties for the pump station to the three respective distribution lines, are complex as it comprises two distinct components:

- Feeding into direct beneficiary nodes.
- Filling elevated tanks.

The design provides for the utilisation of VSD's to enable the wide variety of duties to be catered for. Consequently, the respective configuration, pump duties, efficiency, and power requirements are portrayed in Table 5 below:

Table 5: Phases 3 & 4 - Pump Duties (Element Consulting Engineers, 2023a)

Pumpstation	Pump	Flow (l/s)	Head (m)	Efficiency (%)	Power (kW)
Bukalo-Lusese P/S	1	11.6	87.2	78.3	9.6
(2+1) Config	2	11.6	87.2	78.3	9.6
	Total	23.2			19.1
Bukalo-Ngoma PS	1	9.7	90.0	76.7	11.5
(2+1) Config	2	9.7	90.0	76.7	11.5
	Total	19.5			22.9
Bukalo-Muyako P/S	1	5.5	90.0	74.6	7.2
(1+1) Config	Total	5.5			6.0

The head include both static and frictional head loss. The project area is extremely flat and most required head is due to the frictional head loss within the pipelines.

Two (2) of the distribution line pump sets will consist of 2 (two) operational pumps with a third as a standby pump to be cycled automatically. The Bukalo-Muyako boosterpump station will only consist of 1 (one) operational pump and one standby which will also cycled automatically.

A diagrammatic presentation of the proposed pump layouts and the configuration is portrayed in Figure 7.

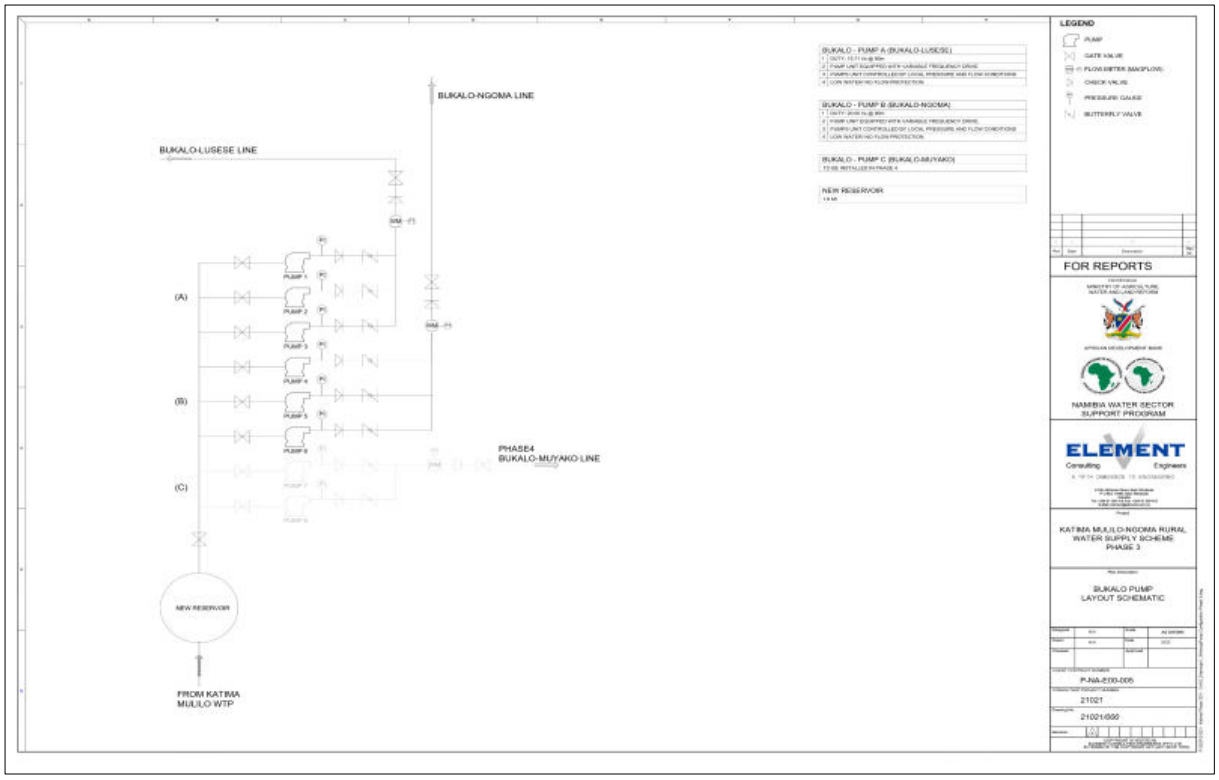


Figure 7: The diagrammatic layout of the pump stations for Phase 3 (Element Consulting Engineers, 2023a)

3.2.2. Electrical (Electronic)

The description on designs for the available power supply to the pump stations and reservoirs herein are based on a 33kV NORED distribution power line between Katima-Mulilo and Ngoma with information obtained from NORED. However, these are subject to final confirmation.

A. Bulk Power Supply

The existing electrical infrastructure comprising 33kV overhead lines can be extended to the proposed pump stations and reservoirs. The existing overhead lines have adequate capacity to cater for the new infrastructure, with transformers to be provided at the respective sites.

Pole-mounted transformers will be required at each of the sites, with the total capacity at Bukalo being 100kVA and that of Ikumwe adequate to cater for 6kW pumps.

The pump motors will run at 400V; hence the transformers will need to step down to 400V. Each transformer will have a weatherproof meter and LV distribution box. A 3-phase approved meter will be installed in the LV kiosk for each transformer.

B. Pump Motors and Variable Speed Drives (VFD)

The pumps will be fitted with variable frequency drives (VFD's) for improved capacity control and energy efficiency.

The motor control centres (MCCs) will interface to the VFDs via a serial link or the network, and all safety interlocks will be hardwired.

The installation of variable frequency drives shall be strictly in accordance with the manufacturer's instructions and the lowest practical switching frequency shall be used.

The variable frequency drives shall have the facility to monitor the power consumption of the motor and drive with an accuracy of ±5%. Each drive shall have a kWh output for remote monitoring. The specifications related to climatic conditions pertains to the area provided in Table 6.

Table 6: Temperature conditions of the Phase 3 route area (Element Consulting Engineers, 2023a)

ITEM	PROPOSED DESIGN CRITERIA
Town/Area	Katima Mulilo, Namibia
Altitude	950m AMSL
Maximum outside dry bulb temperature	40°C
Minimum outside dry bulb temperature	3 °C

The natural ventilation should be able to keep the pumps cooled. Although differing from one manufacturer to another, the maximum temperature that a centrifugal pump can handle is around 120 degrees Celsius.

The VSDs, controls and switchgear shall be located within the instrumentation room adjacent to the pumps. Although they are highly efficient, (97% or higher) the VSDs will discharge some heat into the space which shall result in heat build-up if not addressed. The proposal is that the enclosed spaced shall be provided with passive ventilation in the form of louvres and possibly roof mounted wind turbines.

In addition to the passive ventilation, it is proposed that the instrumentation room shall also be provided with inverter type DX air conditioning to handle any additional heat build-up in the space.

C. LV distribution and switchgear

From the transformer, there will be LV PVC/SWA 4 core cables to the MCC inside the control building. All cables within the control building will run in PVC conduits and galvanised cable trays.

The MCC switchgear will comprise feeders, VSDs and LV incomer into the MCC. A separate Small Power & Lighting DB will be designed for lighting and small power loads for the new pump station control building.

D. Telemetry

The existing SCADA system at Katima-Mulilo WTW will be upgraded to accommodate the additional pump stations and reservoirs on the Katima-Ngoma Scheme. The mimicsof the SCADA at Katima-Mulilo will be updated and integrated with the new equipment at Bukalo as well as the respective elevated towers and bulk water meters being placed strategically.

On the overall mimic all the flows will be displayed in m^3/h, the status of the pumps will be indicated in a colour, i.e., green for running, blue for available, red for trip and orange for unavailable for automatic/remote operation. Telemetry system will be used to connect to PLC's and data radios that connect to Remote Terminal Units (RTU's)

In Table 7, is a summary of the existing and the new equipment to be monitored on this section of the scheme.

Table 7: Monitored Infrastructure Parameters (Element Consulting Engineers, 2023a)

Site	Equipment
Bukalo Pumpstation	5 x new pumps, heads, and flows
Elevated Reservoirs	3x Levels.
Bulk Water Meters	4x Water Meters at Strategic positions to be confirmed

Consideration will be given to look at new radio technologies to incorporate NamWater compatible SCADA to remote monitoring only of the sites via internet.

The SCADA System will also be used to trend and report on all analogue signals, i.e., flows, pressures, levels, and pump speeds. Furthermore, will stop, start and trips of pumps be logged on the SCADA system.

3.2.3. Mechanical

E. Elevated Tank Level Control

Standard mechanical level control valves shall be installed. The Level Control Valve shall be double chambered to power fully open at pre-set low level, and to shut off at pre-set high level regardless of valve differential pressure.

3.3. Phase 4: Description of Activities

The upgrade of the bulk conveyance capacity from Katima Mulilo to Bukalo comprises a review of the total potable water demand since the previous Phases 1 and 2 upgrades, designed in 2010 and commissioned in October 2015. The scheme designed and implemented partially in 2013-2015 comprised a rural water supply scheme with no limited provision for bulk supply to towns and villages in the area. Accordingly, provision has only been made for elevated towers in strategic locations in smaller villages such as Muyako, as part of the distribution network. Since no reservoirs and pump stations are planned as part of Phase 4, the focus in this section will only be on pipe networks and related elevated tanks.

3.3.1. Civil: Structural/Hydraulic Design

The outline of the resulting design parameters obtained for each of the hydraulic/structural components identified, planned and designed as part of the implementation of this project phase are as follows:

A. Pipelines

The distribution network comprises a system feeding directly into demand nodes, as well as filling the elevated tanks based on level-control mechanisms in the tanks. The pipework has been optimised balancing life-cycle cost with capex, rendering an optimal network with flow velocities varying between 0.7m/s to 1.5m/s. The optimal pipe network comprises a combination of diameters from 200dia uPVC Class 9 to 75dia HDPE Class 10 as portrayed on the general layout in Figure 8.

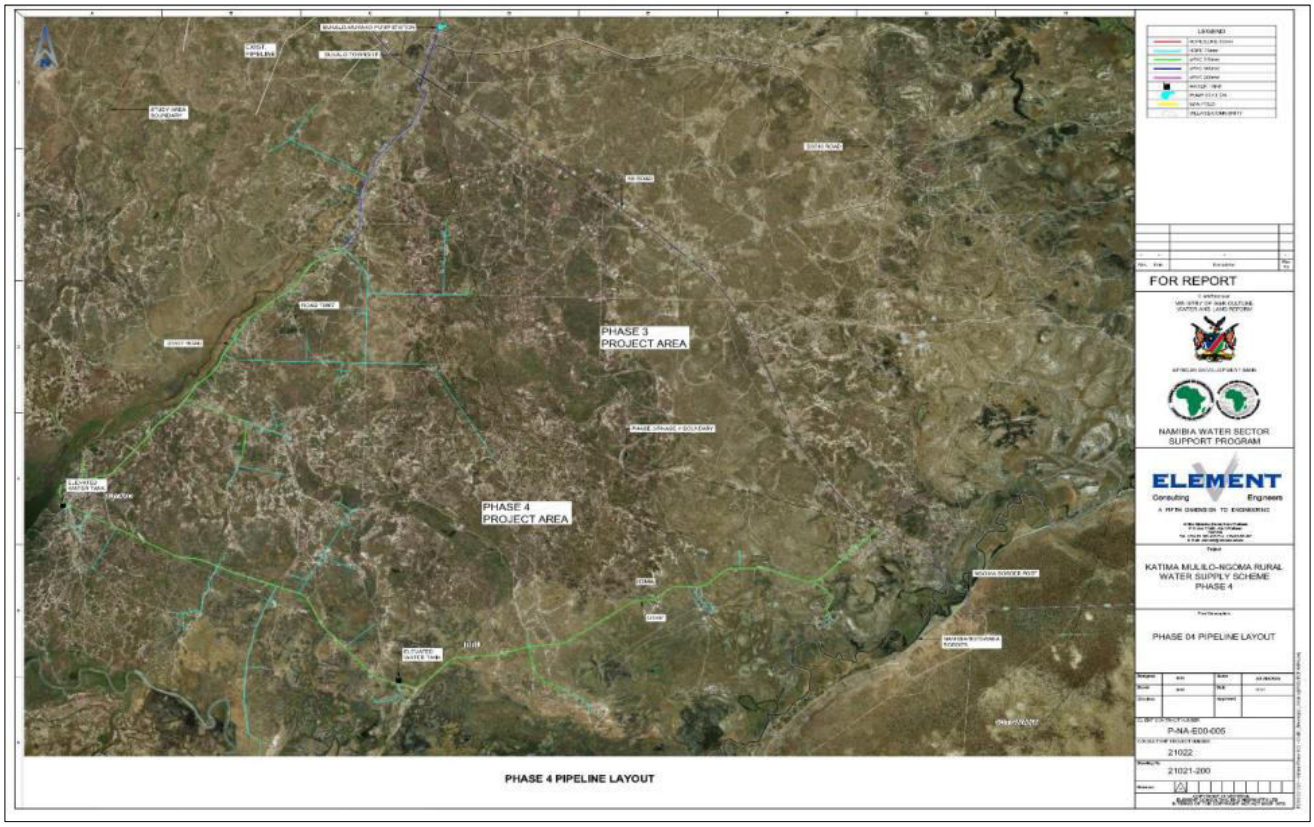


Figure 8: The general pipeline layout for Phase 4 (Element Consulting Engineers, 2023b)

The hydraulic gradients have been produced for the main feeders, indicating the residual heads throughout the scheme, and are shown in Figure 9.

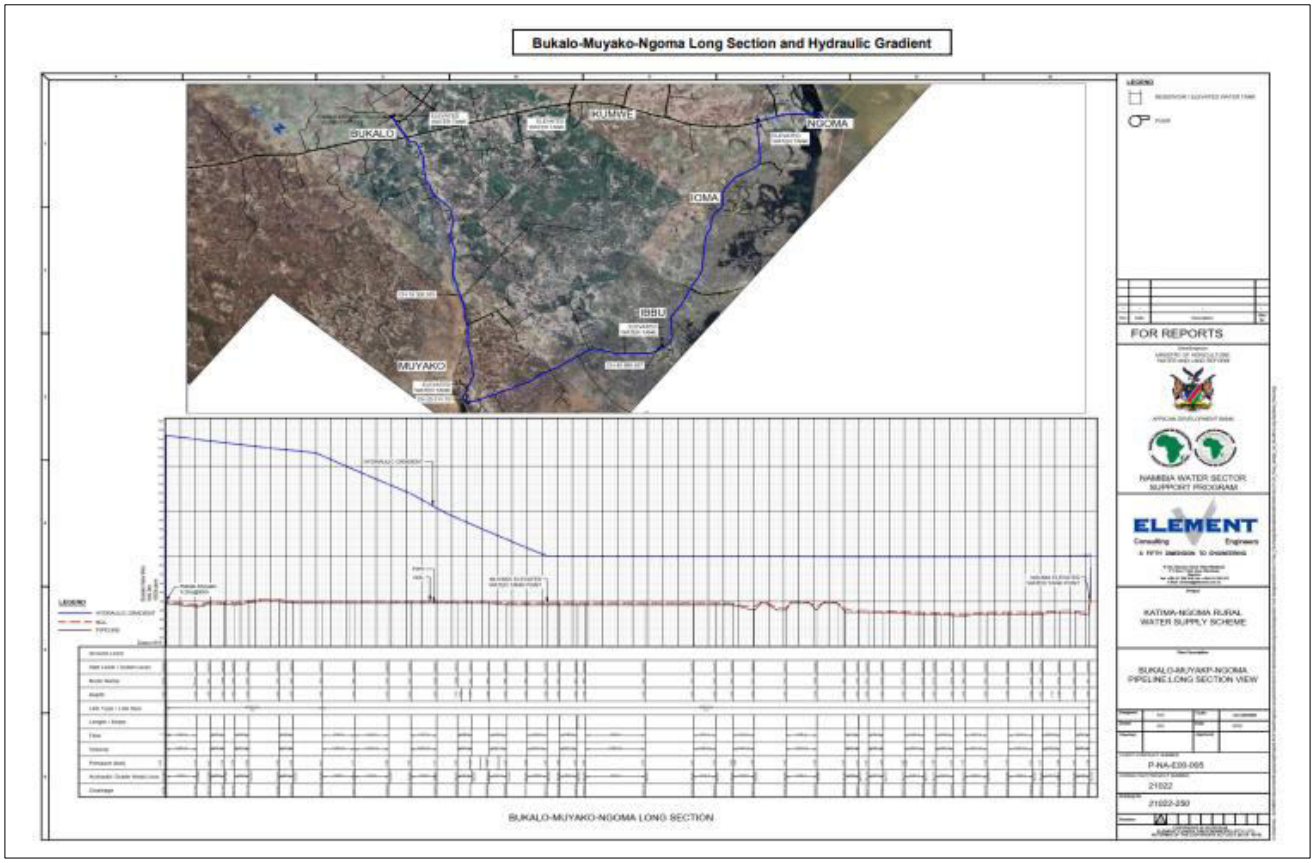


Figure 9: The hydraulic gradient for Phase 4 (Element Consulting Engineers, 2023b)

B. Elevated Tank Storage

The provision of elevated tanks with composite manifolds to enable water supply to individual water users and are as follows:

- Optimised Locations
- 2x 25m prefabricated GMS Elevated Towers with 40m^3 sectional steel tanks
- Composite manifolds.
- Lockable taps with associated water meters.

C. Manifold Distribution Points

All manifolds are fed directly from the single direct distribution network when the pumps are running or via the same network feeding back from the newly planned elevated tower tanks via a common floor level in/outlet. The pressures at the manifolds will accordingly vary between 2.5bar and 9bar depending on its relative location to the main feeder pump stations.

The manifolds positioned were determined to provide households within the project area with domestic water within a range of not more than 500m. Only households who applied for water were taken into account when determining the positions of the manifolds. Each manifold consists of six (6) off-takes to supply six (6) households.

Provision for additional off-takes will be allowed at each manifold. All manifolds with their associated valves and water meters will be in a lockable cage on a concrete slab. Each user will have a valve with a valve lock on the outside of the cage to control this water usage.

3.3.2. Mechanical and Electrical (Electronic)

The standard mechanical level control valves shall be installed. The Level Control Valve shall be double chambered to power fully open at pre-set low level, and to shut off at pre-set high level regardless of valve differential pressure.

In terms of electrical, the infrastructure of electrical/electronic nature only consists of telemetry, comprising SCADA-compatible equipment. Telemetry system will be used to connect to PLC's and data radios that connect to Remote Terminal Units (RTU's)

Table 8A summary of the existing and the new equipment to be monitored on this section of the scheme is provided in Table 8.

Table 8: Monitored Infrastructure Parameters (Element Consulting Engineers, 2023b)

Site	Equipment
Elevated Reservoirs	1x Levels
Bulk water meters	2x water meters at strategic positions to be confirmed

Consideration will be given to look at new radio technologies to incorporate NamWater compatible SCADA to remote monitoring only of the sites via internet.

The SCADA System will also be used to trend and report on all analogue signals, i.e., flows, pressures, levels, and pump speeds. Furthermore, will stop, start and trips of pumps be logged on the SCADA system.

In the absence of NORED reticulation, it is foreseen that the equipment will be PV powered through a 24V system.

3.4. Project Phases, Main Activities, and associated Impacts

The project activities above have been presented based on the preliminary design information provided by the Design Consulting Engineers and project needs. These activities have been analysed in terms of alternatives considered and these are provided under the next chapter.

4. PROJECT ALTERNATIVES CONSIDERED

Alternatives are defined as: “different means of meeting the general purpose and requirements of the activity” (Environmental Management Act (2007) of Namibia and its regulations (2012)). This chapter will highlight the different ways in which the project can be undertaken and identify the alternative that will be the most practical but least damaging to the environment as well as in terms of technical and economic feasibility/suitability.

4.1. No-Go Alternative

The “No-Go” alternative is the option of not proceeding with the activity, which typically implies a continuation of the status quo. This would mean that the proposed upgrade and construction of water supply infrastructure in the area will not be carried. Should the proposed project be discontinued, none of the potential impacts (positive and negative) identified would occur. This would mean that the current inaccessibility to safe and clean water supply will persist and the communities in the project area will continue to face water scarcity issues.
In considering the proposed project, the ‘no-go’ option cannot be the preferred alternative.

4.2. Design Alternatives

The detailed design for the proposed water supply infrastructures will take into consideration all raised environmental, social and technical options thereto. However, due to this project upgrades being done mainly along an existing infrastructure (local roads), i.e., activities taking place within an existing road reserve (for pipelines), it is unlikely that design alternatives will significantly change to potentially impact the environment.

4.3. Location Alternatives

Considerations for alternative sites for the positions of pump stations, pipelines and reservoir in the area are crucial for the project. The environmental, social and economic evaluation of these sites is performed according to the following criteria:

- Ecological Considerations: The main project activities that are likely impact ecological components are the pipelines. However, given the fact the longer distances of the pipelines will be within an existing road reserve and shorter distance from the main pipeline (for offtakes) will be less. Therefore less ecological disturbance through vegetation clearing for instance, therefore, potential negative impact to the ecological environment will be minimized.
- Possible permits required: The permits to be obtained in terms of locality will be consent letters from directly affected landowners and local leadership (for communal land) where the pipelines pass through, if required by MEFT on the ECC application portal.
- Land use suitability: The land, particularly the topography (flat ground) is suitable for the project infrastructure establishment. Some pipelines may cross through private land (crop fields), and this will be negotiated between the affected communities/landowners and MAWLR using the Resettlement Action Plan (RAP) before construction works start to ensure that there are no conflicts that may impact the project implementation.
- Communities and Stakeholders Consultation (Socio-economic): The stakeholders and communities indicated in the consultation meetings, the need to construct the water infrastructure in the consulted/targeted areas so that the communities have access to clean and safe water. The

communities also emphasized the employment of locals during construction to benefit through income earned from the work.

- Cost-Benefit analysis: A cost-benefit analysis for the project was done by the Design Engineer, and it was deemed feasible.

The site selection process for the proposed project activities have identified optimum locations and routes. These are based on a screening criteria focusing on lowering the potential impacts from the project activities. Thus, the project development (construction and operation) is expected to induce lower impacts on fauna, flora, birds, local fishing, local tourism, archaeological aspects, and near habitation. Site specific alternatives assessment have been considered in this ESIA and will be audited against during implementation on compliance to the project ESMP.

4.4. Service and Infrastructure Alternatives

In terms of the resources that may be required for the proposed water supply construction (upgrading works), their alternatives are presented in Table 9 below.

Table 9: Alternatives considered in terms of services infrastructure for the project for the Construction phase

Services	Proposed source	Alternative source
Water	-Water to be sourced from the nearest water supply source -Water from the local existing boreholes	For construction, a small volume of water will be required for the actual construction works. However, water will be required for domestic use by the workers. Therefore, the contractor will source the required water from the nearest water supply in the Region (upon reaching agreement with the supplier).
Power	-Electric drives and generators -Electricity grid (powerlines) and or Solar	-For construction, diesel powered generators will be used. -For operations, where there is a nearby powerline, the water infrastructure will be connected to the grid. Where impossible, solar (photovoltaic (PV) will be utilized.
Power for cooking	-Gas stoves -Firewood	-Gas stove (paraffin cookers) to avoid
Worker's accommodation	-Setting up campsites tented campsite at selected sites along the project route -Commuting from Katima Mulilo or Ngoma	This will depend on where along the work is taking place. Set up temporary camps onsite (instead of commuting to and from towns or settlements. The travelling time needed to and from working sites, would affect the work productivity. Therefore onsite camp would be feasible. An agreement to set up camp will be made with the Traditional Authority.
Waste Management for construction and maintenance		

Services	Proposed source	Alternative source
Sewage	-Install fixed facility with septic tank -Portable facilities with septic tank	Portable toilets – these are easily transportable and have no direct impact on the environment or ecology (if waste is properly disposed of). In other words, to minimize rehabilitation costs portable facilities were selected as the best option.
Domestic waste	-Onsite waste bins, regularly emptied at the nearest waste management site -Create a project dumpsite onsite	Storing waste in waste bins onsite and upon reaching capacity, transport it to the nearest town waste site such as Katima Mulilo or nearest settlement council with an approved solid waste management site
Hazardous waste (chemicals)	Waste generated is to be transported to and disposed of at an appropriate facility in the nearest town equipped for the disposal of hazardous waste.	None

The above presented project activities and alternatives provided above are governed by both local (institutional), regional and national as well as international legal requirements. Therefore, legal framework pertaining or applicable to this project and its activities are presented under the next chapter.

5. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A review of Namibian legislation, policies and guidelines applicable and relevant to the proposed development is given in this chapter. This review serves to inform the Proponent (MAWLR), Interested and Affected Parties (I&APs) and the decision-makers at the DEA of the requirements and expectations, as laid out in terms of these instruments, to be fulfilled in order to undertake the water infrastructure upgrade activities.

5.1. National Legal and Policy Requirements

The implementation of Phase 3 and 4 in the Katima-Ngoma water supply scheme triggers the following Namibia legislations, policies and legal framework:

5.1.1. Applicable Legal Requirements

The national legal requirements governing the proposed project activities are as follows:

- Constitution of Namibia (1990)
- Environmental Management Act No. 7 of 2007
- Environmental Assessment Regulations of 2012
- The Water Act 54 of 1956
- Water Resources Management Act No.11 of 2013
- Atmospheric Pollution Prevention Ordinance 11 of 1976
- Soil Conservation Act 76 of 1969
- Forest Act 12 of 2001
- Nature Conservation Ordinance (1996)
- The Labour Act 11 of 2007
- The National Health Act 2 of 2015
- The National Heritage Act 27 of 2004
- The Health and Safety Regulations GN 156/1997 (Government Gazette 1617)
- The Public Health Act 36 of 1919
- Public and Environmental Health Act No. 1 of 2015

5.1.2. The Policies Requirements

The national policies governing the proposed project activities are as follows:

- Environmental Assessment Policy of Namibia 1994
- Water Policy for Namibia (2000)
- Water Supply and Sanitation Policy (WSASP) of 2008
- National Policy on Climate Change for Namibia (2011)
- National Gender Policy 2010 – 2020
- National Resettlement Policy.

The plans that were developed for the management of water resources as well as bills associated with the water resources development activities are as follows:

- Integrated Water Resources Management Plan (2010)
- National Climate Change Strategy & Action Plan 2013 – 2020
- Pollution Control and Waste Management Bill
- National Solid Waste Management Strategy
- Namibia's Second National Biodiversity Strategy and Action Plan 2013 – 2022

The above-listed legal requirements (national legislations and policies and their inclusion in the proposed project assessment) are presented in Table 10.

Table 10: The national laws, policies, legal and administrative regulations pertaining to the project activities

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
The Constitution	Namibian Constitution First Amendment Act 34 of 1998.	The articles 91(c) and 95 (i) commits the state to actively promote and sustain environmental welfare of the nation by formulating and institutionalising policies to accomplish the Sustainable objectives which include: -Guarding against overutilization of biological natural resources, limiting over-exploitation of non-renewable resources, ensuring ecosystem functionality, and maintain biological diversity.	Ecological sustainability concepts within the constitution should guide all projects. Protect the environment and ensure citizens enjoy their right to a safe environment.
Recent Development Plans	Namibia's 5th National Development Plan (NDP) (2017/2018-2021/2022)	The NDP5 indicates that by 2022, Namibia has a sustainable production and consumption of water resources resulting in improved access to safe drinking water for human consumption and for industry use. Each rural constituency will have water access of above 50%.	The project is aimed at contributing to the NDP5 by upgrading existing water infrastructures, construct new bulk water supply infrastructure, improve the management of existing water sources, enhance transboundary cooperation
Climate Change	National Policy on Climate Change for Namibia (2011)	The National Policy on Climate Change supports constitutional obligations of the Government of the Republic of Namibia, namely for "the state to promote the welfare of its people and protection of Namibia's environment for both present and future generation." The goal of the National Policy on Climate Change is to contribute to the attainment of sustainable development in line with Namibia's Vision 2030 through strengthening of national capacities to reduce climate change risk and build resilience for any climate change shocks.	The project by virtue of providing safe reliable access to water and sanitation services, it enhances and improve the welfare of the people of Namibia, particularly those living in remote and marginalised communities. Through the implementation of the project that offer water supply solutions, the program project contributes towards sustainable development. The project, directly and indirectly, reduces the climate risk for several communities through provision of reliable, safe water to the people of Namibia.

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
		The policy reckons that Namibia has limited capacity to adapt to climate change impacts. The policy projected that Namibia would become drier with more variability in rainfall and developed strategies and action plan to cope with adverse climate change impacts, (Namibia, 2010).	The project implementation is aimed at addressing climate change mitigation and adaptation. The implementation should be climate sensitive. By implementing the project, MAWLR is promoting the provision of basic services of safe, clean and reliable water supply.
	National Climate Change Strategy & Action Plan 2013 - 2020	The Strategy outlines Namibia's response to climate change. The strategy aims to address and plan for action against climate change, both through mitigation and adaptation actions. In its adaptation strategy, the Strategy recognises the role of a sustainable water resource base.	The project implementation should adopt measures that strengthen sustainable water resource base development of the country. The implementation should be very careful on not to cause harm to ensure sustainable use of the available water resources but and improve the management through various conservation technics.
Environmental management	Environmental Management Act, (Act No. 7 of 2007)	The Act gives general principles for the management of the environment and natural resources. Requires that projects with significant environmental impact are subjected to an environmental assessment process (Section 27). According to Section 5(4) a person may not discard waste as defined in Section 5(1)(b) in any way other than at a disposal site declared by the Minister of Environment and Tourism or in a manner prescribed by the Minister Requires for adequate public participation during the environmental assessment process for interested and affected parties to voice their opinions about a project (Section 2(b-c)).	The EMA and its regulations should inform and guide this EIA / ESIA process of. An ECC should be obtained for the project If granted, the ECC should be renewed every three years, subject to compliance audits.

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
	EIA Regulations Government Notice (GN) 57/2007 (Government Gazette (GG) 3812	Details principles which guide the EIA process. Details requirements for public consultation within a given environmental assessment process (GN No 30 Section 21). Section 3 (2) (e) states that "assessments must be undertaken for activities which may have a significant effect on the environment or the use of natural resources". Details the requirements for what should be included in a Scoping Report (GN No 30 S8) an EIA report (GN No 30 S15).	
Vegetation	Annotated Statutes Forest Act 12 of 2001 Forestry Act 13 of 2005 & Forestry Regulations (GN 170 of 2015.	Section 10 (1) set out the aim of the forest management as to or for which forest resources are managed and developed, including the planting of trees where necessary, in Namibia is to conserve soil and water resources, maintain biological diversity and to use forest produce in a way which is compatible with the forest's primary role as the protector and enhancer of the natural environment. Section 22. (1) (Protection of Natural vegetation) Unless otherwise authorised by this Act, or by a licence issued under subsection (3), no person shall on any land which is not part of a surveyed erven of a local authority area as defined in section 1 of the Local Authorities Act, 1992	The clearing of vegetation is prohibited (subject to a permit for protected plant species). Certain (protected) tree species occurring in the area are protected under this Act and require a permit from the Directorate of Forestry for removal. The construction of waterworks infrastructure (bulk water supply) such as pipelines and conveyance systems may trigger the removal of vegetation. The constructions of the bulk water infrastructure projects especially at abstraction points on surface water resources can potentially trigger the removal of living trees, bushes and shrubs growing within 100m of a river, stream or watercourse. The removal of trees in the above instances would require the project contractors or sub-contractors to acquire necessary permits first.

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
		(Act No. 23 of 1992) cut, destroy or remove - Republic of Namibia 20. (a) vegetation which is on a sand dune or drifting sand or on a gully unless the cutting, destruction or removal is done for the purpose of stabilising the sand or gully; or (b) any living tree, bush or shrub growing within 100 metres of a river, stream or watercourse. (2) A person who wishes to obtain a licence to cut and remove the vegetation referred to in subsection (1) shall, in the prescribed form and manner, apply for the licence to a licensing officer who has been designated or appointed for the area where the protected area is situated.	Protected tree and plant species as per the Forest Act No 12 of 2001 and Forest Regulations of 2015 may not be removed without a permit from the Ministry of Agriculture, Water and Forestry.
	Nature Conservation Ordinance (1996)	This ordinance relates to the conservation of nature; the establishment of game, parks and nature reserves; the control of problem animals; and highlights matters incidental thereto.	The activities of the project are highly localized but there are certain areas where the project passes through the Kavango-Zambezi Trans frontier Conservation Area. Therefore, there is a potential to interfere with parks, games, and nature reserves. However, there is need for proper designing and planning of the water supply network of the project to make sure that the infrastructure will not interfere with facilities listed in the Nature Conservation Ordinance.
Occupational Health and Safety	Labour Act 11 of 2007.	Empowers the minister responsible for labour to publish regulations pertaining to health and safety of labourers (S135). Details requirements regarding minimum wage and working conditions (S39-47).	All contractors involved in the construction of the services infrastructure for this project are required to comply with this Act and its regulations. The construction and operation activities will invite significant amount of laborious work. Therefore, there is need to make sure that the workers

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
	Health and Safety Regulations GN 156/1997 (GG 1617)	Details various requirements regarding health and safety of labourers. Section 119 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."	participate are protected and that they are from the local's especially unskilled labour. Potential nuisances (e.g. dust generation) should be considered during the construction phase and avoided.
Community and Environmental Health and Safety	Public Health Act (No. 36 of 1919)	Section 119 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."	The Proponent, their contractors (subcontractors) and all its employees should ensure compliance with the provisions of these legal instruments during the construction as well as operational and maintenance phases. The Proponent should ensure that the project infrastructure, vehicles, equipment, and machinery are designed and operated in a way that is safe, or not injurious or dangerous to public health and that the noise and dust emissions which could be considered a nuisance remain at acceptable levels Provision of community labour, the input of the local communities is usually in the form of labour for the excavation, backfill and compaction of the pipeline trenches. These activities are usually associated with health and safety risks owing to mishandling of equipment and materials, as well as poor storage of hazardous materials onsite.
	Public and Environmental Health Act No. 1 of 2015	The Act serves 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.	

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
Gender	National Gender Policy 2010 - 2020	The Policy seeks to create an enabling environment for sectors to mainstream gender in line with National Development Plans (NDPs). It identifies who will be responsible for the implementation of the policy and who will be accountable for gender equality results.	The project implementation should make sure that both women and men are included in equal proportions including their water needs and priorities. Since women play central role in the collection of water in Namibia, their input is crucial should not be undermined. The project implementation should mainstream gender including the assigning of roles and participation of both women and men at various development phases of implementation.

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
Waste management	National Solid Waste Management Strategy	The Strategy ensures that the future directions, regulations, funding and action plans to improve solid waste management are properly co-ordinated and consistent with national policy, and to facilitate co-operation between stakeholders The Strategy listed priorities for the strategy to address for effective solid waste management, the priorities given below are the most relevant to the project. Waste disposal is the main problem with the current solid waste management in Namibia. The top priority is to reduce risks to the environment and public health from current waste disposal sites and illegal dumping in many areas of Namibia.	The water infrastructure upgrade can potentially generate significant amount of solid waste that might need proper management by contractors to avoid pollution. Waste management plans should be generated and implemented prior the commencement of civil works and during operation of the project infrastructures. Contractors for the construction of the water infrastructures should reduce the risk of solid waste to the environment and surroundings of the project area.
	Pollution Control and Waste Management Bill	The bill aims to "prevent and regulate the discharge of pollutants to the air, water and land" Of particular reference to the Project is: Section 21 "(1) Subject to sub-section (4) and section 22, no person shall cause or permit the discharge of pollutants or waste into any water or watercourse." Section 55 "(1) No person may produce, collect, transport, sort, recover, treat, store, dispose of or otherwise manage waste in a manner that results in or creates a significant risk of harm to human health or the environment."	The project activities trigger section 21 and 22 of the bill, this so because activities like the activities associated with the construction of water infrastructures, installation of pumps can potentially directly pollute the water sources, if not properly handled. Contractors and subcontractors of the civil works of the projects should make it mandatory that they manage their waste in a manner that do not cause environmental threat and risk both to the surroundings and the local communities.

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
	Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)	Regulation 3(2)(b) states that "No person shall possess or store any fuel except under authority of a licence or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 litres or less in any container kept at a place outside a local authority area"	If the contractor intends to keep hydrocarbon (fuels) onsite in the quantity of 600 litres or more, they should obtain the necessary authorisation (consumer installation certificate) from the Ministry of Mines and Energy for the storage of fuel on-site.
	Hazardous Substance Ordinance, No. 14 of 1974	The ordinance provides for the control of toxic substances. It covers manufacture, sale, use, disposal and dumping as well as import and export. Although the environmental aspects are not explicitly stated, the ordinance provides for the importing, storage, and handling.	The Proponent should handle and manage the storage and use of hazardous substances on site so that they do not harm or compromise the site environment.
Water	Water Act 54 of 1956	The Water Resources Management Act 24 of 2004 is presently without regulations; therefore, the Water Act No 54 of 1956 is still in force: -Prohibits the pollution of underground and surface water bodies (S23 (1)). -Liability of clean-up costs after closure/ abandonment of an activity (S23 (2)). -Protection from surface and underground water pollution	The protection of ground and surface water resources should be a priority. The main threats will most likely be concrete and hydrocarbon spills during construction.
	The Water Resources	The aim of the Act is to provide for the management, protection, development, use and conservation of water	The protection (both quality and quantity/abstraction) of water resources should be a priority.

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
	Management Act No. 11 of 2013	resources; to provide for the regulation and monitoring of water services and to provide for incidental matters. Section 3 of the Act recognises the fundamental principles in Water Resources Management in Namibia: Equitable access for all people to safe drinking water is an essential basic human right to support a healthy productive life. Access by all people to a sufficient quantity of safe water within a reasonable distance from their place of abode to maintain life and productive activities; Promotion of the sustainable development of water resources based on an integrated water resources management plan which incorporates social, technical, economic, and environmental issues; Development of the most cost-effective solutions, including conservation measures, to infrastructure for the provision of water; Supporting integrated water resources management through human resources development and capacity building; Promotion of water awareness and the participation of persons having interest in the decision-making process	Relevant permits and or agreements to abstract and use water should be applied for and obtained from the Ministry of Agriculture, Water and Land Reform's Directorate of Water Resources Management (Water Law Policy Administration Division)

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
		should form an integral part of any water resource development initiative	
	The Water Policy of Namibia, (2000)	The Policy established that the development and management of water services in Namibia have focused on building and running supply delivery systems to meet water needs of various users. These structures and systems include – at the sophisticated end of the scale – large dams, canals, major pipelines, pumping stations, and water treatment works. The Policy listed 12 principles of water management in Namibia among to support Water Resources Management Act No. 11 of 2013: Equity (right to water for all Namibians), Promotion of development (water resources should be utilized, developed and managed in such a way as to promote equitable and sustainable socio – economic development), Economic value (scarce water in Namibia should be utilised and recognised as an economic value), Awareness and participation (fostering participation of different water stakeholders), Openness and transparency. Decentralisation (The operational management of water resources and water services shall be decentralised to	The project should aim to fulfil the requirements and goals of the Policy through the construction and upgrading of the planned pipelines works and reservoirs in the project area.

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
		the lowest practicable level), Ecosystem values and sustainability, Integrated management and planning, Clarity of institutional roles and accountability, and Capacity building.	
	Water Supply and Sanitation Policy (WSASP) of 2008	The policy has strong focus on Water Demand Management (WDM). The policy was formulated with four long term components: - Water supply and sanitation services should become available to all Namibians; Equitable improvement of water and sanitation services should be achieved by the combined efforts of the government and the beneficiaries, based on community involvement and participation, the acceptance of a mutual responsibility and by outsourcing services where necessary and appropriate, under the control and supervision of government. Communities should have the right, with due regard for environmental needs and the resources and information available, to determine which water and sanitation solutions and service levels are acceptable to them within the boundaries of the national guidelines. The policy formulated to improve the provision of water supply to: - Contribute to improved public health; - Reduce the burden of collecting water; - Promote community based social development taking the role of	It is relevant as it puts emphasis on the improvement of water supply services should be a combined effort of the government and the beneficiaries, based on community involvement, participation and responsibility, it is thus imperative to determine which solutions and service levels are acceptable to them, and they shall contribute towards the cost of services.

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
		women - into special account; - Support basic water needs; - Stimulate economic development; and - Promote water conservation The policy has two water supply priorities: (1) This is the provision of water for domestic use, and. (2) This is the provision of water for economic activities.	
	The Integrated Water Resource Management Plan (2010)	The Plan promotes coordinated management and utilisation of water, land and related services in Namibia to realise social, environmental and economic growth. The overall long-term goal of IWRM in Namibia is to achieve a sustainable water resources management regime contributing to social equity, economic efficiency and environmental sustainability.	The implementation of the project is line with the goal of the IWRM Plan of Namibia because the program would ensure there is social equity and economic efficiency of water management.
Soil	Soil Conservation Act 76 of 1969	The Act established to consolidate and amend the law relating to the combating and prevention of soil erosion, the conservation, improvement and manner of use of the soil and vegetation and the protection of the water sources in the Republic of Namibia. The Act give powers to the Minister in section 3 (d) the powers to gazette activities that relate to the run-off or drainage of rainwater, the withdrawal from cultivation, the protection and stabilizing of natural water courses and the establishment, maintenance and protection of artificial water courses	Duty of care must be applied to soil conservation and management measures must be implemented during the construction and maintenance stages of the project.

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
Air Quality	Atmospheric Pollution Prevention Ordinance (1976	This ordinance provides for the prevention of air pollution and is affected by the Health Act 21 of 1988. Under this ordinance, the entire area of Namibia, apart from East Caprivi, is proclaimed as a controlled area for the purposes of section 4(1) (a) of the ordinance.	The proposed project and related activities should be undertaken in such a way that they do not pollute or compromise the surrounding air quality. Mitigation measures should be put in place and implemented.
Heritage	National Heritage Act 27 of 2004	Section 48(1) states that "A person may apply to the (Heritage) Council for a permit to carry out works or activities in relation to a protected place or protected object" Protects and conserves cultural heritage and cultural resources with special emphasis on places and sources of National heritage including graves, artefacts and any objects older than 50 years.	The construction of long pipelines has a potential to pass through heritage sites, graveyards. Any heritage resources (e.g. human remains etc.) discovered during excavations would require a permit from the National Heritage Council of Namibia for relocation. Detailed designing of the pipe routes, locations of installation of pumps and tanks should avoid the heritage sites, when it's not possible, necessary arrangements with right stakeholders should lead the process. A Chance Finds Procedure provided should be implemented upon discovery of archaeological and heritage resources.
Land	Communal Land Reform Act 5 of 2002	The law states who owns communal land, how the land is given to people by whose authority. The Act regulates the registry of customary land rights and certificate of registration of customary land right. Wherever, there is potential to interfere with the communal land. Right procedures should be followed. The Act give Chiefs or Traditional Authority the power to allocate a customary land right under section 22 of the Act.	The bulk water supply projects may interfere with communal landowners (such as pipelines passing through crops fields where there is no suitable diversion), this may arise disputes, especially in a case where pipelines are passing through areas where communities are not beneficiaries. Contractors should always approach chiefs or traditional authorities wherever there is potential to interfere with communal land and disputes.
	The Regional Councils Act (No. 22 of 1992)	This Act sets out the conditions under which Regional Councils must be elected and administer each delineated region. From a land use and project planning point of view, their duties include, as described in section	The relevant Regional Councils are I&APs and must be consulted during the ESIA and implementation of the project. The project site falls under the Zambezi Regional Council; therefore, they should be consulted and engaged

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
		28 "to undertake the planning of the development of the region for which it has been established with a view to physical, social and economic characteristics, urbanisation patterns, natural resources, economic development potential, infrastructure, land utilisation pattern and sensitivity of the natural environment.	throughout the construction throughout to the operational phase of the project.
	National Resettlement Policy	The primary objective of the Policy is to focus on resettlement of eligible person in ways which are institutionally, sociologically economically and environmentally sustainable and allow beneficiaries to become self-supporting. The Policy reckons that resettlement should not only mean providing people with land, housing, infrastructure, knowledge and skills to maintain and develop new environment, but it also means establishing innovative attitude.	There are project activities and projects that can potentially cause resettlement of communities that will only become evident after detailed and specific designs of the infrastructure like pipeline routes (on activities that require opening of new land). There is no anticipated relocation or resettlement of communities, however, there is a potential of water infrastructures such as pipelines passing through community crop fields. However, this will be mitigated through the use of existing roads/paths and field boundaries. Wherever resettlement happens during the implementation of various activities, the victims (affected parties) should receive training related to the improvement of their innovative attitude and their self-supporting.
	Traditional Authority Act (Act No. 25 of 2000)	The Act also stipulates that Traditional Authorities (TAs) should ensure that natural resources are used on a sustainable basis that conserves the ecosystem. The implications of this Act are that TAs must be fully involved in the planning of land use and development for their area. It is the responsibility of the TA's customary leadership, the Chiefs, to exercise control on behalf of the state and the residents in their designated area.	The project routes fall under the local Traditional Authorities of the project area. Therefore, they should be consulted and updated throughout the project implementation through local representatives such as headmen and or secretaries/chairpersons. Where needed, especially by MEFT for the evaluation of the ESIA/Scoping report, a land use consent should be obtained.

Theme/Aspect	Legislation	Relevance Provisions	Project Implications
Roads	Road Traffic and Transport Act, No. 22 of 1999	The Act provides for the establishment of the Transportation Commission of Namibia; for the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, the control and regulation of road transport across Namibia's borders; and for matters incidental thereto.	The pipelines mainly follow the road or fall within the road reserves. Therefore, Roads Authority of Namibia should be engaged throughout the project cycle. If need be, the relevant permits must be applied for.
	Roads Ordinance No 17 of 1972	The Ordinance consolidates the laws relating to roads. -Section 3.1 deals with width of proclaimed roads and road reserve boundaries. -Section 27.1 is concerned with the control of traffic on urban trunk and main roads. -Section 36.1 regulates rails, tracks, bridges, wires, cables, subways or culverts across or under proclaimed roads. -Section 37.1 deals with infringements and obstructions on and interference with proclaimed roads.	The proposed water infrastructure upgrades must adhere to all applicable provisions in the Roads Ordinance.

5.2. AfDB Legal and Policy Framework

As the funding agency, AfDB requires that the project comply with its existing legal requirements. These are provided below.

5.2.1. AfDB Operation Safeguards (OS)

The AfDB as the lending institution they have specific requirements that borrowers should satisfy regarding protection of the environment, local people/communities against exclusion and marginalisation caused by certain economic development activities. The OS are a set of five safeguard requirements that Bank clients are expected to meet when addressing projects that have potential to cause social and environmental impacts and risks. The five OS of the AfDB that the borrower should satisfy are given below:

- Environmental and social assessment
- Involuntary resettlement land acquisition, population displacement and compensation
- Biodiversity and ecosystem services
- Pollution prevention and control, hazardous materials and resource efficiency
- Labour conditions, health and safety

The checklist of the operation safeguards against the project activities is provided in Table 11 below.

Table 11: The applicability of the AfDB OS to the project activities

Operational Safeguard	Applicability / Implication to the Project
Environmental and social assessment	The nature of the activities trigger both environmental and social impacts; negative and positive. Activities like construction of bulk water infrastructure (pipelines, installation elevated water reservoirs, trenching, excavations, and contractor's construction vehicle movements) potential causes environmental impacts to the receiving communities hence require assessments prior the implementation. The provision of safe reliable water will improve the social wellbeing and livelihoods of communities in that part of the Zambezi Region. The project will also create jobs to the societies hence improve the socio-economic status of the communities.
Involuntary resettlement land acquisition, population displacement and compensation	The project activities like long pipeline installation can potentially causes involuntary resettlement, acquisition of land, population displacement and compensation.
Biodiversity and ecosystem services	The project implementation should ensure that all the natural resources are conserved and sustainably used to allow future use of the resources and development. Concepts of sustainable development should lead the process.
Pollution prevention and control, hazardous materials and resource efficiency	The project activities such as construction of bulk water infrastructure (pipelines, installation elevated water reservoirs, trenching, excavations, and contractor's construction vehicle movements) potential generate solid waste that can pollute the environment. Proper planning of waste through waste management plan should be provided to/by contractors' prior civil works.
Labour conditions, health and safety	The construction and installation of bulk water infrastructure require enormous labour which majority of it particularly the unskilled labour should be provided by locals. These are people with no training hence proper human management and monitoring is need to avoid accidents at work, ensuring good labour conditions is also critical. Some of them would be woman and other vulnerable groups.

5.2.2. AfDB Safeguard Policies

Other than the OS, the Bank's has Safeguard Policies (SP) where the Integrated Safeguards System (ISS) were developed from. The project activities triggers these safeguard policies. The safeguard policies are:

- Involuntary resettlement (2003)
- Environment (2004)
- The Gender (2001)
- The Climate Risk Management and Adaptation Strategy (2009)
- Health (1996)
- Integrated Water Resources Management (2000)
- Agriculture and Rural Development (2000, 2010)
- Poverty Reduction (2004)

5.3. Applicable International Legal Requirements

In addition to the Namibian legal requirements detailed above and the AfDB Standards, compliance with various International Standards and guidelines would be required during the implementation and operation of the project but not mandatory. This however, allows acceptability of the program at global level. The international legislations and guidelines are described below.

5.3.1. International Finance Corporation (IFC) Standards

The International Finance Corporation's (IFC) Sustainability Framework articulates the Corporation's strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The Sustainability Framework comprises IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy. The Policy on Environmental and Social Sustainability describes IFC's commitments, roles, and responsibilities related to environmental and social sustainability. As of 28 October 2018, there are ten (10) Performance Standards (Performance Standards on Environmental and Social Sustainability) that the IFC requires a project Proponents to meet throughout the life of an investment.

Given the fact that the proposed project is funded by international investors and the financing require the project to comply with certain requirements, particularly the International Finance Corporation (IFC) Performance Standards (PSs). Therefore, it is crucial to analyze the ESIA Study process against these IFC's PSs and these are listed in Table 12.

Table 12: The applicability of the IFC Performance Standards (PSs) to the project activities' ESIA Study

IFC PS	Relevant Provisions of the IFC PS	Implications for the project / Actions Taken
PS1	Assessment and Management of Environmental and Social Risks and Impacts:	The ESIA has been undertaken in accordance with this PS, whereby the project has been advertised in the national media outlets, consultation meetings held and comments noted down for incorporation into the Report and ESMP together with identified potential adverse/negative and positive environmental and social impacts from the project.

IFC PS	Relevant Provisions of the IFC PS	Implications for the project / Actions Taken
PS2	Labour and Working Conditions	The ESIA Study assessed the potential impacts of the project activities on the project crew's health and safety in accordance with the Labour Act (No. 6 of 1992) and fair labour working conditions, including compensations, i.e., no compromising of the labour and working welfare of workers as required in the ESMP.
PS3	Resource Efficient and Pollution Prevention and Management	The ESIA Study assessed the usage of resources such as water, soils and power resources required for the project during the duration of construction works. The appropriate measures to manage and mitigate the impacts associated with the project activities have been provided in the ESMP for implementation.
PS4	Community Health and Safety	The potential impacts of the project activities on the construction crew as well as communities' health and safety in accordance with the Labour Act (No. 6 of 1992) have been assessed and mitigation measures provided accordingly, i.e., ensuring that the construction and operation activities do not compromise the safety and welfare of workers and communities.
PS5	Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement	The project area falls on communal land. Therefore, a consent letter is issued by the area Traditional Authority which is submitted to the MEFT alongside the Scoping Report. There is a potential involuntary relocation or displacement of properties such as crop field fences or pipelines passing through people's crop fields. Therefore, PS5 is applicable to the project during construction.
PS6	Biodiversity Conservation and Sustainable Management of Living Natural Resource	The ESIA Study undertook a baseline assessment of the fauna and flora in the project area.
PS7	Indigenous Peoples/Sub-Saharan African Historically Undeserved Traditional Local Communities	The project falls within a communal land and according to the information provided in the consultation meetings, there is no presence of indigenous people within or along the project route.
PS8	Cultural Heritage	An Archaeological & Cultural Heritage Impact Assessment (AHIA) has been undertaken for the ESIA Study by TARO Archaeological & Heritage Consultants (TARO Consultants). The baseline, impact assessment and mitigation measures have been done and compiled by TARO Consultants. The AHIA Report has been compiled in accordance with the Guidelines of the National Heritage Council of Namibia (National Heritage Act No. 27 of 2004 and The National Monuments Act (No. 28 of 1969)).

5.3.2. Other Applicable Regional and International Statues and Conventions

The applicable regional and international statues such as policies, standards and conventions that may govern the project activities are provided under Table 13 below.

Table 13: Other international treaties and conventions governing the proposed project activities

Statue	Relevant Provisions	Implications for the project
Protocol on Shared Watercourses in the SADC	The overall objective of the Protocol is to foster closer cooperation for judicious, sustainable and coordinated management, protection and utilisation of shared watercourses and advance the SADC agenda of regional integration and poverty alleviation.	Relevance and implication to NWSSP: This project will be drawing water from the Zambezi river, which is a shared water course. NAMWATER and MAWLER are already signatories to the protocol and this project is not anticipated to affect existing agreements.
Equator Principles	A financial industry benchmark for determining, assessing, and managing environmental and social risk in projects (August 2013). The Equator Principles have been developed in conjunction with the International Finance Corporation (IFC), to establish an International Standard with which companies must comply with to apply for approved funding by Equator Principles Financial Institutions (EPFIs). The Principles apply to all new project financings globally across all sectors.	These principles are an attempt to: '…encourage the development of socially responsible projects, which subscribe to appropriately responsible environmental management practices with a minimum negative impact on project-affected ecosystems and community-based upliftment and empowering interactions.'
The United Nations Convention to Combat Desertification (UNCCD) 1992	Addresses land degradation in arid regions with the purpose to contribute to the conservation and sustainable use of biodiversity and the mitigation of climate change. The convention objective is to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability United Nation Convention.	The project activities should not be undertaken such that they contribute to desertification.
The UN Convention on Biological Diversity 1992	Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use. Promote the protection of ecosystems, natural habitats, and the maintenance of viable populations of species in natural surroundings	The project activities excavations and civil works of bulk water infrastructure should conserve biodiversity, the removal of vegetation cover and destruction of natural habitats should be avoided and where not possible it should minimised
United Nations Framework Convention on Climate Change (UNFCCC) in 1995	In 1995 Namibia ratified the UNFCCC; an international environmental treaty. The ultimate objective of the Convention is to "stabilise greenhouse gas concentrations in the	This applies to climate change component, the convention calls for intervention in reduction of greenhouse gases; the project activities should reduce the emission of greenhouse.

Statue	Relevant Provisions	Implications for the project
	atmosphere at a level that will prevent dangerous human interference with the climate system."	
Stockholm Declaration on the Human Environment, Stockholm (1972)	It recognizes the need for: "a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment.	The project implementation should ensure protection of natural resources and prevention of any form of pollution wherever possible.
International Union for Conservation of Nature (IUCN)	The Union provides public, private and non-governmental organisations with the knowledge and tools that enable human progress, economic development and nature conservation to take place together. The mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.	MAWLR should ensure that conservation of nature is prioritized in the areas of their operations.
African convention on conservation of nature and natural resources	This Convention focuses on living resources, calling for the creation of protected areas and for the specific conservation measures for listed species. It also provides the grounds for the conservation of other natural resources such as soil and water, for the consideration of environmental concerns in development plans, and for research and education.	The project activities will have a direct impact on the natural resources by clearing of vegetation, loosening soils during trenching activities. Thus the requirements of this convention have to be considered in the implementation of the project.

5.3.3. Applicable Permits, Licenses and Approvals

Environmental permits, in addition to an environmental clearance certificate, may be needed to carry out the proposed project development to ensure full compliance with the Namibian law. The permits and licenses that may be relevant to the projects are outlined in Table 14.

Table 14: Applicable Permits, Licenses and Approvals

Category	Name	Relevant Authority	Validity
National	ECC	MEFT – Department of Environmental Affairs	3 years
	Vegetation Removal Permit	MEFT – Directorate of Forestry	Once Off
	Temporary Fuel Storage	Ministry of Mines and Energy	6 months
	Water Abstraction Permit	Ministry of Agriculture, Water and Land Reform- Directorate of Water Affairs	Once Off
	Archaeological and Heritage Removal, Inclusion or Amendment Permit	National Heritage Council	Once Off
AfDB	ESIA	Prior the project development	Once Off.

5.4. Gap Analysis

A high-level Gap Analysis was done to compare the applicable Namibian regulatory requirements with relevant AfDB OS. This is presented in **Table 15**.

Table 15:Gap Analysis of Namibian Legislation Versus AfDB ESS

No.	Guideline	Requirements	Equivalent Namibian Legislation	Gaps
1	Operational safeguard 1 – Environmental and social assessment	• *Environmental and Social (ES) Framework:* Use Borrower's (or Applicant) ES Framework in the assessment, development and implementation of a project to address the risks and impacts of the project, and enable the project to achieve objectives materially consistent with the ESSs. • *Environmental and social assessment:* Carry out an environmental and social assessment of the project to assess the environmental and social risks and impacts of the project throughout the project life cycle. Key aspects to consider, include: ▪ Assess, in an integrated way, all relevant direct, indirect and cumulative environmental and social risks relevant to the project. Consider activities and facilities. ▪ Baseline information. ▪ Environmental and social risks and impacts to be informed by Scoping. ▪ Stakeholder engagement as an integral part of the assessment. Also consider disadvantaged or vulnerable individuals or groups. ▪ Qualified and experienced persons to assess impacts. ▪ Consider all relevant Policies and legislation of the country; applicable requirements under the ESSs and the EHSGs; and other relevant Good International Industry Practice. ▪ Apply a mitigation hierarchy. ▪ Prepare environmental and social assessment of subprojects, in the case of projects involving multiple small subprojects.	1. Environmental Management Act 2007 (Act 7 of 2007) 2. EIA Regulations GN30, 18 January 2012. 3. List of activities that may not be undertaken without Environmental Clearance Certificate: Environmental Management Act, 2007	• No requirement for an ES Framework, ESCP or ESMS, although there is a requirement for an EMP. • "Environment" also includes "Social" aspects per definition of the legislation. Therefore reference to "EIA" and not "ESIA". • The EIA process requires the identification and assessment of impacts, linking to the project activities, baseline conditions, laws and guidelines and taking all project phases and cumulative effects into consideration. • Poor guidance in the Regulations on "subprojects". • Specialists required – as needed, but not clearly defined. • Stakeholder engagement is a key component of the EIA regulations, although there is no specific requirements for engagement "throughout the life cycle of the project"- only during the EIA process. Ongoing engagement is often included as a commitment in the EMP (where relevant). No specific reference to the need for engaging with vulnerable groups or groups based on gender. This is typically included in the Terms of Reference for the EIA (where relevant). • Typically, an EMP includes an organogram and roles and responsibilities to implement the various mitigation measures including monitoring and reporting. Although this does not necessarily tie back to the implementing organisations ability to

No.	Guideline	Requirements	Equivalent Namibian Legislation	Gaps
		▪ Engage one or more internationally recognized independent experts for projects that are High Risk or contentious, or that involve serious multidimensional environmental or social risks or impacts. ▪ Consider potentially significant project-related transboundary and global risks and impacts. • *Environmental and Social Commitment Plan (ESCP):* ▪ Develop and implement an ESCP, setting out measures and actions required for to achieve compliance with the ESSs over a specified timeframe, taking the findings of the environmental and social assessment into account. ▪ Allow for adaptive management of proposed project changes or unforeseen circumstances. ▪ Implement the measures and actions identified in the ESCP and review the status of implementation of the ESCP as part of its monitoring and reporting. ▪ Describe the different management tools that will be used to develop and implement the agreed measures and actions – compared to a 'typical Environmental (& Social) Management System (ESMS)". • *Monitoring and reporting* ▪ Monitor the environmental and social performance of the project. ▪ Where appropriate and as set out in the ESCP, engage stakeholders and third parties, such as independent experts, local communities or NGOs, to complement or verify its own monitoring activities.		provide sufficient capacity to undertake the necessary actions. No clear requirements for adaptive management, however, renewal applications are required every three year, where the EMP needs to the reviewed and re-submitted. • While specific requirements are listed in the EIA Regulations, it does require for effects on the environment to be mitigated, controlled and monitored. Monitoring and review is typically included in the EMPs. • Unless specified as a commitment in the EMP , there is no specific requirement in the EIA regulations for ongoing reporting. • Amendment Applications (i.e. significant project changes) are covered in the EIA Regulations, however, the process and further stakeholder engagement are not defined.

No.	Guideline	Requirements	Equivalent Namibian Legislation	Gaps
		▪ Provide regular reports providing an accurate and objective record of project implementation, including compliance with the ESCP and the requirements of the ESSs. ▪ Based on the results of the monitoring, identify any necessary corrective and preventive actions, and incorporate these in an amended ESCP or the relevant management tool. • *Stakeholder engagement and information disclosure* ▪ Continue to engage with, and provide sufficient information to stakeholders throughout the life cycle of the project. ▪ Consult with project-affected parties if significant changes to the project that result in additional risks and impacts are foreseen.		
2	Operational safeguard 2 – Involuntary resettlement: land acquisition, population displacement and compensation (Only in the event the Programme requires resettlement)	• *General issues:* The following aspects are of relevance: ▪ Eligibility classification: Establish the status of the affected persons. ▪ Project design: Demonstrate that involuntary land acquisition or restrictions on land use are limited to direct project requirements for clearly specified project purposes within a clearly specified period of time. Consider feasible alternative project designs to avoid or minimize land acquisition or restrictions on land use. ▪ Compensation and benefits for affected persons: When land acquisition or restrictions on land use cannot be avoided, offer affected persons compensation and other assistance. ▪ Community engagement: Engage with affected communities.	1. Namibia Laws on expropriation or compensation for land that is taken away. • Article 21 of the Namibian Constitution, as amended by the Constitution Amendment Act 2010. • Communal Land Reform Act 5 of 2002, as last amended by	• There is a need to identify if involuntary resettlement will be required. This can only be undertaken once the location of infrastructure has been finalised and the directly affected people and landowners identified. This will form part of the more detailed assessment within the Social Impact Assessment i.e. to identify the need for involuntary resettlement. If required a detailed gap analysis will be undertaken. • There is no requirement for a Grievance Mechanism in the Acts. •

No.	Guideline	Requirements	Equivalent Namibian Legislation	Gaps
		▪ Grievance mechanism: Ensure that a grievance mechanism for the project is in place. ▪ Planning and implementation: Where land acquisition or restrictions on land use are unavoidable, the Borrower will, as part of ▪ Establish an inventory of land and assets to be affected to determine who will be eligible for compensation and assistance, as part of the environmental and social assessment. • *Other aspects to be addressed:* ▪ Displacement (i.e. physical displacement and Economic displacement). ▪ Collaboration with other responsible agencies or subnational jurisdictions. • Technical and financial assistance	the Communal Land Reform Amendment Act 11 of 2005. 4. National Resettlement Policy	
3	Operational safeguard 2 – Involuntary resettlement: land acquisition, population displacement and compensation (Relevant to the construction phase of the Project)	• *General:* ▪ Assessment of risks and impacts: Through the environmental and social assessment, identify the potential risks to and impacts on habitats and the biodiversity that they support. ▪ Consider the following: o Off-sets where relevant. o Conservation of biodiversity and habitats. o Modified habitats o Natural habitats o Critical Habitat o Legally protected and internationally recognized areas of high biodiversity value. o Invasive alien species o Sustainable management of living natural resources. • *Primary suppliers:* ▪ The environmental and social assessment will include an evaluation of the systems and verification practices used by primary suppliers.	1. Nature Conservation Ordinance, 1975 (No. 4 of 1975) 2. Nature Conservation Amendment Act 3, 2017. 3. Forest Act, 2001 (No. 12 of 2001), as amended, and Regulations (Government Gazette No. 5801) 4. Plant Quarantine Act, 2008 (No. 7 of 2008) 5. Namibia's Biodiversity	• Various acts govern the protection and conservation of natural resources and legally protected area and control of invasive alien species. • While the EIA Regulations do allow for issues regarding impacts on biodiversity to be identified and assessed, the mechanism of defining habitat as modified, natural or critical does not exist and need to be specified as part of the Terms of Reference for an EIA. • Implementing biodiversity off-sets in Namibia is not common and need to be considered on relevant projects, where required. • While the biodiversity strategy and action plan makes reference to the importance of ecosystem services, the EIA Regulations do not specifically require that ecosystem

No.	Guideline	Requirements	Equivalent Namibian Legislation	Gaps
			Strategy and Action Plan 6. The Forestry Act 12 of 2001 7. The Wildlife and Protected Areas Management Bill, 2001. 2. Environmental Management, Act 7 of 2007	service be identified and the impact on these services assessed.
4	Operational safeguard 2 – Involuntary resettlement: land acquisition, population displacement and compensation	• *Resource Efficiency:* Implement technically and financially feasible measures for improving efficient consumption of energy, water and raw materials, as well as other resources. • *Pollution Prevention and Management:* Avoid the release of pollutants or, when avoidance is not feasible, minimize and control the concentration and mass flow of their release using the performance levels and measures specified in national law or the EHSGs, whichever is most stringent. This applies to the release of pollutants to air, water and land. The following also needs to be taken into consideration: ▪ Historical pollution issues. ▪ Existing ambient conditions. ▪ In areas already impacted by pollution, the remaining assimilative capacity of the environment. ▪ Existing and future land use. ▪ The project's proximity to areas of importance to biodiversity.	1. Water Act (Act 54 OF 1956) 2. Water Resources Management Act (No. 11 of 2013 3. Pollution Control and Waste Management Bill (3rd Draft September 2003) 4. Atmospheric Pollution Prevention Ordinance (Ordinance 11 of 1976) 5. Agricultural Pests Act, 1973 (No. 3 of 1973) 6. Hazardous Substances Ordinance, 1974 (No. 14 of 1974)	• The sustainable use of resources and pollution prevention and management are covered under the Acts. • The EIA Regulations requires an understanding of the baseline conditions, however, does not provide details on aspects like historical pollutions issues, ambient conditions, future land use, etc. • Lack off emission limits (air quality). • Effluent discharge Standards available under the Water Act (issued by the DWA). • There is no specific requirement to quantify GHG emissions and to develop management strategies to reduce GHG emissions, should this be necessary.

No.	Guideline	Requirements	Equivalent Namibian Legislation	Gaps
		▪ The potential for cumulative impacts with uncertain and/or irreversible consequences. • Impacts of climate change.	7. Environmental Management Act 2007 (Act 7 of 2007) 8. EIA Regulations GN30, 18 January 2012.	
5	Operational safeguard 2 – Involuntary resettlement: land acquisition, population displacement and compensation (Relevant to the construction phase of the Project)	• *Working Conditions and Management of Worker Relationship:* Develop and implement written labour management procedures applicable to the project. These procedures will set out the way in which project workers will be managed, in accordance with the requirements of national law and this ESS. The following needs to be addressed: ▪ Terms and conditions of employment ▪ Non-discrimination and equal opportunity ▪ Worker's organizations in countries where national law recognizes workers' rights to form and to join workers' organizations • *Protecting the work force:* The following issues need to be addressed: ▪ Child labour and minimum age. ▪ Forced labour. • *Grievance mechanism:* Develop a grievance mechanism which will be provided for all direct workers and contracted workers to raise workplace concerns. • *Occupational Health and Safety:* Measures relating to occupational health and safety will be applied to the project. Develop and implement and H&S System and procedures to establish and maintain a safe working	1. Labour Act, 2007 (No. 11 of 2007) 2. Social Security Act, 1994 (No. 34 of 199, as amended 3. Employees Compensation Act, 1995 (No. 5 of 1995) 4. Regulations relating to the health and safety of employees at work (GN 156 of 1997)	• These Acts stipulate, amongst other things, sound labour relations, employment equity, fair employment practices, training, minimum basic conditions of service, workplace health and safety and retrenchment. Compliance is enforced and monitored by the Ministry of Labour through the office of the Labour Commissioner. • The legislation and regulations are broadly considered comprehensive and adequately compare to the WB ESS and industry guidelines. • There is no requirement for a Grievance Mechanism in the Acts.

No.	Guideline	Requirements	Equivalent Namibian Legislation	Gaps
		environment. Measures will be designed and implemented to address: ▪ Identification of potential hazards to project workers, particularly those that may be life threatening; ▪ Provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances ▪ Training of project workers and maintenance of training records. ▪ Documentation and reporting of occupational accidents, diseases and incidents. ▪ Emergency prevention and preparedness and response arrangements to emergency situations. ▪ Remedies for adverse impacts such as occupational injuries, deaths, disability and disease. • *Contracted workers:* ▪ Ensure that third parties who engage contracted workers are legitimate and reliable entities and have in place labor management procedures. ▪ Establish procedures for managing and monitoring the performance of such third parties. ▪ Incorporate the requirements of this ESS into contractual agreements with such third parties. • *Community workers:* ▪ Measures to be implemented to ascertain whether such labour is or will be provided on a voluntary basis as an outcome of individual or community agreement.		

No.	Guideline	Requirements	Equivalent Namibian Legislation	Gaps
		▪ Apply the relevant provisions of this ESS in a manner which reflects and is proportionate to (a) the nature and scope of the project; (b) the specific project activities in which the community workers are engaged; and (c) the nature of the potential risks and impacts to the community workers. ▪ Clearly identify the terms and conditions on which community labour will be engaged. • *Primary supply workers:* ▪ Links to previous commitments relating to child labour, forced labour and serious safety issues which may arise in relation to primary suppliers and workers safety issues.		

6. ENVIRONMENTAL AND SOCIAL BASELINE

The proposed project will be undertaken in a specific biophysical and social environment. The baseline conditions of these environmental features are described in the following subchapters. The baseline conditions are described for the subject area, which is the area/regions through which the project activities will be carried out. The proposed water supply project is located within the Zambezi Region.

6.1. Physical Features

The physical characteristics of the Zambezi Region and project area are as follows:

6.1.1. Climate

The Region is characterized as tropical with high temperatures and good rainfalls. According to Mendelsohn et al (2002), the annual temperatures range between 20 and 22°C, minimum temperature between 4 and 6°C, and maximum arranging between 34 and 36°C. The coldest months are July and August while the hottest months are September and October.

The Zambezi Region receives an average rainfall of more than 600mm per year (Mendelsohn et al, 2022) between the months of December and March. Furthermore, according to Lohe et al (2021), the climate of Zambezi Region is characterised by mean annual rainfall rates of 500 to 700 mm, the highest observed in the country, mean annual temperatures of 21 to 22 °C and potential evaporation rates of between 2,200 to 2,500 mm per annum.

6.1.2. Geology

Geologically, the aeolian sands and reworked aeolian or fluviatile-lacustrine deposits that entirely cover the Zambezi Region belong to the Kalahari Supergroup. Outcrops of underlying rocks are scarce and the geology is only identified from a few exploration boreholes and geophysical exploration. The Kalahari Sequence is a sedimentary succession starting from Late Cretaceous mainly consisting of unconsolidated to semi-consolidated conglomerates, gravel, sand and clays (Lohe et al., 2021). Similarly, Mendelsohn et al (2002) states that the geology of the project area is characterized by the Kalahari sands. Based on the site specific geology map in Figure 10 below, the project site is underlain by the sands, calcrete and gravel of the Kalahari Group.

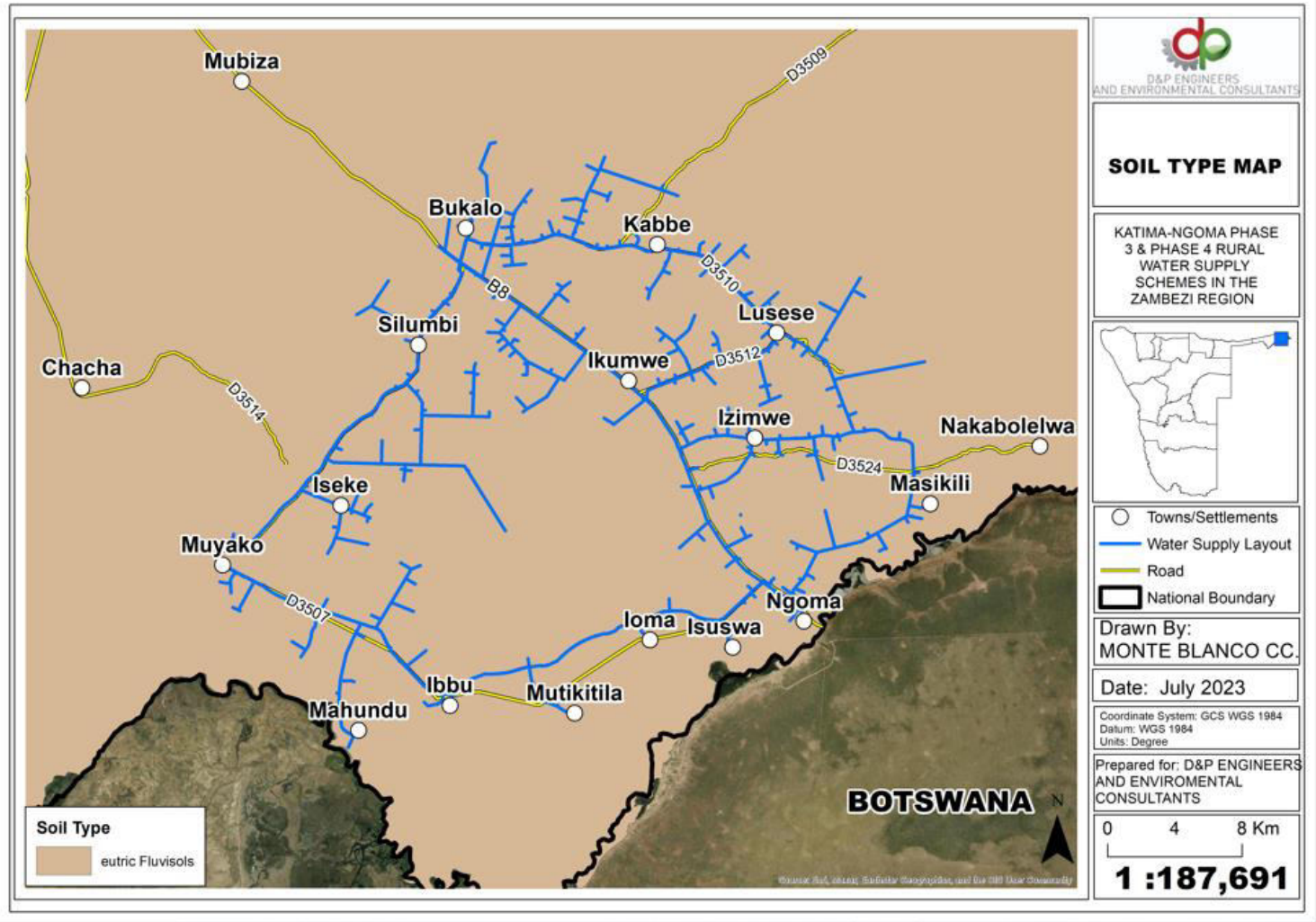


Figure 10: The geology (rock unit types) map of the project area

6.1.3. Soils

The dominant soils on and around the project site area are eutric fluvisols - Figure 11. According to Mendelsohn et al (2002), eutric are defined as fertile with high base saturation, the second component of the soils (fluvisols) are soils along the margins and valleys of larger river courses in eastern Namibia. Some soils are flooded regularly, especially the soils in and around the Zambezi River and eastern Caprivi floodplain. Some fluvisols provide nutrient-rich soils for crop cultivation, a quality exploited by many farmers in the Zambezi and Kavango areas (Mendelsohn et. al, 2002).

Figure 11: The soil map of the project area

6.1.4. Hydrology (Surface Water)

In terms of hydrology, the Region contains three perennial rivers, namely the Zambezi, Kwando, Chobe and Linyati Rivers. The Zambezi-Kwando-Linyanti Basin includes the intra-Namibian surface catchments of the Zambezi, Kwando and Linyanti rivers. The drainage systems are separated from the drainage system of the Okavango River, which discharges into the intra-continental Okavango Delta, while the Zambezi-Kwando-Linyanti (ZKL) River system drains into the India Ocean.

6.1.5. Geohydrology (Groundwater)

The Zambezi Region falls under the Caprivi Strip hydrogeological region with groundwater mainly tapped from the Kalahari Sequence which forms a porous aquifer. The variable yields from 0 to more than 20 m^3/hour are recorded. Iron is a major concern, causing a high percentage of water points to be classified as Group D water. Good quality water is generally found up to 5-20km from the rivers, which recharge the aquifers. Thus water quality often deteriorates rapidly away from the rivers and with increasing depth to groundwater. Recharge in the central part is low with most of the water derived from precipitation. The velocity of the regional groundwater flow is extremely low (Kasinganeti et al, 2019).

Hydrogeologically, the project is found in the area characterized by porous aquifers, i.e., primary aquifers as shown on the map in Figure 12. The primary aquifers consist mainly of unconsolidated to semi-consolidated sediments of the Kalahari Sequence (sands, and gravel) that occur in the area shown in the geology map above. A continuous porous aquifer, referred to as the Upper Kalahari Aquifer (UKA) is developed within the upper unconsolidated sand and silt of the Kalahari Supergroup covering the entire area of the Zambezi Region. The thickness of the aquifer commonly exceeds 100 m. The UKA is locally confined or unconfined depending on the existence of intermittent clay-rich layers within the sedimentary succession.

In the central parts of the Zambezi Region, over an area of at least 2,000 km^2, a deep confined freshwater aquifer within the Kalahari sediments, the so-called Lower Kalahari Aquifer (LKA), exists at depths approximately 130m below the ground surface (Lohe et al., 2021). Furthermore, near the floodplains of the Kwando River, groundwater flows in a west to easterly direction whereas in areas further to the east groundwater generally follows in a north to southerly direction. The flow direction thus implies that surface river recharge occurs particularly in the floodplains of the Kwando River.

The Kalahari Sequence sediments constitute the most important aquifers in the region and the vast majority of boreholes drilled for rural and bulk water supply intersect the Kalahari aquifers. Boreholes drilled in close proximity to the Zambezi River, can be have high yielding and most of the bulk water schemes are developed along perennial Rivers such as the Zambezi.

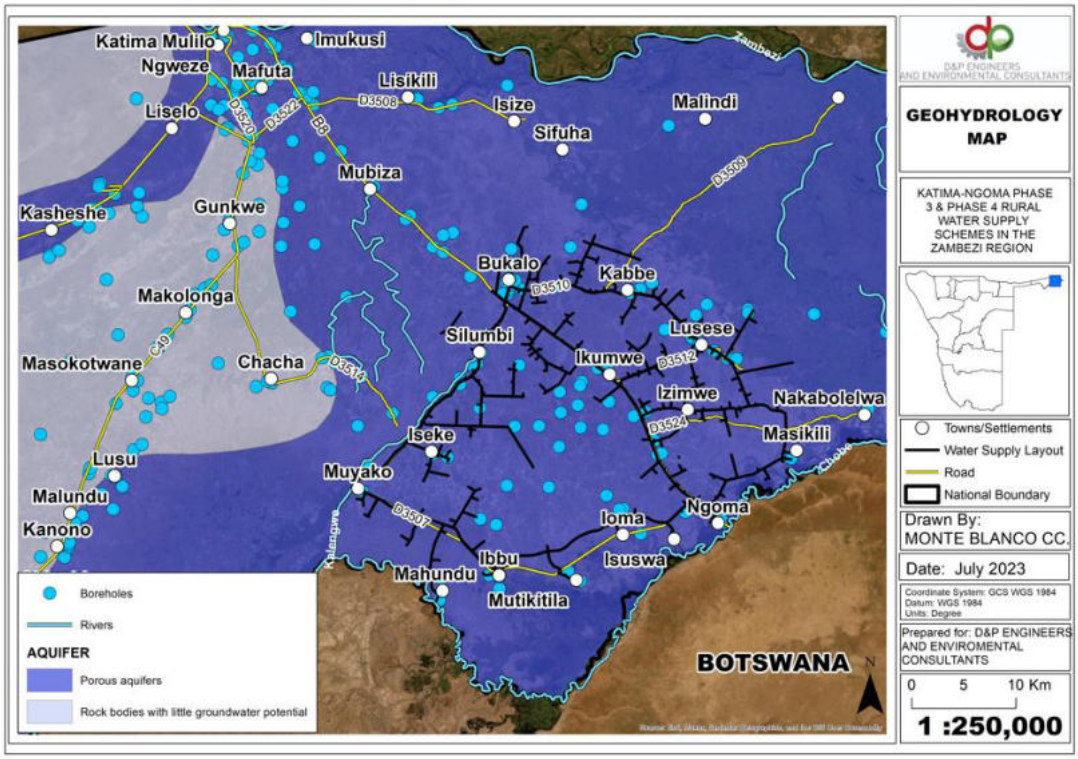


Figure 12: The geohydrology (groundwater) map of the project area

Groundwater use and quality

As with other parts of the country, groundwater is an indispensable source for local water supplies in the Zambezi Region. Groundwater is pumped from a large number of wells using solar installations, fuel-operated power generators or hand pumps. Its composition and quality is however highly variable throughout the region. High salinity caused by evaporation before infiltration (known as evapo-concentration) and the dissolution of evaporates such as halite and gypsum along the flow path is a major concern. Locally, high iron, sulphate or fluoride content can restrict the use of groundwater as a potable water source (Lohe et al., 2021).

Five zones with characteristic groundwater composition can be distinguished within the UKA. The water quality in the western parts of the Zambezi Region, the zone between the Okavango and Kwando rivers, is usually good; groundwater can be located easily and is available in sufficient quantities.

Groundwater along the Kwando River is also abundant and generally of good quality. This zone is made up of recent alluvium and influenced by regular indirect recharge of surface water. The groundwater corresponds to the calcium-magnesium-bicarbonate type and has low Total dissolved solids (TDS) content, typically between 330 and 500 mg/l and sulphates (usually <10mg/l) (Lohe et al., 2021).

6.1.6. Landscape and Topography

According to Mendelsohn et al., (2002), the landscape of the Katima Mulilo-Ngoma and surroundings is characterized by the Zambezi floodplains and Kalahari Sandveld. This landscape is found in much of the northern and eastern Namibia dominated by Savanna woodlands growing on sands deposited by wind over the last 70-63 million years ago. The landscape is particularly flat, although the sands have been molded into dunes in some areas.

There are no significant mountain ranges and inselbergs, thus, the project area is relatively flat with elevations range between 0 and 547 meters above sea level as shown on the map in Figure 13.

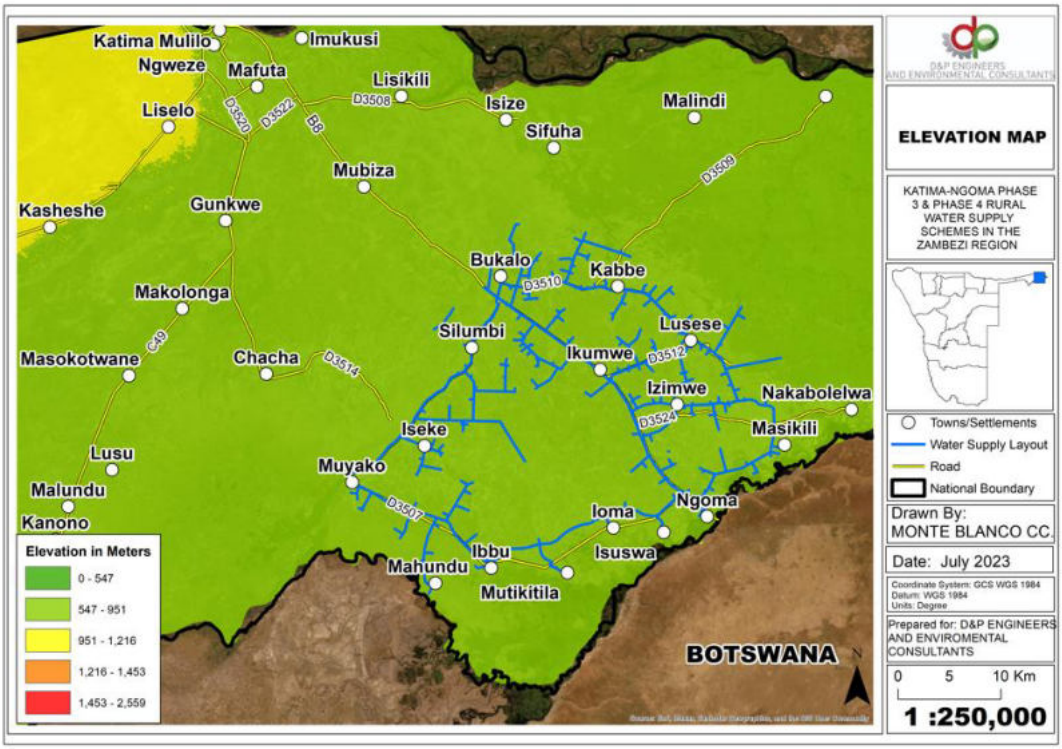


Figure 13: The elevation of the project area

6.2. Biological Features

The Zambezi Region has one biome, namely the Savanna. The biodiversity features of the project area are presented under the following subsections:

6.2.1. Fauna

A. Mammals and Reptiles

The Zambezi Region including the project sites is blessed with a rich diversity of mammals and reptiles, showcasing the region's unique ecological significance and diverse habitats. The project area is located within the boundaries of the Kavango-Zambezi Trans frontier Conservation Area (KAZA TFCA) which has been demarcated to allow the free movement of migratory animals between international borders. There is an animal migratory sign along the project route (Figure 14).

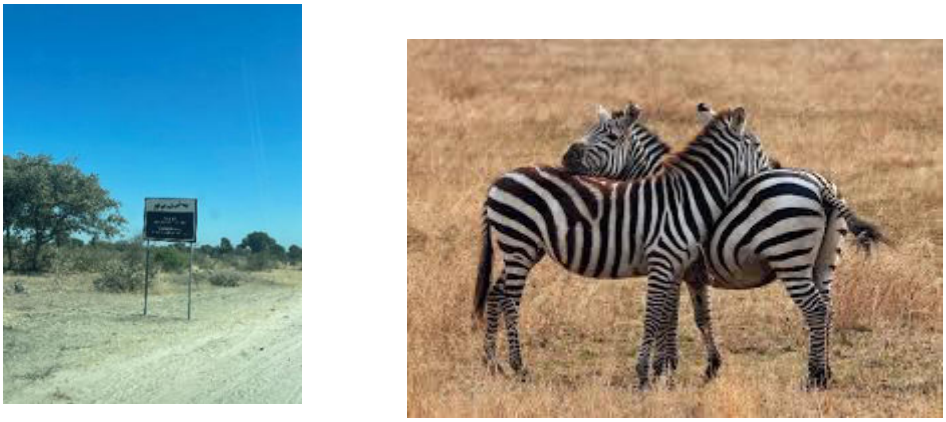


Figure 14: Animal Migratory Sign Post and zebra observed along the project route

The mammals known to appear and observed in the area (along the project site) are listed below:

- African Elephant (*Loxodonta africana*): The Zambezi Region and project is known for its significant elephant populations, especially in the Bwabwata National Park. These majestic creatures are iconic and an important part of the local ecosystem.
- African Buffalo (*Syncerus caffer*): Often seen in herds, African buffaloes are a common sight in the region's grasslands and woodlands. They play a crucial role in shaping the region's ecosystems.
- Lion (*Panthera leo*): Lions are apex predators in the Zambezi Region and are found in protected areas. They are vital for maintaining the balance of the ecosystem.
- Leopard (*Panthera pardus*): These elusive cats are well-adapted to the region's varied terrain and are often spotted near water sources.
- Hippos (*Hippopotamus amphibius*): The Zambezi River is home to large hippo populations, which spend much of their time in the water, emerging at night to graze.
- Various Antelope Species: The region is home to diverse antelope species, including impalas, kudus, and bushbucks, which inhabit the woodlands and grasslands.

B. Reptiles:

- (*Python sebae*): The region is home to this impressive snake species, which can be found in a variety of habitats.
- Southern African Rock Python (*Python natalensis*): Another python species that resides in the region, often near water sources.

- Nile Monitor Lizard (*Varanus niloticus*): These large, diurnal reptiles are commonly seen near water bodies.
- Geckos and Agamas: Various species of geckos and agamas inhabit the region's arid areas.
- Spur-Thighed Tortoise (*Geochelone sulcate*): These tortoises are adapted to the region's semi-arid conditions and are frequently encountered.

The proposed project area's diverse mammal and reptile populations contribute to its ecological importance and make it a prime destination for wildlife enthusiasts and researchers. Conservation efforts, including protected areas and sustainable tourism practices, are crucial for preserving this biodiversity and ensuring the coexistence of these remarkable species with the local communities.

C. Birds (Avian)

The Zambezi Region including the project area is a birdwatcher's paradise, renowned for its remarkable avian diversity, attracting ornithologists and nature enthusiasts from around the world. The region's varied ecosystems, from lush wetlands to arid savannahs, provide a range of habitats for a wide array of bird species. Some of the notable bird species found in the Zambezi Region include:

- African Fish Eagle (*Haliaeetus vocifer*): This iconic raptor is often spotted along the Zambezi River, soaring above the water and hunting for fish.
- African Skimmer (*Rynchops flavirostris*): Zambezi's riverbanks provide ideal breeding sites for these distinctive birds, which use their unique bills to skim the water's surface for prey.
- Pel's Fishing Owl (*Scotopelia peli*): A sought-after sighting for birdwatchers, this large and elusive owl can be found near water bodies, especially in the Bwabwata National Park.
- Saddle-billed Stork (*Ephippiorhynchus senegalensis*): These striking birds, with their vibrant plumage and distinctive bills, are often seen in wetland areas.
- Lilian's Lovebird (*Agapornis lilianae*): Zambezi is part of this species' range, and birdwatchers can spot these colorful parrots in woodlands and savannahs.
- Carmine Bee-eater (*Merops nubicoides*): During the breeding season, these stunning birds congregate in colonies along riverbanks, creating breathtaking displays of color.
- Southern Ground Hornbill (*Bucorvus leadbeateri*): This large, charismatic bird is often seen foraging on the ground in savannah areas.
- African Jacana (*Actophilornis africanus*): These striking waders are known for their incredibly long toes, which allow them to walk on floating vegetation in wetlands.
- White-crowned Lapwing (*Vanellus albiceps*): A distinctive lapwing species often seen foraging in grassy areas near water.
- African Skimmers (*Rynchops flavirostris*): These unique birds, with their remarkable bill adaptations for skimming the water's surface, are commonly spotted along the Zambezi River.

The Zambezi Region's diverse birdlife not only attracts birdwatchers but also plays a vital role in local ecosystems and tourism. These avian species are not only beautiful but also contribute to the region's ecological health and are crucial components of its natural heritage. Conservation efforts in the region, including the protection of wetlands and sustainable tourism practices, are essential for safeguarding this rich avian diversity for future generations to enjoy.

6.2.2. Flora

The Zambezi Region falls within the broader Tree-and-Shrub Savanna biome and forms part of the Broadleaved Tree-and -shrub Savanna sub-biome. The Broadleaved Tree-and -shrub Savanna sub-biome is characterized by many species of tall trees that often form thick canopies (Mendelsohn et al., 2002). The Zambezi Region can be divided into four vegetation units namely floodplains, mopane woodlands, riverine woodlands and Kalahari woodlands.

The Zambezi Region boasts a diverse array of grasses and trees, each uniquely adapted to its semi-arid to sub-humid climate and varying ecological niches. In the Region's floodplains and along the Zambezi River, lush vegetation thrives, including aquatic grasses, papyrus reeds (*Cyperus papyrus*), and water lilies (*Nymphaea* spp.), creating essential habitats for aquatic life and bird species. Transitioning into the savannah woodlands, one encounters a mix of grass species, such as finger millet (*Eleusine coracana*) and buffalo grass (*Panicum maximum*), which serve as primary forage for livestock and support local agriculture. Acacia trees, including the iconic camelthorn (*Acacia erioloba*), are prevalent and provide crucial shade and habitat for wildlife. The mopane tree (*Colophospermum mopane*) is a dominant species in the eastern areas, characterized by its distinctive butterfly-shaped leaves. Additionally, the Zambezi Region is rich in medicinal plants, with species like the Devil's claw (*Harpagophytum procumbens*), known for its anti-inflammatory properties, and aromatic herbs like wild sage (*Salvia africana-lutea*) being of cultural and economic significance. This diverse flora contributes significantly to the Region's biodiversity and the well-being of its local communities.

The list of vegetation (with photos) that were observed along the project route and their status are provided under Appendix C of this Report.

6.3. Socio-economic Features

6.3.1. Population

According to NSA Census 2011, Zambezi Region had a population of 90,596 (46,497 females and 44,099 males) and population density of 6.2 people per square kilometre. Most of the Region’s population lives in rural areas.

From a local perspective, a separate baseline socio-economic survey was conducted for the project route area between August and October 2022.

6.3.2. Economy

The labour force (15+ years old) was reported at 61% with 62% employed and 38% unemployed. The main sources of household income comprised of farming (21%), wages & salaries (30%), cash remittance (6%), business, non-farming (29%) and pension making up 15% (NSA, 2012)

The Region depend on the wooded forests for poles, tubers, medicinal uses (for sale and income). High agricultural activities for pastoral and commercial purposes, i.e. maize, millet and Kalimbeza Rice Farm. Furthermore, the economy of the Region is centred on business opportunities mainly through game farming and lodges; tourism industry (most popular for the Impalila Island, Mamili National Park and the Chobe and Zambezi Rivers) (GCS Water and Environmental Consultants, 2018).

6.4. Infrastructure Development

6.4.1. Transport

The transportation corridors in the Region include the Trans-Caprivi Highway, increased air travel from Windhoek to Katima Mulilo by FlyNamibia, as well as tourism marketing and conservation efforts.

6.4.2. Power Supply

The supply of electricity is generally related to the development of other infrastructure and areas supplied with electricity are potential growth centres.

In Zambezi, the water is obtained by utilizing water from the flood plains, open wells and boreholes (water with high saline and iron content) which caused hardship and restricted development due to prolonged periods of drought and crop failure.

6.4.1. Water Supply

The water supply project (Katima Mulilo- Ngoma) is aimed to provide potable water to communities in the Zambezi Region through the development of infrastructure to ensure a reliable supply of water in acceptable quality and quantity to the communities. This is done to stimulate economic growth and to promote social development. The project of interest for this ESIA is the Katima Mulilo – Ngoma Water Supply Project Phase 3 & Phase 4.

6.4.2. Telecommunications

The Zambezi Region and the delivery of mail between Windhoek and the Region takes approximately one week. Several courier services also operate efficiently between Windhoek and the Region. Landlines, as well as mobile telephone facilities, are available in these areas and these services are constantly being improved and extended. 4G LTE connectivity is available throughout most of the route. Improved telecommunication services stimulate growth, which in return necessitates the upgrading of water networks.

Good telecommunication services will facilitate communication during the construction and operational phase of the project.

6.5. Social, Archaeology and Cultural Heritage Aspect

A Social and Archaeological & Heritage Impact Assessment (AHIA) was carried out for the project by a qualified and experienced Archaeologist from TARO Archaeology Consultants. The site and baseline assessment were conducted, and report compiled thereto as briefly presented under this subsection and detailed in TARO Heritage Consultants (2023) – Appendix D.

6.5.1. Regional Aspect

According to TARO Consultants (2023), the Zambezi Region has a relatively short archaeological sequence representing the introduction of agricultural resettlements to the area within the past two thousand years. Research coverage to identify archaeological sites in the region has been poor. Some studies have been done during EIAs for developments such as power lines, in some areas, remains from burials are found, but not recognized as formal graveyards. This is because funerals in the rural areas are often not done formally. Such sites could be disturbed or destroyed during future construction projects (Kinahan, 2004). An archaeological survey was done for the 400kV power line running from Zambia, through the Zambezi Region (Kinahan, 2004).

The assessment identified two sites which have significance to the archaeological record. On the west bank of the Kwando River at Kongola, the dune cover overlies a calcareous tufa-like deposit with a dense hump of root casts from what appear to be reeds and sedges. The upper surface of the tufa-like deposit represents the former water level of the adjacent wetland.

The second site is of recent alluvial deposits north of Kasheshe, near Katima Mulilo. They indicate shifts in the course of the middle Zambezi River in the Quaternary Period. A few artefacts including sub-fossil bones and freshwater molluscan shells were found. Historically, the Zambezi Region has a few monuments of Namibia's colonial past. A building at Luhonono (former Schuckmansburg) still stands, that served as an ammunition storage during the German period (Otto et al., 2014). Schuckmansburg served as the administrative centre for the region at that time. More recently, there is a monument to the Singalamwe massacre, where people were tortured and killed for supporting the freedom struggle. Today there is a graveyard in Masida village for them (TARO Consultants, 2023).

There are two recorded archaeological sites as per the available National Heritage Council (NHC) database located about 60km southwest and 20km northwest of the project area boundary as shown in Figure 15 (two green dots).

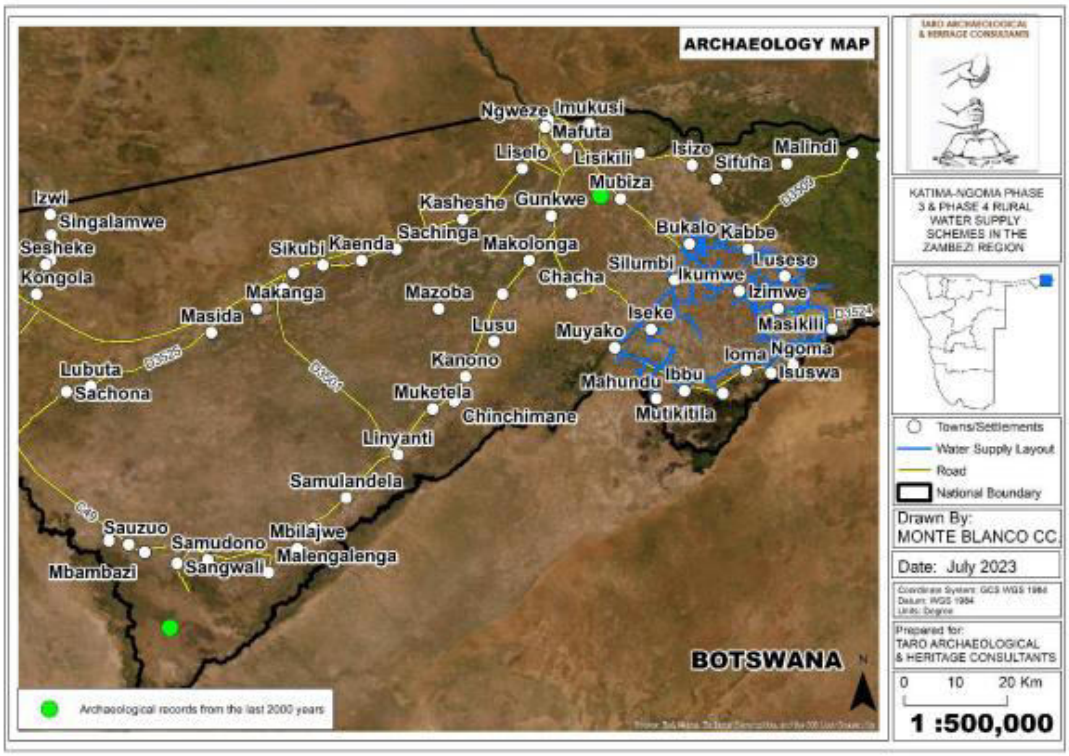


Figure 15: Archaeological map showing sites of significance outside the Proposed Development (TARO Consultants, 2023)

6.5.2. Local Aspects and Onsite Findings

Most of the findings related to this project were the graves and burial places, the graves and burial places regardless of their age and contexts, are considered to be sacred and deserve high attention and respect. Of all the traversed areas and villages, nothing of archaeological significance was either recorded or identified, and this corresponds well with the previous research and studies in the Zambezi Region that did not yield much archaeological sites for various reasons.

6.6. Climate Change Adaptation and Mitigation

Currently, the average annual temperature in Namibia has been increasing at a rate of 0.0123°C over the period 1901-2016 (NC412). Unlike temperature, there are no obvious trends in precipitation during the reference period. A non-significant increase of about 0.039mm is observed in annual precipitation. It is predicted that the north-eastern parts of the country will experience the highest increases in average annual temperature. It is projected that the mean annual temperature will increase by 2°C and 4°C relative to the baseline (1981-2018) by mid- and end-century respectively, under the worst-case scenario (i.e., a2 Emission Scenario).

The majority of the 35 General circulation models (GCMs) used, predict that Namibia will become drier, that rainfall variability will likely increase and that extreme events such as droughts and floods will become more frequent and intense. Mid-, and end-century projections respectively show, with low confidence, a 7% and 14% reduction of rainfall from the baseline period (1981-2018).

6.6.1. Vulnerability

As per the above projections, it is anticipated that women and children will be disproportionately affected by climate-related disasters due to their socio-economic status. The occurrence of natural disasters, namely floods, droughts and epidemics, have had dire socioeconomic impacts including loss of numerous lives. It is estimated that during the period 1980 to 2020, droughts (9), epidemics (7) and flood (15) events have cumulatively affected more than 3.25 million people, costing the economy more than 2 billion USD. Epidemics other than the COVID-19 pandemic and floods are responsible for claiming more than 555 lives over the same period13.

Namibia's socioeconomic development is highly natural resource-based and critical activities depend on water supply despite it being impacted by climate change. The latest assessment from the NC4 indicated the high vulnerability of the agriculture, water resources, coastal zone, health, biodiversity, ecosystems, fisheries and tourism sectors. A new approach used to calculate the vulnerability index of the 121 constituencies of Namibia indicated that those in the southern part of the country were more resilient compared to those in the northern regions where the poorer segments of the population reside.

6.6.2. Adaptation Measures

Adaptation measures have been assessed for the proposed project as follows:

(i) Climate adaptation has been integrated into the outputs and indicators of the project as rural water supply it is too specific as an adaptation activity. However, it could be considered as a criterion for the selection of beneficiary communities, additional benefits such as climate-smart agriculture and food security enhancement can be considered.

(ii) Implementing agencies and the beneficiary communities are made aware of possible unintended impacts that their actions can have on the environment, climate change mitigation, adaptation to climate change, conflict and context sensitivity, human rights, and gender equality, and will design their implementation activities accordingly.

(iii) The project will comply with valid national and international environmental law, minimise greenhouse gas emissions where possible and avoid activities that could make the population and/or ecosystems more vulnerable to the impacts of climate change.

The public consultation and engagement process and means employed for the project ESIA Study is presented under Chapter 7.

7. PUBLIC CONSULTATION AND ENGAGEMENT

7.1. Overview

Public and Stakeholder involvement is a key component of the EA process. The public consultation process, as set out in Section 21 of Regulation No. 30 of EMA, has been followed during this assessment and the details thereof are documented below.

Public consultation forms an important component of an Environmental Assessment (EA) process. The consultation provides potential Interested and Affected Parties (I&APs) with an opportunity to comment on and raise any issues relevant to the project for consideration as part of the assessment process. Public consultation has been done in accordance with both the EMA and its EIA Regulations.

The public consultation process assists the Environmental Assessment Practitioner (EAP) in identifying all potential impacts and the extent to which further investigations are required. Public consultation can also aid in the process of identifying possible mitigation measures.

7.2. Approach to the Stakeholders (I&APs) Consultation

7.2.1. Interested and Affected Parties (I&APs)

The Environmental Consultant identified specific I&APs, whom were considered interested in and/or affected by the proposed activities through the following means:

- Information for the applicable local authorities was obtained from the existing GCS stakeholder database
- Notification letters and/or emails were sent to those possibly interested and affected by the proposed project, and
- Notices were placed in the local newspapers requesting any potentially affected or interested members of the public to register as I&APs.

The main stakeholders pre-identified and registered throughout the ESIA Study are summarized below (and attached hereto as Appendix E):

- MAWLR: Directorate of Water Resources Management
- MAWLR: Directorate of Water Supply and Sanitation
- NamWater
- Ministry of Environment, Forestry and Tourism and representatives
- Regional and local authorities, i.e., Zambezi Regional Council, Constituency Offices, Town Council and Settlement offices
- Respective Traditional Authority
- Village Development Committees (VDCs)
- Primary beneficiaries / community representatives.

7.2.2. Communication with I&APs

Regulation 21 of the EIA Regulations details steps to be taken during a given public consultation process and these have been used in guiding this process. Communication with I&APs regarding the proposed development was facilitated through the following means and in this order:

- Building a Stakeholder Database: A stakeholder database for the project was compiled with pre-identified key stakeholders throughout the ESIA Study. During the advertisement of the project (though public notices in local newspapers), the list was augmented as Interested & Affected Parties (I&APs) registered and contact information of stakeholders updated.
- Circulation of the Background Information Document (BID) containing descriptive information about the proposed activities was compiled and sent out to all identified and registered I&APs. The printed copies of the BID were also prepared for distribution in consultation meetings.
- Compilation and placement of newspaper adverts (ESIA Study notifications) in two different newspapers. The adverts were placed in the *New Era* and *Windhoek Observer* newspapers dated 29 June 2023 and 06 July 2023 –Appendix F. The project details were briefly explained in the newspapers and inviting members of the public to register as I&APs.
- Radio announcements for the ESIA Study's consultation meetings were made to the communities via the Zambezi Regional Council's local constituency offices (Katima Mulilo Rural, Kabbe North, and Kabbe South Constituencies). The letter of notification and consultation was shared with the Office of the Chief Regional Officer for the Zambezi Regional Council on the 29th of June 2023 (Appendix G) through which all regional correspondences should be sent.
- Consultation meetings: consultation meetings were scheduled and held with stakeholders, local leadership and public between the 07th and 12th of July 2023 in the Zambezi Region. There was one stakeholders consultation meeting, four public and stakeholders meetings as well as a one-on-one engagement session in Katima Mulilo – please refer to subchapter 7.2.3.

The modes of consultation used for the Study are presented in Table 16 below.

Table 16: Modes of Public notification and engagement for the ESIA Study

Mode of Consultation	Area of Distribution	Language	Action Dates
New Era	Country Wide	English	29 June & 06 July 2023
Windhoek Observer	Country Wide	English	29 June & 06 July 2023
Consultation Meetings	Regional and Local	English and translations in Subiya	Between 07 and 12 July 2023

7.2.3. Stakeholders and Public (Community) Consultation Meetings

Public consultation meetings were conducted with representations from the traditional authority, council representatives, regional council, residents, government and quasi-government departments and ministries. Pertinent issues relating to the project were discussed and recorded in the meeting minutes for each meeting. The meeting minutes with attendance registers are attached hereto as Appendix H. The details of the consultation meetings are provided in Table 17 below.

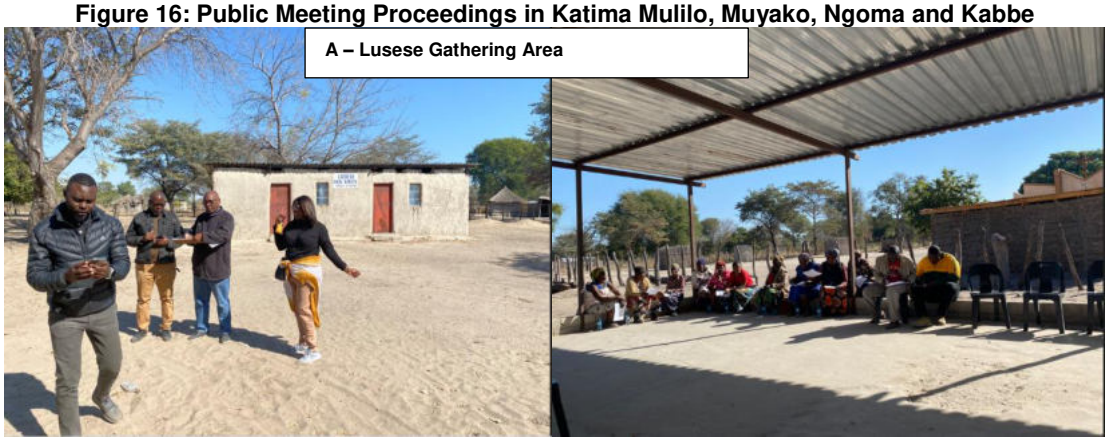
Table 17: Records of stakeholders and public consultation and engagement for the ESIA Study

Date and Time	Activity	Meeting Venue/Place
Friday, 07 July 2023: 09h30	Stakeholders' Meeting: Zambezi Regional Council, MAWLR's Directorate of Water Supply & Sanitation Coordination (DWSSC) and NamWater	Zambezi Regional Council Boardroom, Katima Mulilo
Monday, 10 July 2023: 10h00	Public /Community Consultative Meeting	Muyako Khuta

Date and Time	Activity	Meeting Venue/Place
Monday, 10 July 2023: 14h00	Public / Community Consultative Meeting	Ngoma Khuta
Tuesday, 11 July 2023: 10h00	Public / Community Consultative Meeting	Kabbe Constituency Office
Tuesday, 11 July 2023: 14h00	Public / Community Consultative Meeting	Lusese Khuta
Wednesday, 12 July 2023: 09h00	One-on-One Consultative Session	Katima Mulilo near the water reservoir

The meeting proceedings photos are provided in Figure 16 and Figure 17.

Figure 16: Public Meeting Proceedings in Katima Mulilo, Muyako, Ngoma and Kabbe



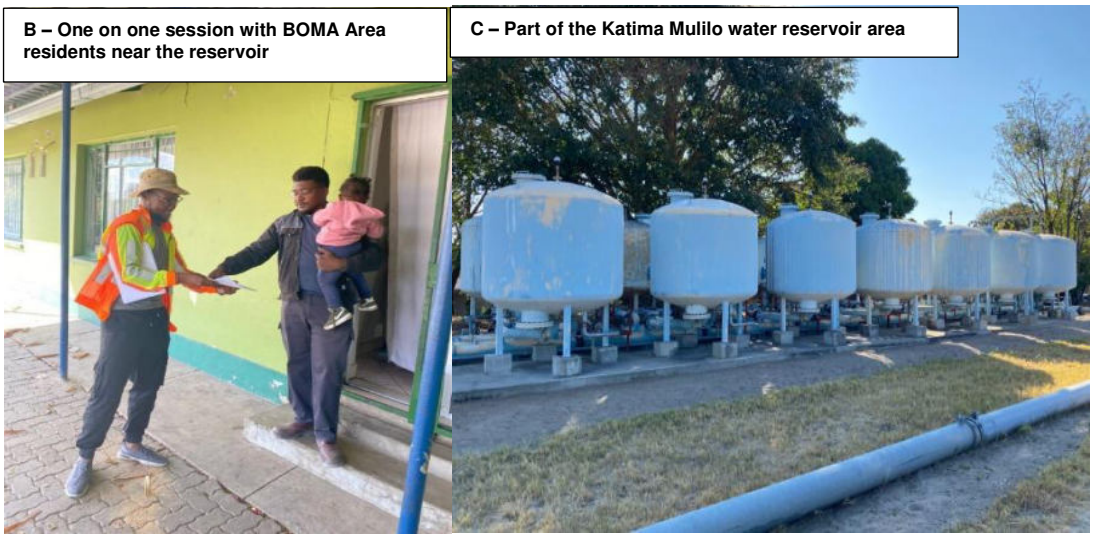


Figure 17: Public Meeting Proceedings in Lusese and Katima Mulilo

7.2.4. ESIA Study Comments Period

After the initial newspaper notification on 29 June 2023, the I&APs were given until 28 July 2023 to submit their comments on the project. However, the comment period remains open until the final ESSR is submitted to MEFT (which has a further 14 days for public comments directly to the Office of the Environmental Commissioner).

7.2.5. Feedback and Issues raised by the Stakeholders (I&APs) in Meetings

The key issues were raised by some I&APs/stakeholders during the consultation meetings and these have been recorded and incorporated herein. The summary these few key issues are presented in Table 18.

Table 18: Summary of key issues noted throughout the consultation period (consultation meetings)

Aspect	Comment	Response
Land Use	-Compensation of properties affected by the water infrastructure such as pipelines crossings. -Community members emphasized on consultative engagements. - The Muyako-Ngoma area has an issue of houses erected close to the road and subsequently the pipeline planned along the route.	-The project will avoid property impacts by all means through prioritising public servitudes and informal servitudes or boundaries. The Engineering consultant has indicated that they will design the pipeline in a way that avoids significant properties, should the right of way affect a property, compensation for the impact will be quantified, costed, and settled.
Economic	-Emphasis on the employment of locals along the project route. -Management and handling of labour associated with the project, in terms of recruitment -The urgent need for clean (good water quality) and accessible water supply -Affordability of water and non-payment of accounts for water during operational phase.	-The Zambezi Regional Council indicated that they would ensure that appointed contractors will employ locals for all semi-skilled labour. -The issue of water affordability will be put into consideration by NAMWATER.

Aspect	Comment	Response
Environmental	-Protected tree species were mention to be important and compensation should be ensured. - Provision of troughs for animals, and not only human consumption -Water infrastructures passing through conservancies to minimize human-wildlife conflicts.	-A Resettlement and Compensation Plan will be drafted after the final designs have been drafted, -This will be drafted in collaboration with the consulting Engineer. -The project right of way will not affect any conservancies, however during construction, minimal impacts will be anticipated to natural environments and wildlife sanctuaries in proximity.
Social	-Issue of water affordability (water given for free and when you start charging, conflict will start). -Water infrastructure care (how will the community maintain the infrastructures). -Stakeholder Disclosure and continued engagement throughout the project planning and implementation. -The urgency of the project (access to clean and safe) for the community as the current water is of poor quality water since 1990. -Groundwater (borehole water) quality issues (poor water quality (salty)), making the water unfit for human consumption. -Aspect of pipeline crosses through a graveyard/cemetery (archaeology). -Elders (senior citizens) travelling about 3km from their households to water supply points -The issue of water supply promises over the years and nothing materializes. Expediting the process to address the water needs at Ngoma. -Vandalism of water infrastructures such as meters by some community members. Installation of water meters should be close to the community/people for protection.	-Adressed above. -NAMWATER will manage all bulk water infrastructure, whilst Rural Water Supply and Sanitation will maintain community water supply lines. -The project will not use any borehole water. -The project engineer will ensure that graveyards and cemeteries will be avoided. All potential sites have been mapped out. -MAWLR is implementing this project to address the water supply challenge in the Zambezi region. -The Zambezi Regional Council will communicate with the local chiefs and headmen to ensure protection of the waterlines. Namibian Police was present during the meeting, and they guaranteed that they will ensure security of powerlines.
Others	--Existing system of community payment for the operation and maintenance of water infrastructure support such as generators. -The need to access water 24 hours (always) as at times there is no water. Thus, requesting for a main reservoir and backup reservoir for security. This is also because where there is a damage in the infrastructure (pipeline) for a certain period at Bukalo, this interrupts supply to the area until the repairs works are completed.	-The community will not be expected to pay for pipeline and associated infrastructure's maintenance, except for their rates. -The project will construct a reservoir in Bukalo.

7.3. Grievance Redressal Mechanism (GRM)

The Grievance Redress Mechanism (GRM) will provide a way to provide an effective avenue for expressing concerns and achieving remedies for communities. Social accountability will need to be strengthened through the effective GRM. The GRM is established to ensure that complaints are directed and expeditiously addressed by the relevant agencies which are to enhance responsiveness and accountability. A Grievance Redress Panel (GRP) to be set up at central, and constituency levels. At community, constituency and regional levels, the GRM will strive not to develop parallel structures but make use of existing and locally recognized grievance redress systems. The functions of the GRP should include:

- Redressing grievances of project affected persons (PAPs) in all respects
- Rehabilitation and resettlement (R&R) assistance and related activities
- Dealing with or hearing issues related to R&R and individual grievances
- Ensuring that affected and grieved parties are properly addressed.

7.3.1. The GRM Objectives

The objectives of the grievance mechanism will be to:

- Clarification and analysis of the grievance nature,
- Provide stakeholders with a platform to submit their grievances and or comments pertaining to the Project activities,
- Record the grievances received as well as comments in a grievance log,
- Review and investigate the grievances from a stakeholder and or public,
- Provide responses (solution to the grievances) to the stakeholder and ensure that they are satisfied with the mitigating action or solution (response) provided, and
- Communicate the responses to the stakeholders and provide satisfactory feedback or action to their grievances.

7.3.2. Proposed Grievance Procedures

The grievances associated with the project will be handled by MAWLR through the Project Manager (most likely the MAWLR Regional Officer), Construction Contractor, and subsequent Operations & Maintenance Operator. These will include the following steps and timelines:

- A grievance registration book will be available on-site,
- Establish GRM mechanism to address any grievances,
- A grievance form for the stakeholder to complete (personal details and grievance details). One copy will be submitted to the appropriate Project Phase Manager onsite and another copy to MAWLR's Project Manager,
- Open discussion of the issue or problem by the Project Manager and onsite respective phase Manager, to find solutions to the problem(s),
- Communication of the resolution to the concerned stakeholder(s), and
- If the stakeholder is not satisfied with the proposed resolution, it can be appealed.

Stakeholders will also be encouraged to submit anonymous grievances, if not comfortable providing their identity. The grievance registration form will be attached to the ESMP.

The Grievance Mechanism stipulates the need for the following:

- Training – those who are responsible for addressing grievances, must have detailed knowledge on how the Project's grievance mechanism work and who to speak with on each category of issues.
- Record Keeping – all aspects of the grievance management process must be comprehensively documented and accurate records should be maintained.
- Reporting – MAWLR will compile information relating to engagement activities as appropriate for the monthly social and environmental reports.

A Grievance Mechanism is also developed to detail the procedures that a project will establish to manage complaints and grievances. The GRM process is shown in the diagram in Figure 18.

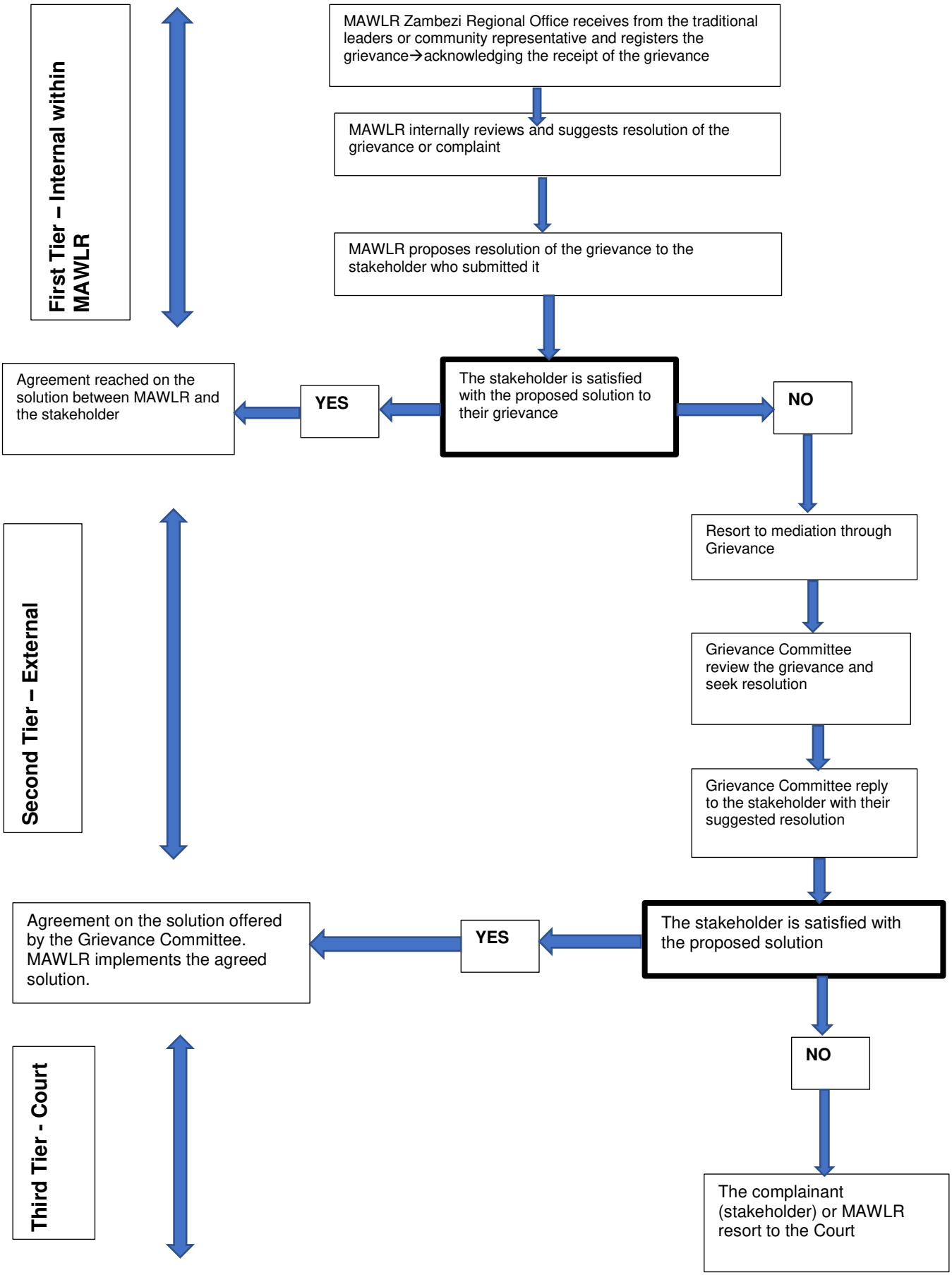


Figure 18: Grievance Mechanism Process

7.3.3. Complaints/Grievance Logging Procedure

A complains shall be received/reported to local GRP (in the community) and recorded in the compliant logbook/sheet when a compliant completes the compliant form. The GRP would determine on the case, if action proposed is adequate a case is withdrawn. If no, the GRP will establish long term action, a follow up channel is set and inform the compliant (if appropriate) of the corrective measures and implement the corrective action.

7.3.4. Accountability Mechanisms

AfDB recognizes that even with strong planning and stakeholder engagement, unanticipated issues can still arise. Therefore, the Integrated Safeguards System (ISSs) are underpinned by an accountability mechanism outlined below:

- Independent Review Mechanism (IRM) that ensures individuals, peoples, and communities affected by projects have access to appropriate grievance resolution procedures for hearing and addressing project-related complaints and disputes.
- The aim of IRM is to provide people adversely affected by a project financed by the AfDB, with an independent mechanism through which they can request the AfDB to comply with its own policies and procedures.

7.4. Feedback: Draft ESSR Review

For review and further comments, the Draft ESSR Report with associated appendices will be circulated to I&APs for a specified period.

D&P Environmental Consultants conclude that the public participation was extensive and transparent enough to ensure any comments or issues regarding the proposed development were addressed and to suggest possible mitigation measures.

The potential impacts associated with the project activities are provided under the next chapter. Under the same chapter, the impacts methodology, description and assessment are also provided.

8. ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

8.1. Overview

This chapter is a presentation of identified potential impacts (positive and negative), the description of impacts, impacts assessment methodology and their assessment.

8.2. Potential Impacts Identified

The potential positive (benefits) and negative (adverse) impacts associated with the proposed development and its associated activities are presented below.

8.2.1. Positive Impact or Benefits of the project

The potential positive or benefits from the proposed project (development) are as follows:

- Water Infrastructure development and betterment of the communities served by the water supply infrastructure
- Temporary employment creation to both skilled, semi-skilled and unskilled (casual labour) during the construction phase
- Boost in local economy and investment capacity
- Improved Sanitation through safe and accessible clean water.

8.2.2. Negative impacts

The preliminary adverse or negative impacts identified for the proposed project phases are as follows (as pre-identified and after consultation meetings and site route assessment) are listed below:

- Land use change (aesthetic value)
- Physical land / soil disturbance resulting in compaction and erosion,
- Impacts on fauna and flora
- Impacts on surface and groundwater resources (abstraction, and pollution)
- Waste generation (littering)
- Culture, heritage and archaeological impacts
- Occupational and community health and safety risks/hazards during the construction phase
- Displacement of properties (Displacement, Resettlement and Compensation Plan to be implemented)
- Noise
- Vehicular traffic safety
- Climate Change impact.

8.3. Impact Assessment Methodology

The recommended mitigation measures prescribed for each of the potential impacts contribute towards the attainment of environmentally sustainable operational conditions of the project for various features of the biophysical and social environment. The following criteria were applied in this impact assessment as shown in Table 19 and Table 20.

Table 19: Impact Assessment Criteria (IFC, 2012)

Duration – What is the length of the negative impact?	
None	No Effect
Short	Less than one year
Moderate	One to ten years
Permanent	Irreversible
Magnitude – What is the effect on the resource within the study area?	
None	No Effect
Small	Affecting less than 1% of the resource
Moderate	Affecting 1-10% of the resource
Great	Affecting greater than 10% of the resource
Spatial Extent – what is the scale of the impact in terms of area, considering cumulative impacts and international importance?	
Local	In the immediate area of the impact
Regional / National	Having large-scale impacts
International	Having international importance
Type – What is the impact	
Direct	Caused by the project and occur simultaneously with project activities
Indirect	Associated with the project and may occur at a later time or wider area
Cumulative	Combined effects of the project with other existing / planned activities
Probability	
Low	<25%
Medium	25-75%
High	>75%

8.3.1. Impact Significance

Impact significance is determined through a synthesis of the above impact characteristics. The significance of the impact "without mitigation" is the main determinant of the nature and degree of mitigation required. Once the above factors (in Table 20) have been ranked for each potential impact, the impact significance of each is assessed using the criteria in Table 19. The impact significance will then be rated according to the significance classes (Table 20).

Table 20: Impact Significance (IFC, 2012)

Class	Significance	Descriptions
1	Major Impact	Impacts are expected to be permanent and non-reversible on a national scale and/or have international significance or result in legislative non-compliance.
2	Moderate Impact	Impacts are long-term, but reversible and/or have regional significance.
3	Minor	Impacts are considered short-term, reversible, and/or localized in extent.
4	Insignificant	No impact is expected.
5	Unknown	There are insufficient data on which to assess significance.
6	Positive	Impacts are beneficial

The impacts assessment will also be done in conjunction with the AfDB key environmental policies triggered and these are presented in Table 21 below.

Table 21: AfDB Key Environmental Policies Triggered

No.	AfDB Key Environmental issues triggered	Key	Yes	No
1.	Reversing Land Degradation and Desertification	RLDD	[√]	[...]
3.	Protecting Global Public Goods	PGPG	[√]	[..]
4.	Improving Public Health	IPH	[√]	[..]
5.	Enhancing Disaster Management Capabilities	EDMC	[√]	[..]
6.	Promoting Sustainable Industry, Mining, and Energy Resources	PSIMER	[√]	[..]
7.	Improving Urban Environmental Management	IUME	[..]	[√]
8.	Environmental Governance	EG	[√]	[..]
9.	Institution and Capacity Building	ICB	[√]	[..]
10.	Increasing Awareness	IA	[√]	[..]
11.	Stakeholder Participation	SP	[√]	[..]

The description and assessment of potential impacts stemming from the proposed activities is presented under the following subsections.

8.4. Description of Potential Impacts

The potential impacts from the proposed project activities are described in Table 22, and assessed in Table 23. The management and mitigation measures in the form of management action plans are provided in the Draft ESMP.

Table 22: The Description of the impacts of the proposed activities on the biophysical and social environment

Impact	Impact Description	Phase
Positive Impacts		
Employment creation and income generation	Although temporary, the project activities will create employment to some locals through both skilled, semi-skilled and unskilled (casual labour) during the construction phase. The employed locals will be able to earn income for themselves and their families.	Construction and Operation
Skills transfer	With the employment of locals in the project working with skilled labour such as engineers, drivers, excavators this may lead to special skills transfer for the locals.	Construction
Economic benefits from improved safe, easily accessible clean water	Improved access to clean water means other household micro-economic activities can be implemented by communities which boost the local economy. The availability of clean water will boost investment capacity of the project areas (where there is water, there is life and opportunities).	Operation
Improved sanitation through safe and accessible clean water	The availability of clean water will boost in local economy and promote investment capacity in the areas (where there is water, there is life and opportunities). Moreover, access to safe drinking water and sanitation reduces the burden on women and girls from looking after sick children or siblings and from water carrying, giving them more time for productive endeavours, (adult) education and leisure. Furthermore, water sources closer to home reduce the risk of assault for women, girls, marginalised and vulnerable groups when collecting water (UNESCO-WWAP, 2006). In addition, improved health from availability of water and reduced water-carrying burdens improve school attendance, especially among girls. The time lost because of long-distance water collection and poor health contributes to poverty and reduced food security (Kasinganeti, et al, 2019).	Operation
Climate change adaptation	Sustainable water management helps society adapt to climate change by building resilience, protecting health and saving lives. It also mitigates climate change.	Operation
Gender equality benefits	Improved access to safe drinking water reduces the burden on women and girls of collecting water, walk long distances that sometimes exposed them to harm, reduce school attendances. This will give them more time for productive endeavors, education and contributes to other economic activities.	Operation
Water Infrastructure development and betterment of the communities	Access to clean and safe water will improve the livelihood of the community, and eventual socio-economic empowerment through access to a crucial services such as water (''water is life'').	Construction and Operation

Impact	Impact Description	Phase
Empowerment of local businesses	Procurement of local goods and services for construction by small and medium businesses will promote local entrepreneurship empowerment and local economic development (income generation).	Construction and Operation
Negative (Adverse) Impacts		
Physical disturbance soils	The excavations and land clearing to enable siting of project structures and equipment will potentially result in soil disturbance through site establishment, access road creations and unnecessary offload driving. These would leave the site soils exposed to erosion (areas with no to little vegetation cover to hold the soils in place). The movement of heavy vehicles may lead to compaction of the soils during construction and slightly during operations. This will, however, be a short-term and localized impact.	Construction
Impact on the sensitive Biodiversity: domestic and wild fauna as well as flora	There are some large indigenous trees located along the project route, on which the proposed activities will take place. Some vegetation (particularly protected species) may need to be removed should the linear infrastructures such as pipelines deviate from the current road route alignment. The clearing of land to create project access roads, setting up project equipment and infrastructures, may lead to floral disturbance. This may also lead to habitat destruction for some fauna. To mitigate this impact, care will need to be taken during the removal of vegetation for site preparation to ensure minimal disturbance in the area. In other words, the clearing of vegetation, where deem necessary will be limited to the specific route and minimal, therefore, the impact will be localized, site-specific, therefore manageable. Furthermore, given the fact that there is wildlife in the area, this mean potential illegal hunting (poaching) of local wildlife by project related workers (especially by outsiders). This could lead to loss or number reduction of specific faunal species which also impacts tourism in the community.	Construction
Impact on Land Use Change (Aesthetic value)	The excavation works to lay pipelines may leave scars on the local landscape, especially when the trenches are excavated close to the roads and not properly filled or they are left open for long. This may contrasts the surrounding landscape and thus may potentially become a visual nuisance to road users and locals.	Construction and Operation
Impacts on surface and groundwater resources (abstraction, and pollution)	Water will be required during construction but mainly for domestic use, thus, there is a low risk of abstraction of water resources during the construction phase. It is anticipated that water will be sustainably abstracted during operational phase. However, there is a risk of soil and water pollution during construction when there is handling of pollutants such as oils, fuels and grease. Improper handling and storage of these may lead to pollution especially during heavy rainfall (rainy season between December and March) when surface run off	Construction and Operation

Impact	Impact Description	Phase
	is amplified. The amount of pollution would also depend on the volume of the pollutant spilling on the ground surface.	
Waste generation, littering (Environmental pollution)	Waste types such as solid, wastewater and possibly hazardous will be produced onsite during construction, mainly, if the waste is not properly handled or disposed of in a responsible way. The mishandling of solid waste may result in environment pollution which can cause visual nuisance or worse, consumed (ingested) by local animals (both domestic and wild) which could be detrimental to their health.	Construction and Operation
Culture, heritage and archaeological impacts	The proposed project activities are likely to involve the removal of topsoil to enable earthworks in the form of clearing, excavating, removing, or sitting of the project equipment. The inadvertent unearthing on the surface and the subsurface may result in the destruction of heritage resources.There are also identified traditional meeting places and places of high significance locally that may be impacted by the project indirectly.	Construction
Occupational and community health and safety risks/hazards (during the construction and maintenance phase)	Project workers, locals and animals may be exposed to health and safety risks from heavy vehicles, improper securing of equipment and fuel storage area. Another potential risks to both people and animals would be unfenced or unclosed trenches that could pose a risk of unsuspecting/unaware people, and or animals falling into the open trenches leading to injuries. The use of heavy equipment, and the presence of hydrocarbons on sites may result in accidental fire outbreaks. This could pose a safety risk to the project personnel and locals.	Construction
Community health and safety	The construction and operation of a bulk pipeline may pose potential risks to the community regarding the spread of communicable diseases. Excavation activities and the presence of workers in the vicinity may inadvertently increase the likelihood of exposure to sexually transmitted infections (STIs) and HIV. It is crucial for the project management to implement strict safety protocols, including regular health screenings for workers, to mitigate these risks and protect the community from potential health hazards.	Construction
	The transportation and installation of pipeline components can significantly impact local traffic conditions, heightening the risk of traffic accidents. The movement of oversized and heavy construction vehicles, as well as increased traffic flow in the vicinity of construction sites, poses potential dangers to both pedestrians and drivers. The alteration of established traffic patterns may lead to confusion and an elevated risk of collisions.	Construction

Impact	Impact Description	Phase
	Moreover, the extended duration of construction activities could result in prolonged disruptions to normal traffic flow, exacerbating the likelihood of accidents and congestion.	
	The construction and operation of a bulk pipeline expose the community to various hazards, encompassing both immediate and long-term risks. Accidents such as leaks, spills, or from temporary storage tanks for fuel and oils may release hazardous substances into the environment, leading to potential chemical exposures for residents. Moreover, the routine maintenance and inspection of the pipeline, involving the use of heavy machinery and specialized equipment, can introduce additional risks. These hazards may extend beyond the construction phase, as the long-term operation of the pipeline requires ongoing vigilance to prevent unforeseen incidents and to address any potential environmental and health impacts.	Construction, and Operation
Displacement of properties (during construction)	The fact that infrastructure such as pipelines may pass through crop fields, this may result in loss of productive land as the pipeline trenches and servitude areas would be not utilized for crop production, particularly deep plough that may damage buried pipelines (activities that require opening of new land). If not properly planned for or amiable solution is not reached between MAWLR, construction contractor and affected land/crop field owner, this may lead to conflicts between the two parties.	Construction and Operation
Air quality (during construction):	Site clearing, construction activities and the presence of construction vehicles may lead to the generation of dust which could impact the local communities negatively, if there are no measures in place.	Construction and Operational Maintenance
Noise (construction)	There is a potential of noise from certain construction activities (excavation, movement of heavy vehicles and operation of heavy equipment) may be a nuisance to communities and wildlife in the area. Excessive noise and vibrations without any protective measures in place can be also a health risk to workers on site, if no measures are in place.	Construction and Operational Maintenance
Vehicular traffic safety (construction):	The local roads are the main transportation routes for all vehicular movement in the project area. Therefore, there would be a potential increase in traffic flow especially during the delivery of supplies, materials and services to site. Depending on the project needs, trucks, medium and small vehicles will be frequenting the area to and from working sites in the area. This would potentially increase slow moving heavy vehicular traffic along these roads, which may cause road accidents.	Construction and Operational Maintenance

Impact	Impact Description	Phase
	There is a potential risk of road accidents during rainy seasons when the road connections in the Region is expected to be in bad conditions for traffic movement. Therefore, if construction vehicles travel to site between December and March, this might impact vehicular traffic and safety. Construction works will be undertaken in stages, on certain days of the week, few vehicles and the work will be temporary. Therefore, the risk is anticipated to be short-term, not frequent	
Impact on local road use	The project activities will mean an increased movement of heavy trucks and equipment on the local gravel roads which would exert more pressure on these rural roads, and worsening their conditions. This will be a concern if maintenance and care is not done particularly during the construction phase. The impact would be short-term and therefore, manageable.	Construction and Operational Maintenance
Climate Change Assessment	The project is anticipated to have climate protection relevance as significant Greenhouse Gas (GHG) emissions may be emitted from some activities during construction, primarily from the operation of motor driven vehicles and potential removal of vegetation to create ways for the pipeline. However, the potential volumes arising during these activities and vegetation clearing will be localized in a linear form, and are therefore not of significance. No further screening or specific assessment of the risks of GHG emissions is required for the project. However, MAWLR (through their contractor(s) is advised that every opportunity to reduce GHG emissions during construction activities should be adopted. The primary GHG emissions reduction mechanisms to be incorporated into ESMPs are the preferential use of cleaner energy sources and the minimisation of energy consumption during construction. Some project activities may be subject to the influences of climate change and could benefit from the consideration of adaption relevance. The key considerations include: • Could a change in rainfall (more or less, higher or lower intensity, altered temporal distribution) affect the suitability of the location for housing and related infrastructure? • Could a change in temperature (higher daily maximum, higher averages, altered seasonal profile) affect the suitability of the location for housing and related infrastructure? • Could a change in vegetation affect the suitability of the location for housing and related infrastructure? • What aspects of the layout and design could be altered to increase resilience to change?	Construction and Operation

Impact	Impact Description	Phase
Impacts on water supply	The construction and installation of a bulk pipeline may result in the temporary or even prolonged disruption of public utilities within the affected community. Excavation activities, trenching, and the installation of pipeline infrastructure can affect existing water, electricity and telecommunication lines. The disruption of these essential services may lead to inconvenience for residents and businesses, affecting their access to clean water, communication, and other critical services.	Construction
Labour	The labor dynamics associated with the project can have multifaceted impacts on the community. While the project may generate employment opportunities for residents during the construction phase, the transient nature of much of the workforce could result in challenges related to housing, social integration, and strain on local amenities. Additionally, the influx of external labor may lead to competition for jobs and resources, potentially impacting the social fabric and economic stability of the community.	Construction
Water Supply requirements	The extraction of water for pipeline construction and operation can impact other users who depend on the same water sources. Local communities, agriculture, and ecosystems relying on water from the same watershed or aquifer may face reduced water availability. This could result in conflicts over resource use, affecting not only human populations but also the broader ecological balance in the region.	Construction and Operation

8.5. Assessment of Potential Impacts according to the IFC Standards

The assessment of potential impacts associated with the project is done as provided in Table 23.

Table 23: The Assessment of biological, physical and social impacts associated with the proposed activities (adopted from Outrun Consultants, 2022)
Key: O – Operation phase, CO – Construction and Operation phases, C – Construction phase

Impact / Activity	Affected Environmental And Social Components														Project phase	Duration	Magnitude with project	Extent / Spatial scale	Type	Probability	Significance without mitigation
	Fauna and Flora	Water Quality	Water Quantity	Land Use	Soil and Slope Stability	Visual Intrusion	Air Quality	Human Settlements	Public Nuisance	Infrastructure & Services	Agriculture	Archaeology, Culture & Heritage	Occupational and Public Health & Safety	Source of Income							
Vegetation Clearing	√	√	√	√	√	√	√		√		√	√	√	√	CO	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Air pollution	√	√	√	√			√	√	√				√	√	CO	Short	Moderate	Local	Direct	Medium 25 - 75%	Minor (-)
Soil pollution	√	√	√	√	√	√	√		√	√	√			√	CO	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Soil erosion	√	√	√	√	√	√	√		√	√	√			√	CO	Short	Small	Local	Direct	Medium 25 - 75%	Major (-)
Water resources pollution	√	√	√	√				√		√	√		√	√	CO	Moderate	Moderate	Local	Direct	Medium 25 - 75%	Major (-)
Water resources depletion	√	√	√	√	√			√		√	√			√	O	Permanent	Moderate	International	Direct	High >75%	Major (-)
Solid waste Generation	√	√	√	√		√	√	√	√	√	√		√	√	CO	Permanent	Moderate	Local	Direct	Medium 25 - 75%	Major (-)
Vehicular Movements	√			√	√		√	√	√				√		C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Hazardous Substances storage and handling	√	√			√		√						√		CO	Permanent	Moderate	Local	Direct	Medium 25 - 75%	Major (+)
Excavation of pipeline trenches	√	√	√	√	√	√	√		√	√			√	√	C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Construction camps establishment	√	√	√	√	√	√	√		√	√			√	√	C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Vehicular traffic	√			√	√		√			√			√		C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Water Supply		√	√	√				√		√	√		√	√	O	Permanent	Moderate	Regional	Direct	Medium 25 - 75%	Beneficial Minor (+)
Social Aspects Proliferation						√		√	√	√	√	√	√	√	C	Short	Small	Local	Direct	Low <25%	Beneficial Minor (+)

Impact / Activity	Affected Environmental And Social Components														Project phase	Duration	Magnitude with project	Extent / Spatial scale	Type	Probability	Significance without mitigation
	Fauna and Flora	Water Quality	Water Quantity	Land Use	Soil and Slope Stability	Visual Intrusion	Air Quality	Human Settlements	Public Nuisance	Infrastructure & Services	Agriculture	Archaeology, Culture & Heritage	Occupational and Public Health & Safety	Source of Income							
Boost in water reliant activities	√	√	√	√	√	√		√		√	√		√	√	O	Permanent	High	Regional	Direct	High >75%	Beneficial Minor (+)
Employment Creation	√			√	√			√		√	√		√	√	CO	Permanent	High	Regional	Direct	High >75%	Beneficial Major (+)
Livelihoods Development				√									√	√	O	Permanent	Moderate	Regional	Direct	High >75%	Beneficial Minor (+)
Climate Resilience	√	√	√	√				√			√				O	Permanent	Moderate	Regional	Direct	Medium 25 - 75%	Beneficial Minor (+)
Inclusion of Women and Children	√	√	√								√		√	√	CO	Permanent	Moderate	Regional	Direct	Medium 25 - 75%	Beneficial Minor (+)
Sanitation and Health Improved		√	√							√	√		√		O	Permanent	High	Regional	Direct	High >75%	Beneficial Major (+)
Skills transfer				√									√	√	O	Permanent	Moderate	Regional	Direct	High >75%	Beneficial Minor (+)
Economic benefits from improved safe, easily accessible clean water				√									√	√	O	Permanent	Moderate	Regional	Direct	High >75%	Beneficial Minor (+)
Developed Water administrative system		√	√								√		√		O	Permanent	High	Regional	Direct	High >75%	Beneficial Minor (+)
Land Use change	√	√	√	√	√	√		√	√		√	√		√	CO	Permanent	Medium	Local	Direct	Medium 25 - 75%	Minor (-)
Occupational Hazards													√		C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Pressure on local services and Resources	√		√	√	√			√	√	√	√			√	CO	Short	Medium	Local	Indirect	Medium 25 - 75%	Minor (-)
Noise	√	√	√	√	√	√	√		√	√	√			√	C	Short	Small	Local	Direct	Medium 25 - 75%	Major (-)

Impact / Activity	Affected Environmental And Social Components														Project phase	Duration	Magnitude with project	Extent / Spatial scale	Type	Probability	Significance without mitigation
	Fauna and Flora	Water Quality	Water Quantity	Land Use	Soil and Slope Stability	Visual Intrusion	Air Quality	Human Settlements	Public Nuisance	Infrastructure & Services	Agriculture	Archaeology, Culture & Heritage	Occupational and Public Health & Safety	Source of Income							
Air quality issues (dust)	√	√	√	√	√	√	√		√	√	√			√	C	Short	Small	Local	Direct	Medium 25 - 75%	Major (-)
Community health and safety													√		C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Impacts on water supply	√	√	√	√	√	√		√	√		√	√		√	CO	Permanent	Medium	Local	Direct	Medium 25 - 75%	Minor (-)
Labour													√		C	Short	Small	Local	Direct	Medium 25 - 75%	Minor (-)
Water Supply requirements	√	√	√	√	√	√		√	√		√	√		√	CO	Permanent	Medium	Local	Direct	Medium 25 - 75%	Minor (-)

9. RECOMMENDATIONS AND CONCLUSION

Some key potential positive and negative impacts were identified by the Environmental Consultant and based on issues raised by stakeholders and I&APs during the consultation period. The pre-identified negative impacts and issues raised were addressed and incorporated into this Report whereby mitigation measures have been provided thereof in a form of action measures provide in the Draft ESMP. These are provided to avoid and/or minimize their significance on the environmental and social components, while maximizing the benefits (potential positive impacts) of the project.

Impact Assessment: The key negative impacts were described, assessed. The potential negative impacts mostly indicated a medium rating significance, and this is due to the duration of the short-term duration of most activities, thus short-term and non-significant impacts (linked to the project phases).

To minimize the significance, appropriate management and mitigation measures made thereof for implementation by the Proponent, construction contractors and subcontractors to avoid and/or minimize their significance on the environmental and social components. The effective implementation of the recommended management and mitigation measures accompanied by monitoring will particularly see the reduction in the significance of adverse impacts that cannot be avoided completely (from medium rating to low).

9.1. Recommendation

The Scoping assessment Study with the baseline archaeological and heritage assessment was deemed sufficient and concluded that no further detailed assessments are required to the ECC application for the project activities.

Therefore, D&P Environmental Consultants are confident that the potential negative impacts associated with the proposed project activities can be managed and mitigated by the effective implementation of the recommended management and mitigation measures and with more effort and commitment put on monitoring the implementation of these measures throughout the project cycle.

With that said, the proposed project and is associated activities can be granted an ECC, on condition that:

- All the management and mitigation measures provided in the ESMP are effectively and progressively implemented.
- All required permits, licenses and approvals for the proposed activities should be obtained as required. These include permits and licenses for land use agreements (consents), services provision agreements (water and power provision) are obtained to ensure compliance with these specific legal requirements.
- Transparency in communication and continued engagement with stakeholders and communities and or through their leaders (such as the traditional authorities) should be maintained before project implementation and throughout the project cycle.
- MAWLR, their project workers or contractors (and subcontractors) comply with the legal requirements governing their project and its associated activities and ensure that project permits and or approvals required to undertake specific site activities are obtained and renewed as stipulated by the issuing authorities.

- Project site area particularly where trenching (excavations) are done should be backfilled (stockpiled topsoil levelled), and rehabilitated, as far as practicable.
  The ESMP implementation onsite should be checked and done by the responsible team member onsite (Environmental Control Officer), and audited by an Independent Environmental Consultant on a bi-Annual basis to compile Environmental Monitoring (Audit) Reports. These reports are to be submitted to the Environmental Commissioner.

9.2. Conclusion

The key potential biophysical and social impacts related to the construction, operational and maintenance and decommissioning phases of the proposed project were identified and assessed. Without any mitigation measures implemented, the impacts can be rated as of a slightly high to “medium” significance, but after the implementation of management and mitigation measures, the impacts’ significance rating will be reduced to medium (for slightly high significance pre-mitigation), low (for medium rating pre-mitigation), and eventually negligible. The impact can be adequately addressed by the suitable recommended management and mitigation measures provided in the ESMP. The key potential negative impacts identified and addressed are as follows:

- Impact on land use change (aesthetic value), land or economic displacement for the construction of the reservoirs and/ or pipeline network
- Physical land / soil disturbance resulting in compaction and erosion
- Impact on fauna and flora (biodiversity)
- Impacts on surface and groundwater resources (abstraction, and pollution)
- Waste generation (littering):
- Culture, heritage and archaeological impacts, i.e., the inadvertent unearthing in the subsurface may result in the destruction of heritage resources.
- Occupational and community health and safety risks/hazards (during the construction and maintenance phase)
- Displacement of properties (during construction)
- Air quality (during construction)
- Noise (construction)
- Vehicular traffic safety, as well as Climate Change impact (during construction).

In conclusion, based on the information provided in this Report, D&P is confident the identified potential risks associated with the proposed project can be reduced to acceptable levels, should the measures recommended in the ESMP be effectively implemented and monitored. It is therefore recommended that the project receives an ECC.

10. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

10.1. Aim of the ESMP

The EMA requires that an Environmental & Social Management Plan (ESMP) or simply known as an EMP to adopt a holistic approach to environmental management and encompass all components of the environment, biophysical, social, cultural, health and economic. The EMA and its regulations stipulate that an ESMP must include the following as a minimum:

- Information on any proposed management, mitigation, protection or remedial measures to be undertaken to address the effects on the environment that have been identified including objectives in respect of the rehabilitation of the environment and closure,
- As far as reasonably practicable, measures to rehabilitate the environment affected by the undertaking of the project or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principles of sustainable development,
- A description of how the applicant intends to modify, remedy, control or stop any action, activity or process which will cause pollution or environmental degradation, remedy the cause of pollution or degradation and mitigation of pollutants.

The ESMP document is a legally binding document which compels the Proponent (or Project developer) to implement the proposed mitigation measures in an effective manner and in accordance with the set of conditions upon which an ECC will be granted by the Environmental Commissioner. Contravention with the ESMP and ECC conditions is punishable, and the extent depends on severity. Environmental Officers in the MEFT are appointed to carry out the provisions of EMA and are main persons responsible for enforcement of the EMA. Environmental Officers not only do they have specific powers such as the powers of entry and inspection, they can also issue compliance orders to any person who has violated the EMA or a condition of an ECC (sections 19 and 20). The decisions made by the Environmental Commissioner are subject to appeal to the Minister according to Sections 50 and section 25 of the EIA Regulations, and decisions of the Minister are subject to appeal to the High Court in accordance with Section 51 of the EMA.

Subsequently, this Environmental & Social Management Plan (ESMP) has been developed as part of the Environmental & Social Impact Assessment (ESIA) for the proposed to upgrade the water supply network in the Zambezi Region, upgrade the water supply network under Phase 3-4 and Reservoir in the Zambezi Region.

The document is a presentation of proposed measures to manage and mitigate the identified impacts for the construction and operational & maintenance, a monitoring plan, indicators and associated ESMP implementation costs. Together with Scoping Report, the ESMP will be shared with the registered Interested and Affected Parties (I&APs) and Stakeholders before submission to the Environmental Commissioner at the Ministry of Environment, Forestry and Tourism (MEFT) for approval.

The scope of the ESMP is aimed to meet the requirements of the Environmental Management Act, 2007 and its Regulations, 2012 and the African Development Bank's (AfDB) policies and guidelines.

10.2. ESMP Objectives

The purpose of this document is to provide a general framework for the Environmental and Social Management System (ESMS) planned to be implemented for the proposed project. It provides the necessary management tools to ensure legal compliance and environmental best practice. Besides the legal and institutional requirements for the successful implementation of the relevant management plans, ESMP also determines the roles and responsibilities of the implementing agency (MAWLR), the Consulting Engineer and the contractor / sub-contractors. Its main objectives are to:

- Ensure the project is in compliance with applicable national environmental and social legal requirements and AfDB's safeguards policies and procedures,
- Outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project's beneficial impacts,
- Address capacity-building requirements to strengthen the implementing agency's safeguards capacities,
- Provide an overview of the environment, health and safety (EHS), socio-economic and cultural heritage policies, standards and legal legislation that the Project should comply with,
- Determine the roles and responsibilities of the Project Promoter, Consultant and Contractors in order to ensure compliance with EHS requirements during project implementation,
- Ensure that project activities are in compliance with EHS policies, standards and legal regulations, and
- Ensure reporting systems are developed and streamlined to deliver EHS compliance performance.

10.3. The Environmental Assessment Practitioner (Consultant)

To fulfil the requirements of the EMA and its Regulations as well as the AfDB Safeguards on environmental and social protection and management, MAWLR appointed D&P Engineers and Environmental Consultants (a team of Independent Environmental Consultants / EAPs) to apply for the ECC, conduct the required ESIA process, compile an ESIA (Scoping) Report and develop this document.

The ESMP was compiled by Ms. Fredrika Shagama, a qualified Hydrogeologist and experienced Environmental Assessment Practitioner (EAP) with 8 years' experience in the Environmental and Groundwater management consulting sector. The ESIA Study is overseen and reviewing of the ESMP is done by the Lead EAP, Mr. Tendai Kasinganeti, a qualified and experienced EAP and Climate Change Policy specialist with 9 years of consulting experience.

10.4. Contents of the ESMP

The content of the ESMP is presented in Table 19 below.

Figure 19:Sections of the ESMP

Document Section Name	Chapter of the Document (ESMP)
Introduction: Project Background and Location	Chapter 10: Subchapter 10.1
Aim of the ESMP	Subchapter 10.2

Document Section Name	Chapter of the Document (ESMP)
ESMP Objective	Subchapter 10.3
Appointed Environmental Consultant	Subchapter 10.4
Contents of ESMP	Subchapter 10.5
Legal requirements (in terms of authorization and permitting/licenses)	Chapter 11
ESMP Roles and Responsibilities	Chapter 12
Environmental and Social Impacts: Key identified impacts	Chapter 12: Subchapter 12.1
Environmental and Social Management and Mitigation Measures	Subchapter 12.2
Planning & Design Phase: Environmental and Social Management and Mitigations	Subchapter 12.2.1
Construction Phase: Environmental and Social Management and Mitigations	Subchapter 12.2.2
Operations and Maintenance Phase: Environmental and Social Management and Mitigations	Subchapter 12.2.3
Decommissioning Measures	Subchapter 12.2.4
Environmental Rehabilitation and Monitoring	Chapter 13
Conclusions	Chapter 14
References List	Chapter 15
Annexures/Appendices to the ESMP	

11. LEGAL REQUIREMENTS: AUTHORIZATIONS AND PERMITTING (LICENSING)

A review of Namibian legislation, policies and guidelines applicable and relevant to the proposed project was provided in detail in the Scoping Report. Therefore, the legal presentation in this ESMP is only for the project activities that require authorization or permitting (licensing) from relevant authorities before the implementation of Phase 3 and 4 in the Katima-Ngoma water supply scheme or implementation of certain project activities.

The Proponent, therefore, has the responsibility to ensure that the project activities conform to the principles of the EMA and must ensure that contractors and employees act in accordance with such principles. Table 24 below lists the requirements of an EMP as stipulated by Section 8 (e) of the EIA Regulations, primarily on specific approvals and permits that may be required for the activities associated with the project.

Table 24: The legal requirements and permits required for the project activities

Theme/Aspect	Legislation	Project Implications	Type of Authorisation or permitting and Contact details, where available
Environmental management	Environmental Management Act, (Act No. 7 of 2007)	Requires that projects with significant environmental impacts are subject to an environmental assessment process (Section 27). Details principles which are to guide all EAs.	The ECC should be renewed every three years, subject to environmental compliance audits. Should there be a need to amend the ECC and subsequent ESMP, the application should be made with the Office of the Environmental Commissioner at the Department of Environmental Affairs and Forestry (DEAF), Ministry of Environment, Forestry and Tourism (MEFT), Mr. Timoteus Mufeti Tel: +264 61 284 2701
	EIA Regulations Government Notice (GN) 57/2007 (Government Gazette (GG) 3812	Details requirements for public consultation within a given environmental assessment process (GN 30 S21). Details the requirements for what should be included in a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15).	
Land Use	Traditional Authority Act (Act No. 25 of 2000):	The Traditional Authorities should be involved in the planning of land use and development for their area.	The Proponent should obtain land use consent for communal land use from the respective local traditional authorities (village headmen) in the areas through which the pipelines and associated infrastructures will be established.
	Communal Land Reform Act 5 of 2002	The bulk water supply projects may interfere with communal landowners (such as pipelines passing through crops fields where there is no suitable diversion), this may arise disputes, especially in a case where pipelines are passing through areas where communities are not beneficiaries. Contractors should always approach chiefs or traditional authorities wherever there is potential to interfere with communal land and disputes.	

Theme/Aspect	Legislation	Project Implications	Type of Authorisation or permitting and Contact details, where available
Vegetation	Annotated Statutes Forest Act 12 of 2001 Forestry Act 13 of 2005 & Forestry Regulations (GN 170 of 2015.	Section 22. (1) (Protection of Natural vegetation) Unless otherwise authorised by this Act, or by a licence issued under subsection (3), no person shall on any land which is not part of a surveyed erven of a local authority area as defined in section 1 of the Local Authorities Act, 1992	The clearing of vegetation is prohibited (subject to a permit for protected plant species). Certain (protected) tree species occurring in the area are protected under this Act and require a permit from the nearest MEFT's Directorate of Forestry for removal. Forestry office (MEFT) in Katima Mulilo, Zambezi Region Tel: +264 66 253 027 OR Mr. Johnson Ndokosho (Forestry Director) Tel: +264 61 208 7666
Hazardous substance usage	Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)	Regulation 3(2)(b) states that "No person shall possess or store any fuel except under authority of a licence or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 litres or less in any container kept at a place outside a local authority area"	If the contractor intends to keep hydrocarbon (fuels) onsite in the quantity of 600 litres or more, they should obtain the necessary authorisation (consumer installation certificate). The consumer installation certificate for the storage of fuel containers that are or exceeding 600 litres onsite should be applied from the Ministry of Mines and Energy for the storage of fuel on-site. Mr. Carlo Mcleod (Ministry of Mines and Energy: Acting Director – Petroleum Affairs) Tel: +264 61 284 8291
Water Usage and management	Water Act 54 of 1956 Water Resources Management Act (No 11 of 2013)	Ensure that the water resources of Namibia are managed, developed, used, conserved, and protected in a manner. Therefore, a Groundwater Abstraction & Use Permit should be applied for. The Permit is required for all commercial and industrial water uses.	The protection of ground and surface water resources should be a priority. The main threats will most likely be concrete and hydrocarbon spills during construction. The quantity/abstraction of water resources should be a priority. Where required, the relevant permits and or agreements to abstract and use water should be applied for and obtained from the MAWLR's

Theme/Aspect	Legislation	Project Implications	Type of Authorisation or permitting and Contact details, where available
		For any project wastewater planned for discharge into the environment, a discharge permit should be applied for and obtained.	Directorate of Water Resources Management (Water Law Policy Administration Division) The Water Permit should be applied from the Ministry of Agriculture, Water and Land Reform (MAWLR) <u>Department of Water Affairs (DWA)</u> Contact: Mr. Franciskus Witbooi Division: Water Policy and Water Law Administration Division Tel: +264 61 208 7158
			MAWLR, DWA' Water Environment Division Contact: Ms. Elise Mbandeka Tel: +264 61 208 7167
Power Supply	Electricity Act No. 4 of 2009	Exercises control over the provision, use and consumption of electricity in Namibia.	MAWLR should enter into agreements with the respective electricity supplier in the Zambezi Region (NORED) to provide electricity for the infrastructure where required. The contact details are as follows: <u>NORED Head office Switchboard</u> Tel: +264 83 282 2100, CEO Office: Tel.: +264 83 282 2101
Heritage	National Heritage Act 27 of 2004	The construction of long pipelines has a potential to pass through heritage sites, graveyards. Any heritage resources (e.g. human remains etc.) discovered during excavations would require a permit from the National Heritage Council of Namibia for relocation. Detailed designing of the pipe routes, locations of installation of pumps and tanks should avoid the heritage sites,	Should any archaeological material, such as bones, unknown graves, old weapons/equipment etc. be found on the EPL, work should stop immediately, and the National Heritage Council of Namibia must be informed as soon as possible. The Heritage Council will then decide to clear the area or decide to conserve the site or material.

Theme/Aspect	Legislation	Project Implications	Type of Authorisation or permitting and Contact details, where available
		when it's not possible, necessary arrangements with right stakeholders should lead the process. A Chance Finds Procedure provided should be implemented upon discovery of archaeological and heritage resources.	Contact Details at National Heritage Council (NHC) of Namibia Mrs. Erica Ndalikokule – NHC Director Tel: +264 61 301 903
Roads	Road Traffic and Transport Act, No. 22 of 1999	The pipelines mainly follow the road or fall within the road reserves. Therefore, Roads Authority of Namibia should be engaged throughout the project cycle. If need be, the relevant permits must be applied for.	Where site specific access roads are required, permits from the district roads should be formalized by applying for these and obtained from the nearest Roads Authority office. Mr. Eugene de Paauw: Road legislation Specialist Tel: +264 (0) 61 284 7072
	Roads Ordinance No 17 of 1972	The proposed water infrastructure upgrades must adhere to all applicable provisions in the Roads Ordinance.	
Waste	National Solid Waste Management Strategy	The project activities can potentially generate significant amount of solid waste (stockpiles, soil remains, domestic and rubbles) that might need proper management by contractors to avoid pollution. Waste management plans should be generated and implemented prior to the site establishments and operations.	The Contractor should first seek consent and sign an agreement with the nearest local authority (such as Katima Mulilo Town Council) with an approved waste management facility to dispose of construction waste. For hazardous waste, an agreement should be reached with the local authority with such authorized facility to manage and handle hazardous waste.
	The Pollution Control and Waste Management Bill	Contractors should reduce the risk of solid waste to the environment and surroundings of the project area.	

11.1. Amendments of the ESMP

Any party involved with the project can suggest changes to the EMP via the Environmental Control Officer (ECO). Such suggestions will be discussed with the Proponent and application for amendments to the project activities, and subsequently, the ESMP will be made to the Office of the Environmental Commissioner. Approved changes will be minute and drafted into the existing ESMP in the form of an appendix or amendments.

11.2. Penalties and offences under the EMA Act No. 7 of 2007

Section 30 of the EMA states that, a person commits an offence if that person:

- (a) knowingly provides false or misleading information in any document submitted in terms of the Act to the Environmental Commissioner,
- (b) knowingly and without the consent of the EC makes or causes to be made any entry on a document, and
- (c) destroys or defaces any document; or alters or causes to be altered any entry on a document.

A person who commits an offence in terms of this regulation is on conviction liable to a fine not exceeding N$100 000.00 or to imprisonment for period not exceeding 10 years or to both the fine and imprisonment.

The components contained in this ESMP which should be implemented by the Contractor and do not do as such attract non-compliance and shall be considered sufficient ground for the imposition of a penalty. Possible offences, which should result in the issuing of a contractual penalty, include, but are not limited to:

- Unauthorized damage to natural vegetation,
- Failure to barricade work areas and prevent encroachment of domestic animals or any other unwanted guests,
- Unauthorized camp establishment (including stockpiling, storage, etc.),
- Hydrocarbons, hazardous material: negligent spills or leaks,
- Ablution facilities: non-use, insufficient facilities, insufficient maintenance,
- Insufficient solid waste management (including clean-up of litter, unauthorized dumping, etc.,
- Erosion due to negligence, non-performance,
- Excessive cement, concrete spillage, contamination,
- Non-provision of adequate personal protective equipment,
- Insufficient fire control and unauthorized fires,
- Preventable damage to water courses or pollution of water bodies, and
- Non-induction of staff.

11.2.1. Fines and Penalties

The following fines and penalties are in place for transgressions listed below. It will be issued after the procedures contained herein has been duly followed and only in severe cases and after repeated non-compliance. The graveness of the transgression is justified by each specific penalty.

11.2.2. Fines

Fines may be issued per incident at the discretion of the Proponent's Project Manager – see next chapter. Such fines will be issued in addition to any remedial costs incurred as a result of noncompliance with the ESMP. The Environmental Control Officer (ECO) will inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from monies due under the Contract.

Fines for the activities detailed below, will be imposed by the ECO on the Contractor and/or his Subcontractors.

Any persons, vehicles, plant, or thing related to the Contractors operations within the designated boundaries of a "no-go" area.	N$2,000
Any vehicle guilty of reckless driving on and in the vicinity of the site, including excessive speeds.	N$1,000
Any vehicle being driven and items of plant or materials being parked or stored outside the demarcated boundaries of the site.	N$2,000
Persons repeatedly walking outside the demarcated boundaries of the site.	N$1,000
Persistent and un-repaired spilling of hazardous materials and materials causing pollution.	N$3,000
Persistent littering on site.	N$500
Individuals repeatedly not making use of the designated toilet facilities.	N$200
Disposal of waste other than agreed on in the waste management plan.	N$5,000
Deliberate lighting of illegal fires on site (e.g. outside of the designated camp site).	N$2,000

For each subsequent similar offence, the fine may, at the discretion of the Project Manager (in collaboration with the ECO), be doubled in value.

The Project Manager shall be the judge as to what constitutes a transgression in terms of this document.

11.2.3. Penalties

Where the Contractor inflicts non-repairable damage upon the environment or fails to comply with any of the environmental specifications, he shall be liable to pay a penalty fine over and above any other contractual consequence.

The Contractor is deemed NOT to have complied with this specification if:

- within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of the specification; environmental damage due to negligence;
- Safety of contractor personnel and public being compromised due to negligence;
- the Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time;
- the Contractor fails to respond adequately to complaints from the public; and
- Payment of any fines in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.

The Project Manager will be responsible for a report on the non-repairable damage and / or non-compliance with visual and other evidence as well as issuing the penalty to the contractor with the report attached.

A copy must be handed to the ECO.

The penalties that are recommended for the transgressions of the ESMP components are provided in Table 25 below.

Table 25: The penalties are suggested for non-compliances

Actions leading to erosion:	A penalty equivalent in value to the cost of rehabilitation plus 20%.
Oil spills:	A penalty equivalent in value to the cost of clean-up operation plus N$1,000.
Damage to indigenous vegetation:	A penalty equivalent in value to the cost of restoration plus N$2,000.
Damage to trees:	A penalty to a maximum of N$5,000 shall paid for each tree removed without prior permission, or a maximum of N$2,000 for damage to any tree, which is to be retained on site.
Damage to indigenous vegetation:	A penalty equivalent in value to the cost of restoration operation plus N$2,000.
Damage to sensitive environment:	A penalty equivalent in value to the cost of restoration operation plus 20%.
Damage to cultural sites:	A penalty to a maximum of N$100,000 shall be paid for any damage to any cultural historical site.
Damage to natural fauna:	A penalty to a maximum of N$2,000 for damages to any natural occurring animal.
Accident due to safety negligence:	A penalty to a maximum of N$50,000 for injuries to personnel or public.

11.3. Environmental Register

An environmental register should be kept on site in which incidents related to actual impacts are recorded. This will include information related to incidents such as spillages, dust generation and stakeholders' complaints as well as information relating to remedial actions taken. It is recommended that the EM, ESSO and the contractor(s) records and maintains the register.

12. ESMP IMPLEMENTATION ROLES AND RESPONSIBILITIES

As the Proponent, MAWLR is ultimately responsible for the implementation of the ESMP during the planning & design, construction, operational and decommissioning phases, but they may delegate this responsibility or part of it to someone else at any time, as they deem necessary. The Minister of the Ministry of Environment, Forestry & Tourism (MEFT) through the Environmental Commissioner (EC) is responsible implementation of the Environmental Management Act, and project Proponent are entirely responsible for the implementation of their project EMPs/ESMPs. The Environmental Commissioner advises organs of state on the preparation of environmental plans, receives and records applications for ECCs and the overall management, protection, reviewing of the assessment report and enforcement of monitoring and implementation of environmental plans in accordance with the EMA.

The roles and responsibilities of all parties involved in the effective implementation of this ESMP are set in Table 26.

Table 26: The roles and responsibility for implementing the ESMP

Role	Responsibilities
Ministry of Agriculture, Water and Land Reform (MAWLR): **The Implementing Agency and Proponent**	MAWLR, as the implementing agency, will be responsible for: -Managing the implementation of this ESMP and updating and maintaining it when necessary. -Ensuring that the environment is rehabilitated to its natural state as far as possible. MAWLR shall ensure that all employees attend an Environmental, Awareness Training Course. The training course shall be structured to ensure that delegates are capacitated with appropriate knowledge to: -Become familiar with the environmental, health, and safety controls contained in the ESMP. -Be aware of the need to conserve water and minimise waste. -Be aware of MAWLR's Code of Conduct. -Be aware that a copy of the ESMP is readily available as a reference at the site office and that all staff are aware of the location and have access to the document. -ensuring that there are employee information posters outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) will be placed at prominent locations throughout the site.
Proponent's Project Manager	-Ensuring that the objectives of the proposed ESMP are achieved at the various project lifecycle phases. -Work hand in hand with the Environmental Control Officer to ensure that the ESMP is implemented and that penalties and fines for non-compliances are enforced onsite. -Ensuring that all identified environmental impacts are managed according to the environmental principles of avoiding, minimizing, mitigating and rehabilitation. This will be achieved by the successful implementation of the ESMP. -Managing and monitoring of individuals and/ or equipment on-site in terms of compliance with this ESMP and issuing fines for contravening ESMP provisions. -Ensuring that appropriate environmental monitoring and compliance auditing is done and that biannual reports are submitted to the MEFT.
Contractor (Site / Construction Manager): **To be appointed by MAWLR prior to construction activities**	The Contractor and / or its agents will be responsible for environmental management on site during the construction phase of the project. For the purpose of this document: "the Contractor" (and its sub-contractors) refers to construction personnel responsible for construction activities planned for this project.

Role	Responsibilities
	The Contractor will appoint an Environmental and Social Site Officer (ESSO) who will be responsible for ensuring that the ESMP requirements are implemented on-site on behalf of the Contractor. The contractor shall ensure that all construction staff, sub-contractors, suppliers, etc. are familiar with, understand and adhere to the ESMP. Failure by any employee of the Contractor, Sub-contractor, and Suppliers etc. to show adequate consideration to the environmental aspects of this contract shall be considered sufficient cause for the ESSO to instruct the EM to have the employee removed from the site. The EM will also A pre-construction meeting is recommended to reach agreement on specific roles of the various parties and penalties for non-compliances with the ESMP. In addition surrounding residents, land owners or occupiers of land must be notified in advance of any potentially disturbing activities.
Consulting Engineer (Planning & Design Engineer)	The Engineer is ultimately responsible for the designing of the civil/structural, electrical, and mechanical aspects of the project prior to construction.
Environmental and Social Site Officer(ESSO): **To be appointed (as part of the Construction Contractor Team)** NamWater's Environmental Control Officer (ECO) for the Operations and Maintenance Phase	The ESSO is expected to administer and control all environmental matters during the construction phase. The ESSO will conduct the following: -Identify non-compliance and recommend corrective measures in consultation with MAWLR's Project Manager, and the ECO (for the respective phase) as required. -Ensure that environmental problems are remedied timeously and to the satisfaction of the Project Manager, and the ECO as required; -Set up activity based method statements prior to the start of relevant construction activities and submit these to the Project Manager, the EM and the ECO as required; -Perform ongoing environmental awareness training of the Contractor's site personnel as and when required. -Ensure implementation of the ESMP. -Always ensure safe keeping and easy accessibility of correct environmental records. -Ensure accurate and timely communication of ESMP requirements to relevant project, contractor and sub-contractor personnel as required for ESMP implementation. -Monitor compliance of ESMP implementation and compliance of all contractors and sub-contractors onsite. -Facilitate environmental induction of all project staff and either deliver or coordinate delivery of all such training that would be required for the effective implementation of the ESMP. This includes identifying additional project training requirements and implementing the training programme.

Role	Responsibilities
	-Update and maintain training records for all project personnel including contractors. -Maintain environmental incidents and stakeholder complaints register. -Undertake environmental system reviews, site inspections, audits and other verification activities to assure that the ESMP implementation is at an optimal level. -Report significant incidents internally and externally as required by law and the conditions of authorization. -Investigate incidents and recommend corrective and preventative actions. -Provide support and advice to the contractor and all sub-contractors in the implementation of environmental management procedures and corrective actions. -Ensure that monitoring programs, which assess the performance of the ESMP, are implemented. -Ensure maintenance of site document control requirements. -Assess the efficacy of the ESMP and identify possible areas of improvement or amendment required within the ESMP
Environmental Control Officer (ECO): **D& P Environmental Consultants**	The ECO for the site is an independent environmental consultant to monitor and review the on-site environmental management and implementation of this ESMP on the construction site. The duties of the ECO are to: -Ensure that all construction or decommissioning activities on site are undertaken in accordance with the ESMP. -Conduct environmental compliance audits and reporting as required by law. -Provide support and environmental advice to the project team, contractors, and all subcontractors in the implementation of environmental management procedures and corrective actions. -Report significant incidents internally and externally as required by law and the ECC conditions. -Ensure that ESMP performance monitoring programs are implemented. -Assist in incidents and non-conformances investigations and implementation of effective corrective and preventive measures. -Assess ESMP effectiveness and identify possible areas of improvement. -Facilitate the amendment of the ESMP in liaison with the Environmental Manager. -Provide environmental training for key project personnel (in liaison with Environmental Manager). -Conducting site inspections of all areas with respect to the implementation of this ESMP (monitor and audit the implementation of the ESMP).

Role	Responsibilities
	-Advising the Proponent or Site Manager on the removal of person(s) and/or equipment not complying with the provisions of this ESMP. -Making recommendations to the Proponent with respect to the issuing of fines for contraventions of the ESMP. -Undertaking an annual review of the ESMP and recommending additions and/or changes to this document.
Public Relations Officer (PRO): **To be appointed by MAWLR or form part of the Construction Contractor Team**	The PRO will be responsible for the following tasks: -Liaising between the stakeholders, public (communities) and the Proponent. -Ensure effective communication with stakeholders, media (if necessary) and the public. -Organising and overseeing public relations activities, Managing public relations issues. -Preparing and submitting public relations reports, if required. -Collaborating with personnel and maintaining project-related open communication among personnel.
NamWater Maintenance Manager	NamWater's Maintenance Manger will be responsible for: -Ensuring that the objectives of the ESMP are achieved at the various during the operations & maintenance phase as well as decommissioning. -Work hand in hand with their Environmental Control Officer to ensure that the ESMP is implemented and that penalties and fines for non-compliances are enforced onsite. -Ensuring that all identified environmental impacts are managed according to the environmental principles of avoiding, minimizing, mitigating and rehabilitation. -Managing and monitoring of individuals and/ or equipment on-site in terms of compliance with this ESMP and issuing fines for contravening ESMP provisions during operations & maintenance stages of the project. -Ensuring that appropriate environmental monitoring and compliance auditing is done and that biannual reports are submitted to the MEFT.

12.1. Environmental and Social Management and Mitigation Measures

The management and mitigation measures in the form of management action plans for the four project phases (planning & design, construction, and post-construction), operations & maintenance and decommissioning) are provided under the following subchapters.

12.1.1. Planning and Design Phase Measures

The management and mitigation action plans or measures for this phase are presented under Table 22.

Figure 20:Planning and Design Phase - Management and Mitigation Measures

Environmental and social Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
GRM Dissemination	When there is no proper communication of the project's GRM that limits transparency and participation of affected parties.	- Establish GRM and clarify roles and responsibilities (see GRM section of ESMP) - The programme GRM drafted will act as the overall guiding document of the site-specific GRM. - Provide contractor with GRM contact details to be used for: a. GRM sign boards; b. GRM Contact Cards for Affected People - Erect sign boards at the construction site entrance with: a. Project details. b. GRM procedures and contact details. - Print 'GRM Contact Cards' for all workers to give to complainants and keep cards with all vehicles, machinery, and site managers/foremen. - Affected People Training. Contractor to raise awareness of all workers on how to respond when an affected person or member of the public has a complaint i.e., direct the person to the most senior site manager present at the time and provide a 'GRM Contact Card	- Ensure that contractors have a copy of GRM and the GRM registration forms	- Implementing Agency - Contractors	Included in Project Cost
High unemployment rates.	The is a malpractice that resulted from 'Outsiders' given the employment opportunities over locals, leading to conflicts.	- Maximise on local labour especially for non-skilled labour force of the project. All unskilled labour shall be sourced from local communities. Specific recruitment procedures should be clearly outlined that consider locals first. - Out-of-area employment should be justified, for example by the unavailability of local skills.	- Ensure that contractors make provision for detailed recruitment plan in their tender application.	Construction Contractor in partnership with the respective constituency councillors will	Included in Bid price

Environmental and social Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		- The anticipated work opportunities and number of positions should be announced through the local leadership offices (both in Katima Mulilo, and local VDCs). - Local leadership should participate in the screening for employment to ensure that the opportunities reserved for the locals are not given to outsiders.		determine employment considerations.	
	Gender inequality.	- Equal recruitment for all gender - At least 50% of recruits must be women for non-strenuous jobs.			Included in Bid price
Health and social pathology.	Increased prostitution and associated social pathologies and health risks. Sex workers are hired from the local communities by the construction team.	- Prior to commencing construction, the risk of an increase in the spread of HIV/AIDS should be explained to regional health authorities and partners be identified amongst all stakeholders to formulate a joint programme to limit the spread of HIV during the construction period. - Particular provisions shall be worked into the tender documents for the contractor to approach the Ministry of Health and Social Services to co-opt a health officer to facilitate HIV/AIDS education programmes periodically on site.	- Ensure that contractors that bid make a provision for the co-opting of an HIV/AIDS health officer from the regional health office in their tender application	Planning & Design Engineer in partnership with National and Regional HIV task forces and NGO's working in the field	Included in Project Cost
	Health and safety risks to the workers and public due to uncontrolled access to the public during construction Unsafe traffic conditions. The lack of personal protective clothing, etc.	- Prior to construction all construction workers should undergo environmental induction.	- Ensure that contractors that tender make provision for environmental induction in their tender applications	Planning & Design Engineer Project Manager Environmental and Social Site Officer(ESSO):	Included in Bid price

Environmental and social Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
Conflicts	Nuisances caused by the building contractor. Lack of communication between Contractor and communities	- A meeting should be arranged with the local community once the contractor has been appointed. - The contractor shall appoint an ESSO from the construction team to take responsibility for the implementation of all provisions of this ESMP.	- Ensure that contractors that tender make provision for the appointment of an Environmental and Social Compliance Officer (ESCO) in their tender application. - Arrange a meeting once contractor has been appointed	Planning & Design Engineer Project Manager Environmental and Social Site Officer (ESSO)	Included in Bid price
Obtain & activate permits and licenses	Lack of Agreements, Permits/ Licenses	- Contractors to comply with all statutory requirements set out by Government for use of construction equipment, and operation construction plants. All the required agreements and licenses or permits should be applied for and signed, respectively before commencement of work in the area, or as required. - Contractor to ensure all required permits are in place prior to construction, such as (but not limited to): a. Land use agreement by the Traditional Authorities and private property owners. b. Waste management disposal permits from the relevant facility owner such as local authority (Katima Town Council). c. Water abstraction & use permit (if abstracting directly from a borehole, river or dam). d. Fuel storage permit from MME for petroleum stored onsite (equals to or in excess of 600 litres).	- Land use consents should be timely obtained prior to implementation of such activities	Construction Contractor MAWLR: DWSSC (for water permits)	Included in Bid price

Environmental and social Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
Location of water sources in protected area	Nuisance to the biodiversity (flora, fauna, water ecosystem) due to dust, silt runoff, noise, etc.	- Increase sensitivity for construction and protection mitigation measures in the transmission line rehabilitation to all Springs especially when within the National Park boundaries. - Guarantee contractor is trained, accepts and follows all operational procedures applicable within the protected areas. Contractor must not: a. Kill, injure, damage, remove, handle, disturb or interfere with any endangered species or existing animals under any circumstances; b. Bring domesticated animals on-site; c. Poaching on-site or the surrounding forests; d. sell endangered species or derivatives of these species; e. export endangered or derivatives of these species; f. cleared trees without inspection for nesting birds prior to cutting. The nest will be transferred carefully to another tree safe from project activities.	-	Implementing Agency	Included in Project Cost
Compensation for land use (in the case of displacement of properties to make way for pipeline establishment)	Lack of consultation, clear communication, and clarity on the compensation.	- Compensation should be communicated and explained clearly to the affected landowner/land custodian (Headmen of the respective villages / Traditional authority). - The landowner should be compensated fairly and in accordance with the Policies and ensure harmony throughout the process.	- The Executing Agency must make provision for compensation of land loss due to construction activities	Proponent - MAWFL	Included in Project Cost
Vegetation loss	Loss of vegetation or land clearing as part of site preparation	- The routes for the planned facilities such as pump stations, reservoirs, pipeline routes should be located at the early stages of the project (before construction) and ensure that they are placed where there are no trees or minimum number of trees. - Make use of existing linear infrastructure such as roads to lay	- The ESSO should investigate the finalized routes and advise the Contractor and Engineer	Planning & Design Engineer Contractor	Included in Project Cost

Environmental and social Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		the pipelines alongside and make use of existing access roads. - Position new pipelines in such a way to follow existing access roads in the project area. - Avoid unique and special habitats or culturally protected areas. - Create buffers from special, sensitive and ecologically important habitats.			

12.1.2. Construction and Post-Construction Phase Measures

The management and mitigation actions plans or measures for construction phase are presented under **Error! Reference source not found.**. The ESMP should be included in the bidding/ contract documents and their implementation should be contractual binding for the contactors.

Table 27: Construction and Post-Construction Phase - Management and Mitigation Plan.

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		Social Environment			
Conflict	- Communities dissatisfied with the activities. - Nuisances caused by the building contractor.	- Clear communication between contractor and community as well as stakeholders, on the schedule/timeframe for operations and the duration of the construction phase. This should be provided for in the form of a Public Consultation Plan (PCP) which should include at least: - One meeting for site-handover and to introduce the local community and farmers to the Contractor. - A system for the on-going management of the communication between the Contractor and local communities, which should include; a means for lodging a complaint concerning construction activity, provision of feedback to the plaintiff from the Contractor	- Minutes of meetings - Draw up PCP	Project Manager, ESSO and Contractor	Included in Project Cost

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		stating how the issue is being addressed, report back on issues raised and how addressed from the Contractor to the Project Manager and Proponent, and detailed construction programme should be presented during a meeting with the local communities and stakeholders.			
		- Ensure that relevant stakeholders are adequately informed throughout construction and that there is effective communication with and feedback to the Project Manager and Proponent.	- Meetings and communication.	Project Manager, ESCO and Contractor	Included in Project Cost
	Delayed construction, which has cost implications and causes low user satisfaction.	- Programme delays into the construction schedule should be timely communicated to the communities.	- Project Manager and Contractor to constantly monitor delays and adapt programme accordingly. - Constantly update stakeholders and communities on delays and latest schedules.	Project Manager and Contractor.	Included in Project Cost
	Poaching and trapping	- Poaching or trapping of animals is strictly prohibited and is a criminal offence.	- Project Manager, ESSO and Contractor to monitor this	Contractor ESSO	Included in Project Cost
Poaching (illegal hunting of wildlife) and animal trapping to promoting biodiversity conservation	Presence of project workers (mainly outsiders) may lead to poaching of local wildlife in the area.	- Commit to creating awareness among the project workers and the impact of such crimes on the host environment and country at large. - Report any suspicious activities related to wildlife crime to the nearest Police.	- Contractor and ESSO to monitor this	Contractor ESSO	Included in Project Cost

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		- To minimize the risk of poaching by outsiders, commit to hiring more locals for jobs that they can do, as they are likely to appreciate the importance of conserving wildlife in their areas. - Incorporate a No-tolerance rule for poaching in every employment contract and ensure that the workers understand the seriousness of this. In other words, there is no tolerance for poaching or to wildlife crime.			
Dangerous work area	Existence of dangerous/hazardous work areas	- The work areas must be set out and isolated and demarcated by means of danger tape on a daily basis. The demarcated work area may only contain materials, equipment, and personnel required to execute the work. - Once the work for the day is completed, the demarcated area must be cleaned of any spilled materials and waste products. This must be disposed of in the allocated containers. - If the work area is dangerous or sensitive, the danger tape should stay in place until work is complete or not sensitive anymore.	-Inspections for approval. -Record excavation / backfill schedule in the site instruction records.	Project Manager and Contractor.	Included in Bid price
Threats to the health and safety of construction workers.	Insufficient provision of safety equipment Negligent behaviour	- The contractor must adhere to the regulations pertaining to health and safety, including the provision of protective clothing, failing which the contract may be suspended with immediate effect. - Failure to remedy such lack of provision may result in the immediate cancellation of the contract according to the clauses stipulated in the Specific and General Conditions of Contract. - The contractor should comply with all relevant labour laws as stipulated by the Labour Act. - First aid kits to be readily available in case of injuries	- Regular visual inspection and records kept of safety equipment and materials issued.	Project Manager Contractor ESSO	Included in Bid price
		- Dust protection masks shall be provided to staff members if they complain about dust.	- Regular inspections and attendance to work complains.	Project Manager and Contractor.	Included in Bid price

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		- Workers in the vicinity of sources of high noise should wear necessary protection gear.	- Regular Inspection	Project Manager and Contractor.	Included in Bid price
		- No person is allowed to smoke close to fuel storage facilities and in portable toilets at the construction site since the chemicals used in chemical toilets are highly flammable.	- Regular Inspection.	Project Manager and Contractor.	Included in Bid price
		- Workers should not be allowed to make use of the existing neighbourhood facilities. Potable water must be provided to workers to avoid dehydration.	- Regular Inspection.	Project Manager and Contractor.	Included in Bid price
		- Portable toilets should be available at the construction site in the following ratio: 2 toilets for every 50 females and one toilet for every 50 males.	- Regular Inspection.	Project Manager and Contractor.	Included in Bid price
	Low productivity and increase health risk of workforce due to high temperatures.	- Provide hats, ample drinking water. - Provide regular breaks.	-Daily checking of weather forecast.	Project Manager and Contractor.	Included in Bid price
	Accidental fire outbreaks (incidents)	- Foam and serviced fire extinguishers must be in close proximity to fuel kept on site and one extinguisher at the camp. - There should be two to three trained personnel and equipped with basic firefighting skills. - At least two extinguishers should be placed in the workshop. - No open fires should be created by project personnel on and around the site. - Consider using gas or paraffin cooks to prepare food instead of open fires. The cooks/stoves fire should be put out before leaving the camp.	-Foam fire extinguisher should be available when work commences.	Project Manager and Contractor.	Included in Bid price

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		- Make provision for smoking areas for crew members who smoke. This is to ensure that the cigarettes' fire is completely put out to and disposed of in allocated bins at the smoking area. - Potential flammable areas and structures such as fuel storage tanks should be marked as such with clearly visible signage. - Raise awareness to workers on the impact of careless handing of fires and flammable substances onsite.			
Health and social pathology.	Increase prostitution and associated social pathologies and health risks Sex workers are hired from the local communities by the construction team.	- Prohibit unauthorized people on site and secure construction area, while monitoring entrance and exits. Contract penalties. - Workers are not allowed to reside on the construction site. - Engage workers in sexual health talks and training about the dangers of engaging in unprotected sexual relations which results in contracting HIV/AIDS and other sexual related infections. - Provision of condoms and sex education through distribution of pamphlets and health trainings. These pamphlets can be obtained from the nearest local health facility in the area, and if needed, health care services should be obtained in Katima Mulilo.	- Daily monitoring by contractor. - Record visitors in a site-visit book	Contractor ESSO	Included in Bid price
	- Health and safety risks to the workers and public due to uncontrolled access to the public during construction. - Unsafe traffic conditions, the lack of personal protective clothing, etc.	- During inductions, provide project workers with an awareness training of the risks of mishandling equipment and materials on site and health & safety risk associated with their respective jobs. - Project workers should be properly equipped with adequate and appropriate personal protective equipment (PPE) such as coveralls, gloves, safety boots, earplugs, dust masks, safety glasses, etc. - Heavy vehicle, equipment and fuel storage site should be properly secured, and appropriate warning signage placed where visible.	- Daily monitoring by contractor	Contractor ESSO	Included in Bid price

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		- Workers should not be allowed to enter the working sites when under the influence of alcohol as this may lead to mishandling of equipment which results into injuries and other health and safety risks.			
Alcohol abuse.	Use of alcohol on construction site.	- At no stage may a construction worker be allowed on site under the influence of alcohol or any narcotic substances.	- Daily monitoring by contractor. - Spot checks.	Project Manager and Contractor	Included in Bid price
Lack of privacy	Intrude on neighbouring properties.	- Under no circumstance are workers allowed to intrude on neighbouring properties.	- Regular monitoring by Consulting Engineer.	Project Manager and Contractor	Included in Bid price
Construction Area					
Disorderly and unwanted settlement in the pipeline reserve	Informal market stalls providing services to construction workers	- In consultation with the regional council and traditional authorities, to determine the conditions for of market stalls next to the road and at lay-byes. - No settlement will be allowed.	- Set conditions for market stalls. - Regular inspection of site.	Contractor	Included in Bid price
Construction site	Visual nuisance of the construction activities.	- The boundaries of the construction area shall be demarcated prior to any work commencing on the site. - The construction area should be clearly marked.	- Consulting Engineer and Contractor should agree on demarcation lines.	Project Manager and Contractor	Included in Project Cost
	Improper conduct on construction site.	- The construction area should adhere to the following requirements: - Access should be controlled and only workers allowed within the boundaries of the campsite: - Records should be kept and all visitors should sign in and sign out of a visitors logbook - The contractor should in no way permit or allow prostitution to take place at the construction area.	- Regular visual and record inspection by the Project Manager.	Project Manager and Contractor	Included in Project Cost

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
Campsite Establishment					
Negative impact on the social and ecological environment.	Establishment of campsite.	- One campsite should be established for all construction activity (i.e. for all three sites). - The contractor must negotiate the use of existing facilities before considering entering new terrain. - The contractor must receive approval to use a facility or land in writing. -This approval must state the remuneration and conditions of use. - Devise a layout for the site so that internal circulation of workers and vehicles in relation to the various construction functions is optimised.	- Contractor and MAWLR should agree on a satisfactory area.	Contractor with approval of the Proponent and Traditional Authority	Included in Bid price
	Conduct on campsite.	- No one is allowed to reside on the campsite, save for construction personnel. - The campsite may act as a facility for the storage of construction material, temporary stockpile sites, and fuel installations etc., required by the Contractor or subcontractors and suppliers. - Materials must be stored in a separate closed-off premise that is sufficiently prepared to protect the environment for pollution, such as impermeable floors, closed containers and a security fence.	- Daily monitoring by contractor.	Contractor.	Included in Bid price
	Stockpiling materials on site.	- Stockpile materials such as bricks, sand, and stones in neat piles store sensitive materials such cement, hazardous materials, and consumables separately in a demarcated area on site. - Store only small amounts of materials on site to avoid unsupervised use that may lead to accidents and spills.	- Daily monitoring by contractor. - Regular visual and records inspection by the Project Manager.	Project Manager and Contractor.	Included in Bid price

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		- Stockpiles must be of a safe height of less than 2m high and 45° slope angle. - Protect all fluids containers from low temperatures to avoid leaks and pollution.	- Regular visual and records inspection by the Project Manager.	Project Manager and Contractor.	Included in Bid price
Biophysical Environment					
Soil erosion and compaction	Unnecessary soil disturbance and excavations	- Stockpiled topsoil and materials should be used to backfill the excavated and disturbed site areas such as borrow pits. - Topsoil stripped from certain site areas to enable project works and can be returned to its initial position, should be returned. This is to avoid unnecessary stockpiling of site soils which would leave them prone to erosion. - Vehicles/machinery should stick to access roads provided and not to unnecessarily create further tracks on and around the site by driving everywhere resulting in soil compaction and erosion. - Unnecessary off-road onsite and neighbouring areas is strictly prohibited. Stick to approved site access roads.	- Daily inspection of the surface protection work	Contractor.	Included in Bid price
Soil pollution	Garbage, cement, concrete, sewage, chemicals, fuels, oils or any other objectionable or undesirable material.	- Hazardous waste should be disposed of in the prescribed manner in order to prevent contamination of soils. - In case of accidental spills, the contaminated soil must be suitably disposed of in a container for hazardous waste.	- Daily monitoring and regular visual inspection by contractor.	Contractor ESSO	Included in Bid price
	Soil pollution by fuel leaks	- If fuel is stored at the construction camp, fuel tanks must be properly bunded. The volume of the bunded area must be sufficient to hold twice the capacity of the storage tanks. The floor	- Daily monitoring by Contractor and	Contractor ESSO	Included in Bid price

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		of the bunded area must be impermeable and the sides high enough to achieve the twice holding capacity.	regular visual inspection by ESSO		
		- Drip trays should be available for all equipment that is intended to be used during construction. These trays should be placed underneath each vehicle while the vehicles are parked. The drip trays should be cleaned every morning and the spillage handled as hazardous waste.	- Daily monitoring and regular visual inspection by contractor.	Contractor ESSO	Included in Bid price
	Soil pollution by cement mixed on the ground.	- Under no circumstances should cement be mixed on open soil. A designated metal container should be made available for this purpose.	-Daily monitoring by Contractor and regular visual inspection by the ESSO	Contractor ESSO	Included in Bid price
	Cleaning of equipment.	- All cleaning of equipment should take place within the construction site and the water from washing operation should be collected in a tank and disposed of in agreed manner.	- Daily monitoring by Contractor.	Contractor ESSO	Included in Bid price
	Heavy vehicles/ movement of vehicles across site.	- The movement of vehicles to and across the site should be controlled. Construction material required should be moved to where it is needed by means of wheelbarrows (when possible) instead of trucks thereby minimizing the impact on the soil. - For the safety of the homestead residents and immediate community members who utilize the existing access path, the contractors should create safer routes to be used by the road construction vehicles only and avoid the existing community paths.	- Daily visual inspection and monitoring by Contractor.	Contractor ESSO	Included in Bid price
Biodiversity (fauna and flora)	The illegal hunting of wildlife in the area may affect the biodiversity	- Refrain from disturbing or killing wildlife found on and around the project sites.	- Inspection of the site rote by the ESSO	Contractor ESSO	Included in Project Cost

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
	in the area and surroundings	- Breeding sites for animals and birds occurring on and around the project pipeline route should not be destroyed nor disturbed. - Pipeline trenches should be secured (temporary fencing/ covering) and backfilled and capped after sampling is completed to prevent animals from falling into trenches. - Incorporate Environmental awareness and biodiversity preservation into the employment contracts of all workers.	- Reporting of illegal poaching to the Police		
	The uncontrolled or unauthorized removal trees, especially protected tree species may lead to that species in the area	- Avoid unnecessary removal of vegetation to promote a balance between biodiversity and the project. - Vegetation found on the site, but within the footprint of the infrastructure route or access route should be left undisturbed/avoided. - Barricading tape (to indicate working areas) should be established. - Vehicle movement should be restricted to existing roads and tracks to prevent unnecessary damage to the surrounding vegetation. - No onsite vegetation should be cut or used for firewood. - Access roads should be created in a manner that disturbs minimal vegetation. - Environmental awareness on faunal and floral biodiversity preservation should be provided to the workers and contractors. This should be incorporated into the workers' contracts	- -Inspection of the site by the ESSO	Contractor ESSO	Included in Project Cost
Vehicular movements	Irresponsible driving and operations on/around sites	- Project goods, materials and services should be delivered to site once to twice a week, maximum. - Operators of the vehicles and machinery should be in possession of valid and appropriate driving/operating licenses and adhere to the road safety rules.	- Inspection of the site	Contractor ESSO	Included in Bid price

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		- The site speed limit should be slowly (40km/hour or less) and be on the lookout for people (children, especially) and animals. - The site access roads should be equipped with temporary clear, and visible road signs. - All vehicles should be road worthy and serviced regularly to avoid accidents owing to mechanical faults of vehicles. - No vehicle driver or machine operator should be allowed to operate vehicles/machinery while under the influence of alcohol or drugs. - Vehicles should be parked within the demarcated areas for such purpose onsite. - Site deliveries from and to site should be done during weekdays and between the hours of 8am and 5pm.			
Dust Generation	Dust from movement of heavy vehicles and earthworks mostly excavation for the pipelines and water infrastructure installation.	- Vehicles should not be driven at a speed more than 40 km/h to avoid dust generation in the project area mostly in gravel roads. - At dust sources onsite, a reasonable amount of water should be used by using regular water sprays to suppress the dust that may be emanating from such sites. - Dust masks, eye protective glasses and other respiratory personal protective equipment (PPE) such as face masks should be provided to the workers on site excavation-based areas, where they are exposed to dust as well as heavy machinery operators. - Machines, and vehicles should be regularly maintained to ensure efficiency and reduce dust generation and harmful gaseous emissions.	- Inspection of the site	Contractor ESSO	Included in Project Cost

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
Accidental disturbance of archaeological or heritage objects	Inadvertent destruction or disturbance of archaeological resources during site clearing and earthworks	- Upon discovery or unearthing of archaeological materials or human burials or skeletal remains, the work in the immediate area should be halted, the finds would need to be reported to the NHC may require inspection by an Archaeologist. The ESSO should have the area fenced off and contact NHC (Tel: +264 61 244 375), National Forensic Laboratory (+264 61 240 461) immediately. - Buffer zones of 1km from any significant archaeological, historical or cultural heritage sites or finds should be maintained around. This includes graves, stratigraphic profiles, or past human dwellings, and areas with cultural significance. These can be a demarcation by fencing off or avoiding the site completely by not working closely or near the known site. - Direct damage to archaeological or heritage sites should be avoided as far as possible and, where some damage to significant sites is unavoidable, scientific/historical data should be rescued. - All accidental discoveries shall be reported immediately to an archaeologist/heritage practitioner so that an investigation and evaluation of the finds can be made, acting upon advice the ECO / EC will advise the necessary actions to be taken; - Any pile of stones or mound of the earth looking even remotely like a grave should be avoided at all costs (this could be a grave). - Cognizance must be taken of the larger historical landscape of the area to avoid the destruction of previously undetected heritage sites. Should any previously undetected heritage or archaeological resources be exposed or uncovered during the	- Inspection of the site during site clearing and earthworks.	Contractor ESSO	Included in Project Cost

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		project activities, these should immediately be reported to the heritage specialist or heritage authority (NHC). - The Proponent and Contractors should adhere to the provisions of Section 55 of the National Heritage Act in the event significant heritage and cultural features are discovered in the course of developmental works.			
Water Conservation					
Irresponsible use of water.	Water wastage due to careless practices during construction.	- Groundwater abstraction and use permit should be applied for from the MAWLR prior to boreholes drilling and water abstraction, respectively. - Establish a water plan which, should include at least the following: a. A description of: the source of the water, where and how the water will be stored, and how the water will be distributed/utilised. b. Describe measures that will be taken to conserve water at each of the above-mentioned phases. c. Educate the work force on sustainable and effective use of water, e.g. clean equipment in containers. d. No member of the construction team is allowed to wash clothes or vehicles on the construction site.	- Daily inspections and condition reports.	Contractor ESSO	Included in Project Cost
Water usage	Leaks from tanks and taps.	- Water should be used sparingly throughout the construction duration. It is the responsibility of the site coordinator to ensure that water conservation is strictly enforced.	-Daily inspections and condition reports.	Contractor ESSO	Included in Project Cost
		- Water tanks / taps must be fixed. The water tank or taps must have water meters and be accessible to visual inspection. All faulty and leaking taps and pipes shall be immediately repaired.	-Daily inspections and condition reports.	Contractor ESSO	Included in Project Cost

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
Groundwater contamination.	Refuse, garbage, cement, concrete, chemicals, fuels, oils or any other objectionable or undesirable material.	- Accidental spills must be cleaned immediately to avoid the pollution of the wetland, and ground water, since the soil around the site is highly permeable. - No member of the construction team is allowed to wash clothes or vehicles on the construction site.	-Inspection daily, reporting, and regular clean up.	Contractor ESSO	Included in Project Cost
Conservation of Vegetation					
Loss of biodiversity	Clearing of vegetation (removal of trees, etc.).	- The area to be constructed on the site, as well as lay-down areas, access routes, etc. should be clearly demarcated. The workforce must be instructed to operate within these boundaries. Any activity resulting in the chopping down of trees or removal of vegetation without the required authorisation is strictly prohibited. - All protected tree species should be tagged so that they are visible during construction works.	-Regular review of photographic records. Take photographs before construction starts as a record. -Monitoring by the ESSO	Contractor ESSO	Included in Project Cost
	Planting of alien vegetation.	- No alien vegetation may be introduced to the site in the form of seeds or plants, for beautification or any other reason. - At the end of construction all alien vegetation that has established should be eradicated.	- Regular inspection of site vegetation by the ESSO.	Contractor ESSO	Included in Project Cost
Waste Management					
Construction waste.	Incorrect or infrequent disposal of building rubble.	- Construction waste should be stored in skips and should regularly be removed off the site for disposal at an applicable municipal waste disposal site.	- Regular inspection on site.	Contractor ESSO	Included in Project Cost
	Construction waste blown by wind (e.g., cement bags).	- Empty cement bags, plastics, wrapping waste, strapping, etc. to be secured in containers for general waste to prevent wind-blown waste.	- Daily inspection and clean up.	Contractor ESSO	Included in Project Cost

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
Increased general waste.	Domestic waste from construction team.	- Waste shall be separated according to cardboard/paper materials, plastic, bottles and tins. - The various waste types shall be disposed of at appropriate municipal and recycling facilities. - Appropriate containers shall be placed on site for waste separation and the workforce trained sensitised accordingly. - Only the general waste, which cannot be recycled shall be disposed of at the municipal waste disposal facility.	- Daily inspection and clean up.	Contractor ESSO	Included in Project Cost
Domestic waste.	Domestic waste from construction team.	- The workforce must be sensitised to dispose of waste in a responsible manner and not to litter, not at the construction site and not at the campsite. - Sufficient waste bins should be supplied. - No waste should be burned nor buried onsite.	- Daily inspection and clean up.	Contractor ESSO	Included in Project Cost
		- Domestic waste which cannot be recycled should be stored in a skip and removed via truck once a week.	-Regular inspection.	Contractor ESSO	Included in Project Cost
Hazardous waste.	Accidental / negligent spillages from equipment working on site.	- Spillages of any potentially toxic materials, whether by accident or through negligence, must be scooped up immediately into drums. - All waste hydrocarbon material should be collected and stored in appropriate containers and transported off-site to a suitably qualified third party which routinely handles such waste. An example is Oiltech Namibia (https://oiltech.com.na/). The City of Windhoek also has facilities to handle hydrocarbon waste (http://www.windhoekcc.org.na/depa_infra-solid_waste_management.php).	- Daily inspection and clean up.	Contractor ESSO	Included in Project Cost
	Storage of hazardous materials.	- Oil sludge, oily rags, contaminated spill clean-up materials, contaminated soils and other hazardous materials waste must be kept off-site or in a dedicated separate container on site. These	- Daily inspection and clean up.	Contractor	Included in Project Cost

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		containers must be locked and only accessible by the site foreman. Wesco Group should be approached to collect these wastes periodically or as needed.		ESSO	
Ablution waste.	Construction team.	- Only portable chemical toilets should be used on site and at the campsite. Under no circumstances may the waste from these toilets be dumped in the veld. The waste should be removed at least once a week to the nearest municipal sewage site. Alternatively, it may be pumped out into sealable containers and stored until it can be removed by truck. If stored, the containers should be kept out of direct sunlight and should not be stored for longer than a month. People responsible for cleaning these toilets should be provided with latex gloves and masks. - Spillage or leakage to be cleaned-up and fixed immediately.	- Daily inspections and clean-up.	Contractor ESSO	Included in Project Cost
Dust Control					
Dust generation and harmful gas emissions	Dust proliferation due to fines content of soil as well as harmful gas emissions or fumes form vehicles and machinery may compromise air quality in the project areas	- Soil stacks should be placed downwind from the main activity areas and from the road detour. - All construction areas and soil stacks should be regularly wetted using regular water sprays on problematic dusty sites to suppress the dust that may be emanating from such construction areas onsite. - Project vehicles within the area should not be driven at a speed more than 40 km/h to avoid dust generation. - Dust masks, eye protective glasses and other respiratory personal protective equipment (PPE) such as face masks should be provided to the workers onsite where they are exposed to dust. - Excavating equipment should be regularly maintained to ensure excavation efficiency and so to reduce dust generation and harmful gaseous emissions.	- Visual monitoring for dust nuisance and safety	Contractor ESSO	Included in Project Cost

Environmental Management Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs of activities (N$)
		- Vehicles and machinery that are not in use should not be left idling nor unattended. Therefore, they should be turned off.			
Noise Control					
Noise generation.	Noise from vehicles and construction activities.	- All machinery should be calibrated and maintained regularly. - No construction activities should be done during night-time hours, i.e., between 18h00 to 07h00 and over weekends. - Construction hours should be restricted to between 07h30 and 17h00 to avoid noise generated by construction equipment and the movement of vehicles before or after hours	- Daily monitoring. - Complaints from neighbours. - Records of how these have been addressed.	Contractor ESSO	Included in Project Cost
Community Health and Safety					
Community health and safety	Lack of safety and health measures in the community during construction may lead to minor and serious injuries	- Heavy vehicle, equipment and fuel storage site should be properly secured, fenced off and away from public exposure and access. - Trenches should be temporarily fenced off during sampling, and once completed, they should be backfilled thereafter. - An emergency preparedness plan should be compiled, and all personnel appropriately trained. - Ensure that goods and projected loads are securely fastened to vehicles to avoid falling and injure people or animal along the project route. - Warning signage should be erected at hazardous site areas such as open trenches. The site areas that are considered temporary risks should be equipped with "danger" or "cautionary" signs clearly written in English and local languages.	- Daily monitoring. - Complaints from neighbours. - Records of how these have been addressed.	Contractor ESSO	Included in Project Cost

12.1.3. Operations & Maintenance Phase Measures

The management and mitigation actions plan for this phase are presented in **Error! Reference source not found.**. It should be noted that some impacts occurring during the construction phase might be encountered during the operations and maintenance phase. Reference to respective impact under the construction phase will be done under such circumstances. The maintenance activities will be done internally by MAWLR, or they would choose to subcontract it to an external water infrastructure maintenance service provider.

Figure 21:Operations and Maintenance Phase - Management and Mitigation Measures.

Environmental Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs (N$)
		Social Environment			
Conflict due to closed water supply as a result of unpaid bills or damaged infrastructure	- Communities dissatisfied with the water supply scheme services	- MAWLR should timely notify the communities of both foreseen and unforeseen circumstance of water supply issue. This will help the communities to make provisions for water supply during water supply interruptions duration. - Schedule annual community engagement and issues submissions meeting in each village. - A system for the on-going management of the communication between the Proponent and local communities, which should include: a means for lodging a complaint concerning maintenance activities, provision of feedback to the plaintiff from the maintenance team stating how the issue is being addressed, and report back on issues raised and how addressed from the maintenance team to the Project Manager / Proponent.	- Minutes of meetings - Communication Plan shared via constituency councillors' offices	Proponent / MAWLR through their regional representatives (officers)	O&M Costs Included in project design

Environmental Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs (N$)
Maintenance solid waste	Stockpiling materials on site.	- Stockpile materials such as bricks, sand, and stones in neat piles store sensitive materials such cement, hazardous materials, and consumables separately in a demarcated area on site. - Store only small amounts of materials on site to avoid unsupervised use that may lead to accidents and spills. - Stockpiles must be of a safe height of less than 2m high and 45° slope angle. - Protect all fluids containers from low temperatures to avoid leaks and pollution.	- Regular visual and records inspection by the Project Manager.	Proponent / MAWLR	O&M Costs Included in project design
Biophysical Environment					
Soil erosion and compaction	Unnecessary soil disturbance and excavations	Please refer to measures provided under the construction phase and implement accordingly.	- Daily inspection of the surface protection work - Daily monitoring and regular visual inspection by contractor.	Proponent / MAWLR	O&M Costs Included in project design
Soil pollution	Garbage, cement, concrete, sewage, chemicals, fuels, oils or any other objectionable or undesirable material.				O&M Costs Included in project design
	Soil pollution by fuel		- Daily monitoring and regular visual inspection by the maintenance team	Proponent / MAWLR	O&M Costs Included in project design
	Heavy vehicles/ movement of vehicles across site.				O&M Costs Included in project design
Dust Generation	Dust from movement of heavy vehicles for	Please refer to measures provided under the construction phase.	- Inspection of the site	Proponent / MAWLR	

Environmental Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs (N$)
	maintenance and excavations/ earthworks done to repair the water supply line.				
Accidental disturbance of archaeological or heritage objects	Inadvertent destruction or disturbance of archaeological resources during site clearing and earthworks	Please refer to measures provided under the construction phase.	-Inspection of the site during earthworks	Proponent / MAWLR	O&M Costs Included in project design
Water Conservation					
Water usage	Excessive water and unsustainable water use practices.	- Constantly monitor water usage of the communities if the water is used for domestic and livestock purposes which is the aim of this project.	- Monthly inspections and condition reports.	Proponent / MAWLR	O&M Costs Included in project design
	Leaks from the reservoirs, pipeline, tanks and taps.	- Water conservation should be strictly enforced. - Inspections at the pipeline, reservoirs, and taps should be done on a monthly basis to ensure that there are no damages and leaks that may result in water wastage and eventual high-water bills for the communities. - Damaged water tanks / taps must be fixed. The water tank or taps must have water meters and be accessible to visual inspection. All faulty and leaking taps and pipes shall be immediately repaired.	- Monthly inspections of the supply line and produce condition reports.	Proponent / MAWLR	O&M Costs Included in project design
Non-revenue water	Poor maintenance of the pipeline that result in high leakages thus increasing non-revenue water which burdens the	- Timely repair of the pipeline. - Constant monitoring of the leakage of the main pipeline. - Encourage communities to report leakages. - Set-up contact number and procedure for communities to report leakages.	- Constant inspection and maintenance of the water supply lines.	Proponent / MAWLR	O&M Costs Included in project design

Environmental Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs (N$)
	water users and utility provider.				
Conservation of Vegetation					
Loss of biodiversity	Clearing of vegetation (removal of trees, etc.).	- Any activity resulting in the chopping down of trees or removal of vegetation without the required authorisation is strictly prohibited.	- Regular review of photographic records. Take photographs before maintenance starts as a record.	Proponent / MAWLR	O&M Costs Included in project design
	Planting of alien vegetation.	- No alien vegetation may be introduced to the site in the form of seeds or plants, for beautification or any other reason.	- Regular inspection of site vegetation	Proponent / MAWLR	O&M Costs Included in project design
Waste Management					
Maintenance waste	Incorrect or infrequent disposal of maintenance rubble.	- Maintenance waste should be stored in skips and should be removed off the site for disposal at an applicable municipal waste disposal site.	- Regular inspection on site.	Proponent / MAWLR	O&M Costs Included in project design
	Maintenance waste blown by wind (e.g., cement bags).	- Empty cement bags, plastics, wrapping waste, strapping, etc. to be secured in containers for general waste to prevent wind-blown waste.	- Daily inspection and clean up.	Proponent / MAWLR	O&M Costs Included in project design
Increased general waste.	Domestic waste generated by the maintenance team.	- Waste shall be separated according to cardboard/paper materials, plastic, bottles and tins. - The various waste types shall be disposed of at appropriate municipal and recycling facilities after completion of maintenance activities.	- Daily inspection and clean up.	Proponent / MAWLR	O&M Costs Included in project design

Environmental Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs (N$)
		- Appropriate containers shall be placed on site for waste separation and the workforce trained sensitised accordingly. - Only the general waste, which cannot be recycled shall be disposed of at the municipal waste disposal facility.			
Domestic waste.	Domestic waste from maintenance team.	- The workforce must be sensitised to dispose of waste in a responsible manner and not to litter in the area. - Sufficient waste bins should be supplied.	- Daily inspection and clean up.	Proponent / MAWLR	O&M Costs Included in project design
		- Domestic waste which cannot be recycled should be stored in a skip and removed or taken along to Outapi after maintenance works.	- Regular inspection.	Proponent / MAWLR	O&M Costs Included in project design
Noise Control					
Noise generation.	Noise from vehicles and maintenance activities.	- All machinery should be calibrated and maintained regularly. - No maintenance activities should be done during night-time hours, i.e., between 18h00 to 07h00 and over weekends.	- Daily monitoring. - Complaints communities. - Records of how these have been addressed.	Proponent / MAWLR	O&M Costs Included in project design
Community Health and Safety					
Community health and safety	Lack of safety and health measures in the community during maintenance may lead to minor and serious injuries	- If onsite, maintenance equipment and fuel storage site should be properly secured, fenced off and away from public exposure and access. - Maintenance trenches should be temporarily fenced off during sampling, and once completed, they should be backfilled thereafter. - An emergency preparedness plan should be compiled, and all personnel appropriately trained.	- Daily monitoring. - Complaints from communities. - Records of how these have been addressed.	Proponent / MAWLR	O&M Costs Included in project design

Environmental Impacts Requiring Mitigation	Sources of Impacts	Management and Mitigation Measures	Monitoring Actions and Methods	Responsibility for Implementation	Estimated costs (N$)
		- Ensure that goods and projected loads are securely fastened to vehicles to avoid falling and injure people or animal along the project route. - Warning signage should be erected at hazardous site areas such as open trenches. The site areas that are considered temporary risks should be equipped with "danger" or "cautionary" signs clearly written in English and local languages (Oshiwambo).			
Mishandling of chlorine	Health hazards towards the Operators	- Ensure proper storage and handling practices for chemicals. - Chemicals should be placed properly in an indoor warehouse, bunded, with no sun exposure and room temperature control and access limited to authorized personnel only. - Ensure the knowledgeable and skilled person oversees chlorine handling. - Provide training with simulation performances and equipment to improve worker on handling the Chlorine. - Ensure use of PPE while using chemicals	- Daily monitoring	NamWater	O&M Costs Included in project design

12.1.4. Decommissioning Phase Measures

The project infrastructure and services (mechanical and structural components) are anticipated to operate for about 30 to 50 years. The pump station facilities will likely be upgraded then continue operation as long as the communities in this part of Zambezi Region continue to exist and population grow. Maintenance and upgrading may therefore be necessary to keep optimal functionality. After the lifespan is finished and/or no more upgrades are feasible, a decommissioning period will commence. The environmental and social impacts of decommissioning would reflect its operational history, the projected use of the site and the social and environmental conditions within the program area.

Inappropriate disposal of wastewater technology and biodigester equipment and infrastructure, may involve environmental harm. Recycling and disposal of waste will be done by a company with a license and experience in this type of decommissioning projects. The projected impacts and risks during this phase are expected to be limited in scope but may include:

- **Soil disturbance:** All drilled boreholes and excavated pits related to the project activities should be capped and backfilled, respectively. This will include the levelling of stockpiled topsoil soon after completion of works at affected/disturbed sites. Any temporary setup on site should be dismantled, and the area rehabilitated as far as practicable, to their original state.
- **Disturbance to traffic:** The following activities associated with decommissioning may disturb traffic flow and these include road cuttings, excavations of trenches, temporary road closures/lane closures, heavy vehicle movement from trucks loaded with demolition material, and vehicle and pedestrian traffic deviations. These could result in traffic congestion and perhaps risks of accidents.
- **Air pollution:** Emissions from the use of machines and dust production from infrastructure and equipment dismantling may result in a decrease in air quality impacting nearby residents, pedestrians and/or nearby activities.
- **Noise pollution:** Noise generated through dismantling infrastructure and equipment could potentially impact on workers and neighboring residents.
- **Occupational health and safety**: Possibility of injury to workers from onsite accidents.
- **Waste generation**: Decommissioning of infrastructure and equipment may cause excess material generation. Equipment such as piping, valving, pumps, instrumentation and control equipment, can have residual values and can be sold or relocated off-site for reuse. Where recycling options are possible these will be implemented prior to the last option of landfilling. Other waste such as lubricants, oils and greases must be treated as hazardous waste and disposed accordingly.

13. REHABILITATION AND MONITORING PLAN

The objectives of the rehabilitation are as follows:

- Identify areas that must be rehabilitated to their natural state and areas that can be rehabilitated to a functional state,
- Provide a description of the procedures that should be followed for soil stabilisation and planting,
- Provide a framework for monitoring and reporting on the success of the rehabilitation exercise,
- Define roles and responsibilities for the implementation of this plan.

The “4 R” Approach should be employed for the rehabilitation of the disturbed environment. This includes:

- Restoration
- Rehabilitation
- Replacement / re-vegetation, and
- Reservation/conservation.

The success of rehabilitating the community/population within a designated area is dependent on the satisfactory establishment of the chosen plant species. To ensure that the process is optimised, the correct plant species in the correct densities and combinations should be utilised. Monitoring of the rehabilitation process is imperative to ensure that aggressive plant species and herbivores are controlled, and slopes remain stable. The general aim of a rehabilitation programme is to recreate a natural ecosystem. The rehabilitation will therefore be outlined in three (3) phases, which are required, namely:

- Take measures to stabilise the soil and remedy the soil, when required, through the monitoring and management of the soil composition, pH levels, nutrients, etc.
- Re-vegetate disturbed areas using appropriate natural successional species.
- Monitor and manage the success of the rehabilitation by controlling aggressive indigenous plants, removing alien invasive plant species as soon as they are observed, and maintaining the re-vegetated areas to ensure the successful establishment of these re-vegetated areas.

The proposed Rehabilitation Plan for the project is applicable to the following areas:

- Areas near or bordering wetlands or water drainage channels that may have been disturbed but have not been developed,
- Road verges after temporary access roads construction is completed,
- Campsite areas when construction workers demobilize,
- Wetlands,
- Stormwater soak away features and landscaped areas, and
- Areas where large patches of indigenous or invasive Alien Plant species have been removed.

Rehabilitation starts at the beginning of the project i.e., when clearing for construction begins and is not applied retrospectively. The steps outlined in the sections below must therefore be applied during the construction phase.

13.1. Rehabilitation Methods

13.1.1. Rehabilitation Phase 1: Soil Stabilisation and Remediation

Topsoil, which is removed during construction, must be utilised in the nursery and stored on site for rehabilitation and re-vegetation. Once construction is complete, the topsoil must be spread over the disturbed site and covered with mulch. Where necessary, the soil must be stabilised using suitable materials, such as netting or geotextiles. The plant material (grasses and herbs), which have been removed from the site, should be mixed into the topsoil to supplement the organic nutrient content of the soil. No further soil conditioning in terms of fertilising is deemed necessary at this stage.

13.1.2. Rehabilitation Phase 2: Re-Vegetation Procedure

The selection of species to be used for re-vegetation should be based on the ability of the species to successfully grow from the indigenous seeds, sods and/or slips which have been collected from the site. The revegetation procedures are attached hereto as Annexure 1.

13.2. Rehabilitation Monitoring

As part of ensuring that the environment is returned to its pre-project activities state, the Proponent (through its Construction Contractors), rehabilitation of the site areas will be implemented and maintain a rehabilitation monitoring plan from the commencement date of rehabilitation activities. The monitoring of rehabilitation efforts will need to be continued for a period of 12 months after the rehabilitation procedure has been completed. In case of any arising issues, that have not been resolved through the implementation of the recommended measures, a suitably qualified botanist should be hired to provide further rehabilitation/remedial measures. The ECO should monitor the rehabilitation process and record the progress in the regular audit reports using photographic evidence. The rehabilitation should include monitoring the establishment success (presence, percentage cover or absence) of plant cover and species composition per rehabilitated area. Monitoring must be undertaken biannually throughout the project cycle.

The success of the rehabilitation program measured on primary grass cover fully established, and there is no further requirement for frequent monitoring and management of the vegetation growth.

MAWLR will ensure that the Rehabilitation Plan is reviewed for efficacy, and any necessary changes thereto will be reflected in the periodic revisions of this document. A summary of all rehabilitation monitoring activities and outcomes will need to be reported on in the biannual reports.

13.3. ESMP Monitoring and Evaluation

The environmental and social aspects to be monitored throughout the project implementation phases are provided in **Error! Reference source not found.**. Monitoring ensures that mitigation measures are implemented effectively. Monitoring will happen at two levels:

a. **Compliance monitoring** – will check whether the actions proposed in the ESMP have been carried out through visual observation, photographic documentation and the use of checklist prepared in the ESMP. MAWLR as the implementing agency should take lead in this monitoring to enforce compliance to the ESMP by contractors involved in project implementation.

b. **Effects monitoring** – records the consequences of project activities on the biophysical and social environment; as applicable, these effects are repeatedly measured by applying selected indicators. Contractors appointed by MAWLR should take lead in this monitoring and MAWLR will play an oversight role.

This ESMP recommends the monitoring of the RSWSP Phase 1 activities to be done in two parts: internal and external monitoring.

a. Internal monitoring

This would be applied to various aspects of the ESMP, including:

i. The project screening procedure (to make sure it operates successfully and effectively).
ii. Environmental and social monitoring of the RSWSP Phase 1 project implementation in terms of changes to baseline conditions, adherence to necessary protection and compensatory measures, and recommendations made by environmental and social studies conducted for the project such as ESIA, environmental or social impacts, to ensure that they do not exceed expected limits.
iii. Ensuring that all necessary safeguards have been properly put in place, assessing the effectiveness of mitigation measures, and suggesting additional mitigation measures as necessary to control impacts.
iv. The implementation of capacity-building and training.

b. External monitoring

This should be done separately and regularly as as part of a periodic review of the project's overall progress.

13.3.1. Areas to be monitored.

The areas to be monitored must be precisely mapped before monitoring begins. This helps by providing details on where to watch, when to watch, how, what tools to use, what units of measurement, and who enforce compliance and checks. As listed below, the following areas will be taken into consideration for monitoring:

- Ambient air quality
- Chemical pollution
- Loss of natural and cultural heritage
- Marginal lands/fragile ecosystems
- Noise and Vibrations
- Socio-Cultural Issues
- Soils
- Vegetation
- Water resources and use (including pipeline to ensure non-revenue water is under control)
- Wildlife

Table 28: Environmental and Social Aspects to be monitored during project implementation.

Potential impact	Mitigation / Enhancement Measure (s)	Responsible Party	Indicator (S)	Monitoring Frequency	Monitoring Agent
Domestic solidwaste generated by workers	- Provide bins for waste collection, especially atcamp sites; - Dispose of domestic waste generated at the nearest designated waste disposal site.	Contractor	Amount and typeof waste generated	Weekly	MEFT
Soil contamination or pollution from hazardous chemicals orproducts such as petroleumproducts e.g. oil and fuel, brine and watertreatment chemicals aswell as wastewater from toilets.	- Prevent spillages of any chemicals and petroleum products (i.e., oils, lubricants, petrol and diesel): - Use drip trays, linings or concrete floors when evidence of leaks is observed on vehicles or equipment; - All fueling, storage and chemical handling shouldbe conducted on surfaces provided for this purpose. - No major servicing and maintenance of vehicles and/or equipment should be conducted onsite; - Drip trays, linings or concrete floors must be usedwhen removing oil from machinery; - Spillage control procedures must be in place according to National Oil Spill Contingency Plan - Wastewater collection systems should be connected to these systems; - Should portable toilet facilities be necessary, adequate containment systems should be erected at the site for use during the decommissioning phase; - Wastewater should properly be contained to avoid any leakages and/or spillages, and should regularly be disposed of at a suitable sewage disposal site; - Run-off from toilets due to overflows should be avoided at all costs; - Proper environmental awareness and remedial response training of operators must be conducted on a regular basis.	Contractor	Observations andsoil tests (Hydrocarbons)	Daily orweekly observations.	MEFT, MWLR

Potential impact	Mitigation / Enhancement Measure (s)	Responsible Party	Indicator (S)	Monitoring Frequency	Monitoring Agent
Noise generated from dismantling of infrastructure	- Check for faults when equipment is noisy; - Turn off machinery and equipment when not in use. - Ensure regular maintenance of machinery and vehicles. - Ear plugs must be used when working in noisy areas	Contractor	Allowable noise Exposure in decibels: 85 dBA as an 8 hour Time Weighted Average)	Monthly	Ministry of Labour, Industrial Relation and Employment Creation (MLIREC)
Disruption of water supply Switching / cutting off water supply.	- Communicate and warn stakeholders of the planned maintenance resulting in water cuts. - If decommissioning, an alternative water supply system should be commissioned before water supply is halted.	Contractor and / or MAWLR Zambezi Region	Number of announcements (water cuts)	Monthly	MAWLR
Occupation health and safety (Injuries due to onsite accidents)	- Provision of appropriate personal protective equipment such as gloves, goggles, masks and clothes; - Provision of first aid kits and equipment; - All visitors to report to the Scheme Officer on duty and be inducted / guided through the site with appropriate personal protective equipment; - First aid and safety awareness training for employees; - The employees must be properly trained on safety and health issues of the removal of old equipment. - All sites must be fenced off and fences maintained intact to prevent access to unauthorised persons or stray livestock from entering.	Contractor	Lost time cases rate, calculated by the multiplying the number incidents that were lost time cases by 200 000 and then dividing that by the employee labour hours at the company.	Monthly	Ministry of Labour, Industrial Relation and Employment Creation (MLIREC)

Potential impact	Mitigation / Enhancement Measure (s)	Responsible Party	Indicator (S)	Monitoring Frequency	Monitoring Agent
Air pollution	- Soil or ground excavation works should be done when wind is calm. - Use water to suppress dust when breaking up concrete stands and slabs. - Dampen surfaces with water during work. - Protect stockpiled soil with cover materials such as nets to protect loose soil from being blown away by the wind. - It must be ensured that all vehicles entering the site and machinery used in construction activities are in good working order to prevent unnecessary emissions. - Trucks transporting sand should be covered by tarpaulin.	Contractor	Dust count	Monthly	MEFT
Road traffic flow disturbances leading to accidents.	- Drive during day only for project related vehicular movements. - Adhere to speed limits on the national roads; - Adhere to speed limits on construction sites: 30 km per hour for construction vehicles and 40 km per hour for light and passenger vehicles. - Receive deliveries during day. - Mark all construction vehicles as required. - Make use of legible bright colours for signage.	Contractor	Number of motor vehicles accidents	Monthly	MEFT
Excess material which may become waste	- construction rubble should be disposed at a registered building waste material landfill; - Recyclable materials should be segregated and send to recycling enterprises; - Reusable equipment such as pipes, valves, motors can be relocated and auctioned to the public for reuse.	Contractor and Superintendent	Type and quantity of waste	Monthly	MEFT

13.4. Community and Stakeholder engagement

While this ESMP does not repeat details of the consultation and disclosure undertaken as part of the ESIA, it is acknowledged that consultation is an ongoing process and forms part of the life cycle of the project and the following measures are proposed:

- Conduct stakeholders meetings as and when needed, to ensure that the people in the community and stakeholders continue to be informed during construction and, where required, during operation and decommissioning phases. The consultation meetings held during the environmental scoping phase marked the beginning of the early engagement with stakeholders.

13.4.1. Grievance Redressal Mechanism (GRM)

The grievance management mechanism will be implemented throughout the project phases in order to extend an opportunity to all the stakeholders, in particular, those affected by the project to air their views on the project. This will form a channel to allow two-way communication from the lowest level to the top and vice-versa and in a way allow access to information and also to cascade resolutions.

13.4.2. Objectives of GRM

To enable the affected person (stakeholder or I&AP) to air their grievance, the following will need to be done:

- Clarifying the nature of the grievance
- Investigating the reasons for dissatisfaction
- Obtaining, where possible, a speedy resolution to the problem
- Taking appropriate actions and ensure that promises are kept

13.4.3. Grievance processes and procedure

Grievances will be handled by MAWLR's DWSSC through the Zambezi Regional Council's respective constituency office and will include the following steps and timelines:

- Provide a grievance registration form triplicate book onsite,
- Provide a grievance form to the concerned party or stakeholder to complete (personal details and details of the grievance) and submit one copy to MAWLR (DWSSC) and another copy to the Regional Council, one copy remains onsite,
- Open discussion of the issue by project team and proponent to formulate resolution(s),
- Provide for communication of the resolution to the concerned stakeholder(s), and
- Provide for an appeal process if the stakeholder is not satisfied with the proposed resolution of the complaint.

If the stakeholder is still unsatisfied, it is the responsibility of the MAWLR's Area Officer to advise the aggrieved party of their right to legal recourse by the Project Manager. Anonymous grievances can be raised and addressed. The grievance registration form is attached at the end of this report under Annexure 2. Several uptake channels to consider include:

- Walk-ins at focal points such as the Contractor's site office and MAWLR's office
- Short message services (SMSes) – this can be anonymously sent SMS with village or area name and grievance type.

- Clearly hand-written letters of complaints (containing name of the complainants (if comfortable or can remain anonymous), date of complaint, village/area, nature of complaint, and contact details).
- Emails (for those with email addresses and have access to internet)
- Telephone calls

Once an issue is received it must be recorded and resolved within a specified time period. All issues should be reported on and followed up during monthly progress meetings.

13.4.4. Grievance handling procedures

The grievance handling procedures that will be followed is presented in Figure 22 below.

During the ESIA the grievances and / or concerns can be communicated through the following details:

Contact person at MAWLR (at regional level)

Ms. Betty Muyatwa (Control Rural Water extension Officer): MAWLR DWSSC – Zambezi Region

Email: betty.muyatwa@mawf.gov.na

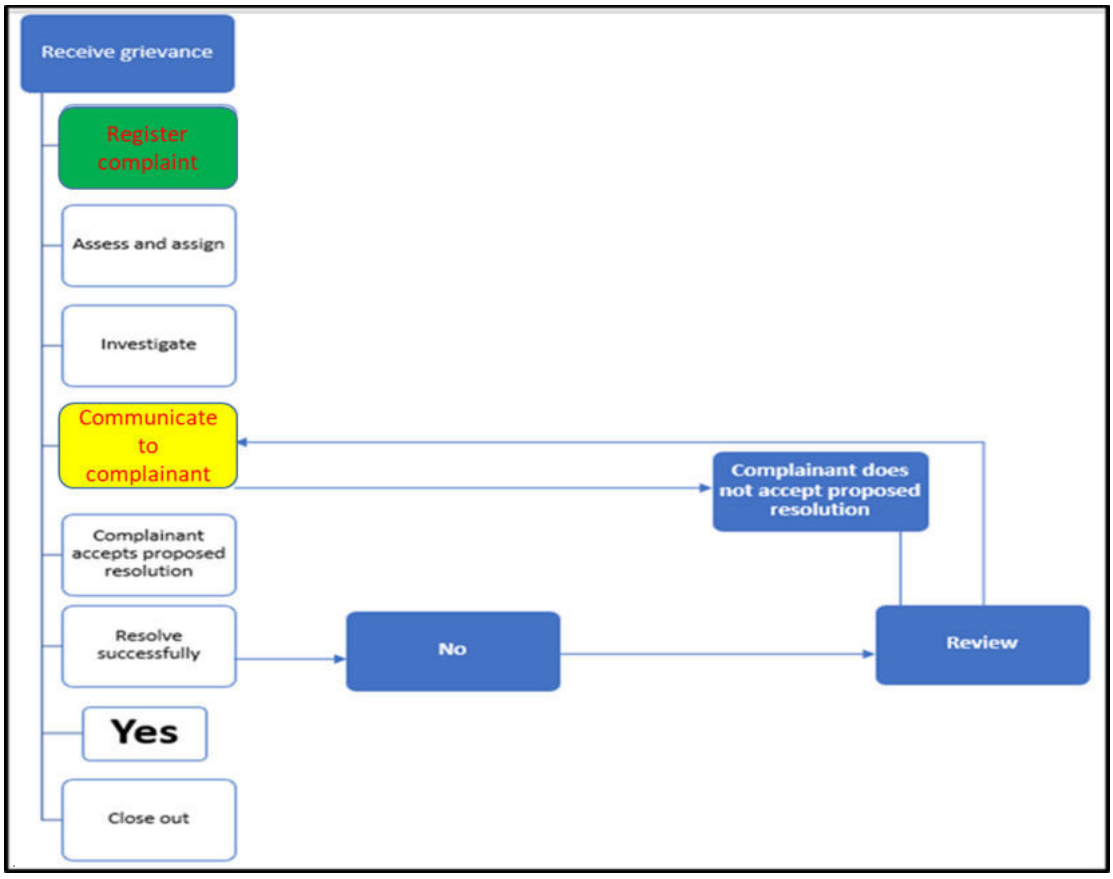


Figure 22: Grievance redressal mechanism process flow (source: Outrun Consultants, 2022)

13.4.5. Estimated overall annual ESMP implementation budget.

An estimated overall annual budget for the implementation of all environmental and social measures is provided in **Error! Reference source not found.** below (considering the project type and distance from Windhoek to Zambezi Region). These costs include training and awareness programs to the responsible for

ESMP implementation monitoring by the executing agency, outreach programs to the communities for sensitization on the environmental and social issues in the ESMP. The actual costs for implementing specific corrective and mitigation measures are provided in different sections of the ESMP (Table 20, 21 and 22). These shall be costed by contractors as they will have better, and detailed costing information based on the technology and methods going to be used to implement the measures. This should be included in the bidding documents clearly written costs for implementing corrective measures in the project ESMP (thus, the ESMP should be made available to the interested bidders). The executing entity (Ministry of Agriculture, NamWater) should check for this at bidding and will be responsible for enforcing. This should be used as one criterion to select appropriate construction bids.

Table 29: Estimated overall ESMP implementation annual budget for the Project.

Impact / activity	**Estimated Cost (NAD)**
SEA / GBV / HIV AIDS awareness training and awareness campaigns	
Development of training and awareness materials master copies	150,000.00
Environmental and Social Compliance Officer	180,000.00
Facilitation	45,000.00
Road shows	50,000.00
Total annual cost	***425,000.00***

14. CONCLUSIONS

The ESMP has been developed to manage and mitigate the potential adverse (negative impacts) associated with the proposed upgrading of water supply infrastructures in the Zambezi Region under Katima Mulilo-Ngoma Phase 3 & 4 as well as Reservoir Rural Water Supply Scheme.

These impacts ranges from impact on land use change (aesthetic value) impact, physical soil disturbance, fauna and flora (biodiversity), water resources (abstraction and pollution), environmental health (pollution/littering), culture, heritage and archaeological, occupational and community health and safety risks/hazards, property displacement, air quality and vehicular traffic safety, as well as climate change.

As described in the Scoping report, these impacts will be site-specific and would be minimized by effectively implementing appropriate management and mitigation measures complemented by monitoring. Therefore, this ESMP should be used as an on-site tool during all phases of the project, namely preconstruction (planning & design), construction, and operation and decommissioning. MAWLR and their Contractor(s) has the overall responsibility for ESMP implementation, to continuously monitor and audit all activities during the construction and operational activities of the project. This will be done to ensure that the ESMP is fully implemented and comply with the national regulations and AfDB safeguards requirements.

Therefore, D&P Environmental Consultants concludes that the proposed project can be granted an ECC, on condition that:

- All the management and mitigation measures provided in the ESMP are effectively and progressively implemented.
- All required permits, licenses and approvals for the proposed activities should be obtained as required. These include permits and licenses for land use agreements (consents), services provision agreements (water and power provision) are obtained to ensure compliance with these specific legal requirements.
- Transparency in communication and continued engagement with stakeholders and communities and or through their leaders (such as the traditional authorities) should be maintained before project implementation and throughout the project cycle.
- The Grievances brought to the Contractors and MAWLR directly during project implementation should be resolved/addressed amicably to the satisfaction of the communities, and or other stakeholders.
- MAWLR, their project workers or contractors (and subcontractors) comply with the legal requirements governing their project and its associated activities and ensure that project permits and or approvals required to undertake specific site activities are obtained and renewed as stipulated by the issuing authorities.
- Project site area particularly where trenching (excavations) are done should be backfilled (stockpiled topsoil levelled), and rehabilitated, as far as practicable.
- The ESMP implementation onsite should be checked and done by the responsible team member onsite (Environmental Control Officer), and audited by an Independent Environmental Consultant on a bi-Annual basis to compile Environmental Monitoring (Audit) Reports. These reports are to be submitted to the Environmental Commissioner.

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16. ESMP-APPENDICES

APPENDIX 1: REHABILITATION PROCEDURES BY REVEGETATION

Aspect of Rehabilitation	Rehabilitation Procedure
Land preparation	The target area should be prepared as follows: -Prior to rehabilitation of the site, all remnants of foreign debris / liter should be removed from the site. Compacted soil should be ripped toa depth of more than 250 mm to allow easy root establishment. -The final prepared surface should not be smooth but furrowed to follow the natural contours of the land. -All target areas must be covered with topsoil. Topsoil should be manually spread evenly over the surface. Topsoil must be spread tothe original depth and deeper where sufficient topsoil is available. -Sites where concrete slabs are to be thrown must first have 20cm ofthe topsoil removed for later use in the rehabilitation programme. -All the target should be mulched. The vegetation stripped and stockpiled during site preparation must be spread in a single layer across the target areas as mulch. -All revegetation target areas should be treated with nitrogen-fixing bacteria which is important for legumes, *Trichoderma* sp. and mycorrhizal products as a natural form of soil remediation.
Plant preparation	Plants should undergo a period of 'hardening-off' during which they have been exposed to full, direct sunlight and been under a reduced watering regime. The individual plants destined for each target site should be groupedinto site-specific, marked containers, before they leave the nursery. Each plant should be labelled with an aluminum label, giving species code, and a specific numeral identifying the site. Before planting commences, the equipment necessary for the proper handling and placing of all required materials must be on hand, in good condition and to acceptable approved standards. -Planting should preferably be done during the rainy season (summer). -Excavate square holes of approximately 800 mm x 800 mm x 800 mm for trees and approximately 500 mm x 500 mm x 500 mm for shrubs. -Backfill planting holes with excavated material/approved topsoil, thoroughly mixed with weed-free manure or compost (per volume, approximately one quarter of the plant hole), one cup of 2:3:2 fertiliser and an approved ant and termite poison (if required). -As much of the soil from container plants as possible must be retained around the roots of the plant during planting. -The soil must cover all the roots and be gently pressed down to a level equal to that of the surrounding in situ material. -After planting, each plant must be well watered and additional soil should be added once the soil has settled, if necessary. -Mulch must be added to the surface area of the topsoil in order to sustain soil moisture. -Stake all trees using at least three (3) weather resistant wooden or steel stakes anchored firmly into the ground. Two (2) of the three (3) stakes should be located on the windward side of the plant. Galvanised wire binding, 3 mm thick, covered with a 20 mm diameter plastic hosepipe must be tied tightly to the stakes, half- to two thirds the height of the tree above the

Aspect of Rehabilitation	Rehabilitation Procedure
	ground and looped around the trunk of the tree. -Place stakes at least 500 mm apart and away from the stem and roots of the tree, so as not to damage the tree or its roots. -Thoroughly water plants as required until the plants are able to survive independently, i.e. until they are able to survive when receiving water from rainfall only. -A raised circular 200 mm high subsoil berm placed 500 mm (shrubs) to 750 mm (trees) from the plant stem must be provided for the watering. Do not simply leave the excavated plant hole partially backfilled for this purpose, the berm must be raised above the natural soil level. -Water aloes and bulbs once directly after transplanting to settle the soil. -Remove stakes and wire binds over time as required, as plants become established.
Grassing using sods	"Sodding" is defined as the laying of grass sods. -Sodding may be done at any time of the year. -The soil should be uniformly wet to a depth of at least 150 mm beforegrass sods are planted. -Protect sods against drying out by keeping them moist from the timeof harvesting until final placement. -Rake or spike the area to create a loose surface to a depth ofapproximately 100 mm. -Lay two (2) rows of sods in a straight line or following a contour,starting at the bottom of a slope (if not flat), where possible. -Place the next two (2) rows of sods in the same direction, 5 m away,until the full area is covered with rows of sods. -Tightly push sods together, taking care not to stretch or overlap sods. -Where a good fit cannot be obtained, the intervening spaces shouldbe filled with parts of sods or topsoil. -After planting, water sods to prevent drying out. -Irrigate as required until the grass is able to survive independently, i.e. until it is able to survive when receiving water from rainfall only.
Grassing using runners	-Plant grass runners evenly by hand or by mechanical means at a rate of at least 400 runners per hectare (i.e. at 250 mm centres). -Only use fresh runners, avoiding grass runners which have dried out. -Rake or spike the area to create a loose surface to a depth of approximately 100 mm. -The soil should be uniformly wet to a depth of at least 150 mm before planting of grass runners. -After planting, the runners must be given copious amounts of water and, when sufficiently dry, must be rolled with a light agricultural roller and re-watered. -Irrigate as required until the grass is able to survive independently, i.e. until it is able to survive when receiving water from rainfall only.
Grassing using seeds	-All seed should be collected from the site during vegetation clearing or from the neighbouring veld. -Seeding must be done during the summer months, when the germination rate is better. -Seeds must be sown at the rate of 0,5kg per 100m2 (50kg per hectare). -The soil should be loose and uniformly wet to a depth of at least 30 cm, before any seeding commences. -Halve the seed and fertiliser mixture as specified and apply evenly in two (2) successive

Aspect of Rehabilitation	Rehabilitation Procedure
	applications perpendicular to each other. -The seeded area must be raked over after seed application and well watered. -Irrigate as required until the grass is able to survive independently, i.e. until it is able to survive when receiving water from rainfall only.
Maintenance	-Cordon-off areas which are under rehabilitation as temporary no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced-off to prevent vehicular, pedestrian and livestock access. -Re-vegetation of the ridges must be the same as the vegetation type which previously existed. -Water all transplanted, planted and grassed areas as specified. -Watering must commence and continue immediately after the seeds have germinated and growth begins. -Mow lawns regularly to a height of 50 mm above ground level. This promotes adequate coverage. Mowing of veld grass is to take place once a year after the grass has shed its seed and not before the grass has fully grown - fire breaks are important. -Check all plants for pests and diseases on a regular basis and treat the plants, when required, using approved methods and products as per the manufacturers' specifications. Control weeds by means of extraction, cutting or other approved methods. -In planted areas which have failed to establish, replace plants with the same species as originally specified. The same species must be used unless otherwise specified by the ECO. -A minimum grass cover of approximately 80% is required. Individual plants must be strong and healthy growers by the end of the maintenance period. -Acceptable cover, in the case of sodding, is attaining 100% cover by the specified vegetation.

APPENDIX 2: GRIEVANCE REDRESSAL FORM

GRIEVANCE REGISTRATION FORM

CONSTUCTION AND OPERATIONAL PHASES: THE KATIMA-NGOMA PHASE 3-4 AND THE RESERVOIR RURAL WATER SUPPLY SCHEMES IN THE ZAMBEZI REGION

PLEASE COMPLETE THIS FORM IN DETAIL AND RETURN TO ANY OF THE FOLLOWING INSTITUTIONS EASILY ACCESSIBLE: **MAWLR Office (during construction and operational phase) and Contractor (Construction Foreman onsite / Site Foreman during construction).**

Date: …… Name & Surname of Complainant: ……

Postal / Residential Address: ……Email address (if any): ……..……

Town / Village: ……..…… Phone Number: ……..

Subject of grievance: ……

Grievance Description: ……

……

Date of receipt / acknowledge: ……Complainant Reference Number: ……..

Expected time of redressal: .....……

If time not met:

Reason for delay of redressal……

Action to be taken: ……

Updated time of redressal: ……..

Final redressal: ……

Type of Action taken……

If Complainant is not satisfied advise on pathway to pursue the matter

SIGNATURE (s):

Complainant: ……..Grievance Committee Chairperson: ……

Date: …… Date: ……

APPENDIX 3: CONTACT DETAILS FOR EMERGENCY SERVICES

Emergency	Response Plan	Contact details
Fire outbreaks	Katima Mulilo Fire Station (Brigade)	+264 66 253 236
Chemical Exposure	Katima Mulilo District Hospital	+264 66 253 012
	Katima Mulilo Ambulance Services	+264 66 253 012
Injuries, loss of life,theft or robbery	Namibian Police (NamPol) – Katima Mulilo	+264 66 101 11
	Katima Mulilo Ambulance Services	+264 66 253 012
Electricity	Katima Mulilo	+264 66 253 117
Water and Sewerage	Katima Mulilo	+264 66 253 164

17. ESIA-APPENDICES

APPENDIX A: FLORA AND FAUNA ASSESSMENT REPORT.

APPENDIX B: ARCHAEOLOGICAL & HERITAGE IMPACT ASSESSMENT REPORT.

APPENDIX C: LIST OF STAKEHOLDERS / INTERESTED AND AFFECTED PARTIES (I&APS).

APPENDIX D: NEWSPAPER NOTICES TO I&APS.

APPENDIX E: STAKEHOLDER AND PUBLIC CONSULTATION MEETING MINUTES AND ATTENDANCE REGISTER.

APPENDIX F: ZAMBEZI REGIONAL COUNCIL CONSULTATION/ENGAGEMENT LETTER.

APPENDIX G: CV'S OF RESPONSIBLE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP).

17.1.1. APPENDIX A: FLORA AND FAUNA ASSESSMENT REPORT

17.1.2. APPENDIX B: ARCHAEOLOGICAL & HERITAGE IMPACT ASSESSMENT REPORT.

17.1.3. APPENDIX C: LIST OF STAKEHOLDERS / INTERESTED AND AFFECTED PARTIES (I&APS).

ESIA Study: **Katima-Ngoma Phase 3 & 4 and Reservoir Rural Water Supply Schemes**

List of I&APs

No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Evidence T. Kasinganeti	D&P Engineers and Environmental Consultants (DPE Consultants): Lead Environmental Assessment Practitioner	+264 81 3634 904	info@dpe.com.na
	Ndjaleka Longeni	DPE Consultants	+264 81 2998 444	info@dpe.com.na
	Kristian Shiwayu	DPE Consultants	+264 81 3959 104	info@dpe.com.na
	Adiel Mudzanapabwe	DPE Consultants	+264 81 3468 492	info@dpe.com.na
	Roland Mushi	DPE Consultants	+26485 333 2373	rolandmushi@gmail.com
	Charles Zambine	MAWLR/DWSSC	+26481 295 5014	zambinecharlesndama@gmail.com
	Simwanga Lucky	MAWLR/NWSSP	+26481 4521 628	
	Marry Ntema	MAWLR		

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Misikila Charles	Council Member	+26481 3492 695	
	Kamwi Sinvula	Constituency Office	+26481 2808 045	Zankonda@gmail.com
	Nchindo Charles	Constituency Office	+26481 6669 983	Nchindocharles@yayoo.com
	Munali Pedro	Constituency Office	+26481 405 1569	munalipedro@gmail.com
	Sitwala Chizabulyo	Z.R.C Katima Rural Constituency		
	Hileni Stephanus	Zambezi Regional Council	+264 81 1578 447	nakakale@gmail.com
	Victor Slinger	MAWLR / DWSSC / NWSSP: Technical Advisor	+264811400086	slingervictor@gmail.com
	Martha L. Hangula	MAWLR: Technical Assistant - Namibia Water Sector Support Program	+264814824850	Martha.Hangula@mawlr.gov.na hangulamarthal123@gmail.com
	L. Muhimba	NamWater: Project Manager		

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Oscar Liswaniso	Kabbe	+26481 347 3369	
	Clement Mwala	Sill Imduma	+26481 141 2282	
	Bernard Sisamu	Councillor	+26481 6935 992	sisamubernard@gmail.com
	L.L Muhanze	Kabbe	+26481 355 7755	
	H.Lyoka	Mundaniko	+26481 4058 494	
	J.Sibenga	Kabbe		
	Meititi Fidelis	Limbeza	+26481 6310 252	
	Muyobz Brendan	Limbeza	+26481 5620 804	
	Liswanzi OM	Limbeza	+26481 2876 858	

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Mazambani M	Kabbe		
	Masama A.M	Kabbe	+26481 6854 359	
	Munilweje Muukwa	Kabbe	+26481 6983 327	
	Mahout Hilda	Kabbe	+26481 8541 370	
	Siseho Imomge	Mudaniko	+26481 6440 755	
	Matau Christian	Kabbe	+26481 0455 333	
	Simasiku Namasiku	Kabbe	+26481 6380 462	
	Simatara Kachana	Kabbe	+26481 6732 350	
	Joseph Sakata	Kabbe	+26481 2340 333	

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Lubanda Judith	Kabbe	+26481 67560 196	
	Mazambani Elizabeth	Kabbe	+26481 4112 363	
	Silimwe Julia	New look	+26481 7628 658	
	Sishekano Agathar	Musumpauko		
	Kayla Rosalia	Limbeza	+26481 6528 350	
	Veronica Matali	Limbeza		
	Matili	Limbeza	+26481 6277 588	
	Muhau Simata	Lianyi	+26481 2233 090	
	Chuma Simada	Lianyi	+26481 7722 435	

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Milner Simata	Lianyi		
	John Lutaka	Linyandelo	+26481 2585 056	jlutaka13@gmail.com
	Col Matewgu	Muudaninko	+26481 3013 234	
	Muwanei Muchokwe	Kasheshe	+26481 7288 670	
	Mukunga Sifefezi	Kasheshe	+26481 2024 265	
	Ivan Sill	Kasikizi	+26481 5878 280	
	Bernard Namayonga	Mudaniko	+2681 3545 346	
	Simasiku Sililo	Kasikili	+26481 4368 230	
	Nyambe Richard	Lianyi	+26481 2798 259	

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Alfred Ilukena	Munsumpauko	+26481 1221 513	
	Bernard Namayonga	Mudaniko Village	+26481 3545 356	
	Simasiku Silolo	Kasikili Village	+26481 4368 230	
	Nyambe Richard	Lianyi Village	+26481 2798 259	
	Alfred Ilukena	Lianyi Village	+26481 1221 513	matenguilekeuna@gmail.com
	Sotwala Mapenzi	Mapenzi Village	+26481 7639 234	Smapenzi1954@gmail.com
	John Mezambais	Kabula Village	+26481 2012 806	
	Imakando Richard		+26481 8185 613	
	Muuge Jeremia	Kweneni Village	+26481 3728 329	

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Sanzila Bornijace	Mudaniko Village	+26481 6799 023	
	Robbison Litaka	Linyamdelo Village	+26481 6410 931	
	Gabriel lutaka	Mutoya Village		
	Matengu Thaddeus	Mudaniko Village	+26481 2336 941	
	Ntonda Sylvester	Libuyu Village	+26481 6846 899	
	Samba Albert	Kahunikwa Village	+26481 2110253	
	Sylverster.S.M	Mudaruko Village	+26481 4520162	
	Rosemary N.Nyambe	Ntonda Village	+26481 2128 970	
	Beatrice I. Ntonda	Ntonda Village	+26481 8937 277	
	Theresa K. Kabende	Kabende Village	+26481 2589 864	
	Anna K.Ntonda	Ntonda Village	+26481 302292	

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Regina N.Lishomwa	Lishomwa Village	+26481 3433 907	
	Sinvula Sankasi	Ngoma Village	+26481 6854 361	
	Mukwa L.W	Ngoma Village	+26481 3654 686	
	Sililo Hendricks	Ngoma Village	+26481 4352 006	
	Mwampole Fritz	Ngoma Village	+26481 2264 714	
	Selilo Harris	Sabelo Village	+26481 7786 022	
	Ismeal Mwanfala	Mubha Gardens Village	+26481 2814 124	
	Gladstone Mutwa	Ngoma Village	+26485 7603 087	
	Mwangala Rapheal	Libuta Village	+26481 8527 138	
	Boniface Siwilo	Sabelo Village	+26481 2915 449	
	Jerome Mwampole	Ngoma Village	+26481 2365 201	Jerome60mwampole@gmail.com

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Mwilima Juddy	Ngoma Village	+26481 2076 667	Juddymwilima@gmail.com
	Sge Mukaya	Ngoma Village	+26481 6847 140	Albertmukaya@gmail.com
	Sitali Gaald	Ngoma Village	+26481 4235 602	
	Lawrence Muyunda	Kandiana Village	+26481 3691 773	
	Annastancia Nigati	Kandiana Village	+26481 3255 438	
	Kamaya Lehie	Ibeza Village	+26481 7415 036	
	Masule Annastancia	Kazizila Village	+26481 8118 224	
	Mapate Theresia	Kandiana Village	+26481 2998 627	
	Mulemwa Mwale	Ibbeza Village	+26481 4741 218	M_mushabati@jayoo.co.uk
	Nchindo Charles	Constituency office	+26481 6669 983	
	Fidelis Likando	Lifelo Village	+26481 2873 736	

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Walter Machiwana	Boma Village	+26581 6844 788	rettaw1940@gmail.com
	Kamwi Sitali	Boma Village	+26481 7895681	starteetity@gmail.com
	Douewad Wessner	Bona Village	+26481 3252 455	weywes@afol.com.na
	Sima siku lesly.S	Lizauli Village, Luses	+26481 707 7488	
	Muliwa Albertina	Makama Village, Lusese	+26481 6146 780	
	Lupito Mariam.S	Lupilakanyambe Village, Lusese	+26481 2767 259	
	Mujiwa Mbile	Makama village	+26481 5931 071	
	Mwajanseyo Sikambwa	Lupikakanyambe Village	+26481 4559 722	
	Kachana Sikambwa	Savana Village	+26481 447 1076	
	Munapo Mavis	Nfune Village	+26481 2937 010	
	Wakibita Julia	Nfune Village	+26481 5534 779	

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Sileze Mwandu	Kasikili Village	+26481 6946 306	sonnetysilezee@gmail.com
	Mbeha Josephine	Mazanga Village		
	Simatara Josephine	Kazauli Village	+26481 3080 180	
	Sikambwe Regina	Malinina Village	+26481 8757 131	
	Inonge Mulako	Nfune Village	+26481 2525 953	
	Musohwa Masule	Nfune Village	+26481 2525 170	
	Lubunda	Lesapola	+26481 6610 531	
	Simasiku Sylwenus	Ilombe	+26481 2715 230	
	James Masule Wolubita	Silver Forest	+26481 7984 434	wolubita.jamesmasule@gmail.com
	Nchindo Walubita	Nfune Village	+26481 6124 937	gftwalubita@yahoo.com

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Siseho Martha	Kangole Village	+26481 2207 844	msiseho.kaugole”gmail.com
	Jennifer Munikasu	Muyako Village		
	Lulu Lucuana	Muyako Village		
	Miyaze Kachele	Muyako Village		
	Rosina Masikili	Muyako Village		
	Kasekela Ronnely	Muyako Village	+26481 2033 316	
	Musweu Peggy	Muyako Village		
	Sinvula Beritlur	Muyako Village	+26481 2033 316	
	Munali Iimani	Muyako Village		
	Sitali Noreen	Muyako Village	+26481 6681 811	

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Leonard Mahunga	Muyako Village	+26481 1464 020	
	Kamwi John	Muyako Village	+26481 2567 239	
	Kameya		+26481 8264 717	
	Mahostri Thaddius	Muyako Village	+26481 3254 488	
	Christopher.K.Minikasu	Muyako Village	+26481 4501 240	Cmunikasu”gmail.com
	Sabberia Nalukui	Muyako Village	+26481 4641 529	
	Martin Kasakonya	Muyako Village	+26481 3026 505	m61kasa@gmail.com
	Thabo Patrich	Muyako Village	+26481 3072 245	
	Simwanza Christopher	Muyako Village	+26481 2365 839	
	John Matengu	Muyako Village	+26481 2365 839	
	Edion Mweti	Muyako Village	+26481 1248 196	Mweties@iway.na

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Lyonya Ronald	Muyako Village	+26481 3287 578	
	Meku David	Muyako Village	+26481 8812 613	
	Kasekele Njuse	Muyako Village	+26481 7047 918	
	Jakobor.S	Muyako Village	+26481 3267 578	
	Sitakamwale	Muyako Village	+26481 7608 437	
	Elisha Lyonga	Muyako Village	+26481 5597 968	
	Regina Joba	Muyako Village		
	Elizabeth Wili	Muyako Village		
	Liswani Namasiku	Muyako Village	26481 6802 744	
	Simataa Kachana	Muyako Village	+26481 8613 797	
	Sinvula Edinah M	Muyako Village	+26481 2615 455	

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No	Name and Surname	Institution / Location & Position (if known)	Telephone Number	Email Address
	Sinvula Ruth N	Muyako Village	+26481 3956 193	
	Simwanza Kachana	Muyako Village	+26481 7387 622	
	Sitali Namasiku	Muyako Village		
	Kabila Bornwela	Muyako Village		
	Shali munalvia	Muyako Village	+26481 2525 842	
	Kamwi Annety	Muyako Village	+26481 3342 882	
	Martin Kasokonya	Muyako Village	+26481 3026 505	
	Museta Mutelo	Muyako Village	+26481 7990 999	
	Nyoka Rosemary	Muyako Village	+26481 7894 006	

17.1.4. APPENDIX D: NEWSPAPER NOTICES TO I&APS.

17.1.5. APPENDIX E: STAKEHOLDER AND PUBLIC CONSULTATION MEETING MINUTES AND ATTENDANCE REGISTER.

17.1.6. APPENDIX F: ZAMBEZI REGIONAL COUNCIL CONSULTATION/ ENGAGEMENT LETTER.

17.1.7. APPENDIX G: CV'S OF RESPONSIBLE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EA)