GOVERNMENT OF
THE KINGDOM OF LESOTHO
MINISTRY OF WATER

Arab Bank for Development in Africa

Saudi Fund for Development

OPEC Fund for International Development

Abu Dhabi Fund for Development

Kuwait Fund for Arab Economic

African Development Bank Group

LESOTHO LOWLANDS WATER DEVELOPMENT PROJECT III

Environment and Social Impact Assessment
-ESIA 2022 Updated Report

October 2025

QUALITY CONTROL

Project Name	Design, Design Review, Construction Monitoring and Supervision for Lesotho Lowlands Water Development Project Phase III **(LLWDP III)**
Document Title	**Environment and Social Impact Assessment -ESIA 2022 Review Report**
Issue Date	**April 2025**
Author	AL-ABDULHADI ENGINEERING CONSULTANCY / MAFUBE Ltd. JV
Reference N°	

Versio	Date	Written by:	Verified by:	Approved by:
V01	19/12/2024	Team AEC JV Mafube	Eng. Oussama Arfaoui	Eng. Jean Bosco Bavakure
V02	30/01/2025	Team AEC JV Mafube	Eng. Oussama Arfaoui	Eng. Jean Bosco Bavakure
V03	25/04/2025	Team AEC JV Mafube	Eng. Oussama Arfaoui	Eng. Jean Bosco Bavakure

FORWARD

Delivered To	**Attention of**	**Email address**	**Number of printed copies**
Project Manager-LLWDP III	**Mrs Matseliso Makhaola**	makhaola.matseliso@gmail.com	1
Project Engineer-LLWDP III	**Mr. Fobokoane Mota**	motaf@llwdp3.org.ls	1

Table of Contents

List of Tables

List of Figures

LIST OF ACRONYMS AND ABBREVIATIONS

AIDS	Acquired Immuno-deficiency Syndrome.
BCC	Behaviour Change Communication
BP	Bank Procedures
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CLO	Community Liaison Officer
CoW	Commissioner of Water
DoC	Department of Culture
DoE	Department of Environment
DRWS	Department of Water Affairs & Rural Water Supply
EA	Environmental Assessment
EC	Ecological Condition
ECO	Environmental Control Officer
EFR	Environmental Flow Requirement
EHS	Environmental Health and Safety
EHSG	Environmental, Health and Safety Guidelines
EM	Environmental Manager
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
FIs	Financial Intermediaries
GBV	Gender Based Violence
GIIP	Good International Industry Practice
GoL	Government of Lesotho
HIV	Human Immuno-deficiency Virus
IA	Iron Age
IBA	Important Bird Area
IBP	International Best Practice

IBT	Inter-Basin Transfers
IDA	International Development Association
IEC	Independent Electoral Commission
IFC	International Finance Corporation
IFR	In stream Flow Requirement
Kg	kilogram
kV	kiloVolt
LEC	Lesotho Electricity Company
LHDA	Lesotho Highlands Water Development Authority
LLWC	Lesotho Lowlands Water Commission
LHWP	Lesotho Highlands Water Project
LLBWSS	Lesotho Lowlands Bulk Water Supply Scheme
LSA	Late Stone Age
LWSIPP	Lesotho Water Sector Improvement Project Phase II
LRWSP	Lesotho Rural Water and Sanitation Policy
MAMSL	metres above mean sea level
MAR	Mean Annual Runoff
MAP	Mean Annual Precipitation
MCM	Million cubic metres
MDGs	Millennium Development Goals
Mg	Milligram
Ml	Mega litres
MSA	Middle Stone Age
MTEC	Ministry of Tourism, Environment and Culture
NGOs	Non-Governmental Organisations
NPOs	Non-Profit Organisations
NSDP	National Strategic Development Plan
OP	Operational Policy
ORASECOM	Orange-Senqu Commission PAH Poly-aromatic Hydrocarbons
PAPs	Project Affected Parties
PES	Present Ecological State

PPE	Personal Protective Equipment
PR	Proportional Representation
RAP	Resettlement Action Plan
SABAP	Bird distribution data of the Southern African Bird Atlas Project (SABAP –1)
SADC	Southern African Development Community
SAIEA	Southern African Institute for Environmental Assessment
SDGs	Sustainable Development Goals
SEP	Stakeholder Engagement Plan
SIA	Social Impact Assessment
STDs	Sexually Transmitted Diseases
TB	Tuberculosis
ToR	Terms of Reference
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WASCO	Water and Sewage Authority
WHO	World Health Organisation
WSS	Water and Sanitation Services
WTW	Water Treatment Works

DEFINITION OF TERMS

Resettlement Action Plan - document in which a project sponsor or the 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.

Alternative – A possible course of action, in place of another, that would meet the same purpose and need (of the proposal). Alternatives can refer to any of the following but are not limited to: alternatives sites for development, alternative site layout, alternative designs, alternative processes and alternative materials.

Assessment – The process of collecting, organising, analysing, interpreting and communicating data relevant to some decision.

Audit – A verification process that is used to obtain information regarding the implementation of the ESMP by the Contractor. It is an objective tool used to make improvements at the workplace.

Berm – A barrier that is designed to divert surface water flow.

Biodiversity - The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity species, between species, and of ecosystems.

Bund – An impervious containment system for potential spillages from tanks/containers stored on site. The bunded area shall have a capacity greater than 110% of the total volume contained. the bunding shall be constructed of a material impermeable and resistant to the stored material.

Critically Endangered - A taxon is Critically Endangered (CR) when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by IUCN criteria (www.iucnredlist.org).

Construction – Means erection or establishment of an infrastructure through activities that include but are not limited to: excavation, masonry works, concrete batching, civil works, electromechanical works.

Contractor – Main Organisation appointed by the developer, to undertake the construction activities.

Consultation - Consultation refers to a two-way communication between the consultants, Project proponent and the affected communities.

Ecosystem Services - Defined as the benefits that people obtain from nature. These are typically divided into four categories.

- Provisioning services are the goods or products obtained from ecosystems, such as food, timber, medicines, fibre, and freshwater.
- Regulating services are the benefits obtained from an ecosystem's control of natural processes, such as climate, disease, erosion, water flows, and pollination, as well as protection from natural hazards.

- Cultural services are the nonmaterial benefits obtained from ecosystems, such as recreation, spiritual values, and aesthetic enjoyment.
- Supporting services are the natural processes that maintain the other ecosystem services, such as nutrient cycling and primary production.

Endangered - A taxon is Endangered (EN) when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by the IUCN criteria (www.iucnredlist.org) or provisionally assessed by an expert group.

Endemic - A species that has ≥ 95 % of its global range inside the country or region of analysis (IFC PS6 GN79).

Environment – Surroundings in which organisms operate, including air, water, land, natural resources, flora, fauna, humans and their interrelations. The environment is made up of: the soil, water and atmosphere.

Environmental Control Officer – Representative of the Contractor, responsible for day-today implementation of the ESMP.

Environmental Feature – Sensitive ecological feature within the Project Site, like wetland areas and remaining natural forest and riparian habitat.

Environmental Impact – The effect of an activity on the environment, whether desirable or undesirable. Undesirable or negative environmental impacts will result in damage and/or pollution or detriment to the environment, or danger to the public, whether immediate or delayed.

Environment and Social Management Plan – The ESMP for the project sets out general instructions that will be included in a contract document for the construction phase of the project. The ESMP will ensure the construction activities are conducted and managed in an environmentally sound and responsible manner. The ESMP also details the organisational structure required to ensure the effective implementation of the ESMP and measures to monitor and improve the application of the ESMP.

Environmental Specifications – Instructions and guidelines for specific construction activities designed to help prevent, reduce and/or control potential environmental implications of these construction activities.

Excavation – Involves removal of soil or rock from site to form an open face, hole or cavity using tools, machinery or explosives.

Footprint – Refers to the surface area of land directly affected by a proposed development or activity. Directly related to the physical extent and size of the development or activity.

General Waste – Domestic and non-hazardous waste as well as builder's rubble e.g. paper, plastics, food, cans, etc.

Ground-truth – to check the design on the site and make sure the design interacts with site sensitivities on the ground, as intended in the design.

Habitat - The environmental or ecological area in which an animal, plant species or other organism lives.

Hazardous Waste – Any organic or inorganic element or compound that because of its toxicological, physical, chemical or persisting properties, may exercise detrimental acute or chronic impacts on human health or development.

Hazardous Substance – Any substance that is of risk to health and safety, property or environment. Hazardous substances typically include, but are not limited to:

- Human excrement, fuel, lubricating oils, hydraulic and brake fluid, acids, paints, anticorrosive, insecticides, pesticides, detergents, cement, etc.; and
- By-products and wastes associated with the use of hazardous substances as well as potentially hazardous items such as spent batteries, old oil filters, light bulbs, circuit boards, sharp objects etc. which requires special collection and handling.

Heritage Sites and Artefacts – Defined as any object or site of cultural, historical, archaeological or paleontological significance found in or on the land.

IBA (Important Bird Biodiversity Area) - According to Birdlife International these areas are:

- Places of international significance for the conservation of birds and other biodiversity
- Recognised world-wide as practical tools for conservation.
- Distinct areas amenable to practical conservation action
- Identified using robust, standardised criteria.

These are sites that together form part of a wider integrated approach to the conservation and sustainable use of the natural environment.

Invasive Alien Species (vegetation) - Species are identified as invasive aliens when (i) they are non-native to an ecosystem, and (ii) their introduction is liable to cause environmental harm, or harm to human health and livelihoods, because they spread rapidly and have negative effects on native species through competition, predation, or disease. Invasive species can be flora, fauna, or other organisms (e.g. microbes) but generally refer to plants.

IUCN Red List - This list has been developed by the International Union for Conservation of Nature (IUCN) and details the global conservation status of a wide range of biological species. The Red List website is http:/www.redlist.org.

Project Area - The area within which most of the project impacts are likely to be expressed.

Land Use – The activities that take place within a given area or space.

Local community - Community within the Project's Area of Influence.

Method Statement – A written submission by the Contractor to the Project Engineer in response to the specifications setting out the plant, materials, labour, timing and method the Contractor proposes using to carry out an activity. The Method Statement shall cover applicable details with regard to:

- Construction procedures;
- Materials and equipment to be used;
- Getting the equipment to and from site;
- How the equipment/material will be moved while on site;
- How and where material will be stored;
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or solid material that may occur;
- Timing and location of activities;

- Compliance/non-compliance with the specifications; and
- Any other information deemed necessary by the Project Engineer.

Mitigation – Measures designed to avoid, reduce or remedy adverse negative impacts.

Modified Habitat - An area that may contain a large proportion of plant and/or animal species of non-native origin, and / or where human activity has substantially modified the primary ecological functions and species composition.

Monitoring – The process which ensures that the environmental requirements stipulated in the ESMP are being complied with and allows for ongoing impacts to be tracked in order to measure the effectiveness of the mitigation. The repetitive and continued observation, measurement and evaluation of environmental data to follow changes over a period of time to assess the efficiency of control measures.

Natural Habitat - An area composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary functions and species composition.

Public – Any individual or group concerned with or affected by the project and its consequences.

Public Participation Process - The public participation process (PPP) is a requirement of Lesotho's EIA guidelines (2009) that requires all Interested and Affected Parties (I&APs), including affected communities, to be consulted during the EIA. This ESIS favours the term Stakeholder Engagement Plan.

Reasonable Measures – Measures that a reasonable (ordinary) person would regard necessary for the specific purpose.

Rehabilitation – The return of a disturbed area, feature or structure to a state that approximates to the state (where possible) that it was before disruption, or to an improved state.

Remediation – Measures implemented to clean-up a polluted environment to a stable state in order to avoid long-term leaching/spread of pollutants or health risks; or repair an altered/disturbed environment to avoid long-term visual scarring, safety risks, erosion and further degradation and secondary impacts.

Sensitive Habitat – A sensitive area or environment can be described as an area or environment where a unique ecosystem, habitat for plant and animal life, wetlands or conservation activity exists or where there is a high potential for ecotourism.

Servitude – A servitude is a right to access which allows a local authority/ proponent to a property for inspection or installation of electricity cables and so on. It is registered against the title deed.

Stakeholder Engagement Process - The stakeholder engagement process is equivalent to the statutory required 'public participation process' referred to in Lesotho's EIA Guidelines (2009) but is used in this report as it infers a wider range of stakeholders; notably the authorities/ international governments who are not considered to be 'public'. Stakeholder engagement is aligned with international good practice terminology and also indicates ongoing, proactive management of stakeholders and their concerns throughout the operational life of the Project. PPP refers only to the process undertaken for the ESIA.

Stakeholder Engagement Plan - The Stakeholder Engagement Plan (SEP) execution plan for ESIA stakeholder engagement activities. The SEP details the method and approach of stakeholder consultation, timeframes, communication mechanisms and tools, as well as monitoring, recording and tracking of stakeholder issues during the ESIA process.

Stockpile – includes any heap, pile and accumulation of any substance where such substance is stored as a product or stored for use at any activity.

Vulnerable - A taxon is Vulnerable (VU) when it is not Critically Endangered (CR) or Endangered (EN) but is facing a high risk of extinction in the wild in the medium-term future, as defined by the IUCN criteria (www.iucnredlist.org).

Workforce – people employed by the proponent or the contractor, persons involved with project activities including permanent, contract, or/and casual labour.

ACKNOWLEDGEMENTS

The Government of Lesotho, through the Ministry of Water would like to acknowledge existing co-financing commitments from the consortium of Arab financiers namely OPEC, Saudi Fund for Development, Abu Dhabi Fund for Development, BADEA and Kuwait Fund for Arab Economic Development. Further acknowledgements are passed to AfDB for availing additional financing to support delivery of water to the distribution networks within all the settlements including the three additional ones as there was a serious unmet water demand.

Further acknowledgements are passed to the communities of Botha Bothe Zone 1 for their diligent cooperation while various studies were undertaken in the area. Compliments are further passed to the Botha Bothe and Leribe district level leaders, Councillors, Chiefs and NGOs. Implementation of this project which will uplift the livelihoods of the communities in the area.

EXECUTIVE SUMMARY

1. Overview of the Project

This document is an updated July 2022 ESIA of the Lesotho Lowlands Water Development and Sanitation Project Phase III (LLWDSP III), following a design review; and expansion of scope under the Lesotho Lowlands Water Development and Sanitation Project Phase III – Additional Financing (LLWDSP III - AF) from the African Development Bank (AfDB) LLWDSP III, after review, will still cover all the initially targeted settlements under : Zone 1 which are: Botha-Bothe Town, Ha Belo (‘Makong) including the Belo Industrial Estate, Ha Seboche, Qholaqhoe, Makhunoane, Khukhune, ‘Muela, Phelandaba, Serutle, Qalo, Ha Majara, Ha Mopeli, Ha Selomo, Ha Rampai, Matlakeng, Pitsi’s Nek, Ha Khabo, Levi’s Nek, Nqechane, and Litlhatsaneng. It also includes the further extended water distribution network works in three newly prioritised settlements not covered in the AfDB’s original funding scope and these are Qalo (Maloseng and Kontsokoaneng); Botha Bothe Industrial (Ha Majara Serutle); and Ha Mopeli (Nqabeni).

The mandate of the LLWDSP III Project is to:

a) Establish the need for water demand for different purposes (domestic, agricultural, institutional, tourism, etc.);
b) Identify and develop potential sources of water.
c) Design large and small infrastructure facilities such as reservoirs, dams, weirs, conveyance systems, sanitation installations to serve the project area, inclusive of construction installations or implementation; and
d) Source funding for those projects from the Government of Lesotho (GoL) and from international funding Agencies.

2. Rationale for ESIA Review

To address the water shortages in the Lowlands, the GoL established the Lesotho Lowlands Water Supply Scheme Unit (LLWSSU) in 2002, under the auspices of the Office of the Commissioner of Water and launched the Lesotho Lowlands Bulk Water Supply Scheme (LLBWSS) in 2004 to address water supply needs in the Lowlands. The LLBWSS’s objective is to address water security challenges and to improve water supplies for domestic, institutional, and industrial use in the Lowlands’ urban, peri-urban, and other demand centres (towns and clusters of villages with populations of 2,500 people and more). The entire LLBWSS aims to benefit a population of 1.1 million, which is projected to increase to 2.0 million by 2040. The GoL, with support from the World Bank (WB), African Development Bank (AfDB) and other development partners, has since embarked on several investment projects in the

Lowlands, including the Metolong Dam Water Supply Programme, Lowlands Rural Water Supply and Sanitation Project (LRWSP) and Lesotho Lowlands Water Development Project Phase II (LLWDP II). The World Bank also financed the Water Sector Improvement Project (WSIP), approved in 2004.

This ESIA review comes as legal requirement as per the Environmental Act 2008, while the project was already issued with a Record of Decision (RoD) permitting the project to start as per the terms contained in it. It is required that the RoD be renewed after every 2 years. Again, the need for project water network extension resulting in scope increase in Qalo (Maloseng and Kontsokoaneng); Botha Bothe Industrial (Ha Majara Serutle); and Ha Mopeli (Nqabeni). These added villages necessitated the review of the ESIA, which included stakeholders and community consultations as well as the assessment of environmental and social aspects that may be affected by the project.

3. Brief description of the project site and the major environmental and social stakes/challenges

The Project is packaged into three lots as follows:

a) Lot 1: Comprises intake works at Hololo River, Raw Water Transmission Line, Water Treatment Works, and High Lifting Pump Station located at the water treatment works;
b) Lot 2: Water Transmission Mains, reservoirs, and pumping stations covering the whole project area.
c) Lot 3: Water distribution networks covering all the settlements within the project area.

These targeted investments will expand service coverage, strengthen resilience, and ensure equitable access to clean water in line with the project's inclusive development objectives. Implementation of works within these settlements will be carried out under Lot 3 mentioned above.

It is envisaged that 4331 people in 2025 and 5388 in 2045 within Qalo (Maloseng) will benefit from construction of distribution networks under the additional funding and a further 12,283 and 15,271 in 2025, 2045 respectively, within Botha Bothe, Industrial, Ha Majara and Serutle will also benefit from the additional funding. While in Ha Mopeli (Nqabeni), 5,316 to 6640 people will benefit from the additional financing bringing the total projected population within the settlements under additional financing to 21,930 and 27,299 in 2025 to 2045 respectively.

4. AfDB' Integrated Safeguards System and Operational Safeguards applicable to the Project and National Legal Framework

4.1. A policy and legal review were conducted and showed that the LLWDSP III will be supported by a host of laws, regulations and institutions that promote a vibrant infrastructure development, whilst protecting the environment and the well-being of the population of Lesotho. All these instruments are guided by the Lesotho Constitution which emphasizes on prudent management of the environment and accords future generations full rights to the environment and benefits thereof. Other GoL's relevant legislation related to environmental issues include: Environmental Act No. 10 of 2008, Mines and Minerals Act No. 4 of 2005, Water Act No. 15 of 2008, Local Government Act (Amended) (Act No. 5 of 2004), Local Administration Act (Act No. 13 of 1969), National Heritage Resources (Act No. 2 of 2012), Roads Act No. 24 of 1969, etc.

The LLWDSP III was also designed and informed by the African Development Bank Group Integrated Safeguards System and Operational Safeguards which emphasises mainstreaming of social, environmental and climate change solutions into Bank funded programmes. The ISS consists mainly of the Environmental and Social Policy for Investment Project Financing (IPF) with ten (10) Operational Safeguards (OS), that it uses to examine potential environmental and social risks and benefits associated with Bank lending operations. This ESMP has been developed in accordance with the requirements of **OS 1 – Environment and Social Assessment** and the other relevant AFBD's ISS-OS which include **OS 2- Labour and Working Conditions, OS 3-Resources Efficiency and Pollution Prevention and Management, OS 4-Community Health, Safety and Security, OS 5- Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement, OS 6- Habitat and Biodiversity Conservation, and Sustainable Management of Living Natural Resources, OS 7- Vulnerable Groups, OS 8- Cultural Heritage** and **OS 10-Stakeholder Engagement and Information Disclosure.**

5. Anticipated Environmental and Social Impacts

The potential associated impacts were analysed and mitigation measures for the identified impacts proposed. The major environmental impacts will include:

- Alteration of the shape of the riverbank
- Increase of sediment in the river causing sand banks
- Loss of fields and grazing land
- Hazardous waste, solid waste and construction waste generation
- Traffic disruptions
- Soil erosion
- Flora and fauna
- Dust emissions
- Management of Employee and community relationships

The major Social Impacts will include:

- Public safety on exposed trenches
- HIV/AIDS awareness
- Gender equity and gender-based violence
- Sexual exploitation and abuse
- Protection of children and the vulnerable
- Impact on cultural heritage resources within the river

The ESMP then establishes a process for addressing all environmental and social issues in the project from preparation, through review and approval, to implementation. The following are a synopsis of mitigation measures to be implemented to address the impacts:

- Rehabilitate disturbed riverbanks
- Construction to occur during low flow months
- Cofferdams to be riprapped to protect walls from flood wash
- Caution be taken in discharging alum residues to soft receiving water
- Compensation of affected property owners
- Suppress dust by wetting frequently
- HIV/AIDS awareness
- Ensure protection of trenches along and within public spaces
- Ensure observation of acceptable drinking water standards limits.
- Supplement low Hololo River flow with water from the existing 'Muela Catchment or arranged LHWP flow releases.
- Enhance or conserve the existing riparian ecosystems.
- Use of chance find process
- Consultation of cultural heritage resources within the project area.

The project will make an important contribution to the constant supply of clean water to many previously disadvantaged Botha Bothe communities. The project should proceed but, in the process of its development, implementers should minimize negative environmental and social impacts to the immediate environment.

Management of Employee and community relationships

The major Social Impacts will include:

- Public safety on exposed trenches
- HIV/AIDS awareness
- Gender equity and gender-based violence
- Sexual exploitation and abuse
- Protection of children and the vulnerable
- Impact on cultural heritage resources within the river
- Poor enforcement of labour standards may emerge if contractors are not monitored.
- Community dissatisfaction due to concerns over the actual or perceived lack of local labour recruitment.
- Cultural issues including inadvertent impact on gravesites.
- Inadvertent damage on utility infrastructure.
- Potential rock blasting risks; cracks to buildings due to vibrations from blasting or compaction of pipelines.

The ESMP then establishes a process for addressing all environmental and social issues in the project from preparation, through review and approval, to implementation. The following are a synopsis of mitigation measures to be implemented to address the impacts:

- Rehabilitate disturbed riverbanks
- Construction to occur during low flow months
- Cofferdams to be riprapped to protect walls from flood wash
- Caution be taken in discharging alum residues to soft receiving water
- Compensation of affected property owners, as per the prepared RAP for compensation of the affected properties.
- Suppress dust by wetting frequently
- HIV/AIDS awareness
- Ensure protection of trenches along and within public spaces
- Ensure observation of acceptable drinking water standards limits.
- Supplement low Hololo River flow with water from the existing ‘Muela Catchment or arranged LHWP flow releases.
- Enhance or conserve the existing riparian ecosystems.

- Use of chance find process
- Development of labour management plan by contractors, which will include protocol for engagement of local labourers. Reporting requirement which will enable monitoring of contractor's labour engagement protocols.
- Contractors to provide schedule of labour requirements and communicate them clearly with the project team and the community authorities.
- Protocol for impacts on and management of gravesites within the project corridor should be discussed and agreed with the community and directly affected persons.
- Services search and identification to be done prior to construction works to avoid damage to existing services infrastructure.
- Contractor to develop a pre-blast and pre works house survey, dilapidation survey protocols with communities. This will include criteria for establishing impact zone and extend.
- Consultation of cultural heritage resources within the project area.

The project will make an important contribution to the constant supply of clean water to many previously disadvantaged Botha Bothe communities. The project should proceed but, in the process of its development, implementers should minimize negative environmental and social impacts to the immediate environment.

6. Stakeholder Engagement

The Environmental and social assessment process included the establishment of a stakeholder consultation process for the project. The process is in line with the Environmental act 2008 and the AFDB's ISS, in particular OS 10, that involves identifying the concerned/affected stakeholders, soliciting their views, and continuously checking if their views are being considered as the project implementation progresses.

The ESIA emphasises the need for continuous consultations with stakeholders throughout the project cycle to achieve successful implementation and monitoring. The Project Implementation Unit (PIU) will have the responsibility to effectively engage stakeholders in achieving the project objectives. The Consultants and Contractors will also be obligated to follow and adhere to the project requirements on stakeholder engagement and consultations.

Stakeholders within the project area were consulted and their views were recorded. These include community leadership (District Administrators, District Council Secretaries, Community Councils, Principal Chiefs as well as Local/area Chiefs). In addition, relevant

Government Departments and Authorities were also consulted to solicit their views on the project.

The main objective of these consultations was to identify and evaluate the likely extent and significance of the potential impacts on identified project stakeholders and resources, to develop and describe measures that will be undertaken to avoid, minimise or compensate for any adverse environmental impacts, and to enhance positive impacts.

Consultations were held at the district level on various dates, from the 30/09/2024, 01/10/2024, and representatives from the district authorities namely, District Administrator, District Council Secretary, Rural Water Supply Social Development, Environment Tourism Arts Culture and Heritage and Physical Planning and Sentebale Health (NGO). On the 02/10/2024 consultations were held with Care for Basotho (HIV/AIDS Education and 07/10/2024 with District Coordinator within Forestry, Conservation, Environment and Range Management.

Community consultations were held on the 09/10/2024 in Qalo, on the 14/10/2024 for Morifi and Majara, on the 15/10/2024 at Ha Chaba and Makeneng, on the 16/10/2024 at Mohobollo and Levi's Nek. Then on the 21/10/2024 to the 30/10/ 2024 consecutive consultations with the communities of Ha Rasekila, Tabolane, Ha Katamelo, Matlakeng, Boribeng and Ha Molotha respectively, were held.

On the 04/11/2024 to 05/11/2024 focus group consultations were held with the Brick layers, Sand mining business community and Nkhaketse Cooperative Society Tsoha 'Malere Irrigation in Khukhune, and Qalo (Additional funding) consultations were also held on the 08/08/2025 with the Community.

An array of concerns that were raised related more to the employment of unskilled labour, increase in sexually transmitted diseases including spread of HIV/AIDS due to influx of construction workers, and increase in teenage pregnancy and Gender based Violence (GBV). Additionally, the following issued were discussed, while the project is much needed, it was indicated that communities are unable to pay monthly use of water. The community also indicated that during construction access roads will be distracted, there will be an increase of migrant job seekers in the area, which may result in teenage pregnancy increase. In one instance the Chief indicated that such project often brings with them an assortment of social issues such as influx of sex workers, increase in cases of household conflicts (GBV) Alcohol abuse, unlawful and teenage pregnancies.

It was also indicated that often project contractors mine sand in big quantities, local businesses suffer due to resource depletion, and contractors leave open pits causing accidents for children and livestock. Particular concern from the irrigation scheme as cash crop producers is that the dust emissions from construction activities will settle on crops and thus affect their produce.

The project manage these concerns through enforcement of Local laws and the Bank's policies on environment and social safeguarding. For labour employment the OS 2 will be the basis for the development of the labour management plan, and the processes and procedures for sourcing of local unskilled labourers will align the local processes and procedures, enhanced and tailored to the needs of the project. Within the ESMP issues of GBV/SEA/SH, HIV/AIDS and sexual transmitted diseases including teenage pregnancies will be adequately covered, the contractor will be required to provide a budget for awareness campaigns for both project employees and the communities (including schools) within the project areas. Proper mitigation and rehabilitation measures will be provided for the management of environmental impacts. In addition, a stakeholder engagement plan – which includes a grievance redress mechanism – has been prepared to guide communication and collaboration with stakeholders so that their views and concerns are continually considered during project implementation.

6.1. Grievance Redress Mechanism Implementation

A Grievance Redress Mechanism that forms the bases for grievance redressal and management. The Project GRM consists of three community level structures –Village Grievance Redress Committees (GRC) formed by persons selected by the community members, one Project Level GRC made up of representatives of the Village level GRC, and one Joint Committee (comprising JC is formed by the Councillors and Chiefs of the affected communities). Issues that cannot be delt with at this level are escalated to the Project Implementation Unit and Management. All concerns, queries and comments from the affected and interested stakeholders will be recorded systematically to allow for ease of tracking. During construction the contractors will be required to develop and implement their site specific GRM in line with the project GRM.

7. ESMP Implementation Budget

The total estimated amount needed to cover all the work to be carried out under the ESMP preparation and implementation for the project is USD 374,000.00 which is about M6,732,000.00. The key indicative aspects that would require a cost budget include training and capacity building for the project PIU; training and capacity building for the contractor's staff, project district and local level; and implementation of the stakeholder engagement plan. Under the Resettlement Action Plan (RAP), the total amount of compensation required for assets affected by Project activities related to settlements under additional funding is estimated at about USD 476,114.00 which is estimated at about Nine Million Maloti (M9,000,000.00). The budget for activities related to Stakeholder Engagement Plan (SEP) is estimated at USD62, 900.00, which is an equivalent of about M1,132,200.00. Thus, the total budget for implementation of ESMP, RAP and SEP (that includes GRM costs) is estimated at about USD 913,014.00 which is an equivalent of M16,434,252.00, and this will be updated as needed whereby on an annual basis a dedicated budget will be allocated.

8. Conclusions

The Lesotho Lowlands Water Development and Sanitation Project Phase III (LLWDSP III) has potential to significantly benefit the communities of the selected villages within Botha Bothe District, more especially poor and vulnerable households through the improving access to water and sanitation services.

Despite the potential risks that have been identified in this ESIA, the project activities are expected to be implemented in a manner in which the negative impacts are avoided or minimised, while capitalising and enhancing the positive impacts to ensure positive developmental and social outcomes related to climate resilience, economic resilience and improved health for the communities.

It is vital that through this ESIA, the project develops and enforces systems and tools that will guarantee compliance by the selected contractors. The systems, tools and standards set forth shall be the basis for the implementation of ESMP and monitoring of the performance of the contractor to ensure compliance and continuous improvement.

1. BACKGROUND AND INTRODUCTION

1.1. Project Background

The Government of Lesotho's (GoL) National Strategic Development Plan, which focuses on inclusive growth and the development of key infrastructure, identifies the rehabilitation and development of water supply and sanitation services (WSS) infrastructure as a priority area for promoting economic growth and reducing poverty. Currently, about 95 percent of urban and 73 percent of rural households have access to an improved source of drinking water. However, a 2017 study showed that just 8 percent of households reported their water source as being reliable. Previous studies in 2004 and 1995 similarly found that households reported having unreliable primary water sources. Moreover, rising industrial demand for water, rapid urbanization in and around the Maseru Metropolitan Area and other industrial towns such as Maputsoe, and dilapidated infrastructure have steadily increased the pressures on WSS services.

The water supply situation has been exacerbated by the impacts of climate change. The effects of an increasingly unpredictable and variable climate have significant implications for Lesotho's water security and economic prospects. According to the Lesotho Water Security and Climate Change Assessment Report, in the absence of augmentation measures, demand for domestic and industrial water supply in the country will not be reliably met under a series of historic and future climate scenarios. Total unmet water demands are expected to reach 40 percent by 2050, with demands for industry projected at almost 60 percent. Moreover, Lesotho remains vulnerable to the shocks of regular and recurrent floods and droughts. The floods in 2011 were the largest on record since the 1930s, while the drought in 2015–16 is the driest recorded to date. Climate projections specifically suggest increased annual temperatures from 0.4-4.7°C, late rains, and changes in rainfall patterns for the northern Lowlands area, which includes the Botha Bothe district.

To address the water shortages in the Lowlands, the GoL established the Lesotho Lowlands Water Supply Scheme Unit (LLWSSU) in 2002, under the auspices of the Office of the Commissioner of Water and launched the Lesotho Lowlands Bulk Water Supply Scheme (LLBWSS) in 2004 to address water supply needs in the Lowlands. The LLBWSS's objective is to address water security challenges and to improve water supplies for domestic, institutional, and industrial use in the Lowlands' urban, peri-urban, and other demand centres (towns and clusters of villages with populations of 2,500 people and more). The entire LLBWSS aims to benefit a population of 1.1 million, which is projected to increase to 2.0 million by 2040. The World Bank also financed the Water Sector Improvement Project (WSIP), approved in 2004.

The Lesotho Lowlands Water Supply Scheme, comprising Zone 1 to Zone 8, Zone 8A, and Semonkong, was considered and approved by the Public Sector Investment Committee (PSIC) at its sitting of the 19th – 23rd March 2008. The scheme is phased according to the availability of funds and the social and economic priorities.

- Phase I of the scheme was implemented between 2010 and 2018 on Zones 4 and 5 through the Metolong Dam and Water Supply Programme.
- Phase II of the Scheme comprises Zones 2, 3, 6, and 7 is ongoing. This Phase is happening simultaneously in two different parts of the country that is in Leribe in the North and in Mafeteng and Mohale's Hoek in the South.

Lesotho Lowlands Water Development and Sanitation Project Phase III (LLWDSP III) addresses the water needs in the Zone 1 - Botha-Bothe Region and parts of the north-eastern parts of the Leribe District under the funding from AfDB, the Kuwait Fund for Arab Economic Development (KFAED), Arab Bank for Economic Development in Africa (BADEA), OPEC Fund for International Development (OPEC), Saudi Fund for Development (SFD), and Abu Dhabi Fund for Development (ADFD). AfDB approved financing to contribute to the phase III of the project in 2022.

Following the 2004 Feasibility studies of the whole Lesotho Lowlands Water Supply Scheme, some detailed designs were completed in 2018 and a Detail Design Report for Zone 1 (subset of Deliverable 5 (D5)) was prepared, as a deliverable under the "Consultancy Services for the Update of the Lowlands Water Supply Study, Detail Designs, and Construction Supervision." However, the implementation of the project did not commence immediately after completion of the designs in 2018 as planned and desired. Hence, the LLWDP III (Zone 1) was only resuscitated in July 2022 by establishing a PIU for its implementation.

The 2024 design review of the bulk water supply and the design of distribution networks that were outside the scope of phase III relocated most of the reservoirs to the higher elevations. The preliminary designs for the distribution networks that commenced in January 2025, within the project area were completed in April 2025 and this include the following additional financing settlements:

a) Z1R4 Qalo (Maloseng and Kontsokoaneng)
b) Z1R7 Botha Bothe Industrial Ha Majara Serutle, and
c) Z1R9 Ha Mopeli (Nqabeni)

The water distribution works will be undertaken under the Lesotho Lowlands Water Development and Sanitation Project Phase III – Additional Financing (LLWDSP III - AF), with AfDB as the financier.

The conceptual design of the proposed Zone 1 bulk water system was undertaken using the water demand projections and seasonal peak factors. The transmission mains system for Zone 1 consists of three separate sub systems:

a) The main system runs from the water treatment plant at Hololo in a westerly direction to supply the main demand center of Butha Buthe. The settlements of Qalo, Serutle, Selomo, Makong, Phooko, Rampais Nek, Nqechane, Jonathane, Pitsi's Nek and Khabo are also supplied from this system. This system conveys 96% of the water treated at the Hololo works.
b) Two secondary systems run from the water treatment plant at Hololo. One system will transfer water in an easterly direction to the settlements of Khukhune, Seboche and Phelandaba. The other system will transfer water in a northerly direction to the settlements of Qholaqhoe and Makhunoane. As a general guideline, pipelines have been routed within existing road reserves and along existing tracks to minimize invasion of private land, and to simplify future access to, and maintenance of, the pipelines. Where the pipelines cross rivers, streams and dongas, the pipeline will be buried below the stream bed and protected against damage by future erosion. Road crossings will preferably cross the road at a right angle with a minimum cover of 1m. In some cases, the nature of the watercourse and erosion thereof may preclude the burying of the pipeline below the watercourse.

According to the design review 2024, 22 pumps have been eliminated and 01 new pump added. Therefore, in the ESIA impacts will be assessed for this 01 new pump. The changes relating to pump from the design of 2024 is as fellow:

a) Number of Pump Station & Locations not changed: 6 Units
b) Number of Pump Stations eliminated: 22 Units
c) Number of New Pump Stations proposed: 01 Unit

The revised pumps status is as in the table below. According to the new design, the new pump to be included in the ESIA is within the already assessed environment.

Table 1: Revised Changes for Pumps

DESIGN 2018		Review DESIGN 2024	ESIA UPDATE
NAME	TYPE		
Z1PS1	Large Type 1	No Change	No Action
Z1PS3	Med Type 1	No Change	No Action
Z1PS10A	Small	No Change	No Action
Z1PS13A	Small	No Change	No Action
Z1PS14	Med Type 1	No Change	No Action
Z1PS15	Med Type 1	No Change	No Action
Z1PS R31	Med Type 1	New	Included in the ESIA

According to Design Review Report 2024, 20 reservoirs are eliminated, 14 remains the same, 12 are relocated and 2 new are proposed. Therefore, ESIA review will cover 12 relocated and 2 new reservoirs. The 20 eliminated reservoirs will be removed from the ESIA.

The changes relating to reservoir from the initial design of 2018 are as follows.

a) Number of Reservoir Locations not changed: 14 Units.
b) Number of Reservoir Locations To be Relocated: 12 Units
c) Number of New Reservoir proposed: 2 Units

Pipelines will follow the route of existing roads, within the boundaries of the road reserve, and as far away from the actual road surface as possible. The exact location will depend on the negotiations of the CW with the Ministry of Public Works and Transport (Roads Directorate). The use of the road reserve greatly reduces the need for land appropriation, simplifies the construction works, and also improves access to the pipelines for future maintenance purposes. The use of specific pipe materials is prescribed, the following pipe materials are recommended:

- Pumping mains: Steel or ductile iron (DIP)
- Gravity mains: CML Steel, DIP, uPVC and HDPE

1.2. ESIA Background

During the preparation of Phase III, an environmental and social impact assessment was undertaken by the Commission of Water (COW), approved by the Department of Environment DOE in 2022. The ESIA was prepared in compliance with GOL regulations and African Development Bank integrated safeguards systems (ISS) and was disclosed on the Ministry of Water's website and AfDB website. The present document is an update of 2022 ESIA. The update covers the following:

a) The 2024 design review changes on the bulk water supply including relocation of the reservoirs to the higher elevations, and
b) the design of distribution networks. These include distribution networks that will be covered by the LLWDSP III-AF which are Manamela, Serutle, Ha Majara and Ha Mopeli
c) upgrading of existing access roads to some of the project locations to facilitate safe delivery of construction equipment.

The existing ESIA of June 2022 was prepared based on the 2017/18 Designs hence, the basis for the ESIA update are the modifications that were made by the 2024 Design Review report as well as the RoD conditions. Therefore, the ESIA update will focus more on environment and social impact investigation and analysis to address modifications made on the following infrastructure layout:

a) Relocated reservoir.
b) New reservoirs and pump stations
c) New electricity lines routes
d) Transmissions lines

1.3. Objectives of the ESIA

The main objective of this ESIA is to assess potential environmental and social impacts as efficiently and effectively as possible in order to allow the integration of environmental considerations into the design and implementation of the project. The purpose of the ESIA is also to ensure that the construction of all the components of LLWDSP III are done with the least possible environmental, social and cultural impacts. The aim is also to provide an integrated approach to compliance monitoring and auditing in meeting the environmental obligations of LLWDSP III. Thus, the ESIA further includes the water infrastructure works in three newly prioritised settlements.

1.4. Project Description and Components

The Bank financing will comprise the following three main components: (i) Climate Resilient and Low Carbon Emission Water Supply Infrastructure Development, (ii) Sanitation Services Improvement; (iii) Institutional Strengthening, Capacity Building and Program Management. Below is a detailed description of the components.

1.4.1. Component 1: Climate Resilient and a Low Carbon Emission Water Supply Infrastructure Development

This component finances activities to improve access to climate resilient and sustainable domestic and industrial water supply services within Butha Buthe district and surrounding settlements. The following is the outline of the activities:

- Construction of 14 km bulk water transmissions mains of diameter 80 to 100mm.
- Construction of 5 service reservoirs and 4 water pumping stations, to deliver water to the 7 settlements.
- Construction and rehabilitation of 100 km of water distribution network pipelines in parts of the Butha Buthe district and 7 settlements including associated service reservoirs, installation of 2000 domestic meters, household service connections, and 176 village service distribution points.
- Development, and implementation of leakage reduction and network optimization measures to improve and guarantee sustainable and reliable supply of water.
- Review of the 2018 detailed designs to integrate cost effective, climate resilient, design measures and opportunity for promoting the use of renewable energy and water efficiency technologies to support low carbon emission and smart water.

1.4.2. Component 2: Sanitation Services Improvement

This component provides support to strengthen Water, Sanitation and Hygiene (WASH) service delivery. This component therefore will be divided into the following main sub-components (a) at increasing population awareness on Sanitation and Hygiene, (b) development of Sustainable and climate resilient Public Sanitation facilities including sanitation facilities for the most vulnerable households targeting female headed households and (c) development of a pilot sustainable climate resilient Feacal Sludge Management (FSM) treatment unit in Butha Buthe district. This component includes the following activities.

- Support for advocacy, sensitization, promotion of Nutrition Smart WASH, development of gender responsive training and promotional material including for HIV/AIDs,
- Improving environmental hygiene practices, menstrual hygiene management, integration of the Leave No-one Behind" (LNOB) in the rural areas, City Wide Inclusive Sanitation approaches (CWIS), Sanitation Marketing and eliminating Open defecation practices, including roll out of Hygiene Strategy.
- Training of Trainers (ToT), creation/ strengthening of school WASH clubs and School Friendly WASH campaigns based on WASH in Schools Guidelines (hand washing with soap and sanitation facilities, responsive to gender and disability).
- Construction of 718 sustainable and Climate resilient sanitation facilities in public institutions including 84 schools, 17 institutions, marketplaces, 182 churches etc.

- Pro-poor service provision by developing a mechanism for promoting the construction of 309 climate resilient sanitation facilities for vulnerable households headed by the elderly, female, and orphans and those living with disabilities, or HIV/AIDS who are not able to access or afford safe sanitation facilities.
- Development of FSM services in Botha Bothe district to improve the level of quality and access to services for the emptying, conveyance, treatment, and safe disposal of Faecal Sludge. These FSM services will be within the broader context of urban sanitation and integrated urban water management (IUWM). A pilot FSM Treatment unit will be constructed, and Guidelines and Regulations for FSM from On-site Sanitation Facilities will be developed.
- Support towards the roll out of the National Sanitation Strategy.
- Support to the Ministries of Water (Department of Rural Water Supply) and Health (Department of Environmental Health) will be provided in undertaking activities directed at increasing awareness concerning the linkages between water and sanitation and benefits of appropriate sanitation, appropriate hygiene practices and behaviour and handling of water.

1.4.3. Component 3: Institutional Strengthening, Capacity Building and Project Management

The component finances sector development activities to promote overall sector policies, regulations, to build and strengthen capacities of sector institutions at community, local and national levels to be better able to deliver and manage services. This component will address factors affecting overall capacity and financial sustainability of service providers responsible for operating and maintaining the various infrastructure, particularly the DWA, Lesotho Meteorological Services (LMS), WASCO, the Department of Rural Water Supply (DRWS), Local Authorities and Community Councils in the project area. This component includes the following activities:

Sub-component 3.1: Institutional Strengthening and Capacity Building

- Development and operationalisation of a Water Sector Gender Strategy
- Mainstreaming Gender, Environment, Climate resilience, and cross cuttings Issues
- Support for inter-sector coordination to improve service delivery; especially between line sectors (environment, health, water supply and sanitation, nutrition, education, and local authorities).

- Capacity building in M&E and data-related activities and improving overall sector data and monitoring system. Training of MoW staff to enhance their capacity in project and contract management and performance monitoring in the water sector.
- Support towards the constitution of a Bulk Water Authority to operate and maintain the bulk water infrastructure. The institutional option selected for the Roadmap splits untreated bulk water functions between the Lesotho Highlands Development Authority (LHDA) and a newly established LBWA (covering all infrastructure not under the management of the LHDA), with WASCO retaining charge of treated bulk water functions and water supply distribution in urban areas. It is likely that other institutional changes will be made during the period that LBWA is formed, notably in respect of rural water supply. A key step will be enactment of legislation for the establishment of the LBWA itself. The Bank will support a short-term consultant to assist with drafting of legislation and other activities such as developing the necessary LBWA internal policies/ guidelines/ manuals to comply with applicable legislation. This activity is expected to be completed by October 2023.
- Community sensitization, mobilization, formation, and training of village water health committees,
- Training and technical assistance for establishment of private and community operators (including O&M training) in peri urban and rural areas as well as capacitating the technical teams from WASCO will backstop the community/private operators.
- Promote reforestation and catchment management activities empowering communities to get involved in these activities during and after project implementation. The project will upgrade water resources monitoring networks in Butha Buthe district (surface water, groundwater, and water quality) and set up an early warning system through installation of Telemetry systems.
- Gender inclusive skills training and empowerment of women and youth, disabled persons in water and sanitation related economic opportunities within the project area. The project will support better training and bring it closer to the informal sector and local networks in Butha Buthe district. A concrete step could be to encourage informal workers, mainly youth and women to participate in training activities, e.g., by providing informal apprentices with some vocational schooling focusing on more general skills and theoretical aspects including plumbing, masonry, and artisan skills. To avoid deterrence, these courses should not be delivered by governments directly but rather by NGOs and vocational training centres such as the Trades school with sufficient acceptance and in-depth knowledge of the economic situation in local communities. 325 youth will be targeted with this training during the project.

Sub-Component 3.2: Project Management

- The project will make provision for technical support, training, goods, and incremental operating costs to MoW to facilitate smooth and effective project implementation at the national, local and community level. Funds will be provided for technical assistance in project co-ordination, procurement, contract management, financial management, design and supervision, financial and technical audits, monitoring and reporting, environmental and social safeguards, climate change initiatives, Gender related activities and development of a Water Sector Gender strategy etc. The Bank will meet some of the operating costs for the Project Implementation Unit (PIU) PIU whereas provision of offices and utilities will be covered through counterpart funding. This component will also include Environmental and Social Management Plan (ESMP) implementation, land acquisition and compensation.

1.4.4. **Project Implementation timelines**

The project activities are to be implemented as indicated in the table below.

Table 2: Project Implementation Timeline

S/N	Activity	Duration	Start	End
1	Design Review	5 Months	January 2024	May 2024
2	Procurement for the Design and Build Contractor of Intake, WTW and other appurtenant Works.	3 Months	January 2024	OCT 2024
3	Coordination during the construction stage of Design and Build Contractor.	14 Months	March 2025	May 2026
4	Preliminary and detailed design of the water distribution systems	6 Months	August 2024	DEC2025
5	Procurement of the Main works contracts for bulk water transmission system (To be done in lots	6 Months	July 2024	DEC 2024

6	Procurement of the contractors for the water distribution Networks	6 Months	JAN 2025	JUNE 2025
7	Construction Supervision and monitoring of the bulk water Conveyance System	36 Months	January 2025	DEC 2028
8	Construction Supervision and monitoring of the Contractors implementing distribution networks	31 Months	May 2025	DEC 2028
9	Monitoring the E&SIA	48 Months	January 2024	DEC 2028
10	Completion Report	One month	January 2028	JAN 2028

2. ESIA METHODOLOGY, ASSUMPTIONS AND LIMITATIONS

The ESIA was conducted following the approaches and methodology outlined in both the national and international standards, procedures and guidelines. All relevant Lesotho legislation were complied with during the implementation of the study. The processes were undertaken and went through the following stages.

- Review of the Terms of Reference (ToR)
- Review of the EIA Lesotho Lowlands Bulk Water Supply Scheme – Northern region.
- A desktop study of all relevant background documents and materials.
- A reconnaissance visits to the project site for appreciation of the site.
- A field work phase to conduct detailed studies of the baseline situation at the project site and determine the potential environmental and social impacts. Public and stakeholders' consultations that encompassed meetings with local authorities as well as government officials.
- An analysis of potential environmental and social impacts.
- The preparation of the ESIA report.
- The preparation of an ESMP for the project.
- Design review and update of the ESIA 2022
- Update ESIA 2024 to include areas under AfDB additional funding

2.1. Data sources

This report has drawn extensively from the EIA Lesotho Lowlands Bulk Water Supply Scheme – Northern region while also incorporating some elements of the Revised Generic ESIA and ESMP for the Lesotho Lowlands Water Supply Scheme.

2.2. Desktop Studies

A desktop study was conducted to review all available documents and reports relating to the project. These included the bio-physical baseline information as well as the existing environmental and social legislation.

2.3. Bio-physical Environment Studies

Three (3) site visits were made to the project site. The site reconnaissance was taken from the 14th to the 17th of June 2022, and 15-17 October 2024 to cover villages in the design review. The objectives of these site visits were to achieve the following:

a) Examination of the current state of the environment.
b) Verification of information obtained from background documents; and

c) Observation of any environmentally and socially significant aspect of the project.

2.3.1. Bio-physical Resource Inventory

a) Reconnaissance Survey

The reconnaissance was conducted to provide the opportunity to examine the prevailing situation at the project site took place from the 9th of October to the 6th of November 2024. The team from the Consultant comprised of the following experts: Team Leader (ESIA Specialist), Social Specialist and Botanist. During this visit every opportunity was taken to meet with the local authorities as well as the community to gain understanding into the nature of the environment.

b) Soils

The soils of the project area were examined through an intensive geotechnical study to characterise them and determine any features that would be relevant to the environmental and design issues around the project. The soils formation is required for identifying soil material for use as a fill and binding material as well as, for preservation of topsoil where necessary for rehabilitation after completion of construction.

c) Geology

The geology of the sites is required for determination of the durability of rock material to sustain the construction structures of the project for a predetermined period and constructability of the access road through geological formation. The Consultant Team relied on the geotechnical study carried out at the project site during design phase as well as the geological maps from the Department of Mines and Geology for surface soundness of the rock, jointing, fracture, weathering, faulting and dykes.

d) Terrestrial Flora

A survey of the vegetation at the project site was conducted through several activities that included drawing up a plant species inventory with demarcation of vegetation zones on maps. This was combined with transect walks and quadrant sampling. Special attention was paid to rare and endangered species. The set of field activities was combined with utilisation of local knowledge through unstructured interviews with the goal to ensure appropriate management of the vegetation of the project site.

e) Terrestrial Fauna

The local Chiefs and communities were consulted to provide information on the reptiles, mammals and birds of the project site including their significance to local livelihoods. Due to the nature of the project the study only included reptiles, mammals and birds. In the field, several transects walks were undertaken to check the chance occurrence of animals, also noting in the process any mammal tracks (spoors) and droppings that could be encountered. No sightings were encountered for mammals and reptiles except for one large bird and burrows indicating burrowing animals.

f) Land Use Patterns

While the land use patterns in the project area are known, the extent of these was generated through site ground truthing and satellite maps from Google maps. The ground truthing zeroed on establishing cropping fields in use and lying fallow and grazing/range land.

2.3.2. Ambient Air Quality measurements

The ambient air quality for Botha Bothe was recorded using a mobile digital application called IQAir. This mobile application uses data on AQI modelled using satellite data. The data was recorded from June to July 2021 for Botha Bothe as part of this ESIA baseline data collection.

The data analysis was done using the AQI (Air Quality Index) guide as provided within the application. This uses a seven-tier air category that ranks the Indexes from good to Hazardous. This directly links the measured air quality to associated public health effects. The Air quality Index guide as copied from the application is provided in Table 2 below.

Table 3: Air Quality Index

Air Quality score	**Quality**	**Quality levels relation to public health**
0- 50	Good	Good Air quality is satisfactory and poses little or no risks.
51 - 100	Moderate	Sensitive individuals should avoid outdoor activities as they experience respiratory symptoms
101 - 150	Unhealthy to sensitive groups	General public and sensitive individuals are at risk to experience irritation and respiratory problems

151 – 200	Unhealthy	Increased likelihood of adverse effects and aggravation to the heart and lungs among the general public.
201 - 300	Very Unhealthy	The general public will be noticeably affected. Sensitive groups will experience reduced endurance in activities
301 - 500	Hazardous	General public and sensitive groups are at high risk to experience strong irritation and adverse health effects that could trigger other illnesses.

2.3.3. Ambient noise measurements

The ambient noise was recorded within the proposed project affected or receptor communities. To incorporate the diverse receptor communities within the proposed project site. The ambient noise was recorded within three receptor communities located within the project footprint. These are: Khukhune (Botha Bothe rural settlement), Makopo (Botha-Bothe urban settlement) and Nqechane (Leribe rural settlement).

The ambient noise measurements were recorded over a 24-hour period. These 24-hour noise measurements were recorded at an interval of 6 hours. The recorded measurement are the average 60 seconds measurement reading. The noise level measurements provided are as recorded for a period of 7 days During winter 2022 June to July 2022.

The Ambient Noise monitoring measurements were interpreted in line with WHO Guidelines for Community Noise published in 1995 (Edited by B. Berglund, T. Lindvall, DH. Schwela). Page XVI provides the Guideline values for Community noise in specific environments. Maximum Outdoor Living Area exposure is 16 hours, and the ambient sound level is between 50 – 55 dBA.

The noise measurement shall be done using a mobile application based Environmental Sound Level meter application. That is called a Sound Meter version 3.2.5 manufactured by Abc® apps. The application has a sound detection limit of 100dB.

2.4. Public Participation and Stakeholder Consultations

The Environmental Act (2008) of Lesotho views the management of the environment as a collective responsibility and therefore requires that all interested parties and stakeholders be consulted. Thus, public consultation is a key legal requirement in the conduct of ESIA's and project briefs in Lesotho. The main purpose is to ensure that as many people as possible who are concerned with or affected by a proposed development are consulted, and their views are recorded. Further, it is important to ensure that, wherever possible, these views are considered in the final design and operation procedures of the project.

The public consultation exercise at the project site included Community Council Secretaries (CCSs), community councillors, the project communities, owners of fields across the Hololo river whose access is likely to be affected by the abstraction point, other groups who use the access next to the abstraction point, herd men, business people, spiritual/church users, entertainment, traditional leadership represented by Principal Chiefs as well as Local/area Chiefs. In addition, relevant Governments Departments and Authorities were consulted as key informants to solicit their views on the project.

The public consultation covered a range of study components. However, the key objectives of the consultation process were:

a) Informing stakeholders of the project.
b) Ascertaining issues of concern, according to those consulted, regarding the proposed project (including their suggestions on how to mitigate potential negative impacts).
c) Identifying potential negative and positive impacts, which may result from the proposed project.
d) Identifying sites of cultural and historical significance to the local community; and
e) Identifying requirements/expectations from government departments/ministries regarding the implementation of the project.

2.4.1. Introductory meetings

The following stakeholders Engagements with Project Authorities were held as part of compiling this ESIA 2022 which was reviewed as ESIA 2024. Multiple meetings were held with District Authorities and Local Council Authorities between June of 2022 and August of 2025. Since the inception of the project multiple consultations have been held with recent consultations being held in regards to the implementation of the Resettlement Action Plan and compensations.

2.4.2. Project Affected Community Consultations

Community consultations were undertaken with different approaches, including focus group discussions and general Pitso's. The Focus Group Discussions were used to achieve the following objectives:

a) To inform communities about the LLWDSP III as well as providing them with an opportunity to seek clarification on the Project; and
b) To gain information on the type of water services available to communities, the positive and negative attributes of the existing water supply systems in villages, recommendations on how best to implement the project, willingness and ability to pay for the LLWDSP III services.

The list of consultations held is listed below. The Focus groups discussions were held on the 30th June 2022 in Botha Bothe in the following manner. Within the villages of Serutle and Marakabei. The groups comprised of:

a) Ipopeng Bo-mme Serutle (16 members) A females only for piggery project.
b) Vuka Mosotho burial Society (10 members).
c) Piting- Ha Bolofo water committee FGD was held on 26thJune 2022.
d) Tsoha 'Malere Irrigation FGD was held 04 November 2024
e) Nkhaketse Cooperative Society was held 04 November 2024
f) Sand mining and Brick making was held on 04 November 2024

Figure 1: Focus Group Discussion

Malere Cooperetive on Impacts of the project on the agricultural scheme, concerns suggestions and recommendations at Marakabei – Botha Bothe. Community Gatherings (Pitso's') were held in the following project affected villages.

a) Pitso Ha Khabo (Khabo, Ha Lehloba) - 29/06/2022; 10:00am
b) Pitso Ha Majara (Marallaneng, Morifi, Litlhalaneng) - 28/06/2022; 09:00am
c) Pitso Ha Belo - 5/07/2022; 10:00am
d) Pitso Nqechane - 27/06/2022; 10:00am
e) Pitso Ha Motšoane (Ha Rampai, Literapeng, Ha Motšoane, Ha Mamatona, Naleli, Ha Loti, Libenyane, Thabana-Tšoana, Makhasane, 'Metsoaneng, Ha Rachane) - 4/07/2022; 11:00am
f) Pitso Koeneng (Literapeng, Ha Mokotjo, Tale) - 30/06/2022; 11:30am
g) Pitso Leribe (Bolofo, Maiseng, Ha Sera, Ha Mothetsi, Mamanyatsa) 30/06/2022; 10:00am
h) Pitso Qalo 09/10/24
i) Pitso Ha Majara 14/10/24
j) Pitso Makeneng 15/10/24
k) Pitso Mohobollo 16/10/24
l) Pitso Ha Rasekila 21/10/24
m) Pitso Tabolane 22/10/24
n) Pitso Ha Katamelo 23/10/24
o) Pitso Matlakeng 29/10/24
p) Pitso Boribeng 29/10/24
q) Pitso Ha Molotha 30/10/24
r) Pitso Liphakoeng 06/11/24
s) Pitso Qalo 08/08/25 (for additional funding)

2.5. Assessment Methodology

The focus is to identify and evaluate the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

a) Direct: Direct impacts occur through direct interaction of an activity with an environmental, social, or economic component.
b) Indirect: Indirect impacts on the environment are these which are not a direct result of the project, often produced away from or as a result of a complex impact pathway. The indirect impacts are also known as secondary or even third level impacts.
c) Cumulative: Cumulative impact consists of an impact that is created as a result of the combination of the project evaluated in the EIA together with other projects causing related impacts. These impacts occur when the incremental impact of the project is combined with the cumulative effects of other past, present and reasonably foreseeable future projects.

The EIA processes followed are those prescribed in the Environment Act, 2008 and advocated by the African Development Bank and shown in Figure 2.

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT FOR LLWDP III PROJECT AND ADDITIONAL FINANCING – ZONE 01

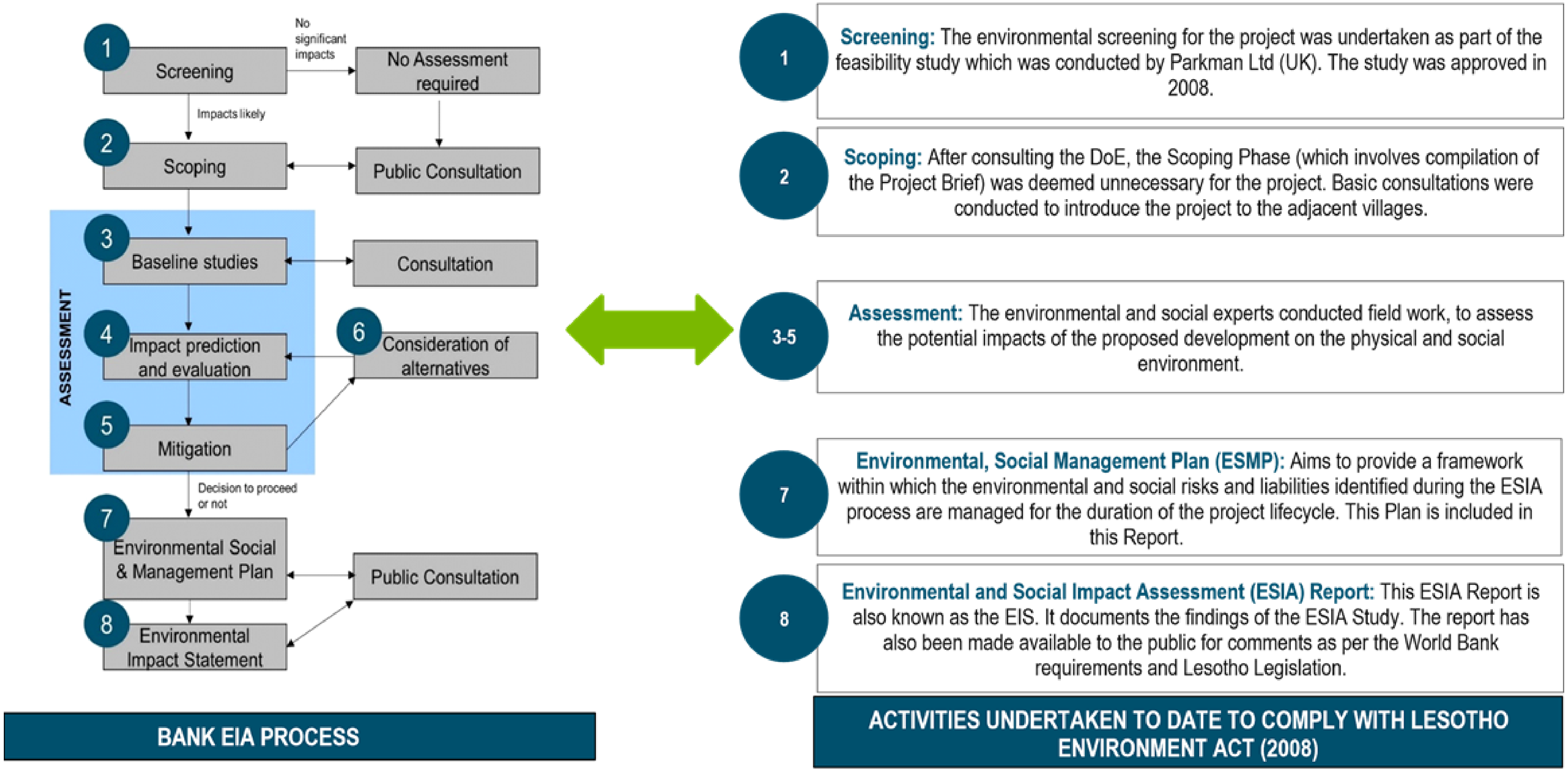

Figure 2: ESIA Process and Approach

The following assessment methodology was followed to identify and assess the impacts:

CONSEQUENCE CRITERIA

The criteria that contribute to the consequence of the impact are INTENSITY (the degree to which pre- development conditions are changed), which also includes the TYPE OF IMPACT (being either a positive or negative impact); the DURATION (length of time that the impact will continue); and the EXTENT (spatial scale) of the impact. The sensitivity of the receiving environment and/or sensitive receptors is incorporated into the consideration of consequence by appropriately adjusting the thresholds or scales of the intensity, duration and extent criteria, based on expert knowledge. For each impact, the specialist applies professional judgement to ascribe a numerical rating for each criterion according to the examples provided in Tables 3 to 8 below.

Table 4: Definition of Intensity Ratings

Rating	Criteria	
	Negative impacts (-)	**Positive impacts (+)**
Very high (-/+ 4)	Very high degree of damage to natural or social systems or resources. These processes or resources may restore to their pre-project condition over very long periods of time (more than a typical human lifetime).	Great improvement to ecosystem or social processes and services or resources.
High (-/+ 3)	High degree damage to natural or social system components, species or resources.	Intense positive benefits for natural or social systems or resources.
Moderate (-/+ 2)	Moderate damage to natural or social system components, species or resources.	Average, on-going positive benefits for natural or social systems or resources.
Low (-/+ 1)	Minor damage to natural or social system components, species or resources. Likely to recover over time. Ecosystems and valuable social processes not affected.	Low positive impacts on natural or social systems or resources.
egligible (0)	Negligible damage to individual components of natural or social systems or resources, such that it is hardly noticeable.	Limited low-level benefits to natural or social systems or resources.

Table 5: Definition of duration ratings

Rating	Criteria
2	**Long-term**: The impact will continue for 6-15 years.
1	**Medium-term:** The impact will continue for 2-5 years.
0	**Short-term:** The impact will continue for between 1 month and 2 years.

Table 6: Definition of extent ratings

Rating	Criteria
2	**Regional:** The impact affects the entire region
1	**Local:** The impact extends across the site and to nearby properties.
0	**Site specific:** The impact is limited to the site or immediate area.

The Environmental consequence was then established using the formula:

Consequence = type x (intensity + duration + extent)

Depending on the numerical result, the impact's consequence would be defined as either extremely, highly, moderately or slightly detrimental; or neutral; or slightly, moderately, highly or extremely beneficial. These categories are provided in Table 6 below:

Table 7: Application of consequence ratings

Rating	Significance rating
-8	Extremely detrimental
-7 to -6	Highly detrimental
-5 to -4	Moderately detrimental
-3 to -2	Slightly detrimental
-1 to 1	Negligible
2 to 3	Slightly beneficial
4 to 5	Moderately beneficial
6 to 7	Highly beneficial

8	Extremely beneficial

SIGNIFICANCE CRITERIA

To determine the significance of an impact, the PROBABILITY (or likelihood) of that impact occurring is also considered. In assigning probability, the specialist considers the likelihood of occurrence but also takes cognisance of uncertainty and detectability of the impact. The most suitable numerical rating for probability is selected from Table 7 below.

Table 8: Definition of probability ratings

Rating	Criteria
4	**Certain/ Definite:** There are sound scientific reasons to expect that the impact will definitely occur.
3	**Very likely:** It is most likely that the impact will occur.
2	**Fairly likely:** This impact has occurred numerous times here or elsewhere in a similar environment and with a similar type of development and could very conceivably occur.
1	**Unlikely:** This impact has not happened yet but could happen.
0	**Very unlikely:** The impact is expected never to happen or has a very low chance of occurring.

The significance is then established using the following equation:

Significance = consequence + probability

Depending on the numerical result of this calculation, the impact would fall into a significance category of negligible, minor, moderate or major, and the type would be either positive or negative. Examples of these categories are provided in Table 8:

Table 9: Application of significance ratings

Rating	Significance rating
-4	Very high - negative
-3	High - negative
-2	Moderate - negative

-1	Low - negative
0	Very low
1	Low - positive
2	Moderate - positive
3	High - positive
4	Very high - positive

2.6. Mitigation Approach

The Mitigation Hierarchy (Figure 3) has been applied when proposing prevention, compensation and mitigation measures within the accompanying Environment and Social Management Plan (ESMP):

a) **Avoid / Prevent:** Avoidance or prevention refers to the consideration of options in project location, siting, scale, layout, technology and phasing to avoid impacts on biodiversity, associated ecosystem services, and people. This is referred to as 'the best option', but it is acknowledged that avoidance or prevention is not always possible.

b) **Minimise:** Minimisation refers to the consideration of alternatives in the project location, siting, scale, layout, technology and phasing that would minimise impacts on biodiversity, ecosystem services and people. As defined in IFC PS1; "acceptable options to minimise will vary and include abate, rectify, repair, and/or restore impacts, as appropriate".

c) **Rehabilitate / Restore:** Rehabilitation refers to the consideration of the rehabilitation of areas where impacts are unavoidable, and measures are provided to return impacted areas to a near-natural state or an agreed land use.

d) **Offset:** Offsetting refers to the consideration of measures over and above rehabilitation to compensate for the residual negative effects on biodiversity ecosystem services and people, after every effort has been made to minimise and then rehabilitate impacts.

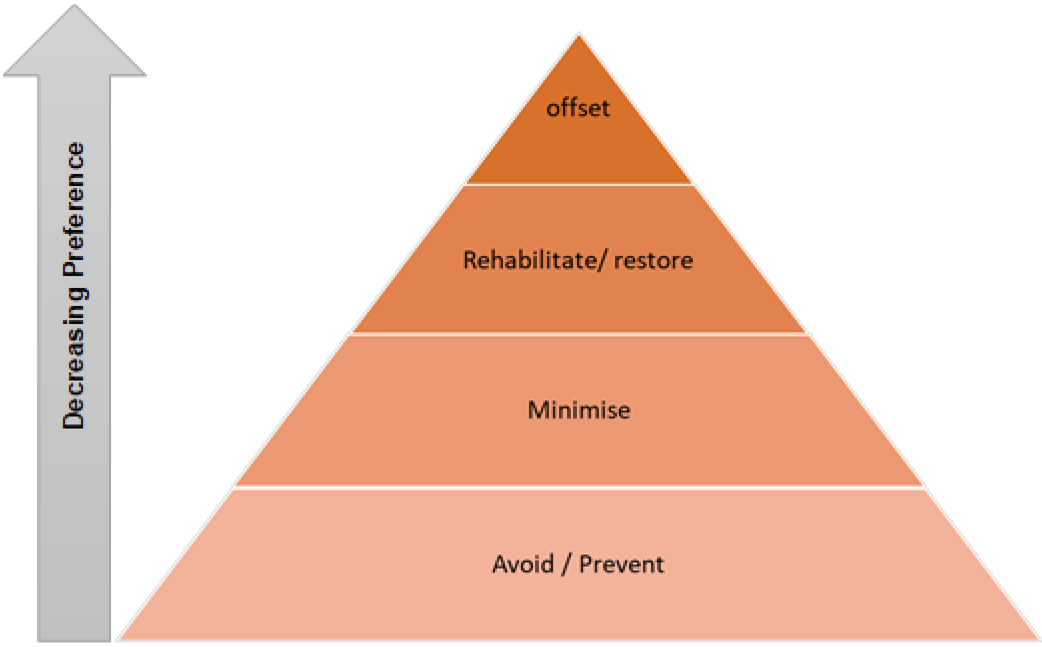

Figure 3: Impact Assessment Mitigation Hierarchy

2.7. Environmental and Social Management Plan

The identified mitigation measures are integrated into a suite of customised management programs. The ESMP is developed to guide environmental and social management throughout the project's life cycle. This is the mechanism whereby mitigation and monitoring of environmental impacts (as defined in the ESIA Report) are integrated with project implementation.

For the purposes of this ESIA, project alternatives (pipeline re-routing and relocation of associated infrastructure e.g. the WTW and reservoirs) are included. Mitigation measures (according to the Mitigation Hierarchy) and monitoring plans are provided where impacts are unavoidable.

2.8. Limitations and Constraints

The main limitations constraining the compilation of this report were:

a) The ESIA is based on preliminary designs that were done in 2018 and design review 2024. The final designs are not yet available for this project. The preliminary designs provide generalised information on the layout of the project infrastructure (e.g., water treatment works, pipelines).

b) The LLWDSP III is a linear project that extends over a large distance of approximately over 133km this means that the ESIA highlighted the key environmental sensitivities along the proposed route.

c) During the ESIA process information on final location and size of construction camps as well as laydown areas was not finalised to properly assess the impacts.

d) The dry season is likely to inhibit the effective sampling in particular terrestrial ecology.

e) The time of socio-economic survey / data collection coincided with the harvesting period which meant that most adults and heads of households were only available very early in the morning (5am-6am) and late at night (6pm-7pm); and

f) The meetings were held in winter when people were reluctant to traverse the rugged terrain to go and sit outside in the cold.

g) During the review, it was planting season, consultations were done late during the day people tired from the fields.

h) Location of burrow pits (sand-winning) required for laying of pipelines. The currently operational borrow areas have been observed but it is not known which of these sites are likely to be used during the construction phase. It is also highly likely that the contractors will not open new borrow pit areas. Rather, all sand and aggregate required will be purchased from existing and approved sand-winning operators.

2.9. Assumptions

There are specific activities associated with the LLWDSP III for which during the design review were not yet finalized. Therefore, to properly assess the impacts worst-case scenarios have been predicted.

a) Locality of laydown areas – the number and locality of the laydown areas associated with the construction phase of the pipeline is not finalised. It is anticipated that a relatively small laydown area will be constructed next to each proposed reservoir site and that materials such as sand, brick, steel, etc. will be stored within the laydown area on an as needed basis. The bulk of such materials will most likely be stored at the contractor's central storage yard.

b) In-stream Flow Requirements Investigations – The proposed LLWDSP III does not involve any dams or weir construction therefore it is expected to have a limited impact on the aquatic ecology. However, this can only be proved through a comprehensive In-stream Flow Requirements (IFR) for the Hololo River which could not be undertaken in this study due to limited timeframe. Hence the IFR information used as a baseline in this study was conducted in 2008 to determine flows needed to maintain the project.

Therefore, the results of this IFR (2008) study are assumed as sufficient to guide this ESIA.

c) Even though it is anticipated that the contractors will source aggregates from approved suppliers in cases where such suppliers are non-existent borrow pit permits have to be considered.

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1. National legislative framework

3.1.1. The Constitution of Lesotho, 1993

The constitution is the supreme law of the country. It also provides an overarching environmental legislative framework for environmental management. Section 36 of the Constitution particularly addresses the need for environmental protection. It states that" Lesotho *shall adopt policies designed to protect and enhance the natural and cultural environment of Lesotho for the benefit of both present and future generations and shall endeavour to assure to all citizens a sound and safe environment adequate for their health and well-being*".

Furthermore Section 17 stipulates that no property (movable or immovable) shall be compulsorily acquired without paying any compensation to the entitled individual. The Constitution also entitles everyone to the protection of health through the adoption of policies aimed at ensuring the highest attainable standard of physical and mental health for its citizens, including policies designed to *inter alia*: "*provide for the prevention, treatment and control of epidemic, endemic, occupational and other diseases"* (Article 27(c)). This Article implicitly includes HIV and AIDS as a disease.

Chapter 2 of the Constitution is devoted to the protection of fundamental human rights and freedoms, two of which are freedom from discrimination and the right to equality before the law. Section 18 provides that no law shall make any provision that is discriminatory either of itself or in its effect (Hodges, 2007).

Relevance to the Project: The project will need to adhere to the Environmental and Social Management Plan (ESMP) requirements and Environmental Impact Assessment (EIA) licence conditions (once issued) to ensure that social, health and environmental management considerations are taken into account throughout the project cycle without compromising both present and future generations.

The Water Commission would have to negotiate with the affected landowners to obtain requisite rights to construct the proposed scheme components on their properties and compensate them accordingly.

3.1.2. Environmental Act No. 10 of 2008

The Environmental Act is the principal underlying framework for environmental legislation for matters concerning the environment in Lesotho. It makes provision for protection and management of the environment and conservation and sustainable utilisation of the country's natural resources.

Section 4 stipulates that "*Every person living in Lesotho has a duty to safeguard and enhance the environment including the duty to inform the Director of all activities and phenomena that may affect the environment significantly.*"

Section 25 further stipulates that no activity listed in the First Schedule may be undertaken without an Environmental Impact Assessment (EIA) license issued by the Director. The categories of project and/or activities for which an EIA is required are outlined in Table 9.

Relevance to the Project: As per the requirements of the Act, the proposed development requires an EIA license to commence with construction. The listed activities (in Part A of the First Schedule of the Act) that will be triggered by the proposed project are listed in Table 9**.**

Table 10: Triggered activities in terms of Environmental Act of 2008

Item	Description of the Activity	Relevance to the Project
3	**Transportation including** – (d) pipelines; and (e) water transportation activities;	A 133 km long pipeline will be constructed as part of the scheme to transport water from the source to the reservoirs in the different demand zones.
4	**Dams, rivers and water resources including** – (a) reservoirs, levees, storage dams, barrages and weirs; (b) canals, channels, aqueducts, river diversions and water transfers; and (d) pipelines and water reticulation systems.	The entire project is a piped water network/ system. The raw water will be abstracted from the Hololo River, treated and distributed to the different demand zones. A total of 26 reservoirs will also be constructed in strategic locations to provide security of supply and facilitate efficient operation of the water supply system.
6	**Mining, mineral extraction including** quarrying and opencast extraction of (d) aggregates, sand and gravel.	Borrow pits will be required to provide suitable bedding and fill material for the pipeline. Aggregate will be required for all concrete works. It is not known whether this material will be supplied from existing or new borrow pits/quarries.

11	**Waste handling, storage, transport, treatment and disposal including –** (i) transportation and storage of hazardous substances or waste	Domestic and hazardous waste generated from construction activities will be temporarily stored on site until it is transported by a service provider to a registered disposal facility.
17	**Projects or activities that could affect any of the following area features which have been demarcated as such by central or local authority including –** (a) streams and river channels, and their banks. (d) high potential agricultural land. (i) burial sites (j) immovable property	The direct surface water abstraction from the Hololo River will affect the river's natural flow regime and potentially other aquatic ecosystems. The Botha Bothe District is known for being rich in tangible heritage such as fossils, buildings, monuments and rock art paintings. It is possible that fossil remnants /remains could be found during construction and excavation of pipe trenches.

3.1.3. Mines and Minerals Act No. 4 of 2005

According to Section 57 of the Act, acquisition of land for a public purpose is in terms of the Land Act 2010. Section 56 deals with compensation for disturbance of rights of a lawful occupier of land subject to a mineral concession, including damage done to the surface of the land which may concern "crops, trees, buildings or works damaged during the course of such operations".

Relevance to the Project: The proposed quarrying and borrow pit and river sand abstraction activities undertaken as part of this project require a natural resources abstraction and or extraction permit.

3.1.4. Water Act No. 15 of 2008

The Water Act provides for the ownership of all water resources to be vested in the Basotho nation and held in trust by the King. It also makes provision for the management, protection, conservation, development, and sustainable use of the Lesotho's water resources. It further makes provision for different types of water use permits and the manner of obtaining them. According to Section 20 of the Act no person shall engage in an activity of using or abstracting water without a water use permit which is valid for a period of 5 years from the date of issue. Activities which are considered as water uses by the Act are listed in Section 5 (3) of the Act.

Relevance to the Project: The proposed development will require a water use permit to proceed with construction and abstraction of water from Hololo river. The activities that are applicable to this project include:

5 (3)(a) taking of water from a watercourse

5 (3)(b) storing water

5 (3)(d) engaging in a stream flow reduction activity

5 (3)(g) altering the bed, banks course or characteristics of a watercourse.

3.1.5. Local Government Act (Amended) (Act No. 5 of 2004)

This Act provides the legal basis for establishment and operational functioning of local councils (district, municipal, urban and community councils) and de-concentrated administrative structures. The Act further provides for the inclusion of chiefs in councils through nomination by fellow chiefs.

Relevance to the Project: The establishment of the proposed water supply scheme will require the support of the local communities and other local institutions/authorities for its success. All the relevant local structures have been involved and/or consulted on an ongoing basis from the early stages of the project to obtain local knowledge about the area and provide inputs/review opportunities at key stages in the ESIA process.

3.1.6. Local Administration Act (Act No. 13 of 1969)

This Act and various other health notices contain provisions relating to fumes, smoke and gaseous emissions which are likely to have human health impacts.

Relevance to the Project: Potential localised air quality impacts from dust and exhaust gases from construction equipment will be experienced and their impacts on the surroundings is dealt with in the ESMP and would also need to form part of the good practice guidelines in the project specifications.

3.1.7. National Heritage Resources (Act No. 2 of 2012)

This Act provides for the protection of man-made cultural sites and artefacts, as well as flora and fauna. Section 9 (2) of the Act states that "*no person shall, without the written consent of the commission destroy or damage any monument or relic or make any alteration thereto or remove it from its original site or export it from Lesotho*". Section 10 also states that no fauna or flora may be destroyed, damaged or removed from original site or habitat without a written consent from the commission. Failure to comply with the any provision of Section 9 or 10 could result in fine and/or imprisonment.

Relevance to the Project: This act has particular relevance to the proposed reservoir sites, which are typically located on elevated hilly areas and may be sites where various Stone Age and Iron age people settled. It also has relevance to graves that may potentially be affected by the project during construction or implementation. The District of Botha Bothe is historically known as being rich in tangible heritage such as fossils, buildings, monuments and rock art paintings. However, it is anticipated that fossil remnants / remains could be found during construction and excavation of pipeline trenches.

In accordance with the Act, the Contractor has the responsibility to conserve endangered or protected species of fauna and flora. Where feasible it recommended that sensitive habitats be avoided, but where this is not possible, removal permits must be applied for.

3.1.8. Roads Act No. 24 of 1969

The Act provides for locating, constructing, opening, maintaining, protecting, deviating, working and closing of roads. Section 25 specifically addresses compensation for any direct damage resulting from road construction or maintenance.

Relevance to the Project: The project will be required to construct new road(s) or upgrade existing access road(s) to the site. Some of the roads will be for temporary use during construction, while some will be required on a permanent basis to access the project infrastructure for maintenance purposes. Where the servitude of the pipeline will be constructed along the road servitude, the necessary permits will be sought from the Ministry of Public Works and Transport.

3.1.9. Road Traffic Act No. 8 of 1981

This Act regulates and controls the use of a public road and road traffic. The Act also stipulates that traffic signs may not be displayed on public roads without authorisation from the Minister.

Relevance to the Project: During construction traffic impacts may be expected. However, the traffic impacts of the project will not be fully understood until the detailed designs have been finalised and construction planning has commenced.

Potential sources of traffic impacts include: material transportation to and from site, use of public roads to access the site, temporary speed limits due to construction (especially on the road reserve) and lane detours or closures. It is also likely that there will be increased congestion and delays at the Caledonspoort border posts, as most equipment and materials will be imported from South Africa.

To ensure safety of the road users, prescribed traffic signs, signals or markings must be displayed and flag men will also be needed in strategic areas to ease traffic flow.

3.1.10. Legal Capacity of Married Persons Act, 2006

The Lesotho's Legal Capacity of Married Persons Act No. 9 of 2006 introduces the principle of equality between men and women and mandates married couples to consult one another on all matrimonial issues – a considerable change from the common law. This gives equal rights to men and women to own land.

Relevance to the Project: This gives equal rights to men and women to own land. This implies that Men and Women must be consulted equally during the RAP planning and implementation.

3.1.11. Sexual Offence Act (Act No. 3 of 2003)

This Act recognises marital rape as an offence and criminalises all offences of unlawful sexual nature. It does not discriminate against any gender group; provides for compulsory HIV testing of perpetrators of sexual violence and imposes heavy penalties on perpetrators who committed the offence knowing their HIV and AIDS positive status.

Relevance to the Project: Evidence shows that the increased availability of cash amongst construction workers and the potential influx of job seekers create an environment that is conducive to increased extra-marital sexual behaviour, often resulting in the spread of communicable diseases such as HIV and teenage pregnancies. In a country where the average HIV prevalence rate is 25%, the knowing transmission of HIV is likely.

3.1.12. Anti-Trafficking in Persons Act (Act No. 1 of 2011

The **Anti-Trafficking in Persons Act (Act No. 1 of 2011)** criminalizes all forms of slavery and provides for harsh penalties for the perpetrators, and protection and support of victims who are usually women and children. Inadequate dissemination of information about this law makes it difficult for victims to use it for their safety. Poverty and vulnerability of women expose them to trafficking and undermine efforts by law enforcers to protect them.

3.1.13. Workmen's Compensation Act (Act No. 13 of 1977)

This Act does not cover all labour groupings. Domestic workers, mostly women, as well as herd-boys and herd-men are the most vulnerable because there is no legal framework to provide basic standards of protection, compensation and terminal benefits for them.

Relevance to the Project: All employees on the project must be covered by this Act and compensated as per the Act in the event of any lost-time injuries.

3.1.14. Labour Law 2024

The Labour Act aims to prevent accidents likely to cause harm to workers. It states that any container which has toxic, corrosive or flammable substances must be marked so and stored and handled safely. Section IV of this Act deals with Health, Safety and Welfare at work:

The employer is required to ensure that persons, both those employed and those who are not employed but who may be affected by their activities, are (as far as is reasonably practicable) not exposed to risks to their safety and health. However, no definition is given for what is "reasonably practicable". The Duties of employees include the wearing of any protective equipment or clothing provided by the employer.

The Labour Act also provides for the notification of industrial accidents and dangerous occurrences. The employer is required to keep a record of all Occupational Health and Safety incidence and report them to relevant authorities.

Relevance to the Project: There are no policy guidelines that stipulate the priorities of the local communities' vis-á-vis outsiders in employment in the construction projects. Common practice might suggest the local communities be given first preference. Efficiency considerations might dictate that qualifications and skills be used, thereby increasing the chances of employment of outsiders who qualify and of potential conflicts over employment with the locals. During employment of both the skilled and non-skilled labourers the ACT is to be observed.

3.1.15. Weeds Eradication Act No. 18 of 1969

The Act declares certain plants as weeds and places a duty on every person who occupies land to eradicate all weeds growing on that land.

Relevance to the Project: During project implementation invasive species need to be managed properly.

3.2. Relevant National Policies, Plans and Strategies

Vision 2030 Lesotho has been implementing the 2030 Agenda for Sustainable Development since its adoption in September 2015. It has been mainstreamed in the country's current five-year development plan, NSDP II (209-2023). Vision 2030 is built around three primary themes: a vibrant society, a thriving economy and an ambitious nation, with commitment to sustainable development that conserves natural resources, biodiversity, ecosystems and wildlife.

The Environmental Policy, 1998 has 14 different objectives covering a wide range of issues focussing on social and economic dimensions of environmental management, the management and conservation of natural resources, and the promotion of community participation. Those that relate specifically to this project are discussed below:

a) To secure for all Basotho a high quality of environment to enhance their health and wellbeing. Clearly this means that any development which is hazardous to health and wellbeing is not in the long-term interests of the country. On the other hand, this project aims to provide treated bulk water supplies to improve inter alia health and well-being.
b) To raise public awareness and promote understanding of essential causal linkages between development and environment, and to ensure that environmental awareness is treated as an integral part of education at all levels. This objective goes to the heart of the role that ESIA has to play in development planning.
c) To encourage and facilitate individual, NGO, community, religious organisations, and business community participation in environmental management. This supports the need for comprehensive consultation to be carried out with all relevant stakeholders.
d) To put in place comprehensive environmental regulatory measures to stimulate sustainable economic and social development. Such development will be complemented by social and economic incentives to influence positive behaviour towards the environment. Implementation of the ESMP will help to ensure that the proposed development will be sustainable. \\
e) To ensure that the true and total costs of environmental use and abuse are borne by the user, i.e. the 'polluter pays' principle. All mitigation measures in the ESMP must be costed by the contractor and financial and compliance audits must be conducted on a regular basis to ensure that the required management actions have been taken. Ongoing monitoring will be required to ensure that national and best practice goals and targets are being met.
f) To empower women to play a key role in natural resource use and management activities. Women are critical members of society when it comes to consultation, and they will also be key beneficiaries of this project. Awareness raising around road safety, unsafe sex, HIV/AIDS, water-borne diseases, hygiene and sanitation need to focus on women and children.
g) To cooperate in good faith with other countries in the Southern Africa Development
h) Community (SADC) region, in Africa, and with international organisations and agencies
i) achieve optimal use of trans-boundary shared natural resources and effective prevention or abatement of trans-boundary environmental impacts. Lesotho is part of the Orange-Senqu River Basin Commission (ORASECOM) and a signatory to the SADC Protocol on Shared Watercourse Systems.

Gender and Development Policy 2003 (as reviewed in 2016) is an instrument designed to establish and sustain support systems to encourage equal participation of women and girls, and men and boys in development. The policy aims to facilitate regular gender training and awareness creation at all places of work to ensure that planning and managerial procedures, programme design and implementation processes respond to the principles of gender equity and equality. With regards to participation in governance processes, the policy aims to ensure that there are no barriers that inhibit equal participation of women and men in electoral candidature positions.

Lesotho Water and Sanitation Policy (LWSP) (2007) is based on international best practices based on Agenda 21, the Dublin Principles, the Helsinki Rules, Johannesburg Plan of Implementation and the guidelines from the Global Water Partnership. The objectives of the policy are to promote:

a) The proper management of the country's water resources and its sustainable utilisation;
b) Adequate and sustainable supply of potable water and sanitation services to all of the population of Lesotho;
c) Co-ordination and coherence in the management and development of water and other related natural resources, in order to maximise the resultant socio-economic benefits without compromising the sustainability of vital ecosystems; and
d) Harmonisation of processes and procedures followed by different development partners and other stakeholders in order to optimise available internal and external resources as well as ensure timely implementation of sector programmes.

The Policy aims to promote equity in provision, use, management and access to potable water supply and sanitation services. It takes into account vulnerable and marginalised groups of women, girls and all those affected to ensure integration of gender equity into environmental and other inter-sectoral issues into water resources programmes and activities. It encourages the participation of all gender categories in the formulation and implementation of all development. Empowerment of different groups to take control of development processes is highlighted.

Long-term Water and Sanitation Strategy (2014) is intended to provide direction and guide the water sector activities in the period from April 2014 to March 2020. It also contributes to achieving the National Strategic Development Plan II (NSDP II) and addresses the objectives of the LLWDP III.

Transport Sector Policy (2007) aims at improving travel conditions for men and women. It aims to impart skills to local communities and empower them to use local resources. In the spirit of promoting local governance, the policy mandates consultations with community leaders and local government structures on planning, implementation and maintenance for local or specific roads and access to development projects. (LCN, 2015).

National AIDS Prevention and Control Programme. The key objective of the AIDS programme is to coordinate strengthening of the national response to the HIV and AIDS pandemic, especially to strengthen the capacity of the Ministry of Health and Social Welfare (MOHSW) so that it provides leadership in the fight against the pandemic. The framework guiding the mandate of this programme comprises: a) prevention and health promotion; b) care and treatment; c) health standards and systems; and d) evidence-based policy and strategy formulation (www.health.gov.ls).

Multi-sectoral National HIV and AIDS Strategic Plan (NSP) for the five-year period from 2011/12 to 2017/18 provides the national response to the HIV and AIDS epidemic in Lesotho and provides interventions around four thematic areas of HIV prevention: treatment care and support, impact [mitigation, response coordination and management. However, there are several key challenges in Lesotho fight against HIV, including difficulties in changing behaviour, the stigma associated with the disease and the number of migrant workers moving in and out of the country.

Ministry of Tourism, Environment and Culture Environmental Impact Guidelines 2010.
Ministry of Tourism, Environment and Culture Environmental Impact Guidelines of February 2010 make provision for facilitation to participation in and compliance with Lesotho's environmental impact assessment requirements mainly by project developers. They are designed to help to integrate environmental concerns and economic development from the earliest stages of project development as required in Environmental Act 2008. They are applicable to all types of projects, whether initiated by the public sector or the private sector, for which EIA is or may be required. Sectoral guidelines (specific guidelines for special types of projects or industries such as urban infrastructure, dams, roads or mining) have been complied to support the Department of Environment in their reviewing and decision-making.

Before any construction project of this kind (roads and bridges construction) can be initiated an Environmental Impact Assessment need to be conducted thus the policy served as a guiding framework during the compilation of this ESIA

Environmental Impact Assessment Regulations 2021. The regulations provide guidance on the Environmental Impact Assessment requirement for different developments from various industries. According to the guidelines, the LLWP 3 project can be categorised under Category A. Category A projects are projects which are likely to cause a range of significant negative environmental impacts whose extent and magnitude cannot be determined without a detailed study. Similarly, appropriate mitigation measures cannot be devised until results of this study have been obtained. These projects can only be implemented after a full Environmental Impact Assessment (EIA) study which involves detailed studies and consultations have been carried out.

3.3. African Development Bank Operational Safeguards

The proposed project is being developed with the support of the African Development Bank. Therefore, all environmental and social assessments carried out under this assignment are in accordance with relevant Operational Safeguards (OSs) 2023. The core of this guidance lies in the Bank's OSs, which are critical to ensuring that potentially adverse environmental/social consequences are identified, minimised and mitigated so as to prevent harm to people and their environment in the development process. The OSs of relevance to the Project for consideration are:

Table 11: Review of AFDB Operational standards

ISS Framework	Purpose and Scope	Relevance to Project
OS 1 - Assessment and Management of Environmental and Social Risk and Impact	The aim of this overarching Operational Safeguard (OS), together with the OSs that complement it, is to mainstream environmental and social (E&S) considerations, including those related to climate change vulnerability. into Bank operations and thereby contribute to sustainable development in the continent.	ESIA is undertaken to identify and assess the potential environmental and social impacts associated with the project and propose mitigation measures to ensure the development is environmentally sound, socially inclusive, and sustainable. This is a requirement for the financier
	ANNEX 1: Environmental and Social Assessment The Borrower shall undertake an Environmental and Social Assessment (ESA) to assess the environmental and social (E&S) risks and impacts of a project throughout the project life cycle. The 'ESA' is a generic term that describes the process of analysis and planning used by the Borrower to	The project is required to undertake environmental and social assessment (ESA) to assess the risks and impacts posed on the environment and social aspects. The project is required to undertake the ESA in line with the Bank's standards and the National Legal framework.

	ensure that the E&S risks and negative impacts of a project, activities or other initiatives are identified, avoided, minimized, reduced, mitigated or compensated for, and the positive impacts enhanced.	The ESA also allows for the implementation of management and mitigation measures tailored to the scope and size of the project.
	ANNEX 2: Management of Contractors The Borrower shall require that all contractors engaged in the project, set of activities or other initiatives operate in a manner consistent with the requirements of the OSs, including the specific requirements set out in the ESMP.	The project will engage contractors to undertake works in accordance with the project objectives. Engagement of these contractors shall be inline with this OS. Contractors will also be required to comply with the project ESIA and ESA.
	ANNEX 3: The environmental and social exclusion list, complementary to the bank group's negative list This list complements the Exclusion List of the Bank Group Policy on Non-sovereign Operations and any other exiting Bank Group Exclusion List, and may be updated from time to time	The project will be construction of water infrastructure as well as all other required infrastructure to enable the smooth operation of the project, i.e., electricity infrastructure and supply. Material and equipment that will be specified and used will comply with this requirement, that is to say all materials and equipment on the exclusion list will be prohibited in the project. The contractors shall be made aware of this requirement.
OS 2- Labour and Working Conditions	OS2 recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth.	The project labour management procedure in line with this OS makes provision for the assessment of labour requirements (Direct Labour, contracted workers and

	Borrowers can promote sound worker-management relationships and enhance the development benefits of a project by treating workers in the project fairly and providing safe and healthy working conditions. Respect of workers' rights is one of the keystones for developing a strong and productive workforce. This OS is informed by the International Labour Organization's (ILO) Declaration on the Fundamental Principles and Rights at Work,103 and the United Nations Guiding Principles on Business and Human Rights.	migrant workers), defining the different types of labour required for the project. Risks assessment on the labour including Occupational Health and Safety risk for the labour within the project are required. Prohibition of labour exploitation, forced labour, child labour and trafficking in persons will be enforced by the project. Labour Management protocols will be designed and implemented to protect all labour working in the project. Regular reporting to the Bank on labour issues shall be done.
OS 3- Resources Efficiency and Pollution Prevention and Management	This Operational Safeguard (OS) recognizes that economic activities often cause air, water, and land pollution, and consume finite resources that may threaten people, ecosystem services, and the environment at the local, regional, and global levels. The current and projected atmospheric concentration of greenhouse gases (GHGs) threatens the welfare of current and future generations. In addition, more efficient and effective resource use, pollution prevention, and	The Environmental and Social Impact Assessment (ESIA) will identify and assess the potential environmental and social impacts associated with the project and propose mitigation measures to ensure the development is environmentally sound, socially inclusive and sustainable. The mitigation measures will be incorporated into an ESMP document which will be implemented by the Contractor during construction.

	GHG emission avoidance, and mitigation technologies and practices have become more accessible and achievable	The mitigation methods employed pollution into the air, water and land. Ensuring that the activities of the contractor do not cause pollution, especially when working within the river, the contractor shall ensure that no spillages or any form of pollution enters the water environment.
OS 4- Community Health, Safety and Security	This Operational Safeguard (OS) recognizes that projects, activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration or intensification of impacts due to a project or activities.	The project will be carried out within public spaces, hazards such as open trenches, excavations and moving construction vehicles may pose risks to the communities within the project area and those passing by. Through this ESIA, the ESMP makes provision for risks posed to the communities. The contractors will implement the mitigation measures to ensure that impacts are avoided or minimised.
OS 5- Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement	Environmental and Social Operational Safeguard (OS) 5 recognizes that project-related land acquisition, restrictions on land access or land use, and loss of property/assets can have adverse impacts on communities and persons. Project-related land acquisition and restrictions on land use may cause physical displacement (relocation,	While every effort has been made during the design phase of the project to avoid having to relocate people, physical and economic displacement may be necessary. All the economic displacement or resettlement activities will be in accordance with the project RAP.

	loss of residential land or loss of shelter), economic displacement (loss of land, assets or access to assets, leading to loss of income sources or other means of livelihood), or both.	Resettlement is concerned with managing challenging processes to minimise impacts on communities, mitigate any impacts that do occur, and ideally leave communities better off, through appropriate resettlement, restoration of livelihoods and related initiatives. The ideal result should be mutual gains for communities, companies, and governments.
OS 6 Habitat and Biodiversity Conservation, and Sustainable Management of Living Natural Resource	This Environmental and Social Operational Safeguard (OS) outlines the requirements for the Borrower to: i. identify and implement opportunities to conserve and ii. sustainably use biodiversity205 and natural habitats; and iii. observe, implement, and respond to requirements for iv. the conservation and sustainable management of priority v. ecosystem services	The Environmental and Social Impact Assessment (ESIA) identifies and assesses the potential impacts on the natural habitats and resources within the project area, including wetlands protected under RAMSAR, protection of habitats and prohibition on trade of endangered species etc. and it proposes mitigation measures to ensure sustainable implementation of the project.
OS 7 Vulnerable Groups	The African Development Bank's views economic and social rights as an integral part of human rights and respects the principles and values of human	The project will be implemented within diverse communities, where the risk of exclusion and discrimination is eminent. The ESIA and ESMP ensures

	rights as set out in the United Nations Charter and the African Charter of Human and Peoples' Rights. Through the requirements of this OS, the Bank encourages Borrowers to observe international human rights norms, standards, and best practices, and to reflect in Bank operations national commitments made under, inter alia, international human rights covenants and the African Charter of Human and Peoples' Rights.	that social inclusion and protection of vulnerable groups is maintained. Through robust awareness campaigns and trainings for the project staff and communities, the project will be able to minimise the impacts on vulnerable groups and thus ensuring protection of human rights for all.
OS 8 Cultural Heritage	The Bank recognizes that cultural heritage is an inherent and essential part of self-identification, and that it provides continuity in tangible and intangible forms between the past, present, and future. People identify with cultural heritage as a reflection and expression of their constantly evolving values, beliefs, knowledge, and traditions. It is defined as tangible and intangible resources inherited from the past that people identify, independently of ownership, as being a reflection and expression of their constantly evolving values, beliefs, knowledge, and traditions.	The communities in which the project will implemented is characterised by different cultural beliefs and norms, most notable is the use of certain land and physical features as sacred to cultural practices, i.e. certain areas within the river may be used by initiation schools for rituals, there may be no go areas within the villages that are attached to cultural practices, even as far as determining which gender may or may not have access to certain lands. All these cultural aspects identified within the ESIA will be managed in accordance with the mitigation measure provided within the ESMP.

OS 10 Stakeholder Engagement and Information Disclosure	This Environmental and Social Operational Safeguard (OS) therefore recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social (E&S) sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.	The backbone of every development project. In order to ensure by-in and sustainability of the project, proper stakeholder planning, identification and engagement is vital and has to be carried out throughout the project life cycle. This ensures that the project gets support, not only from authorities but also from the communities within which the project in implemented.

3.4. Local Permits Required

Based on Lesotho LWS and Policies, the permits required for construction and operation of this project are summarised in Table 11.

Table 12: Required Environmental Permits and/or Licences.

Act/ Regulations	Permit/ Licence	Implementing agent	Relevance to the project
Section 25 of the Environmental Act	Environmental Licence	Department of Environment	Permit to start with the project activities. Record of Decision.
Section 47 of the Environment Act	Noise permit	Department of Environment	A noise permit may be required if the construction noise levels (i.e., blasting activities) are likely to be in excess of the noise emission standards.
Section 76 of the Environment Act	Waste licence	Department of Environment	The Contractor may require a licence to store, handle and transport hazardous waste. Basel Permit
Water Act, No. 15 of 2008	Water Use Permits	Department of Water Affairs	The activities that are applicable to this project which require a Water Use Permit include: ● taking of water from a watercourse. ● storing water. ● engaging in a stream flow reduction activity; and ● altering the bed, banks course or characteristics of a watercourse.
Sections 65–67 of the Environment Act	Consent	Department of Environment	Will be relevant to the removal of endangered or protected plants if any are found on sites to be cleared for construction.

National Heritage Resources Act, 2011	Consent	Ministry of Tourism, Environment and Culture	Permission / consent is required for any destruction or damage to any historical monuments.
Roads Act No. 24 of 1969	Permit	Ministry of Public Works and Transport	A permit will be required where the operational servitude of the pipeline will be constructed along the road servitude as well as construction servitude overlapping with road servitude as proposed.
Labour Law 2024	Notice	Department of Labour	Notice to the Labour commissioner on the commencement of construction activities.

3.5. Administrative Framework for EIA in Lesotho

The legislative requirements for an Environmental Study conducted according to Section 21 of the Environmental Act of 2008 are provided in Table 5.4, with reference to the relevant section of this report.

Table 13: Summary of how this report satisfies the legislative requirements of Section 21 of the Environmental Act (2008).

Subsection	**Description**	**Reference in report**
5(a)	A detailed description of the proposed project or activity and of activities it is likely to generate	Chapter 4
5(b)	A description of the potentially affected environment including specific information necessary for identifying and assessing the environmental effects of the proposed project or activity	Chapter 5
5(c)	A description of the technology, method and processes that shall be used in the implementation of the project or activities and the main alternatives and reasons for declining to use those alternatives	Chapter 4

5(d)	Reasons for selecting the proposed site and rejecting alternative sites	Chapter 4
5(e)	Environmental impacts of the proposed activity or project including the direct, indirect, cumulative, short term or long-term effects on the environment of the project	Chapter 7
5(f)	An identification and description of measures proposed for eliminating, minimising or mitigating the anticipated adverse effects of the project or activity on the environment	Chapter 8
Subsection	**Description**	**Reference in report**
5(g)	An indication of whether the environment of any other state or area beyond the limits of national jurisdiction is likely to be affected and the mitigating measures to be undertaken	Chapter 3
5(h)	A brief description of how the information provided for in this section has been generated	Chapter 5
5(i)	An indication of gaps in knowledge and uncertainties which were encountered in completing the required information	Chapter 2
5(j)	The social, economic and cultural effects the project is likely to have on people and society	Chapter 5
5(k)	The irreversible and irretrievable commitment of resources which will be involved by the project if the implemented in the manner proposed by the developer	Chapter 4
5(l)	A comprehensive mitigation plan	Chapter 9
5(m)	any other matters that the Minister may prescribe (defined in the 2008 RoD)	Chapter 4, 5 & 9

4. Project Description

4.1. Nature of the Project

This project for which an ESIA is being developed entails the construction of water infrastructure segmented in the following lots:

a) Lot 1: Comprises intake works at Hololo River, Raw Water Transmission Line, Water Treatment Works, and High Lifting Pump Station located at the water treatment works;
b) Lot 2: Water Transmission Mains, reservoirs, and pumping stations covering the whole project area.
c) Lot 3: Water distribution networks covering all the settlements within the project area.

The project will be implemented in three (3) phases; Phase one will involve carrying out ESIA studies. Geotechnical investigations, land surveys and detailed design of the project and procurement, while phase two will entail construction works, including site clearance (bulk earthworks, excavations and levelling out of the ground), and phase three be the operations of the development. The anticipated project activities include:

a) Geotechnical and soil investigation
b) Site clearance, excavation, and earthworks
c) Filling or backfilling of works and compaction of surfaces
d) Site drainage establishment (storm water pipeline installation, kerbs and gutters)
e) Site water supply (design, supply and installation of water reticulation is required)
f) Concrete batching and concrete structures erection
g) Reinforcement (supplied, bent, placed and welded)
h) Buildings
i) Hauling of abnormal weight supplies to site.
j) Temporary works (road deviations and access roads)

4.2. Project Location

The project will be implemented in the Northern District of Botha Bothe. The image below depicts the entire Lowlands Water Supply Scheme, in particular Zone 1 highlighted in pink indicates the area of this project, which covers Botha Bothe and part of Leribe District.

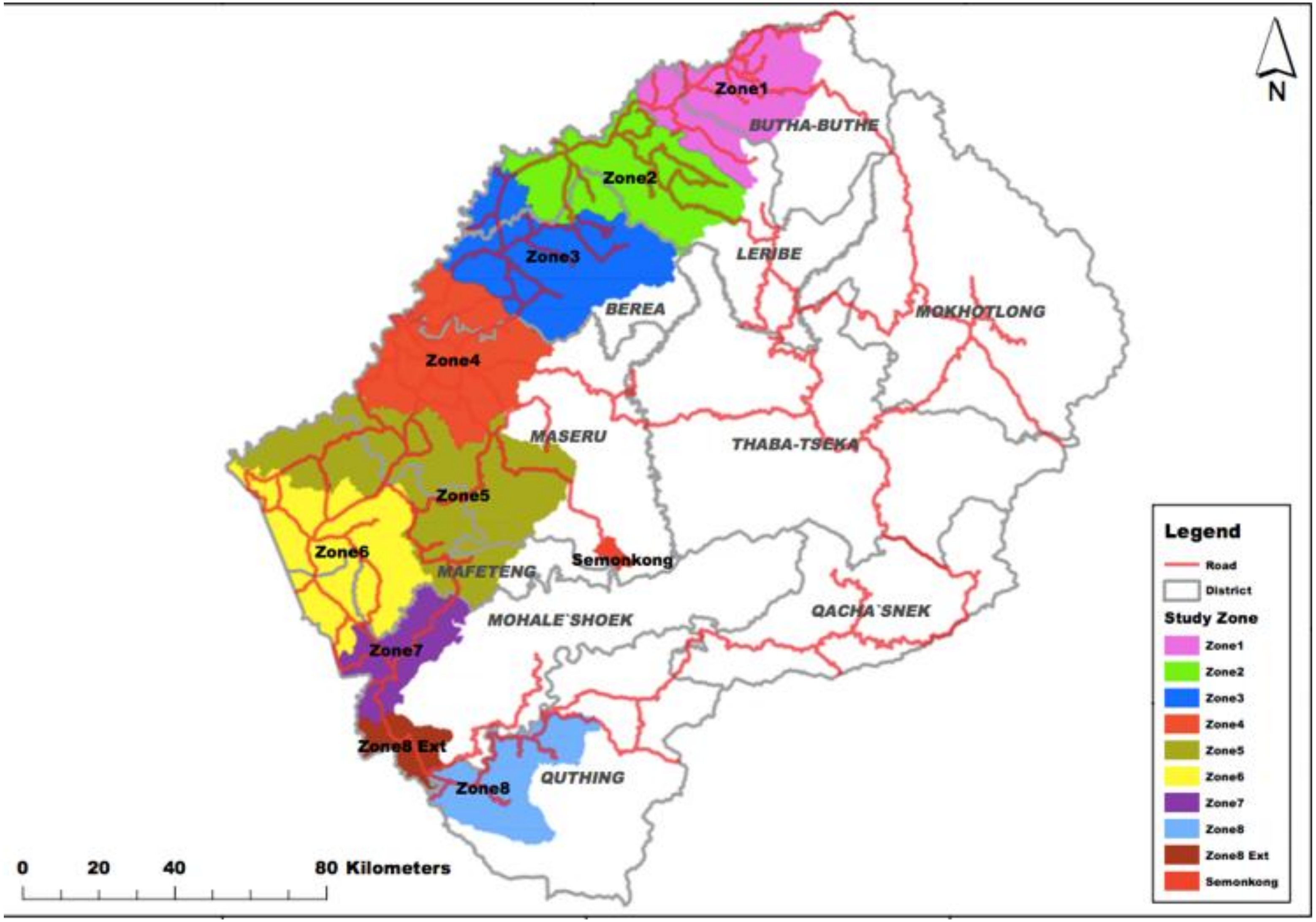

Figure 4: Location of Zone 1, highlighted in pink colour

4.3. Zone 1 Scheme Description

The portable bulk water supply scheme for Zone 1 (Figure 4) is supplied by an abstraction point on the Hololo River close to the road bridge that links Qalo with Monontša, a water treatment plant,9 pump stations, 28 reservoirs and 133km length pipelines with diameter ranging from 80mm to 800mm.

The bulk of the supply is for Botha Bothe district including provision for the newly constructed Ha Belo industrial estates. The main treated water pump station at the Water Treatment Works (WTW) delivers water to a Command Reservoir at Ha Mopeli (Z1R9) from where the water gravitates to Belo Industrial (Z1R7). A booster pump station shall lift water to a Botha Bothe Domestic Reservoir at Makopo (Z1R10) that is be connected to WASCO existing Domestic Reservoir that is located below the proposed new Domestic Reservoir.

A booster pump station lifts water from the Domestic Reservoir (Z1R10) to a Command Reservoir (Z1R11) on the Makopo Hill from where water gravitates in a south easterly direction along the main road to Leribe district, supplying settlements as far as Ha Jonathane and Khabo. Two secondary pump stations at the WTW delivers water via further booster pump station to Makhunoane (Z1R30) in the north and Phelandaba (Z1R27) in the east. Smaller pumping stations and pipelines conveys water to storage tanks at settlements throughout the project area.

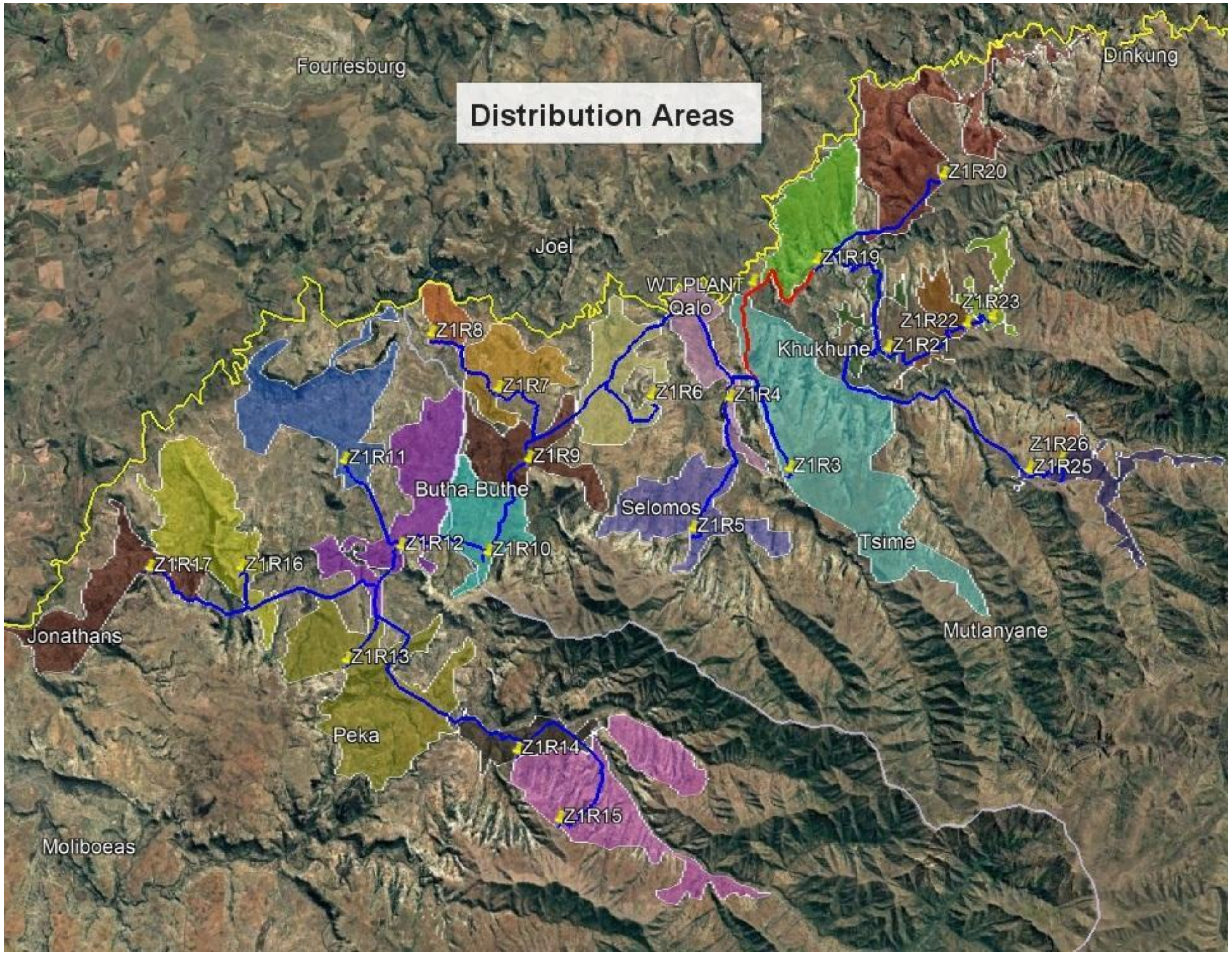

Figure 5: Distribution Water Supply Scheme.

The Lesotho Lowlands Water Supply Scheme area designed in 2017/2018 and the location of Zone 1, as shown in the following map including some of the modifications from the 2018 design are indicated in the figure below.

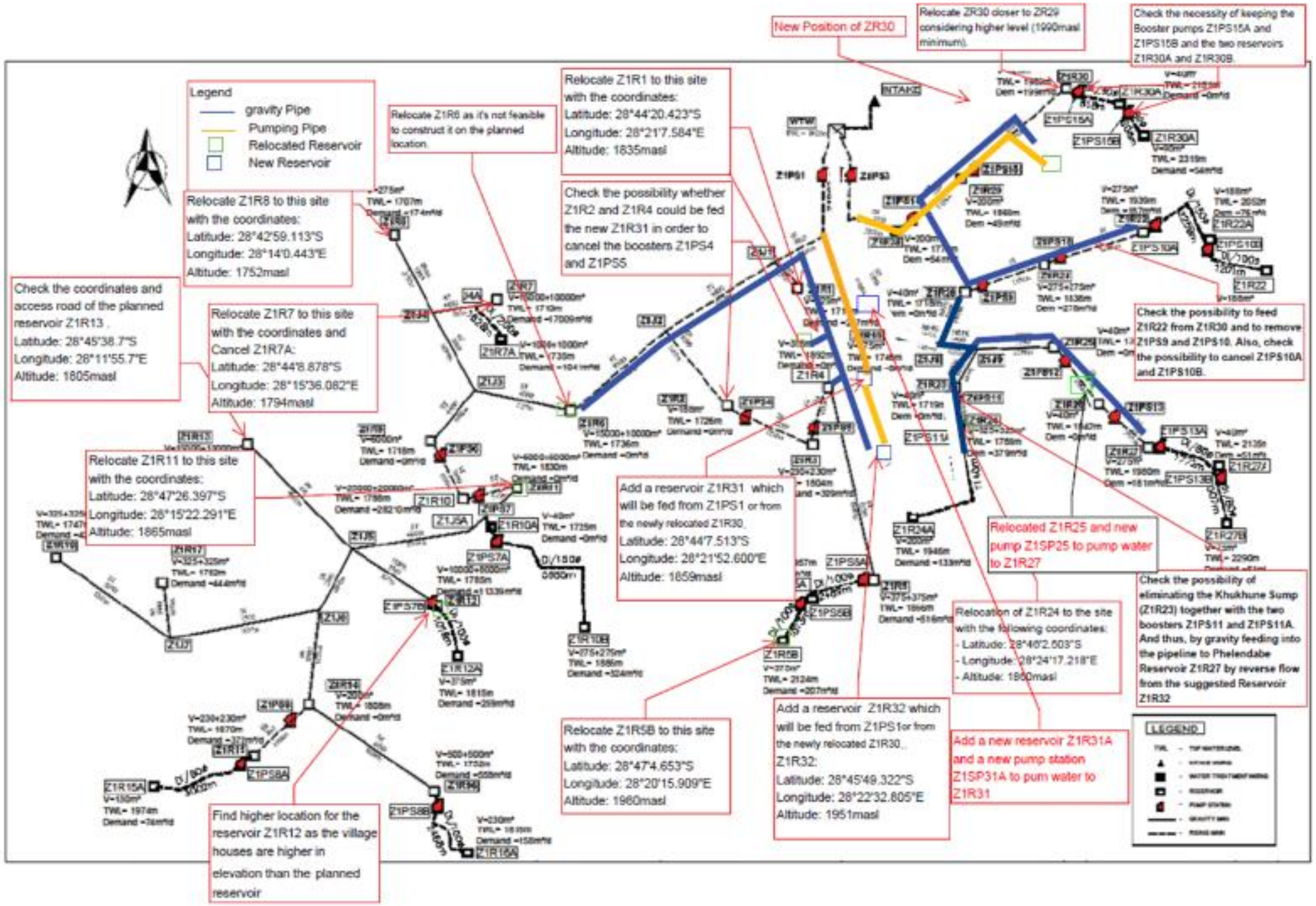

Figure 6: Suggested Design Modifications.

The above figure 6 details the schemes flow, indicating the features of the project that are critical to the success of the project. The scheme will be comprised with the following:

a) **Water Treatment Works** – Water from the river is to be treated to WHO potable drinking water standards at the WTW.
b) **Pumping Stations** – are designed to supply peak daily flows.
c) **Command Reservoir** – is not intended to provide the main storage within the system but is placed at strategic place in the delivery system to balance an inflow from pumping system to the outgoing transmission main, which provides gravity feed to the demand centres.
d) **Transmission Lines** – are designed to carry the daily peak flow based upon the design horizon.

4.3.1. Water Treatment Works

The proposed Water Treatment Works (WTW) is situated on the existing agricultural land on the Southern bank of the proposed intake at the Hololo River. (Figure 1-3) Terrain constraints considered in locating the WTW are flood lines, agricultural activities and storm water drainage patterns. Access to the site will be from the newly constructed tar road (B26) to Monontša. The proposed WTC is located above the 100-year flood line as modelled using the Hydrological Engineering Center – River Analysis.

4.3.2. Intake Works

The raw water source for Zone 1 is the Hololo River at Latitude (DMS): 28o41’50.6” S and Longitude (DMS): 28o21’41.6” E. The intake to the water treatment works is situated on the Southern Bank of the Hololo River.

It is designed to abstract surface water with submersible pumps housed in a reinforced concrete pump station. The intake works will be equipped with an intake screen and submersible raw water pumps as well as a delivery pipe manifold and associated non-return valves and isolating valves connected to a single delivery pipe leading to the inlet of the water treatment works (WTW).

The top surface of the intake is level with the 1:10year flood water level of 1616.7meters above mean sea level (mamsl). The choice of the intake site was based on the presence of good solid bed rock along the outside of a natural bend in the river. The proposed site for the Hololo Intake and Treatment Works is presented in pictures below.

Figure 7: Photo showing proposed site of Hololo intake site.

4.3.3. Pumping Stations

The pump station designed a wet well pump station (with submersible pumps) with delivery pipe manifold and associated non-return valves and isolating valves connected to a single delivery pipeline leading to the inlet of the WTW. The well pump station compartments would be founded on a rock ledge created using pre-split blasting at 200mm centres to prevent fracturing of the main body of the rock. The level of the ledge would be about 1m below the minimum water level. The electric switchgear will be located in a weather-proof container located at the WTW site above the 1:100-year flood level. The pumps would be secured as they are submersible.

4.3.4. Command Reservoirs

The command is placed at a strategic place in the delivery system to balance an inflow from the pumping system to the outgoing transmission main, which provides gravity feed to the demand centres. The inflow from the pumping station is to be up to 22 hours pumping per day, whereas the outflow from the Command Reservoir by gravity into Service Reservoirs, can be over 24 hours. A 2-hour storage capacity suffices to supply the necessary balancing storage. The command Reservoirs are constructed in reinforced concrete.

4.3.5. Transmission Pipes

The transmissions mains system for Zone 1 consists of separate sub systems:

a) The primary pipeline system runs from the WTW at Hololo in a westerly direction to supply the main demand centre of Botha Bothe. The settlements of Qalo, Serutle, Selomo, Makong, Phooko, Rampais Nek, Nqechane, Jonothane, Pitsi's Nek and Khabo are supplied from this system. This system conveys 96% of the water from the WTW.
b) Two secondary pipeline systems run from the WTW and conveys 4% of the water. One system transfers water in an easterly direction to the settlements of Khukhune, Seboche and Phelandaba. The other system transfers water in a northerly direction to the settlements of Qholaqhoe and Makhunoane.

The table below shows a summary of pipeline sizes to be used in the distribution network system.

Table 14: Summary of Pipelines

Diameter	Type	Classe	PN	Length
1200	CML DI	40	NA	17070
1000	CML DI	40	NA	6409
800	CML DI	40	NA	860
800	CML DI	30	NA	9320
600	CML DI	30	NA	5237

400	HDPE	NA	20	3895
200	CML DI	30	NA	22616
160	HDPE	NA	20	1150
150	CML DI	40	NA	13765
150	CML DI	30	NA	10340
125	HDPE	NA	16	10985
110	HDPE	NA	20	2905
110	HDPE	NA	16	6375
100	CML DI	30	NA	4890
90	HDPE	NA	20	3625
80	CML DI	40	NA	10110
80	CML DI	30	NA	2700
75	HDPE	NA	10	4105
50	CML DI	40	NA	4167
				140524

4.4. Additional Financing Components

4.4.1. Component 1: Water Supply Infrastructure Development

This component finances activities to improve access to sustainable domestic and industrial water supply services within the three additional settlements. The following is the outline of the activities:

a) Construction of 129 km water distribution mains of varying diameters ranging from 80 to 32mm.
b) Construction of 9 service reservoirs of capacities ranging from 500 m3 to 1 megalitres and 5 inline water booster pumping stations, to deliver water to the three settlements.
c) Construction of 7*10m3 pressure break tanks to maintain allowable adequate pressures within the network.
d) Construction of access roads to all the service reservoirs, pressure break tanks and booster pumping stations
e) Provision for electricity connection to all the 5 inline booster pumping stations to facility the systems optimal functionality.
f) Provision of 5,250 household service connections and installation of 5,250 domestic meters to serve 100 villages within the three additional settlements.

g) Development, and implementation of leakage reduction and network optimization measures to improve and guarantee sustainable and reliable supply of water.

i. Construction of Distribution Networks for Z1R4 – Qalo (Maloseng) including steel reservoirs, booster pump stations and all the associated civil works and valves.

Table 15: Construction of Distribution Networks for Z1R4.

Construction of Distribution Networks for Z1R4 – Qalo (Maloseng) including steel reservoirs, booster pump stations and all the associated civil works and valves						
				Geographic Coordinates		Notes
Description	Unit	Quantity	Infrastructure	Latitudes	Longitudes	
Piping work incl. Valves, chambers, testing & disinfection	m	37,000.00	SS1 to Ha Sebophe	28°45 23.50"S	28° 21' 46.17"E	
				28° 45' 42.19"S	28° 22' 07.17"E	
			LB1 to SS1	28° 45' 21.94"S	28° 21' 45.31"E	
				28° 44' 46.18"S	28° 21' 06.77"E	
			R1 to LB1	28° 44' 44.40"S	28° 21' 07.59"E	
				28° 44' 40.76"S	28° 21' 10.67"E	
			Junction D to Kotsonkoaneng	28° 44 ' 17.41"S	28° 21' 06.26"E	
				28° 43' 36.44"S	28° 43' 34.83"E	
			LB2 to LB3	28° 43' 39.38"S	28° 20' 54.38"E	
				28° 42' 40.99"S	28° 20' 34.48"E	
			Junction S to Qalo	28° 42' 21.97"S	28° 20' 18.27"E	
				28° 42' 25.91"S	28° 19' 48.00"E	

Provision for yard connections	Unit	600.00				The initial design does not elaborate on the specifics regarding yard connections as for Option 2 of the households` connections consideration.
Inline Booster Pump	U	1	SS1	28° 45' 20.18"S	28° 21' 46.89"E	
10m3 PBT (LB)	U	3	PBT (LB) 1	28° 44' 40.76"S	28° 21' 10.67"E	
			PBT (LB) 2	28° 43' 40.00"S	28° 20' 54.34"E	
			PBT (LB) 3	28° 42' 39.35"S	28° 20' 34.91"E	
$500m^3$ Ground circular steel tank.	U	1	R1	28° 44' 27.67"S	28° 21' 10.39"E	
Chlorination and metering systems for all the reservoirs	U	2	R1	28° 44' 27.67"S	28° 21' 10.39"E	
			Z1R4	28° 43' 47.88"S	28° 20' 33.01"E	

ii. Construction of Distribution Networks for Z1R7 – Botha Bothe Industrial Ha Majara Serutle including steel reservoirs, booster pump stations and all the associated civil works and valves, etc.

Table 16: Construction of Distribution Networks for Z1R7.

Construction of Distribution Networks for Z1R7 – Botha Bothe Industrial Ha Majara Serutle						
				Geographic Coordinates		Notes
Description	Unit	Quantity	Infrastructure	Latitudes	Longitudes	
Piping work incl. Valves, chambers, testing & disinfection	m	46,000.00	Z1R7 to Belo Industrials	28° 44' 09.80"S	28° 15' 36.27"E	
				28° 43' 05.54"S	28°15' 24.82"E	
			Z1R7 to PBT 1	28° 44' 09.80"S	28° 15' 36.27"E	
				28° 43' 45.33"S	28° 15' 15.31"E	
			Ha Majara to Liqalaneng	28° 44' 02.76"S	28° 15' 36.93"E	
				28° 43' 36.55"S	28° 16' 54.99"E	
			Ha Majara to Ha Nqabeni	28° 44' 15.76"S	28° 15' 31.63"E	
				28° 44' 26.39"S	28° 16' 11.00"E	
			PBT1 to Lerobane	28° 43' 41.57"S	28° 15' 06.97"E	
				28° 44' 35.93"S	28° 15' 25.19"E	
			Belo Industrial to Marallaneng	28° 43' 03.29"S	28° 15' 25.38"E	
				28° 42' 47.65"S	28° 16' 04.44"E	
			Morifi to Liqalaneng	28° 43' 32.31"S	28° 16' 07.89"E	
				28° 43' 14.84"S	28° 16' 46.01"E	
Provision for yard connections	Unit	1,300.00				The initial design does not elaborate on the specifics regarding yard connections as for Option 2 of the households`connections consideration.
Inline Booster Pump	U	3	SS1			No booster pumps
			SS2			
			SS3			
10m3 PBT (LB)	U	2	PBT (LB) 1	28° 43'43.19"S	28° 15' 12.40"E	
			PBT (LB) 2	28° 43' 49.62"S	28° 16' 25.23"E	
500m^3 Ground circular steel tank.	U					No service tanks
Chlorination and metering systems for all the reservoirs	U	1	Z1R7	28° 44' 13.59"S	28° 15' 35.44"E	

iii. Construction of Distribution Networks for Z1R9 – Ha Mopeli (Nqabeni) including steel reservoirs, booster pump stations and all the associated civil works and valves, etc.

Table 17: Construction of Distribution Networks for Z1R9.

Construction of Distribution Networks for Z1R9 – Ha Mopeli (Nqabeni)						
				Geographic Coordinates		Notes
Description	Unit	Quantity	Infrastructure	Latitudes	Longitudes	
Piping work incl. Valves, chambers, testing & disinfection	m	46,000.00	Z1R9 to Makopo	28° 45' 44.79"S	28° 15' 57.62"E	
				28° 46' 11.96"S	28° 15' 35.41"E	
			Z1R9 to Ha Mopeli	28° 45' 43.50"S	28° 16' 04.27"E	
				28° 45' 40.38"S	28° 16' 39.11"E	
			Ha Mopeli to Matsatsaneng	28° 45' 32.34"S	28° 16' 38.82"E	
				28° 45' 47.40"S	28° 17' 22.12"E	
			Matsatsaneng to Taung	28° 45' 41.83"S	28° 17' 32.85"E	
				28° 46' 15.59"S	28° 18' 01.40"E	
			R2 to Ha Nqabeni	28° 45'28.95"S	28° 16' 23.19"E	
				28° 44' 50.10"S	28° 15' 58.92"E	
			Ha Nqabeni to Community	28° 45' 03.27"S	28° 16' 32.06"E	
				28° 44' 17.41"S	28° 17' 24.80"E	
Provision for yard connections	Unit	3,350.00				The initial design does not elaborate on the specifics regarding yard connections as for Option 2 of the households`connection s consideration.
Inline Booster Pump	U	3	SS1			The whole system lacks inline booster pumps
			SS2			
10m3 PBT (LB)	U	2	PBT (LB) 1			No pressure break tanks
			PBT (LB) 2			
500m^3 Ground circular steel tank.	U	2	R1	28° 45' 37.09"S	28° 16' 27.15"E	
			R2	28° 45' 23.84"S	28° 16' 24.83"E	
Chlorination and metering systems for all the reservoirs	U	3	R1	28° 45' 23.84"S	28° 16' 24.83"E	
			R2	28° 45' 23.84"S	28° 16' 24.83"E	

			Z1R9	28° 45' 47.88"S	28° 16' 05.50"E	

iv. Access Roads

Qalo – Maloseng Z1R4: The existing access road to the project location have to be upgraded to facilitate safe delivery of construction equipment. Part of the road passes near some houses. Construction Access Road width 3.5m & Carriage way width 2.5m Compacted Gravel Layer 150mm for 1,200 meters.

Botha Bothe Industrial-Majara Z1R7: There is an existing access road that needs to be upgraded. The road branches off from the tarred road from Botha Bothe town to Mokhotlong. The road passes through agricultural land and settlements. Construction Access Road width 3.5m & Carriage way width 2.5m Compacted Gravel Layer 150mm for 1,300 meters.

Mopeli – Kontsokoaneng Z1R9 : There is an existing gravel access road to the site location. Construction Access Road width 3.5m & Carriage way width 2.5m Compacted Gravel Layer 150mm for 550 meters

There are no new environmental impacts foreseen in the up grading of these roads. Noise and dust control should be monitored during upgrading and through the contract period. Thus, all access roads are to be upgraded for heavy machinery transportation.

4.4.2. Key Activities for settlements under the Additional Funding

Additional funds are required for the construction of the Distribution Networks within the settlements that the transmission mains will traverse in line with the prioritization order. The key activities to be financed through the proposed additional funding per area is as follows:

Construction of Distribution Networks for Z1R4 – Qalo (Maloseng) including steel reservoirs, booster pump stations and all the associated civil works and valves

Table 18: Construction of Distribution Networks for Z1R4.

Description
Piping work incl. Valves, chambers, testing & disinfection
Provision for yard connections

Inline Booster Pump
10m3 PBT (LB)
500m^3 GROUND CIRCULAR STEEL TANK
SUB-TOTAL
Chlorination and metering systems for all the reservoirs
Construction Access Road width 3.5m & Carriage way width 2.5m Compacted Gravel Layer 150mm
LEC connections including extension of the existing grid for Guard houses, reservoirs and pump station and the transformers if needed

Construction of Distribution Networks for Z1R7 – Botha Bothe Industrial Ha Majara Serutle including steel reservoirs, booster pump stations and all the associated civil works and valves, etc.

Table 19: Construction of Distribution Networks for Z1R7.

Description
Piping work incl. Valves, chambers, testing & disinfection
Provision for yard connections
Inline Booster Pump
10m3 PBT (LB)
1 ML GROUND CIRCULAR STEEL TANK
SUB-TOTAL
Chlorination and metering systems for all the reservoirs
Construction Access Road width 3.5m & Carriage way width 2.5m Compacted Gravel Layer 150mm
LEC connections including extension of the existing grid for Guard houses, reservoirs and pump station and the transformers if needed

Construction of Distribution Networks for Z1R9 – Ha Mopeli (Nqabeni) including steel reservoirs, booster pump stations and all the associated civil works and valves, etc.

Table 20: Construction of Distribution Networks for Z1R9.

Description
Piping work incl. Valves, chambers, testing & disinfection

Provision for yard connections
Inline Booster Pump
10m3 PBT (LB)
500KL CIRCULAR STEEL TANK
1 ML GROUND CIRCULAR STEEL TANK
SUB-TOTAL
Chlorination and metering systems for all the reservoirs
Construction Access Road width 3.5m & Carriage way width 2.5m Compacted Gravel Layer 150mm
LEC connections including extension of the existing grid for Guard houses, reservoirs and pump station and the transformers if needed

5. PROJECT ALTERNATIVES

The following alternatives were considered in development and planning of this scheme. Water sources used to supply the water project, energy sources used to power the abstraction, treatment and supply of water as part of this project.

5.1. Water sources alternatives assessment

The feasibility study undertaken by Mouchel Parkman in 2005 investigated a series of water supply alternatives to meet the water demand of Lowlands settlements. In 2018 several alternatives and scenarios were considered during the Conceptual design for the project.

The alternatives considered are summarised in Table 20, in order of complexity:

Table 21: Proposed alternative options considered for supplying Zones 1

Water supply alternative	Description	Assessment outcome
Spring-fed system	Construction and/ or upgrading of piped rural water systems using locally available springs to supply storage tanks for local distribution	The spring yields would not be sufficient to meet water demands both current and long term. This option was not considered to be feasible to supply the demands in Zones 1, especially the construction of Belo Industrial Site. **This alternative was therefore not assessed further.**
Groundwater-fed systems	Construction of piped rural water systems using groundwater abstracted by submersible pumps to header tanks for local distribution	The groundwater resources yield would not be sufficient to meet demands. The operational challenges of this scheme include high energy requirements for pumping. **This alternative was not assessed further.**
Abstraction of water from the Hololo River	Construction of abstraction and water treatment systems to supply target settlements from perennial river flow	Abstraction of water from the Hololo River was considered as a preferred bulk water supply option according to the Lesotho Lowlands Bulk Water Supply Scheme Feasibility Study (2008). This alternative would require minimal land thus reducing number of PAP's. It would not also affect the operational rules of LHWP infrastructure. It would pose less risk of water

		losses through evaporation. thus, making this alternative less prone to climate change while also ensuring downstream water use is continued.
Construction or augmentation using off-bank storage	Construction of off-bank storage dams to augment seasonal river flow	Although this option is considered to be far more environmentally acceptable compared to instream dams, it can result in flooding of useful land and reduce access to various resources for the local residents. Storage of water in a shallow off-bank storage dam will increase evaporative losses. This risk makes this alternative highly vulnerable to climate change effects. This alternative was therefore not assessed further.
Instream storage dams	Construction of a major 'in-stream' dam to store water and improve the assurance of supply during low flow periods	This option requires construction of a major dam and has significant cost implications and environmental impacts. The construction of the dam will affect the river's natural flow regime, water quality, biota and other instream ecosystems. The construction of a dam on the Hololo River is an option that is being considered for Phase 2 (and is therefore not assessed in the ESIA)
Water supply alternative	Description	Assessment outcome
Inter-basin transfers	Inter-basin transfer from the Lesotho Highlands Water Project (LHWP) using existing infrastructure to augment flows in the Hololo River during winter months	This option involves the transfer of up to 3.75 million m3 of water per annum from Muela dam. The impacts on downstream hydrology and biota are still to be determined by the implementer of connection of existing Dam and the planned treatment plant. This forms an integral part of Project to ensure that there is sufficient water to meet demand and that there is sufficient water to maintain an IFR of 15% for downstream users.

From the analysis of the above table, the project Zone will be served by a bulk water supply scheme using direct river abstraction, water treatment, pumping stations and conveyance through pipelines to storage tanks near target settlements. Abstraction will be from the Hololo River just below the road bridge crossing to Qholaqhoe, with the treatment works located near the abstraction point, at Ha Marakabei.

When there is insufficient flow in the Hololo River, water will be released from the Highlands Water Project via ‘Muela Dam and the Nqoe River into the Hololo River. Hence, there is a need that this project to connect the dam and the Water Treatment Works should be initiated in parallel by the LLWDP III. The infrastructure has been designed to accommodate future growth at the Belo Industrial Estate being developed by Lesotho National Development Corporation (LNDC) and the Zone 1 settlements.

5.2. Energy source alternatives assessment

The water supply scheme shall require energy for its operation. The different options that could be used to provide for the energy requirements of the scheme are presented in Table below.

Table 22: Proposed Energy sources alternative options considered for the Project.

Water supply Energy source alternative	**Description**	**Assessment outcome**
Solar powered scheme	The entire water supply would not connect to the national electricity grid. But an independent Solar energy generation component would be worked into the design so it can power the energy needs of the entire scheme. This would involve centralised and local solar generation units with storage	This option would reduce the carbon emissions related to the operation of the water supply project. There would be no additional strain on the local electricity supply network. **This option was considered not feasible.** Because additional land parcels would be required to accommodate the solar generation and energy storage infrastructure. This would increase the number of Economically displaced PAP's associated with this project. Thus, further exacerbating poverty within the project area.
Diesel powered scheme	The energy needs of the water supply would be met through the use of on-site diesel-powered generators.	**This option was not considered as it was not aligned to Lesotho's Climate Change Efforts.** This would greatly increase the carbon emissions of the scheme. It would also affect the ambient air quality within all Project Affected communities. Thus, increasing
Water supply Energy source alternative	**Description**	**Assessment outcome**
		public health risks within the receptor communities.

Gravity fed scheme	The energy requirements for Water Treatment works, the Water abstraction, pumping of water to the command reservoir and all other reservoirs as well as supply through the reticulation line. Would be achieved through use of gravity	Topography would not allow. Areas needed to be supplied are at such elevation that abstraction and treatment of water at required elevations that would allow sufficient head for pressurising the system all via gravity would not be feasible. Distance to such areas and yields at those would not be feasible. **This option is technically not feasible. And was not analysed but was rejected.**
Electricity powered scheme	The energy requirements for Water Treatment works, the Water abstraction, pumping of water to the command reservoir and all other reservoirs as well as supply through the reticulation line. Would be achieved	The scheme operational costs would increase. Thus, making unit cost of water for the communities higher. Some of the host communities do not have electricity. There would be additional land requirements to expand the electricity grid to these communities to power the project. This would increase the number of Economically displaced PAPs as a result of this project.
Electricity and gravity fed schemes	The water abstraction and the Water Treatment plant and the pumping of water to the Command reservoir is achieved through the use of electricity from the national grid. The water conveyance system and the reticulation network shall make use of gravity.	This option provides enough energy to power the abstraction infrastructure and the Water Treatment plant. While also incorporating efforts of carbon reduction. By using Lesotho's natural terrain to supply water to the low-lying villages through gravity. While also, saving operational costs.

5.3. Intake structure alternatives

The location is on the left bank approximately 300m downstream of the bridge. The site selection was based on site, location and characteristics of the area (A to E) each of which offered certain advantages. The site was chosen on the accessibility, suitability of good foundation and proximity to intake and WTW sites. Table 2 outlines the key advantages and disadvantages of each site and the reasons for the final selection of Site C.

Table 23: Location of Intake Site

Site	Location	Advantages/Disadvantages	Result
A	On right bank next to existing bridge	• No good rock foundation • Lack of sufficient water depth due to scour	Discarded
B	On right bank about 100 m downstream of existing bridge	• Located on outside of sharp bend • Very good rock foundation • Shallow scour channel erosion in the riverbed which is a good indication. • Access difficult and long pipe bridge required as well as access road in flood plain • Bridge will be submerged during average floods	Discarded
C	On left bank of river about 300 m downstream of bridge	• Very suitable site for abstraction • Good rock • Suitable water treatment site nearby • Excavation of approach necessary	Recommended
	450 m downstream of bridge on right bank	• Unsuitable foundation · Insufficient water depth	Discarded
	On left bank 3 km upstream of bridge	• No good rock foundation • Gabions necessary • Existing intake	Discarded

5.4. Pump Stations Alternatives

Two possible pump station types were considered for use at the Intake.

a) The first would be a wet well pump station that would be overtopped with safety by a flood with a recurrence interval greater than 20 years.

b) The second would be a dry well pump station with suitable end suction pumps, such as self-priming pumps that would be designed to stay dry in floods up to the 1:200-year flood.

5.4.1. Dry well versus Wet well pump station.

The dry well pump station contains pumps that are in the open, are visible, have easy access for maintenance, and have switchgear close-by in the pump station together with monitoring and warning instrumentation. Dry well pump stations are more vulnerable to flood damage and are more costly than wet well pump stations hence not preferred.

The wet well pump station that uses submersible or vertical turbine pumps contains pumps that are generally out of sight beneath the water and accordingly, maintenance staff have to rely on instruments to indicate when pumps are experiencing trouble, or some fault is starting. Consequently, a proper maintenance regime must be instituted to prevent pump failure. As submersible pumps are out of sight under water, it is more difficult to see whether a pump is showing signs of deterioration. Modern pumps are provided with a series of monitoring instruments that are connected to audible alarms. It is possible, however, to provide siren alarms that can indicate if a submersible pump is running into difficulty.

While a detailed comparison of costs for the two pump stations was not undertaken, an approximate cost comparison using indicative costs per square metre of plan area indicates that the wet well option would cost on the order of Maloti 1.4 million less than the dry well option. In conclusion, while a wet well pump station would be slightly less desirable from a maintenance and monitoring point of view than a dry well pump station, the design engineers believe that its significantly lower cost outweighs this primary disadvantage and makes it the best option.

The changes relating to pump from the design of 2024 is as fellow:

- Number of Pump Station & Locations not changed: 6 Units.
- Number of Pump Stations eliminated: 22 Units.
- Number of New Pump Stations proposed: 01 Unit

Table 24: Design Data.

NAME	**TYPE**	**DUTY FLOW (m3/hr)**	**DUTY HEAD (m)**	**POWER (kw)**	
Z1PS1	Large Type 1	1 686,4	162	1 145,5	N/A Change
Z1PS3	Med Type 1	11,2	172	8,1	N/A
Z1PS10000 a00A	Small	3,6	121	1,8	N/A
Z1PS13A	Small	1,4	162	1,0	N/A
Z1PS14	Med Type 1	11,2	106	5,0	N/A
Z1PS15	Med Type 1	11,2	151	7,1	N/A
Z1PS R31					New

5.5. Alternative Pipeline Routes

The conveyance system lies mainly within the road reserve and no specific alternative routes are proposed. The total length of the pipes is approximately 207km including the additional settlements The details are in Table 23 below.

Table 23: Design Data

ITEM	Length (m)
Z1R32-ZR19	2 786
Z1R32-Z1R6	18 523
Z1R32-Z1R1	1 195
Z1R26-Z1R27	2 027
Z1R27-Z1R27A	2 576
Z1R22-Z1R22A	1 833
Z1R32-Z1R11	4 440
Z1R32-Z1R7	3 706
Z1R32-Z1R8	4 211
Z1R32-Z1R12	7 276
Z1R32-Z1R13	4 214
Z1R32-Z1R17	8 479
Z1R32-Z1R16	11 607
Z1R32-Z1R16A	2 525
Z1R32-Z1R18	5 302
Z1R32-Z1R5	2 895
Z1SP3-Z1R29	4 435
Z1R29-Z1R30	6 624
Z1R30-Z1R22	16 338
Z1R30-Z1R21	171
Z1SP2-Z1R31	5 169
Z1R31-Z1R32	3 676
Z1R32-Z1R4	3 515
Z1R32-Z1R26	9 124
Junction N to Junction O	3 000
Total (m)	**132 647**

Pipelines follow the route of existing roads, within the boundaries of the road reserve, and as far away from the actual road surface as possible. The exact location depends on the negotiations of the CW with the Ministry of Public Works and Transport (Roads Directorate). The use of the road reserve greatly reduces the need for land appropriation, simplifies the construction works, and also improves access to the pipelines for future maintenance purposes. The use of specific pipe materials is prescribed; the following pipe materials are recommended:

- Pumping mains: Steel or ductile iron (DIP)
- Gravity mains: CML Steel, DIP, uPVC and HDPE.

5.6. Reservoirs Site Location

These sites and elevations are indicated in Table 6 as per detail review update. Their positions are determined and verified in the field and subjected to the following criteria:

- Geotechnical suitability – depth to suitable foundation conditions and depth to bedrock.
- Topography – slope across the site and extent of a cut & fill operation, if any.
- Sufficient available area for the reservoirs, chambers, storage buildings, security guardhouse, parking and manoeuvring areas.
- Accessibility of the site for construction vehicles and maintenance crews.
- Elevation of the reservoir structure relative to the settlements to be served.
- Presence of existing dwellings or structures on or near the site; difficulties with expropriation of land.
- Environmental and/or social sensitivity of the site.

The changes relating to reservoir from the initial design of 2018 are as follows:

- Number of Reservoir Locations not changed: 14 Units.
- Number of Reservoir Locations To be Relocated: 12 Units
- Number of New Reservoir proposed: 2 Units

Table 25: Summary suggested changes for reservoirs.

Reservoir Name	Locality	Zone	Type	Reservoir Type	Chosen capacity (m3)	Latitude	Longitude	Ground Elevation (m)
Z1R1	Ha Rasekila	South Region	Circular Concrete	sump	6000	28 43 33,81 S	28 21 34,91 E	1754
Z1R2	Ha Tabolane	South Region	Circular Concrete	Sump	6000	28 44 6,97 S	28 21 50,34 E	1845
Z1R3	Ha Katamelo	South Region	Rectangular Concrete	Command + supply	25000+6000	28 45 49,322 S	28 22 32,805 E	1951
Z1R4	Qalo	South Region	Pressed Steel Tank	Supply	500	28 44 20,423 S	28 21 7.584 E	1835
Z1R5	Ha Selomo	South Region	Circular Concrete	Supply	750	28 47 4,40S	28 20 14,90E	1860
Z1R6	Pitsi S Nek	South Region	Pressed Steel Tank	Supply	500	28 44 17,48S	28 19 19,01E	1809
Z1R7	Belo Industrial	South Region	Circular Concrete	Supply	8000	28 44 8,88 S	28 15 36,058E	1760
Z1R8	Makong	South Region	Pressed Steel Tank	Supply	500	28 42 59,11S	28 14 0,44E	1741

Z1R9	Mopeli	South Region	Rectangular Concrete	Supply	10000	28 45 49,50 S	28 16 0,73 E	1750
Z1R10	MAKOPO	South Region	Rectangular Concrete	Supply	25000+25000	28 47 34,38 S	28 15 20,89 E	**1825**
Z1R11	PHOOKO	South Region	Circular Concrete	Supply	1000	28 45 38,75 S	28 11 56,73 E	1782
Z1R12	RAMPAI	South Region	Rectangular Concrete	Supply	25000	28 47 20,23 S	28 13 21,13	1792
Z1R13	PITSIS NEK	South Region	Circular Concrete	Supply	750	28 49 49,10S	28 11 59,30 E	1857
Z1R14	Ha Khabo	South Region	Circular Concrete	Supply	750	28 51 43,30 S	28 16 3,10 E	1730
Z1R15	Khabo Ext	South Region	Pressed Steel Tank	Supply	500	28 52 43,88 S	28 16 34,96E	1879
Z1R16	Nqechane	South Region	Circular Concrete	Supply	1000	28 47 53,29S	28 09 26,86E	1768
Z1R17	Jonathan	South Region	Circular Concrete	Supply	1000	28 47 01,10S	28 07 20,20 E	1740
Z1R18	Ha Lijo	North-East Region	Pressed Steel Tank	Sump	500	28 42 3,9 S	28 22 27,2E	1773

Z1R19	Mitla's	North-East Region	Pressed Steel Tank	Supply and Sump	500	28 41 28,3 S	28 23 12,6E	1860
Z1R20	Makhunoane	North-East Region	Circular Concrete	Command	1000	28 40 16,48 S	28 26 2,02 E	2007
Z1R21	Mpharoane	North-East Region	Pressed Steel Tank	Supply	200	28 43 18,5 S	28 24 55,1 E	1833
Z1R22	Seboche	North-East Region	Circular Concrete	Supply and Sump	750	28 42 48,1 S	28 26 46,7 E	1937
Z1R23	Seboche Ext	North-East Region	Pressed Steel Tank	Supply	200	28 42 39,27 S	28 27 23,08	1973
Z1R24		North-East Region	Pressed Steel Tank	Sump	500	28°45'0.63"S	28°27'10.45"E	1815
Z1R25	Phelandaba	North-East Region	Pressed Steel Tank	Supply and Sump	500	28 45 50,8 S	(28 28 15,1 E	1980
Z1R26	Phelandaba Ex	North-East Region	Pressed Steel Tank	Supply	200	2845 57,21 S	28 29 01,66 E	2135

5.7. No-Go Alternative

The “no-go” alternative is that in which the LLWDSP III project does not proceed and current circumstances and trends in Zone 1 will continue. In this scenario the predicated impacts of the bulk water supply scheme project will not occur. No land will be lost to reservoir, pumping station, water treatment works, pipeline footprints, Hololo river will not have water abstracted from it nor sludge discharged into it under conditions of high flow; access roads will not be upgraded or constructed; and sand-winning from borrow pits will not take place. Local communities will not experience the temporary disruptions associated with the implementation of LLWDSP III.

Equally, none of the benefits of the LLWDP III will accrue: construction and operational phase employment opportunities will not be created, and project people will continue to experience severe water shortages. Belo industrial development will proceed slowly with no guaranteed water supply. Hence, the “no-go” alternative is not a preferred option, even though, from an environmental management perspective, this alternative will be beneficial in the sense that any potential negative impacts associated with the project will be avoided. The Do-Nothing/Without Project Option should not be adopted, as the current water shortage in Zone 1 is very severe leading to poor living conditions and crippling of the economy.

The no-go alternative for the settlements under additional financing would mean that the areas covered under the additional financing would miss out on the benefits from the project, particularly access to water, improved environmental health and improved quality of life. The no-go alternative for the settlements under additional financing would also have an impact of project sustainability as this would result in frequent vandalism of the main pipelines that traverse through those villages.

5.8. Develop the Proposed Project

The “Develop the Proposed Project” Option is recommended as a better option than the “Do Nothing/Without Project” Option. The anticipated benefits of the implementation of the Project include:

a) Ensured sustainable Supply of Potable Water
b) Employment Opportunities
c) Skills Development
d) Secure supply of water to Belo Industrial Estates hence economy improvement
e) Increased agricultural production.

5.9. Different Approaches to be Considered.

This section looks at different approaches that should be considered during construction and supervision of the Project.

5.9.1. Recruitment of Labour

The Lesotho Labour Act stipulates that where local expertise exists, it should be utilised and sourcing out of any expertise should be based on non-availability locally. Ways of recruiting the workforce are outlined in the table below.

Table 26: Alternatives for Recruiting Project Labour

Options	Comments
1. Sourcing unskilled labour from within the surrounding communities	**Positive Aspects:** • This option helps reduce accommodation costs that the developer would have to incur as labourers would continue living in their homes and not on camp site. • Reduction in conflicts with local communities on employment opportunities available to them and • Reduction of possible social disruptions caused by inflow of jobseekers
	Negative Aspects: Basotho from other parts of the country may complain that they have not been fairly treated.
2. Employing Basotho Irrespective of their districts of origin	**Positive Aspects:** This complies with the Labour Code.
	Negative Aspects: ● People are considered for employment irrespective of their place of origin. Therefore, there is a possibility of influx of people into the project area leading to overcrowding and spread of disease e.g. HIV/AIDS. ● Threats of conflicts between the residents and jobseekers. ● Increase in gender-based violence

3. Employing a mixture of locals and expatriates	**Positive Aspects:** Allows for a wide selection of skills required for the Project.
	Negative Aspects: Importation of skills tends to impact on the socio-cultural norms of the Project communities and can be disruptive because of unorthodox sexual activities, which can promote prostitution and associated social challenges.

Recommendation: Option 1 seems to be the better alternative, as implication of imported labour outlined above would be avoided, hence averting associated social problems. Option 3 becomes appropriate for acquiring technical skills that are not available locally.

5.9.2. Solid Waste Management

Options for the management of solid waste are outlined in Table below.

Table 27: Possible Options for Solid Waste Management.

Options	Comments
1. Burning of litter on site	**Positive Aspects:** ● Limited financial burdens; and ● Temporally viable
	Negative Aspects: ● Can Increase chances of fire hazards. ● Some of the litter like glass bottles, cans still need to be transported to a dumping site since they cannot be consumed by fire; and ● Emissions of gases that contribute to air pollution
2. Refuse collection to a common dumping area.	**Positive Aspects:** No management obligations of waste once it has reached the dumping area.
	Negative Aspects:

	● The developer has to make their own arrangements to transport the waste, and this comes at a cost;
3. Recycling of some waste of material	**Positive Aspects:** Plastics, paper, as well as bottles can be recycled for cash.
	Negative Aspects: This is time consuming as it requires separation of recyclable waste. However, if separate bins are available this is avoided

Recommendation: Option 2 of refuse collection seems to be practical optional that can be used by the developer and be employed with Option 3 for efficiency of solid waste management on site.

5.9.3. Ablution Facilities

In any project sanitation facilities are necessary to protect the surrounding environment from pollution and to improve public health. Therefore, the Developer shall ensure that the labourers make use of the toilets provided on site. Sewage management can be done in a number of ways. Some of the options are outlined in the table below.

Table 28: Possible Options for Ablution Facilities.

Options	Comments
1. Construction of VIP Toilets	**Positive Aspects:** ● If well managed the sewage is easy to maintain to reduce sewage seepages to the ground water. ● Financially viable to construct. Do not require frequent emptying; and ● No water required for flashing
	Negative Aspects: ● Contamination of the ground water if not properly constructed.
2. Water System Toilets	**Positive Aspects:** Limited ground water contamination if properly constructed and managed.

	Negative Aspects: ● Require frequent emptying which may be a challenge; and ● Can only operate properly in water reticulated areas, of which some of the Zone 1 areas still have no water reticulation.

Recommendation: a combination of the two options should be utilized on site.

5.9.4. Potable Water Supply

Other than drinking water for the workforce, water will also be required for various construction and operation activities. Table 6.7 shows different options that may be considered.

Table 29: Water Supply

Options	Comments
1. Ground water	**Positive Aspects:** ● Cheap source of water. ● Water does not require any treatment; and ● There is already such facility on Site.
	Negative Aspects: ● Require water quality monitoring regularly; and ● Not easy to trace pollution source.
2. Purchasing water from Water Sewage Company (WASCO)	**Positive Aspects:** Very reliable as water will be available at all times storing in Tanks.
	Negative Aspects: Procuring and transportation of water may be very costly.
3. Water abstraction from nearby natural sources (rivers and depressions)	**Positive Aspects:** Very cheap.
	Negative Aspects: ● Can only be used for Construction; and ● Require water use permit and abstraction permit from Department of Water Affairs (DWA).

Recommendation: If ground water sources are reliable on site, only ground water can be used, however, in times of severe droughts purchasing water from WASCO may be considered. For construction purposes Option 3 to be considered.

5.9.5. Housing for Construction Workforce

If most labourers are local, they can reside in the comfort of their own homes hence reduce demand for accommodation on site. For labourers residing on site the following options may be implemented as shown in table 29 below.

Table 29: Housing for Construction Workforce

Options	Comments
1. Park Homes	**Positive Aspects:** Cheap and can be reused for other projects.
	Negative Aspects: May not be to the specification of the users.
2. Renting from Lodge, bed & breakfast and local communities	**Positive Aspects:** ● Income generation for the Lodges and Communities; and ● No land required for site establishment.
	Negative Aspects: ● Developer to incur cost for renting. ● Presence of workforce in the village may result in conflict and social problems e.g., spread of HIV/AIDS.
3. Construction of Own facilities	**Positive Aspects:** ● This affords the Developer an opportunity to construct an accommodation facility that would meet the need. ● Maybe used during the operation phase of the project as staff accommodation.
	Negative Aspects: ● May be costly to construct the facility; and ● Might not be utilised after the construction phase hence become a white elephant

Recommendation: Use of Park Homes is advised.

6. ENVIRONMENTAL AND SOCIAL BASELINE DESCRIPTION

6.1. Biophysical Environment

6.1.1. Climate

Lesotho's climate is described as continental and temperate due to the influence of the country 's location in the Karoo Basin spanning altitude ranging from about 1400m to above 3480 above sea level. Lesotho has four distinct seasons namely summer, autumn, winter and spring. Winters are generally cold and dry and are characterized by the domination of high-pressure systems with the resulting clear skies, dry air and warm to moderate temperatures during the day, with a sudden cold temperature just after sunset. Precipitation in winter is mainly in the form of snow especially over the highlands.

Summers are hot and humid, due to proximity of the Inter-Tropical Convergence Zone (ITCZ) and the Kalahari low-pressure area which draw in land, the moist tropical air masses from the Congo Basin. Annual precipitation ranges from 15mm in the Lowlands to 500mm in the Senqu River Valley. Lesotho enjoys an average of 310 sunshine days per year, with the summer average being 24 sunny days per month and enjoys low humidity (http://lesmet.org.ls).

a) Leribe District

In Leribe the summers are warm while the winters are short, cold and dry. It is mostly clear around the year with temperatures varying from 0oC to 26°C and rarely below -3°C or above 30°C.

Temperatures

The Leribe district has warm season that lasts for 3.8 months from November to March, with the average daily maximum temperature above 24°C. The hottest month of the year is January with an average maximum temperature of 26oC and Minimum of 14°C. The coolest season lasts for 2.5 months from May to August with average daily maximum temperatures as 18°C and minimum as 0°C.

Precipitation

The wetter season lasts 5.6 months from 12 October to 31 March with a greater than 25% chance of a given day being a wet day. The chance of a wet day peaks to 46% on February 3. While the dry season lasts 6.4 months from 31 March to 12 October with the smallest chance of a wet day being 3% on July 6. A common form of precipitation throughout the year in Leribe is rain.

Rainfall

Leribe experiences significant seasonal variation in monthly rainfall. The rainy period of the year lasts for 10months, from August 3 to June 8, with a sliding rainfall of 13mm. The most rain falls during the 31 days centred around 24 January, with average total accumulation of 83mm. The rainless period of the year lasts 1.8 months from 8 June to August 3. The least rain fall is around July 7, with average total accumulation of 8mm.

The details of climatic factors affecting Leribe are presented below in Table 30:

Table 30: Average Mean Monthly Climatic Factors in Leribe

Climatic Factor	**DURATION (Months)**											
	J	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Average Maximum Temperature (°C)	26	25	24	20	18	14	16	1 8	22	24	24	26
Average Minimum Temperature (°C)	14	12	11	8	4	3	0	4	8	10	10	12
Average Precipitation/rainfall (mm)	18 7.2	142. 4	88 .4	46 .5	17 .1	21 .4	6.5	16. 1	30.6	109 . 6	156 . 1	159
Average Rainfall Days	23	19	16	11	5	3	2	3	6	14	17	21
Humidity %	72	73	57	49	44	46	46	49	54	54	59	65
Average Sun days	5	6	11	17	25	26	28	27	22	15	10	6

Data from worldweatheronline.com

b) Botha Bothe District

The climate of Botha Bothe is mild, and generally warm and temperate. In winter, there is much less rainfall than in summer. The temperature averages 13oC; precipitation 902mm per annum.

Precipitation

In Botha Bothe precipitation is lowest in July, with an average of 11mm. Most precipitation falls in January with an average of 144mm.

Temperature

January is the hottest month of the year at an average of 18.0°C. At an average of 5.7°C July experiences the lowest temperatures in the whole year.

Sunshine

In Botha Bothe, November has the most daily hours of sunshine with an average of 10.28 of sunshine and with a total of 318.63 hours of sunshine. Generally, Botha Bothe has around 3448.8 hours of sunshine throughout the year with an average of 113.39 hours of sunshine per month.

Rainfall

The rainy period of the year lasts approximately for 9.5 months, from August to May, with a sliding 31day rainfall of at least 13mm. The most rain falls during the 31 days centred around January, with an average total accumulation of 90mm. The rainless period of the year lasts for 2.5 months from May to August. The least rain falls around July with an average total accumulation of 8mm.

Climate Change

Current models of climate change for the summer rainfall zone indicate that several changes are likely:

- Greater incidence of droughts and very hot days.
- General increase in mean temperatures.
- Late onset of summer rains.
- Greater intensity of rainfall.
- Higher variability of rainfall.
- Likelihood of significant floods.

Implications for the project

- Snow, very cold weather and excessive rainfall can interrupt construction works.
- High temperatures can affect construction workers and productivity.
- Greater incidence of extreme rainfall events could exacerbate erosion on steep slopes, especially along the pipeline route.

The details of climatic factors affecting Botha Bothe are presented below in Table 31.

Table 31: Average Mean Monthly Climatic Factors in Botha Bothe

Climatic Factor	DURATION (Months)											
	J	F	M	A	M	J	J	A	S	O	N	D
Average Temperature (°C)	18	17.5	16	12.7	9.1	5.8	5.7	8.7	12.9	15.1	16.3	17
Average Maximum Temperature (°C)	23.5	23	21.8	18.5	15.8	12.9	13	16	20	21.7	22.5	23.3
Average Minimum Temperature (°C)	12.2	11.6	9.9	6.5	2.3	0.9	-1.4	1	5.1	7.8	9.5	11.5
Average Precipitation/rainfall (mm)	144	109	104	65	31	18	11	29	29	99	123	140
Average Rainfall Days	13	11	11	7	3	2	2	3	3	8	10	13
Humidity %	66	67	65	63	58	54	51	45	40	49	54	61
Average Sun Hours	10.0	9.8	9.1	8.5	8.6	8.5	8.9	9.3	9.9	10.1	10.4	10.3

Data from http/en.climate-data.org

6.1.2. Ambient Noise

There are no routine noise levels monitoring efforts within the project area. The proposed project area includes rural, peri urban and urban settlements within districts of Botha-Bothe and Leribe. The results of the Baseline noise levels recording within the receptor communities are presented in Tables 32, 33 and 34 below.

Table 32: Typical ambient Noise levels (rural in Botha Bothe - Khukhune)

Sampling Date	6:00 AM	12:00pm	18:00 pm	24:00 pm
27th June 2022	22	48	51	18
28th June 2022	18	40	50	18
29th June 2022	17	30	43	17
30th June 2022	20	54	55	15
01st July 2022	26	58	67	12
02nd July 2022	22	26	38	20
03rd July 2022	24	49	60	22
04th July 2022	23	51	71	

Table 33: Ambient Noise levels Makopo – urban Botha Bothe

Sampling Date	6:00 AM	12:00pm	18:00 pm	24:00 pm
27th June 2022	70.9	69.1	89.2	60.1
28th June 2022	69.6	85.5	98.1	55.4
29th June 2022	69.4	89.1	90.2	50.7
30th June 2022	71.3	91.1	100.2	54.1
01st July 2022	63.1	88.3	98.3	50
02nd July 2022	70.1	88.1	99.5	52.2
03rd July 2022	57.3	87.6	98.3	56.8
04th July 2022	59.6	88.4	112.5	

Table 34: Ambient noise levels Nqechane – rural Leribe

Sampling Date	6:00 AM	12:00pm	18:00 pm	24:00 pm
27th June 2022	24	52	58	20
28th June 2022	22	48	56	22
29th June 2022	20	36	50	20
30th June 2022	28	74	53	18
01st July 2022	25	68	60	15
02nd July 2022	27.5	70	62	19

03rd July 2022	27	78	59	21
04th July 2022	31	82	69	

6.1.3. Air Quality

There are no routine air quality monitoring efforts within the project area. Unpublished Air quality Baseline reports closest to the project area are from Mokhotlong district: from mining and construction operations.

The 7-day winter Baseline air quality index modelled data for Botha Bothe district are presented in Table 35.

Table 35: Ambient Air quality Botha-Bothe

Date	Air quality status	Daily AQI Value	Wind speed	Pollutants (PM2,5 µg/m³)
22/06/2022	Moderate	99	7,2 Km/h	10.6
23/06/2022	Moderate	75	2,9 Km/h	11.1
24/06/2022	Moderate	64	7.2 km/h	10.6
Date	**Air quality status**	**Daily AQI Value**	**Wind speed**	**Pollutants (PM2,5 µg/m³)**
25/06/2022	Good	44	18 km/h	9.6
26/06/2022	Good	38	14.4 km/h	9.1
27/06/2022	Good	46	7.2 km/h	11.1
28/06/2022	Good	25	3.6 km/h	6.1
29/06/2022	Good	46	3.7km/h	10,1
30/06/2022	Good	40	7,2kh/h	7.1

6.1.4. Topography

Lesotho can be divided into several ecological zones based on topography. Typically, the zones consist of the Lowlands, Foothills, Senqu Valley, Upper Mountain Valleys, Mountain Region and High Mountain Regions (Figure 8).

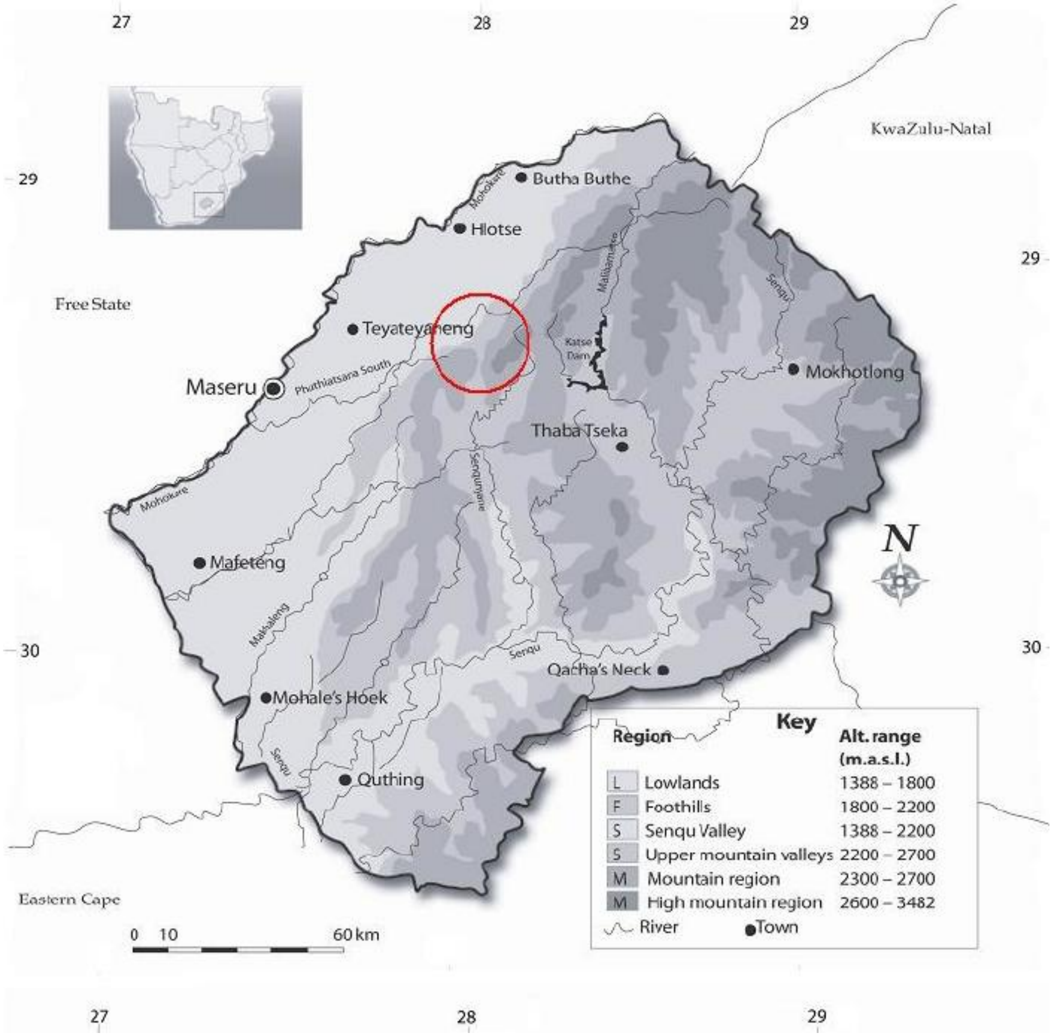

Figure 8: Typical ecological zones of Lesotho based on topography (Mokuku 1997, in Kobisi, 2005)

The project is located within the Lowlands Region of Lesotho which has an altitudinal range of 1,388 metres above mean sea level (mamsl) to 1,800 mamsl. The Lowlands Region covers about a quarter of Lesotho with an approximate surface area of 5,000km^2. The Lowlands lie along the western side of the country between the Mohokare (Caledon) River in the west, and the foothills of the Maluti Mountain Range to the east. The Lowlands area is characterised by flat to gently rolling hills covered with grassland and by streams and rivers that drain the foothills of the Malutis. The undulating, rolling hills are interspersed with isolated hills and ridges or mesas that have cliffs and steep-sided talus slopes.

6.1.5. Geology

The geology of Lesotho comprises horizontal to sub-horizontal dipping sedimentary rocks of the Beaufort and Stormberg Groups of the Karoo Supergroup overlain by up to 1,600m of Drakensburg Group basalts (UNDP, 1984) (Table 5-3). Sedimentary rocks belonging to Burgersdorp, Molteno, Elliot and Clarens Formations include fluvio-deltaic mudstones, siltstones, and sandstones that underlie and crop out in the western Lowlands.

The Clarens Formation is overlain by a thick sequence of (up to 1600 m) compact and amygdaloidal basalt flows of the Lesotho Formation. Numerous dykes, ring dykes and sills intrude the sediment and basalt formations. The doleritic and basaltic dykes mainly trend north-west – south-east and north-north-east – south-south-west, forming either resistant ridge or eroded trench features. The ring dyke complexes form characteristic circular low hills surrounded by Burgersdorp sediments, where they occur in western Lesotho.

Table 36: Stratigraphy of Lesotho

Age	Group	Formation	Lithology
Quaternary and Tertiary		Alluvium, colluvium and residual deposits	Clays, silts and gravels
Middle Jurassic to Permian	Drakensberg	Lesotho	Basaltic lava with subordinate tuff and lenses of sandstone near the base
	Stormberg Beaufort	Clarens	Sandstone and siltstone
		Elliot	Mudstones and shales with subordinate feldspathic sandstone

		Molteno	Sandstones, grits, mudstones, shales and coals
		Burgersdorp	Mudstones and siltstones, sandstone intercalation common
Early Tertiary to Late Cretaceous	Intrusive Rocks	Dykes and sills	Basalt, dolerite and gabbro
		Clusters of pipes and dykes at depth	Kimberlite

The majority of the powerline routes are underlain by sedimentary Karoo rock (Figure 8) of the Beaufort and Stormberg Groups comprising sandstones, siltstones and mudstones. Sandstone and siltstone bedrock was commonly encountered in areas underlain by sedimentary rocks of the Karoo Supergroup. The sandstone rock encountered at shallow depth has undergone varying degrees of weathering and generally ranged in hardness from very soft to medium hard rock. Hard rock sandstone was observed in a major portion of the study area. The figure depicts the geological makeup of the project area.

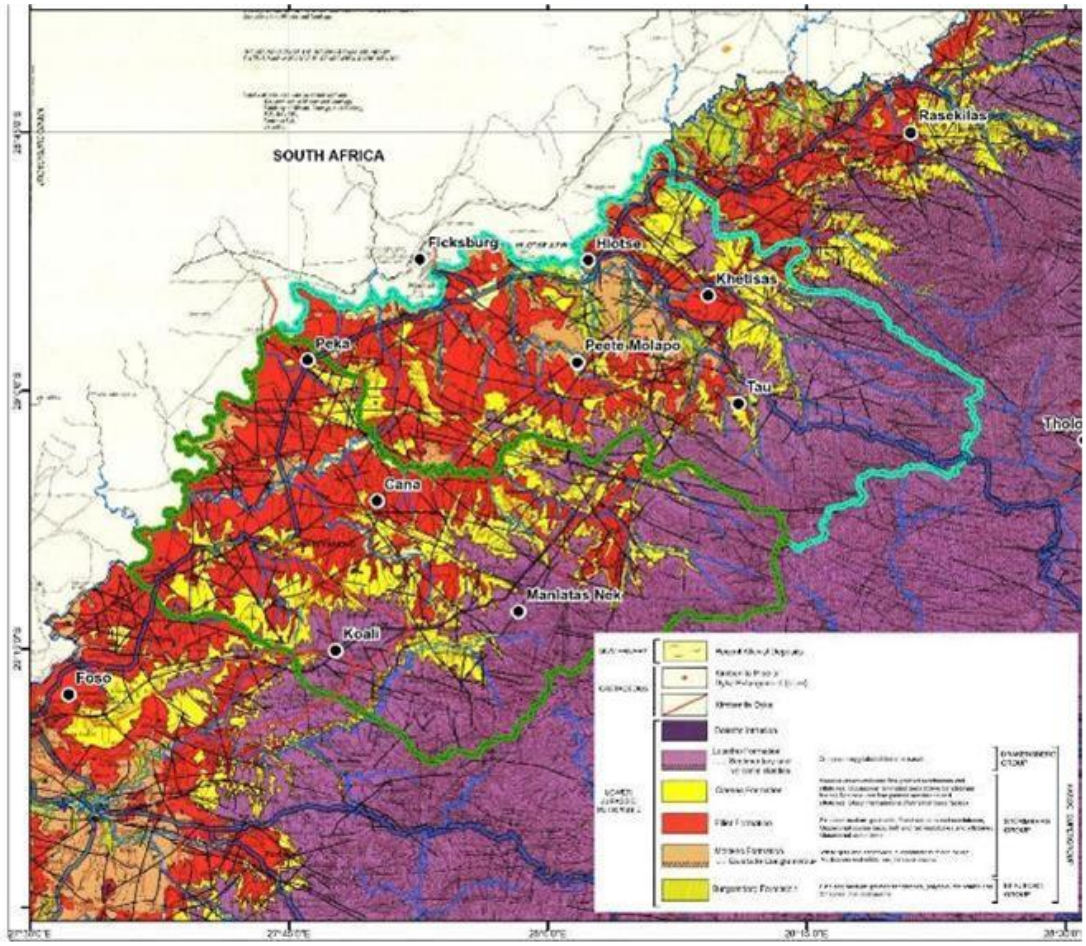

Figure 9: Geology Map of the Project Area

6.1.6. Soils

Baseline information on the soils in the project area is required in terms of their related use for structural materials as well as for the determination of land capability. The kind of soil properties that are important for an engineering project of this nature are aspects such as permeability, shear strength, compressibility, shrink-swell potential, compaction characteristics, organic matter, corrosivity, soil acidity or alkalinity, particle-size distribution, soil drainage, water holding capacity, hydraulic conductivity as well as depth to rock.

The soils derived from the Karoo sedimentary sequences and basalt overlay on the western Lowlands are the country’s main cultivable areas and are typically inherently low in fertility, quite poorly structured, have low water holding capacities, and are easily eroded. The geomorphological units of Lesotho and associated soils are related and were partly modified by Schmitz and Rooyani (1987) as shown in Table 36 below.

Table 37:Geomorphological Units and Associated Soil Series (Schmitz & Rooyani, 1987)

Geology	Geomorphological Unit	Associated Soil Series
Lesotho Formation	Step & middle slopes	Popa & Matsana
	Accumulation glacis	Fusi & Thabana
	Planation surface	Machache, Nkau, Sefikeng, Tumo, Matsaba, Seforong, Ralebese, Matela
	Alluvial deposits	Phechela, Khabo, Sofonia, Maseru dark
Clarens Formation	Structural Plateau	Matela, Berea, Ntsi, Qalaheng, Thoteng, Theko
	High Structural plateau	Lekhalong, Tšenola, Sani
Burgersdorp, Molteno & Elliot Formations	Accumulation glacis	Maliehe, Bosiu, Majara, Moshoeshoe, Tsiki, Sephula, Tšakholo, Maseru
	Planation surface	Leribe, Matela, Qalo, Hololo, Rama
	Alluvial deposits; high terrace	Matsaba, Seforong, Ralebese, Kubu, Khabo
	Alluvial deposits; middle terrace	Khabo, Kubu, Bela, Phechela, Maseru, Maseru dark
	Alluvial deposits; low terrace and flood plain	Caledon, Sofonia, Kolonyama, Phechela
	Dolerite dykes & sills	Ralebese

Table 38: Benchmark Soils of Lesotho in the Project Area (Cauley, 1986)

Benchmark Soil and Binomial	Fertility[1] (TEB)	Profile Description	Settings	Resistance to Erosion[2] & Erosion Hazard[3]
Berea	Low	Berea Series is a fine loamy, friable soil that is easily drained. The upper horizon is about 20cm thick, the lower horizon from 20cm to 82cm, and the subsurface horizon extends from 82cm to 150cm	Yellowish-brown subsoil and formed in the weathered products of sandstone bedrock. Soils occur on smooth side slopes underlain by sandstone.	Berea soils have moderate resistance to erosion (K value = 0.32). The erosion hazard is moderate.
Khabos (Bonheim Form)	High	Black, friable, weakly structured, sandy clay loam surface layer about 25cm thick. The subsoil is 113cm thick, extending to a depth of 138cm. The upper layer is very dark gray, firm strongly structured clay loam	Khabos soils are deep, well drained moderately permeable soils formed in alluvium dominantly of basalt origin. Not extensive & are locally distributed along major streams and rivers in the western lowlands.	Moderate resistance and high tolerance to erosion. Runoff is slow and the hazard or erosion is slight.

Leribe (Hutton Form)	Low	Dark, reddish-brown, weakly structured, friable, loam surface layer about 23cm thick. The subsoil is 157cm thick, extending to a depth of 180cm	Leribe soil consists of a very deep, well-drained permeable soils formed in ancient basaltic alluvium. These soils occur on smooth, convex ridge tops and side slopes of ancient terraces and erosional surfaces. These soils are extensive and widely distributed throughout the western lowlands	Low to moderate resistance to erosion. Erosion hazard is slight to severe, depending on the steepness and length of slope.
Maseru Form	Low	This form has poor topsoil with a shallow layer of fine clay. The upper soil horizon is about 52cm thick and lower soil horizon goes from 52cm extending to a depth of 200cm	Consists of shallow soils, fine clay with low fertility and poor drainage. Maseru soils occur in depressions and other strongly concave areas or on flats that receive water from adjacent areas	Maseru soils have a low resistance to erosion with K value of 0.6. These soils are easily eroded and hazard of soil erosion.
Sephula (Estcourt Form)	Medium	Brown, friable, weakly structured, fine sandy loam surface layers, about 25cm thick and extending to a depth of 45cm, are dark yellowish-brown and greyishbrown, friable, massive, very fine sandy loam. The subsoil is about 36cm thick, extending to a depth of 77cm.	Consists of moderate well to poorly drained soils that are shallow to moderate deep. They are formed in shale residuum that has undergone strong elevation in the upper layer. Sephula soils are commonly at the heads of drains, around slight depressions, and at the base of slopes. **Dongas are commonly associated with Sephula soils**	Sephula soils have low tolerance and low resistance to erosion. The hazard of erosion is moderate to severe, depending on length and steepness of slope. These soils are particularly prone to gully erosion.

Tumo (Hutton Form)	Low	This series has a dark, reddish-brown, friable, weakly structured, loam surface layer about 16cm thick. The subsoil is 144cm thick, extending to a depth of 160cm. The upper layers are dark reddish-brown, friable, moderately structured, clay and clay loam	Consists of deep, well drained, permeable soils formed in the weathered products of basalt residuum. Tumo soils are on smooth ancient erosional surfaces underlain by basalt bedrock. The soils are widely distributed throughout the western foothills but are not extensive	They have moderate tolerance and moderate resistance to erosion. The hazard of erosion is slight to moderate depending on length and steepness of slope.
Fusi (Inhoek Form)	High	Friable, moderate structured, black, clay surface layer about 21cm thick. The subsurface layers extend to a depth of 61cm	Occur at the base of slopes and at heads of drains. Deep, well-drained soils formed in the weathered products of basalt colluviums and residuum. Widely distributed in foothills and lower mountains.	Both resistance and tolerance to erosion are moderate. Erosion hazard is medium to high, depending on steepness and length
Bosiu	Medium	The upper horizon is about 50cm and the lower horizon ranges from 50cm to 200cm	Weathered product of shale, sandstone and siltstone residuum	The erosion hazard is severe and soils should be compacted and grassed.

- [1]Fertility is described in terms of Total Exchangeable Bases (TEB)
- [2]Resistance to erosion is the measure of the ability of a soil to withstand detachment by the impact of rainfall and transport by flowing water. The soil’s resistance to erosion is expressed as an erodibility factor (K) and is determined by simulated rainfall over a known area where Low Resistance is >0.5K; Moderate Resistance is 0.25 – 0.50K; and High Resistance is <0.25K.

- [3]Erosion hazard is an expression of the amount of soil loss that is likely to occur if the soil is cultivated. Extent refers to the amount of an area or region that a soil comprises and is measured in percentage, e.g. if a soil is extensive, it covers less than 5% of a region, moderately extensive covers between 5% and 10%, extensive covers between 10% and 20% and very extensive covers an area greater than 20%.

Implications for the project

- Hard rock sandstone was identified along the pipeline route, which means that some blasting may be necessary in some places.
- In areas with shallow soil and sub-soil, the material excavated from the trench may be too stony to replace in the trench and this will have to be disposed off at a designated spoil area. An initial assessment indicates that up to 20,000 m3 of spoil will be to be disposed off.

6.1.7. Erosion Potential

Lesotho has the highest erosion hazard of any single county in southern and central Africa (Chakela, et. al 1989). An Erosion Hazard Map has been produced for Lesotho that defines the main danger areas for erosion and the principal processes contributing to this hazard. The sub-factors that were considered in producing this map included slope, soil erodibility, rainfall erosivity and cover. It was noted that slope and rainfall are the dominant factors that contribute to the erosion hazard in Lesotho. The erosion hazard map for Lesotho gives values in Erosion Hazard Units (EHU). The following scale was adopted and an erosion hazard map produced (Figure 10)

Level of erosion hazard		**EHU**
4	Medium	51 – 100
5	Hi gh	101 – 250
6		251 – 500
7	Very High	501 – 1000
8		1000+

Figure 10 shows a very high erosion hazard in the foothills and mountain areas, and this is explained in terms of the steep slopes, high total quantities of rain, poor lithosols and only average vegetation cover. The intensively gullied border Lowlands, in which the study area is located, shows the lowest erosion hazard in Lesotho. Nevertheless, on an international scale, the erosion hazard for this area is still high. The Lowlands have suffered years of mismanagement, which accounts for the past history of severe soil erosion. Shallow slopes and low rainfall counteract the high erodibility of the soil. The Project Area is located in an area where the erosion hazard rating varies from high (51 – 100 EHUs) to extremely high (>1000 EHUs) (Figure 10).

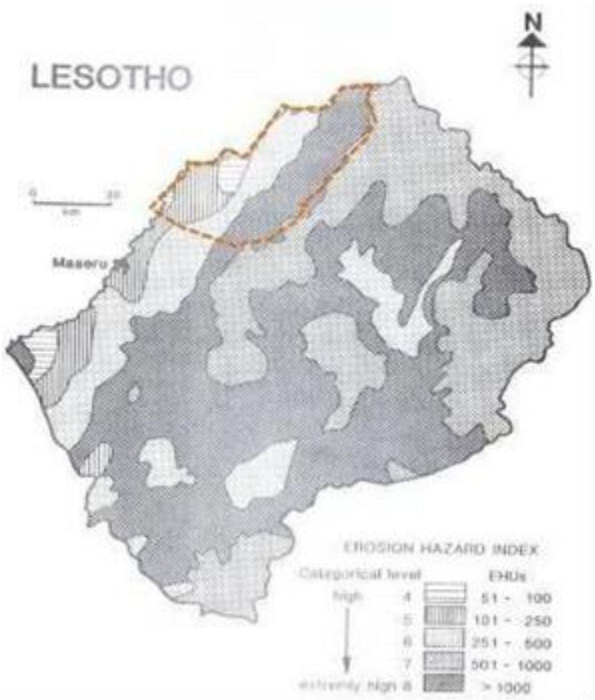

Figure 10: Erosion Hazard Map of Lesotho (Chakela, et al, 1989)

Several areas within the project area may be regarded as erosion hotspots, where severe erosion is evident. (Figure 11).

Several areas within the project area may be regarded as erosion hotspots, where severe erosion is evident. (Figure 11).

Figure 11: Examples of erosion hotspots include the area where the pipeline crosses the Qalo River from the WTW to Botha Bothe

Implications for the project:

Measures will be required where dongas already exist and along the access tracks to the new reservoir sites. Examples of erosion hotspots include the area where the pipeline crosses the Qalo River from the WTW to Botha Bothe.

6.1.8. Land Capability

The soils derived from the Karoo sedimentary sequences and overlying basalt in the western Lowlands are the country's main cultivable areas and have inherently low fertility, are quite poorly structured, have low water-holding capacities, and are easily eroded, even on slopes gentle enough for cultivation.

6.1.9. Vegetation

Lesotho falls within the grassland biome, with small-scattered thickets and woodlands occurring in the valleys and along the foothills. As previously mentioned, Lesotho has been divided into four ecological zones, the Lowlands, Foothills, Senqu Valley and the Mountain.

The flora of Lesotho comprises about 3000 plant species belonging to 800 genera and 200 families (Kobisi, 2005). The general appearance of the vegetation in Lesotho is grassland with small thickets and woodlands found in gullies and valleys of the foothills and on krantzes, steep cliffs and hillslopes of the Lowlands.

The study area falls within the Grassland Biome of southern Africa and within the Mesic Highveld Grassland Bioregion (Gm). Within this Bioregion, the study area is located in three vegetation types (Mucina and Rutherford, 2006) (Figure 5-5). These three types are: Eastern Free state Clay Grassland, Eastern Free State Sandy Grassland, Basotho Montane Shrubland.

Gm 3 - Eastern Free State Clay Grassland - vegetation occurring on the flat to gently rolling surfaces between Maseru and Fouriesburg and occurring at an altitude of between 1 380 and 1 740mamsl on flat to gently rolling land surfaces covered with grassland dominated by Eragrostis curvula, Themeda triandra, Cymbopogon pospischilii, Eragrostis plana, Setaria sphacelata, Elionurus muticus and Aristida congesta. Forbs occurring in this area include many Asteraceae such as Vernonia oligocephala, Berkhya onopordifolia, Geigeria aspera, Helichrysum rugulosum. Geophytes include Boophone disticha, Crinum bulbispermum, Kniphofia ritualis and Ledebouria macowanii. The leguminous Rhynchosia totta occurs amongst the grasses. Helichrysum dregeanum and Felicia muricata occur throughout the study area. This vegetation type is also referred to as VT 48 Cymbopogon-Themeda Veld (sandy) (83%) by Acocks (1988) and as LR 39 Moist Cool Highveld Grassland (73%) by Low and Rebelo (1998).

Gm 4 - Eastern Free State Sandy Grassland - occurring at altitudes between 1520 and 1800mamsl on flat to slightly undulating terrain with streams and rivers that drain the foothills of the Maloti. This grassland is dominated by Eragrostis curvula (seritsoana or matolo and is useful in erosion control), Tristachya leucothrix (letsoalle) and Themeda triandra (Seboku or red grass). Other grasses include Eragrostis capensis (Baroana or senana), E. racemosa (Baroana or tśaane, seritśoana-sa-lithota), E. plana (molula, mosita-tholo), Cymbopogon pospischilii (turpentine grass), Harpocloa falx, Heteropogon contortus (selokoana or spear grass), Elionurus muticus (hloko or motintsane) and Aristida junciformis (wire grass). Forbs include many Asteraceae such as Helichrysum sp., Vernonia, Berkheya, etc.

This vegetation type is embedded within many small hills and mountains carrying **Gm 5 Basotho Montane Shrubland**. This vegetation type is referred to as VT 56 Highland Sourveld to Cymbopogon-Themeda Veld Transition (Eastern Free State Highveld) (42%) and VT 48 Cymbopogon-Themeda Veld (sandy) (31%) by Acocks (1988) and as LR 40 Moist Cold Highveld Grassland (60%) by Low and Rebelo (1998).

Gm 5 – Basotho Montane Shrubland – This vegetation type occurs on the foothills of the Maluti Mountains and on the slopes of mesas such as those near Botha Bothe at altitudes ranging between 1 480 and 1940mamsl. This shrubland unit covers extensive areas in deeply incised river valleys of western Lesotho especially those opening towards the south and west (SANBI, 2006). The steep talus slopes and kloofs of the mesas support tall and in places very dense shrubland dominated by broad-leaved mesophyllous shrubs such as Searsia (=Rhus) erosa, Olea europaea subsp. Euclea crispa subsp. crispa, Buddleja salviifolia, Leucosidea sericea, Rhus burchellii, Rhamnus prinoides, Scutia myrtina and Gymnopentzia buxifolia. Filicia filifolia and F. muricata also occur in relative abundance.

Grasses in this vegetation type include Andropogon appendiculatus, A. schirensis, Aristida congesta, Cymbopogon pospischilii, Cynodon dactylon (mohloa or mohloatsepe, a valuable grass for anti-erosion works as it colonises the soil rapidly), Elionurus muticus, Eragrostis chloromelas, E. plana (molula, mosita-tholo), E. racemosa (Baroana or tśaane, seritśoana-salithota), Heteropgogon contortus (selokoana or spear grass) and Hyparrhenia hirta (an important constituent of Lesotho grassland and although it has little forage value, it is used for thatching). Endemic taxa in this shrubland unit include the forbs Lessertia tenuifolia and Leucaena latisiliqua (NBI, 2006).

This vegetation type is referred to as VT 48 Cymbopogon-Themeda Veld (sandy) by Acocks (1988) and as LR 40 Moist Cold Highveld Grassland (67%) by Low and Rebelo (1998).

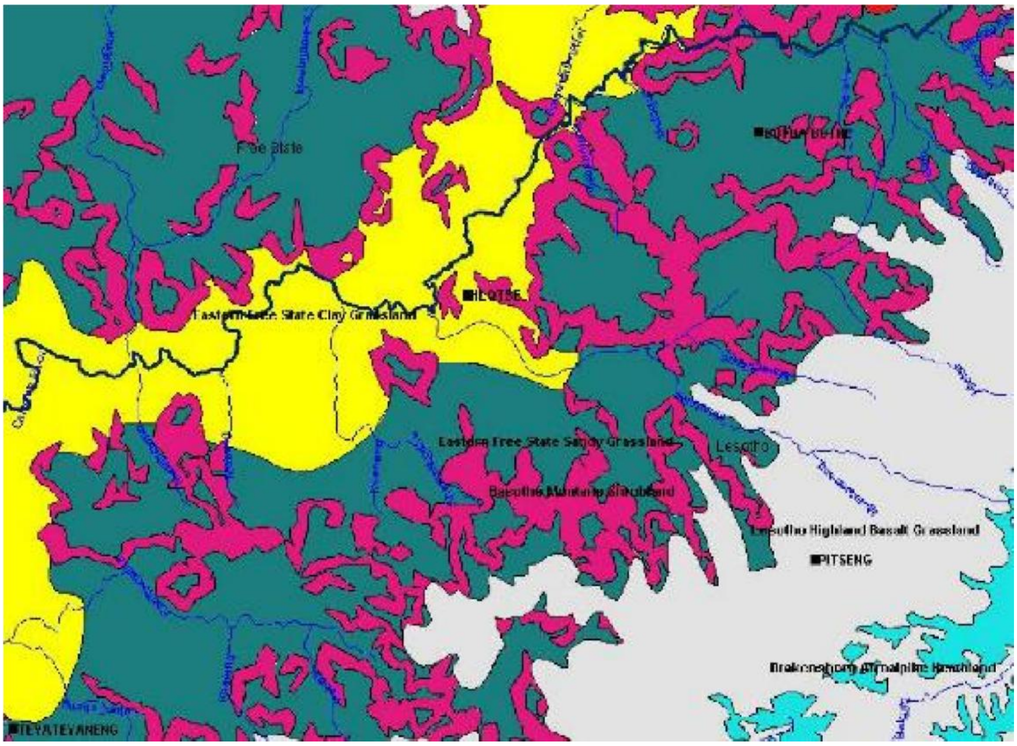

Figure 12: Vegetation Type of the Study Area

Table 39: Key Drakensberg Afroalpine Heathland

	Eastern Free State Clay Grassland
	Eastern Free State Sandy Grassland Basotho Montane Shrubland
	Lesotho Highlands Basalt Grassland

6.1.10. Vegetation of project footprint

Hyparrhenia dominant

The type is dominated by Hyparrhenia species (Refer to Figure 7-6 below) and associated species are *Elionurus muticus, Bracharia serrata, Aristea cognate, Ipomea sp, Aristida species, Hermannia species, Convolvulus species, Anthospermum sp., Melinis sp., Helichrysum sp., Gerbera sp, Microchloa caffra*. The type is a very important source for buildings. The type is always protected from grazing during the growing season until the thatch grass is removed in late winter.

Figure 13: Hyparrhenia dominant type: Heteropogon-Eragrostis -2022

Dominant species are Heteropogon contortus and Eragrostis curvula (Figure 7-7 below). Associated species are Eragrostis capensis, Eragrostis cilianensis, Harpechloa falx, Microchloa caffra, Trachypogon spicatus, Aster sp, Comelina sp, Eragrostis racemosa, Elionurus muticus, Harpechloa falx, Trichoneura grandiglumis, Sporobolus sp., Aristida species, forbs such as Dianthus, Scabiosa, Nolletia, Hermannia, Salvia, Senecio asperulus, Felicia muricata, Gazania krebsiana and many more. The type is important for grazing animals. The sight of Stoebe vulgaris, Felicia filifolius and Aristida adscenscionis indicate the habitat degradation.

Figure 14: Heteropogon – Eragrostics- 2022

6.1.11. Riverine system

The vegetation along the shores of the Hololo river is composed of mainly sedges and rushes. Typical grass-like species and herbs foground near water and damp places are *Scirpus sp., Juncus sp., Cyperus sp., Plantago sp., Schoenoplectus sp., Imperata cylindrica, Miscanthus sorghum, Persicaria, polygonum sp., Anagallis sp, Verbena sp, Bromus sp, Schisostylis coccinea, Poa sp., Homeria sp* and *Moraea sp*. The grass-like species are mainly used for handicrafts. The riparian vegetation is mostly modified with a number of exotic species being present, i.e. Salix sp., Populis sp., etc. (Figure 15).

Figure 15: Riparian Vegetation in the Project Area -2022.

6.1.12. Plantations

This is composed mainly of Pine, Acacia, dealbata and Poplar trees. All these are exotic introduced species. The acacia and poplar trees have invaded extensive areas of formerly indigenous thickets (Figure 16).

Figure 16: Typical Plantations in the Project Area -2022

6.1.13. Floristic Diversity

The area has relatively rich species diversity despite anthropogenic disturbances that have taken place. A total of 131 plant species were identified from field surveys (ESIA Northern Region, 2008), indicating a rich floral diversity. The total number of species documented for Lesotho is 2961. The species list found within the project footprint are listed in Annex 1 of this report.

Threatened Species

There were no red data species (Southern Africa Plant Red data list) found in the footprint area. Threats to the species are harvesting and habitat degradation.

Sensitivity

The project area has been transformed through anthropogenic activities such as grazing of livestock and clearing to build houses for human habitation. Since the areas offer little value to ecosystem functioning, they have low ecological sensitivity.

Invasive Alien Species

A wide variety of dispersal agents contribute to the spread of invasive alien species in the Project Area, such as vehicles, particularly livestock, birds, rodents, insects and wind. Despite legislation to control alien plants (e.g. the Weeds Eradication Act (Act 18 of 1969) and the Environmental Act (Act 10 of 2008), no guideline documents on the eradication of alien invasive species in Lesotho have been produced to date and it appears that the problem of invasive alien species is not actively managed. Examples of alien and pioneer plants seen in the project area are shown in Figure 7-10.

Figure 17: Cosmos Bidens formosa in fields – 2022

6.1.14. Fauna

Poor land management, rapid population growth, excessive exploitation, and disturbance by humans have significantly affected the biological resources of Lesotho and have led to highly modified ecosystems. All large mammals have disappeared from Lesotho due to overhunting and habitat loss leaving only five species of large mammals, but these are limited to mountain areas. However, avifauna and small mammals such as hares, rabbits and moles are said to be widespread in the Lowlands.

A detailed assessment of mammals specific to the Lowlands has not been undertaken. However, Lynch (1994) in his study of mammals of Lesotho predicted that the following species might occur in the Lowlands:

a) *Atelerix frontalis* (Southern African hedgehog)
b) *Vulpes chama* (Cape fox)
c) *Suricata suricatta* (Suricate)
d) *Felis nigripes* (Black-footed cat)
e) *Xerus inauris* (Ground squirrel)
f) *Pedetes capensis* (Springhare).

During the field visits, none of the above species were observed but signs of burrowing and digging animals (Figure 18) as well as ant hills were noted at some of the sites (Figure 19)

Figure 18: ARABIC 18 Heaps of Soil and hole from Burrowing Animals. -2022

Figure 19: Ant Hills in the area 2022

6.1.15. Avifauna

There are six (6) Important Bird Areas (IBA) within Lesotho. These are: Liqhobong, MafikaLisiu, Sehlabathebe National Park, Sehohong and Matebeng, Upper Quthing Valley, Upper Senqu River. The project area does not overlap with any Important Bird Areas of Lesotho. The closest IBA are Liqhobong which is about 80 km from the study area and Golden Gate Highlands National Park. This is located around 100 km from the study area.

According to SABAP2 records, species richness around the study area is 126 species from a total of 18 atlas cards. This represents about 13% of all species recorded in Southern Africa. Among these were 10 priority species. The full Species list of Avifauna observed within the project area are included in Annex 2 of this report form, the SABAP2. From the secondary sources and the community consultations. The commonly observed avifaunal species within the project site are listed in the table below.

Table 40: Common Observed Project Avian Species

Common Name	**Scientific Name**	**Sesotho**
Grassland pipit	*Anthus cinnamomeus*	Tšaase
Rock pigeon	*Columba guinea*	Leeba
Little egret	*Egretta garzetta*	Leholosiana
Turtle Dove	*Streptopelia capicola*	Le-ebana-khoroana
White stork	*Ciconia ciconia*	Mokotatsie
Hadeda Ibis	*Bostrychia hagdash*	Lengangane
Blackheaded heron	*Ardea melanocephala*	Kokolofitoe
Grey heron	*Ardea cinerea*	Kokolofitoe
Fiscal shrike	*Lanius collaris*	Tšemeli
Black crow	*Corvus capensis*	Mokhoabane
European swift	*Apus apus*	Lehaqasi
Southern Bald Ibis	*Geronticus calvus*	Mokhotlo

The table below presents the birds that are within the project areas. These are classified as high priority bird species based on their conservation status. Based on the State of Southern African bird report, 2018.

Table 41: Key/Priority species in and around Ha- Belo

Type of Bird	Name of Bird	CONSERVATION STATUS
Large Terrestrial Birds	Ibis, Southern Bald	Vulnerable
Raptors	Vulture, Bearded	Critically Endangered

	Vulture, Cape	Endangered
Other Birds	Pipit, African Rock	Near threatened
	Pipit, Mountain	Near threatened
	Rockjumper, cape	Near threatened

That is, highly collision-prone species that occur in the top 100 most collision-prone species in southern Africa. Note that because of the relatively poor atlas coverage of the area the Bearded Vulture (*Gypaetus barbatus*) was not recorded. During several visits to the site, the most common birds in the area have been recorded (Table 40) above.

Of these only one is a Red data species – the Southern Bald Ibis (*Geronticus calvus* or Mokhotlo), which is widespread in Lesotho and is frequently seen in the fields of the project area (Figure 20).

Figure 20: The Southern Bald Ibis (Geronticus calvus or Mokhotlo) within site -2022

No breeding areas were observed near project area, even though there are documented breeding sites (Figure 21).

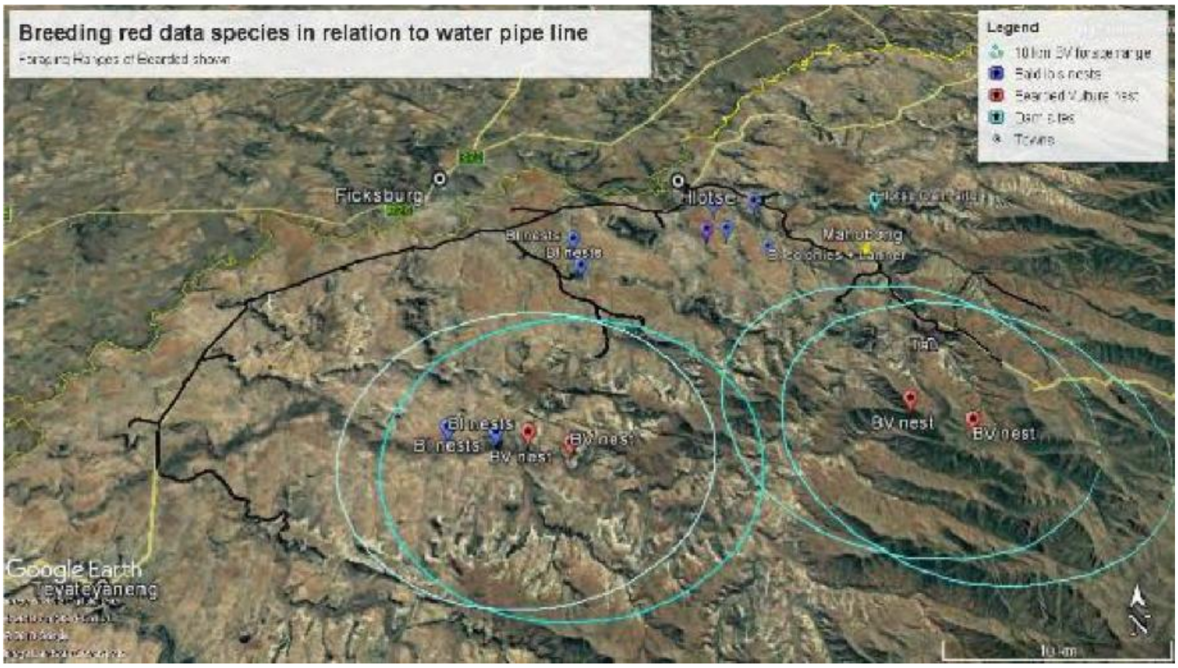

Figure 21: Documented Bald Ibis and Bearded Vulture Breeding Sites with the Project Area, (Water Supply Lowlands Scheme, 2018).

Due to the survey timing mostly, winter breeders were easily observed.

6.1.16. Reptiles

Reptiles are seasonally active, spending the harsher winter months in seclusion, usually in burrows, under rocks or in crevices emerging only under more suitable climatic conditions. There is very limited literature available which accounts for any distribution or abundance in Lesotho. It is likely that some reduction has occurred due to habitat degradation arising from land use practices, the fires and the frequency of contact with human population. Reptiles in Lesotho generally get killed by people on contact. Species that are likely to occur in the project area include snakes such as puff adders (Bitisarientans) (Marabe) and rinkhals (Haemachatus haemachatus) (Masumu) and common lizards.Psammophis notostictus (Cross-marked snake or Mosenene) and Lycodonomorphus rafulus (slug eater or Tlatlametsi).

The following lizards were observed in the project area (Figure 22):

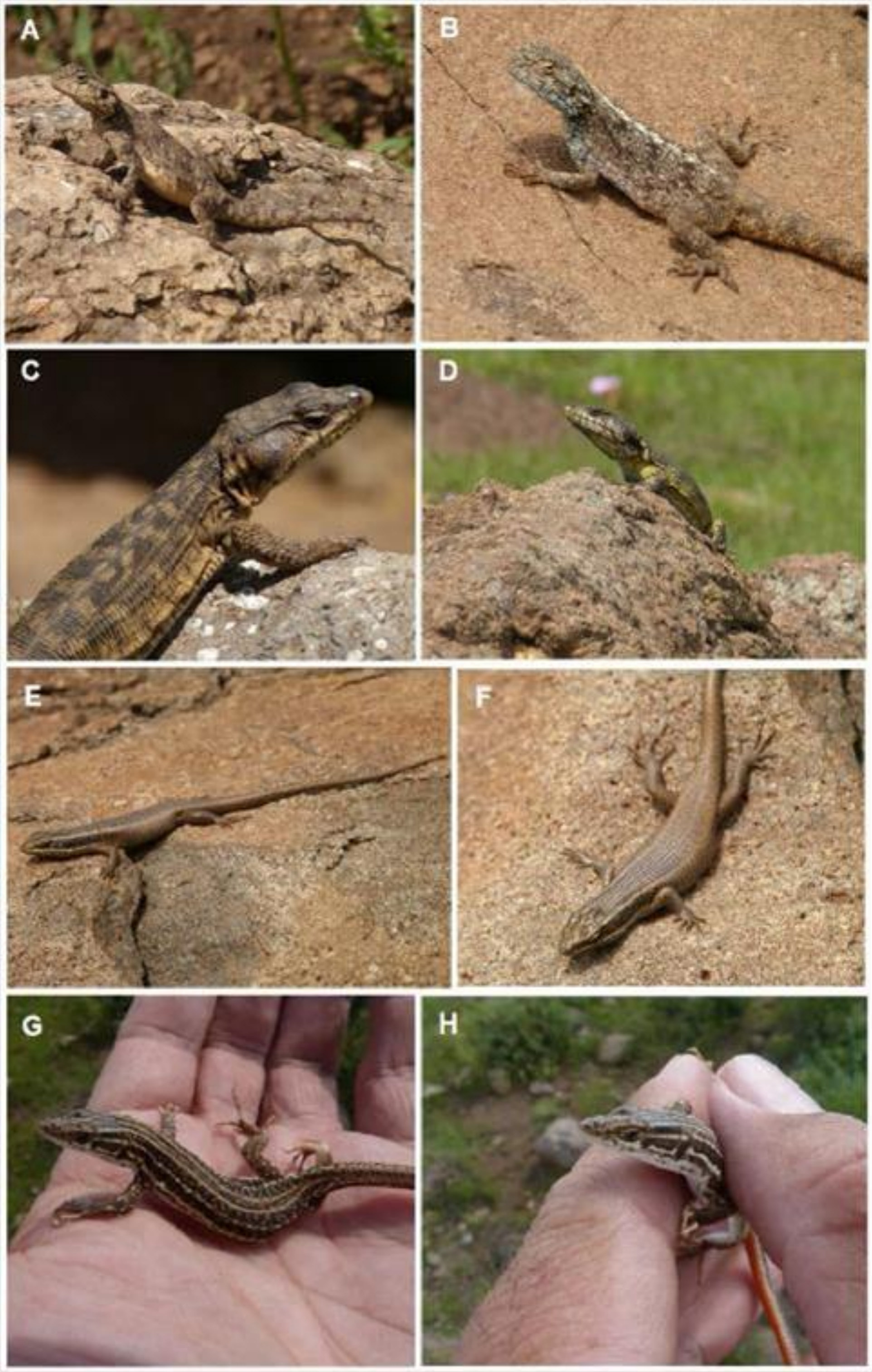

Figure 22: A & B – Southern Rock Agama, C & D – Drakensberg Crag Lizard, E & F – Montane Speckled Skink, G & H – Burchell's Sand Lizard (Annex C).

6.1.17. Hololo River Hydrology
The actual hydrological study for Hololo river was not done. Information used relied on Jeffares & Green 2008, IFR study.

Table 42: Principal hydrological information for Hololo River

	Monthly run-offs				Extreme run-offs	
Water Resource	Q97.5% (m^3/s)	Q90% (m^3/s)	MAR (m^3/s)	5% MAR (m^3/s)	Q1% (m^3/s)	Q20% (m^3/s)
Hololo River						

Low Flows: Q97.5% Monthly run-off availability during 97.5% of the rea, i.e. on 356 days Q90% Monthly run-off available during 90% of the year.

High Flows: Q1% Peak run-off with a probability of 1%, i.e. 1/100 years Q20% Peak run-off with a probability of 20%, i.e. 1/5 years

Implications to the Project

During periods of low flows in the Hololo River, there may be insufficient surface flow for abstraction. During these periods, either major restrictions could be applied, a storage reservoir built, additional water made available from Lesotho Highlands Scheme, or a dam would need to be provided on the Ngoajane River.

PES and Integrated EC for the IFR component of Hololo River
A level III Eco-status assessment that uses invertebrate (MIRAI) and fish (FRAI) response indices and determines the Index of Habitat Integrity (IHI) was undertaken on Hololo River (Jeffares & Green, 2008) to obtain an estimate of the IFR.

During that study, upper site of the Hololo River was used as a “reference condition” of the Present Ecological Status (PES) and a lower site to the abstraction point represents “Monitoring Conditions”.

The Ecological Importance and Sensitivity (EIS) of upper Hololo River was assessed to Moderate and that of the lower Hololo River (closest to the abstraction point) was High as this site provides critical migration corridors and spawning habitats for fish. The Ecological Condition (EC) of the Hololo River is good (EC of C = moderately modified).

Table 43: PES and integrated EC for the IFR component of Hololo River.

System	**Hololo 1 (Upstream)**	**Hololo 2 (Downstream)**
Fish	B	B
Invertebrates	B/C	B
Riparian habitat integrity	E	C
Instream habitat integrity	B	C
Integrated EC	C	C

6.1.18. FR Estimates for Maintaining REC of Hololo River

The IFR assessment (Jeffares & Green 2008), revealed that for Hololo River, the modelled flow estimates for a Recommended Ecological Category (REC) of a C (moderately modified), (A = unmodified/natural and F = critically/extremely modified) is ecologically acceptable.

A summary of the IFR estimates (total flows and percentage of mean annual runoff) required for the maintenance of the recommended EC for the Hololo River below the intake site is given in table below.

Table 44: IRF estimates for maintaining REC of Hololo River.

System	REC	Total IFR (million m3/annum)	High Flows	Low Flows	
			Maintenance High Flows	Maintenance Low Flows	Drought Low Flows
Hololo River	C	8.857 (21.20%MAR)	4.166 (9.97%MAR)	4.690 (11.23%MAR)	2.181 (5.22%MAR)

6.2. Social Environment

6.2.1. Country Context

Lesotho is classified as a low human development country based on its 2018 Human Development Index (HDI) score. With a Gini Coefficient of 54.2, the country has an unequal distribution of income. The Gender Development Index indicates that there is equality between men and women in terms of Lesotho's HDI achievements. However, the Gender Inequality Index suggests inequality between men and women in terms of reproductive health, education, political presentation and the labour market. The 2018 Multidimensional Poverty Index indicates that approximately 57.1% of households live below the National Poverty Line in terms of income. Approximately 33.64% of the population can be defined as multi dimensionally poor. The Living Standard dimension is the greatest contributor to overall poverty, with a contribution of 57.84%. Indicators that form part of the Living Standard dimension are water, sanitation, electricity, assets, cooking fuel and type of floor in the house. Lesotho Ranks 30th out of 51 African countries on the Sustainable Development Goals (SDG) Index. The country is maintaining its achievement on Climate Change (Goal 13) and is on track to achieve the goals of Industry, Innovation and Infrastructure (Goal 9) and Partnerships (Goal 17) of the SDGs by 2030. Scores for Gender Equality (Goal 5), Clean Water and Sanitation (Goal 6), Sustainable Cities and Communities (Goal 11), and Life on Land (Goal 15) are increasing at a rate above 50% of the growth rate, but below the rate needed to achieve the goals by 2030. Lesotho is stagnating or increasing at a rate below 50% of the growth rate needed to achieve the following goals by 2030: No Poverty (Goal 1), Zero Hunger (Goal 2), Good Health and Well-being (Goal 3), Quality Education (Goal 4), Affordable and Clean Energy (Goal 7), and Justice and Strong Institutions (Goal 16). This project will help to achieve Goals 6 and 3.

6.2.2. Settlements

According to the 2016 Lesotho Population and Household Census (PHC), Lesotho has a total population consisting of approximately 2,007,201 persons and 537,457 households.

In general, the settlements of the Project area are linearly spread in a north-southerly direction between the plains and the rugged terrain of the Lowlands region. However, around the Botha Bothe town, the settlements assume a concentric circle pattern as peri-urban areas. The Project area settlement structure, with the exception of peri-urban areas, suitable for the provision of service infrastructure because of the linear structure.

The villages that fall into the peri-urban areas of Botha Bothe town clearly show how unplanned urbanization can distort urban structures and make it difficult to provide support infrastructure such as roads, water pipes, power lines, etc. The demand for land has outpaced the planning process, compelling the informal land market to thrive. As a result, the urban areas have encroached onto croplands in settlements that often have little or no provision for services.

6.2.3. Administration

The proposed project spans two district administrations, the Leribe and Botha Bothe Districts. Although each district is administered by a District Administrator whose role is to ensure law and order and to attend to civil matters in his/her district, development issues are handled by an elected District Council whose District Secretary carries the mandate to coordinate development programs of various government sectors and those of area offices of some public institutions at the district level (Figure 23).

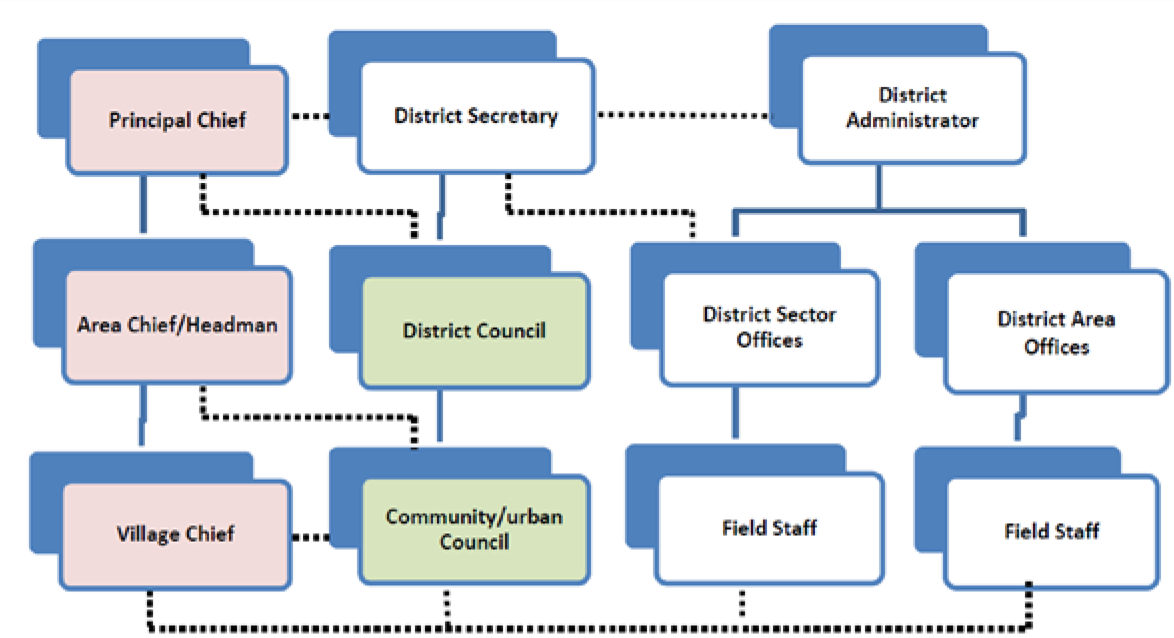

Figure 23: The Existing District Administrative Framework

The lowest governance tier at the local level is a community or urban council, an elected body whose mandate is to monitor the utilization of natural resources (Community council), propose small-scale development projects and provide basic services at the local level, covering several settlements. There are 18 community councils and two urban councils in the Leribe District amongst which are Sephokong, Menkhoaneng and Maisa Phoka Community Councils through which the Project traverses. Similarly, there are 10 community councils and one urban council in the Botha Bothe District and the Project runs through three, namely the Botha Bothe Urban Council, Likila, Tša-le-Moleka, Lipelaneng, Ngoajane, Nkoe and Makhunoane.

Parallel to government institutions (indicated with the continuous lines) is the institution of chieftainship which comprises principal chiefs, area chiefs or headmen and village chiefs (dotted lines). The mandate of this institution is to exercise traditional authority over defined areas. There is one principal chief in the Leribe District and two in the Botha Bothe District.
In addition to being ex-officio members of the District Councils, principal chiefs exert traditional authority in the district of their jurisdiction through a system of area chiefs or headmen and village chiefs. Village chiefs act as custodians of traditional authority at the village level, hence they are a first-point-of-call at that level. Area chiefs, on the other hand, act as custodians of traditional authority at the area level, encompassing a group of defined villages. At any moment, 2 area chiefs represent traditional authority at community or urban councils as ex-officio members.

6.2.4. Demographics

The Botha Bothe District age and gender distribution is shown in Figure 24. The area has proportionately more females than males and 31% of the population is aged 14 or younger.

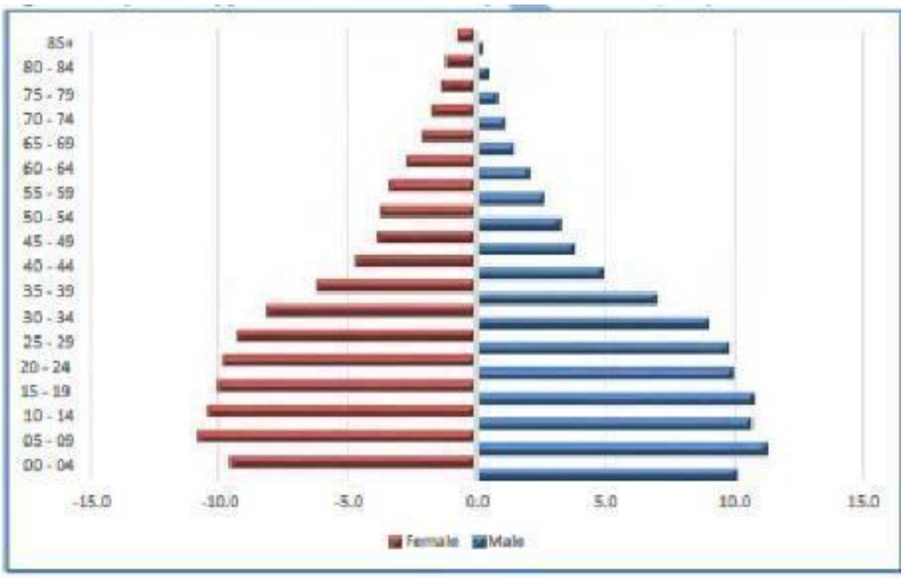

Figure 24: Population pyramid for Botha Bothe District (source 2016 HPC, LBS)

The overall dependency ratio for Botha Bothe District is 59.3 (dependents per 100 people), which is higher than the national average of 56.3 per hundred. The Young Age Dependency ratio (for those aged 0-14) is similar to the national average at 49.9, but the Old Age Dependency ratio is 9.4 for Botha Bothe District is much higher than the national average of 6.6 (dependents over the age of 65 per 100 people.)

Implications for the project:

A large proportion of the population in the Botha Bothe District is of working age and given the high dependency ratios, the benefits of even short-term employment will be significant for those who are currently unemployed.

6.2.5. Skills and Education

The UNDP (2018) estimated that Lesotho has an adult (aged 15 or older) literacy rate of 76.6%. The literacy rate for females aged 15 – 24 years of age is estimated at 94%, while that of males of the same age is estimated at 79.6%. It is not uncommon for boys to leave school early to herd cattle or to become a migrant worker. The primary school drop-out rate is estimated to be 30.7%, while an estimated 67% of a cohort is expected to reach the last grade of lower secondary general education.

At a district level, the 2016 PHC shows that almost 50% of males in the Botha Bothe District and 44% of females aged 15 years or older have attained an education of Standard 7 or less. Standard 7 is the grade that completes primary school education. At the other end of the spectrum, 15.82% of males aged 15 years or older and 18.15% of females in the Botha Bothe District have completed Form 5 or a tertiary qualification.

Implications for the project:

- The data suggest that while a large proportion of the population is literate, a significant number of people did not achieve more than a primary school level of education. This does not preclude employment on the project as unskilled labourers, but skills development programmes will have to be tailored to cater for low educational attainment.
- The data also indicate that skilled labour and supervisory positions could be filled by people from the area who have completed tertiary education.

6.2.6. Employment

Lesotho is geographically surrounded by South Africa and economically integrated with it. The economy of Lesotho is based on agriculture, livestock, manufacturing, and mining, and depends heavily on inflows of workers' remittances and receipts from the Southern African Customs Union (SACU) (www.en.wikipedia.org). Although Lesotho has progressed in moving from a predominantly subsistence-oriented economy to a lower middle-income economy exporting natural resources and manufacturing goods, most households still subsist on farming. The formal sector employment consists mainly of female workers in the apparel sector, male migrant labour, primarily miners in South Africa for three to nine months, and employment by the Government of Lesotho. Water and diamonds are Lesotho's significant natural resources.

The UNDP (2018) has indicated that Lesotho has an employment to population ratio of 48.4%, which indicates the percentage of the population aged 15 years or older that is employed. The Labour Force Participation Rate is 66.5%, which indicates the percentage of the working-age population that engages actively in the labour market, either by working or looking for work. This indicates that there are far more people available to work than are currently working. Of those employed, 10.4% is employed in agriculture and 49.1% in the services sector. Lesotho has a total unemployment rate of 27.3% and a youth unemployment rate of 38.5%. Figures for child labour are not available. More than half (55.3%) of the employed population has to live on an amount that classifies them as working poor. The working poor are working people whose incomes fall below a given poverty line due to lack of work hours and/or low wages.

According to the 2016 PHC, almost half of females (48.3%) aged 15 years and above are housewives while 21.2% are regular wage or salary earners. About 27.7% of males have indicated that they are regular wage or salary earners while 23.8% have indicated that they are ‘housewives.

Subsistence agriculture is an important contributor to the livelihoods of many households. The 2016/2017 Agricultural Production Survey (LBS, 2017) indicates that in the Lowlands, 33.8% of household members get their income from subsistence farming, compared to 26.2% who get their income from wages or salaries.

Traditionally a large amount of support for rural families came from South African mine worker remittances (Mohlahatsa, 2015), but this income has been decreasing due to large scale retrenchments in South Africa’s mining industry. This coupled with severe droughts that have hit southern Africa at different times, has led to a decrease in production capacity in the subsistence sector and serious food insecurity nationwide. The shortage of arable land has further contributed to food insecurity.

Implications for the project:

- Due to the high rates of unemployment in the project area, it is incumbent on the GoL to ensure that local people are employed during the construction of this project rather than foreign workers.
- The presence of retrenched mine workers could also add to the available skills base.

6.2.7. Community facilities and services

Provision of, and access to services such as electricity, safe drinking water, sanitation and clean cooking fuel are all indicators that relate to the Living Standard dimension of the Multidimensional Poverty Index (KPI). In Botha Bothe District, 36.2% of households have access to electricity as their main source of energy for lighting, while 43% use paraffin for this purpose. Very few households (20%) use grid electricity for heating, with the rest resorting to paraffin or fuel wood. In terms of cooking fuel, 26% of households use LP gas, while 44.1% use wood.

On a national level the 2016 PHC indicates that only 11.5% of households in urban areas have access to water inside their dwellings. The majority of households (58%) in urban areas have access to piped water inside their yards or plots. More than half (55.5%) of households in rural areas have to access water through a public tap or standpipe, and 17.9% use an unprotected spring.

On a national level the 2016 PHC indicates that in urban areas 47.7% of households have VIP latrines, while 35.9% have unimproved pit latrines. The picture looks very different in rural areas where 33.5% of households make use of open defecation (bush or field), 33.4% have access to VIP latrines and 26.1% to unimproved pit latrines.

There are no registered hazardous waste sites in Lesotho. The nearest to the project area is located at Holfontein in Gauteng. Hence contractors will need to source services from approved Hazardous waste service providers to manage hazardous waste (Transport to South Africa)

Implications for the project:

- The provision of treated bulk water supply to the towns and villages in one of the most densely populated parts of Lesotho, together with the roll out of domestic distribution networks will bring immediate benefits to the rural poor – particularly women who usually are the ones who must collect water which is both time and energy consuming. However, the provision of water will have to be accompanied by a major awareness

campaign about the value of water, water use, personal hygiene and conservation i.e. demand management;
- From stakeholder comments there are expectations that there will be sufficient water for irrigation as well, which may not be the case and so managing expectations will have to be a key component of the project.

6.2.8. Roads, Transport and Traffic

No assessment of roads and predicted construction traffic was provided in the ESIA. Sections of the main tarred A1 Road running through northern Lesotho from Maseru to Bothe-Bothe and up to the Highlands have been improved., especially the section from Hlotse to Botha Bothe. This road carries a significant amount of traffic, especially in the section between Maseru and Bothe-Bothe. Heavy trucks, taxis, buses and private vehicles use this road as well as donkey carts, horsemen, pedestrians and herders.

Secondary roads are mostly gravel and vary in quality from good to very poor – the latter only being accessible to 4x4 vehicles and non-motorised traffic. It is not known which route construction traffic will follow, but it is anticipated that most of the equipment, pipes and some of the raw materials (diesel, cement, chemicals, etc) will be transported from Gauteng in South Africa. The quickest route would be either via the Caledonspoort and Maputsoe Bridges. Of these, only the Maputsoe Bridge border is open 24 hours per day while Caledonspoort border is open from 06h00 to 22h00.

Implications for the project:

- Delays at the border posts may determine which one is used for transporting equipment and materials to site.
- All suppliers and drivers need to be aware of the risks on the roads in Lesotho especially after dark.

6.2.9. Land use, Lifestyle and Sense of Place

Land use in the project area comprises a mixture of dryland subsistence crops (principally maize and beans), grazing (cattle, sheep and goats), woodlots and forestry plantations of Eucalyptus and pine species, urban areas and extended villages. It is a ‘busy’ landscape with evidence all round of human habitation. The landscape is dominated by sandstone ridges and cliffs, flat plateau, incised valleys and the towering Maluti Mountains in the distance. The project area is thus typical of the rest of the Northern Lowlands area.

The 2016/17 Agricultural Production Survey indicated that Leribe has the highest production of maize, beans and peas in Lesotho, and the third highest production of sorghum. Most households also have vegetable gardens producing cabbages, pumpkins, spinach, rape, carrots, tomatoes, Sepaile (wild parsley), onions and beetroot. Most of the grain and vegetative production is for private use and little is sold on the market.

In terms of animal products, the Botha Bothe District produces 6.4% of the national raw milk production, 8.7% of the wool, 7.7% of the mohair and 15.7% of the country's egg production. Slaughtered animals (cattle, sheep, goats and pigs) make up about 15% of the country's total.

Implications for the project:

- The construction of the pipeline and reservoirs will have little impact on the sense of place of the area and all new project components should be easily absorbed into the landscape, with little visual impact at landscape scale. However, care will have to be taken in the final siting of the reservoirs to avoid impinging on residential space and views.
- Due to the highly seasonal nature of agriculture in this area, food shortages are often experienced in wintertime (May to August) and in January.
- There is an extremely high dependence on small subsistence plots of land for nutritional and economic survival, thus all impacts on agricultural land must be minimised.
- Reduced flows in the Hololo River could impact stock watering activities and local abstraction of water for small-scale irrigation of vegetable plots.

6.2.10. Cultural Heritage

A summary of cultural resources findings for Zone 1 has been shown in the table below:

Table 45: Summary Table of Zone 1 Cultural Resource Findings.

Name of Site	Site No.	Main Findings	Significance	Recommendation
Qalo Reservoir	Z1R4	In open field	Not significant	Proceed with construction
Selomo Community	Z1R4	Located on a rocky neck below the summit of a large hill.	Not significant	Proceed with construction
Selomo Reservoir	Z1R5	Located on a rocky fairly flat exposed area	Not significant	Proceed with construction
Botha Bothe Command Reservoir	Z1R06	Located in a residential area	Not significant	Proceed with construction

Belo Industrial	Z1R07	Located in a residential area	Not significant	Proceed with construction
Makong Reservoir	Z1R08	Located in a residential area	Not significant	Proceed with construction
Ha Mopeli	Z1R9 (relocated)	Located	Not significant	Proceed with construction
Jonathane Reservoir	Z1R17	Located on top of ruins	Medium Significance	Relocation Required
Seboche Reservoir	Z1R22	Located on a field	Not significant	Proceed with construction
Mpharoane Reservoir	Z1R21	Located Close to a house	Aesthetically Medium significant	Needs relocation
Khukhune Sump	Z1R23	Located in open area	Not significant	Proceed with construction
Phelantabe Reservoir	Z1R25	Open area near crest of hill rock	Not significant	Proceed with construction

All reservoirs visited did not show any constraints to the cultural heritage.

6.2.11. Health Services

The 2010 Health Statistics report (LBS, 2014) shows that in 2010 there were 6 doctors for the entire Botha Bothe district. This indicates that there is a huge shortage in health care personnel and that health care is in all likelihood not reaching all who are in need of it.

The main negative impacts of a construction project of this nature on human health are:

- Transmission of communicable diseases such as HIV, Hepatitis, TB due to the potential influx of migrant workers and additional spending power.
- Respiratory ailments due to high dust and exhaust levels.
- Disturbance, learning problems and sleep loss due to noise, vibration, fear of change, influx of 'foreigners' and other stress factors.
- Death and injuries from motor vehicle accidents, falling into trenches, drowning in borrow pits pools and other hazards associated with construction sites.
- Occupational health and safety.

With the aim of this project being an improved supply of treated water, one of the main benefits will be a reduction in water-borne diseases.

a) HIV/AIDS and TB

HIV/AIDS is an existing problem in the study area. Lesotho has the second highest HIV prevalence in the world (https://www.avert.org/professionals/hiv-aroundworld/sub-saharanafrica/lesotho). There are approximately 13,000 new cases of HIV annually among adults aged 15 to 59 years. Approximately 324,000 adults (aged 15 and older) and 2.1%

prevalence in children aged 0-14 in Lesotho are living with HIV. 19,000 young people aged 15-24 are living with HIV in 2024, 70% being women. The lowest HIV prevalence in the country is in Botha Bothe (18.8%), the highest being in Mafeteng (24.0%).

Incidences are higher in women (0.64%) than in men (0.28%) in the country. (LePHIA 2024). The significant modes of transmission are heterosexual sex, other to child transmission and injecting drug use. Women are more affected by HIV than men. The disparity in HIV prevalence by sex is most pronounced among young adults: HIV prevalence among 20- to 24-year-olds is four times as high among females (27.4%) than males (17.8%).

The overall incidence has been declining; however, women still account for the majority of new infections at 62%. Despite the decrease in HIV infections in the country, there is still a challenge in reducing new infections among adolescent girls and young women and ensuring viral suppression among people living with HIV. HIV is closely linked to tuberculosis (TB) and in 2024, 50% of people in Lesotho are co-infected with TB and HIV.

b) Water-borne Diseases

The LLBWSS will be constructed with a view to reducing the incidents of waterborne diseases in Lesotho. Due to its cold climate, Lesotho is fortunate not to have any of the major tropical waterborne diseases, such as bilharzia (Schistosomiasis), river blindness (Onchocerciasis) or Guinea worm (Dracunculiasis). However, diseases such as diarrhoea, typhoid and gastrointestinal issues are of concern. By contrast, diarrhoea is common. If left untreated, it presents a serious risk to children, particularly for those under five years of age. Because of its frequency in Lesotho, and because it is often associated with unprotected or poorly protected water supplies, diarrhoea is a useful health indicator for monitoring water supply projects.

The Lesotho Demographic and Health Survey (2023-2024) shows that there is an improvement in potable water supply in the country. The survey shows that 82% of Lesotho's population has access to clean water. It further shows that there is dire need to address the poor sanitation, especially in the rural areas.

There are a number of ways to monitor the health impact of water supply projects. The first approach is to monitor the quality of the water itself, as there is a strong association between contaminated water supplies and diarrhoea. The second is to monitor the incidents of diarrhoea in children, as reported by their parents or guardians, while the third is to monitor health facility records. All of these are legitimate in their own right, but they all have strengths and weaknesses that must be kept in mind. Below the three approaches are considered.

Approach One - Monitoring Water Quality

Studies of water quality in Lesotho, dating back to the late 1970s, have repeatedly found that unprotected sources are contaminated (Feachem, et. al, 1978). In a more recent study, 72 village water sources were classified as unimproved, semi-improved, or improved and tested for quality. Based on the estimation of total coliforms, which is a nonspecific bacterial indicator of water quality, all unimproved and semi-improved water sources would be considered as not potable. By contrast, Escherichia coli, a more precise indicator of faecal pollution, was absent ($P < 0.001$) in most of the improved water sources (Kravitz, et al. 1999). The results consistently demonstrated that, even in the absence of disinfection, the protection of water sources improves the hygienic quality of rural water supplies.

Unfortunately, water quality alone does not guarantee positive health outcomes. A detailed study carried out by Feachem and others (1978) in Lesotho found that the incidence of diarrhoea in villages with clean water supplies was not much lower than that found in villages with unprotected sources. The main reason for this was that poor sanitation and hygiene resulted in post-collection contamination in the villages with the improved water supplies. The conclusion reached was that monitoring water quality alone is not sufficient. The potential of water projects to deliver positive health outcomes depends on the extent to which they are coupled with improved sanitation, hygiene and health education. Given the complexities of isolating the health impacts of a water system from these other confounding variables, it would be advisable for the LLWDP III to focus directly on a more measurable indicator, notably the incidence of diarrhoea.

Approach Two - Health Facility Data

Health facilities (clinics and hospitals) in Lesotho collect statistics based on WHO disease classifications. Diarrhoea and gastroenteritis are included under Chapter 01 of the ICD-10 classification and fall under category 005 of WHO tabulation list for morbidity. This category includes diagnoses recorded as diarrhoea (with or without vomiting), enteritis, gastroenteritis, as well as dysentery. The data from health facilities show a clear and consistent pattern: during the hot season (November-March), when bacteria multiply more abundantly in water and food, the cases of diarrhoeal diseases peak in both adults and children. In the cold season there is a smaller peak seen only in young children. These cases are probably caused by rotaviruses, which are known to cause outbreaks almost exclusively in the cooler months in temperate climates such as in Lesotho.

Clinical symptoms are seen mainly in children as most adults have already acquired immunity to these rotaviruses. Due to their modes of transmission, the common diarrhoea outbreaks of the hot season are likely to be reduced by water and sanitation control measures as well as health education, while those caused by rotaviruses may be less likely to be so (ESIA, 2008). Health facility data compiled in 2008 from seven (7) clinics serving 90,000 people in the Lowlands area offer an insight into prevalence rates in a typical area of the Lesotho Lowlands. The data show the number of cases diagnosed per 1,000 inhabitants in a year (Table 45).

Table 46: Diarrhoea and Gastroenteritis Diagnoses per 1,000 inhabitants.

Pathology group	**Sex**	**<1 year**	**01-04y**	**05-14y**	**15-19y**	**20-39y**	**40-59y**	**60y +**	**All Ages**
		Number of diagnoses/1000 inhabitants per year							
005 Diarrhoea & Gastroenteritis of presumed infectious origin	M	145.7	55.5	5.5	2.4	9.7	16.1	12.2	17.1
	F	112.4	51.8	4.8	4.8	15.2	16.0	14.9	17.3

As can be seen from Table 45, the number is highest for children under 1 year, with the number of cases for boys being significantly higher than for girls (145.7/1,000 vs. 112.4/1,000). The reasons for this are not well understood but may be related to boys being fed more formulae milk than girls. The numbers then decline to a low point between 15 and 19 years, before rising somewhat in older people.

The main disadvantages of using health facility data for monitoring the impacts of water and sanitation projects are that most cases of diarrhoea are probably not reported as there is a strong tendency for people to self-treat diarrhoea. For this reason, it is important to combine health facility statistics with reports at the household level.

Source Three - Household Data

A reliable source of pre-LLBWSS baseline data on the prevalence of diarrhoea at the household level can be obtained from the Demographic Health Survey (DHS) that is carried out periodically in Lesotho. This includes a specific question about episodes of diarrhoea in children under 5 years in the two weeks preceding the interview. The 2023-2024 survey found 18% of children had experienced such episodes. The percentage varied to some extent according to the mother's education. Little difference was reported between households with access to piped water and those without, confirming that water supply alone does not make a highly significant difference.

c) Land and Residences

Most of the households in the Botha Bothe (45.6%) acquired their land through allocation by the chief, while just over 20% inherited their land or got it as a gift. A larger proportion of females were allocated land by the chief, than the proportion of males that were allocated land by the chief. Form C is the tenure status of 43.2% of households in the Leribe district and 45% of households in the Botha Bothe district. A large proportion of households in the Leribe district (25.5%) and in the Botha Bothe district (23.2%) have indicated that they have no title deed for their property.

7. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

7.1. Construction Impacts

At the construction phase assessment of impacts is done for intake pump stations, water treatment works, reservoir construction, 207 km pipeline for pipes varying from 200-800mm diameter. This also involve the establishment of a construction camp, access roads construction, laydown areas, bulk cement mixing, transportation of all goods, equipment and people to site, burrow pits, workshops, vehicle wash bays, hydrocarbon and chemical handling and storage, waste management facilities, field toilets, diesel generators, etc.

7.1.1. Impacts on surface water resources and aquatic ecology

The construction phase of the project will have a limited impact on water resources and aquatic ecology. Impacts will be restricted to the intake works, coffer dam and where pipelines cross drainage lines. The ecological state of the river has been assessed as being moderately degraded due to bank degradation, sand mining in the rivers, overgrazing, etc. The rivers carry a natural high sediment load during high flows.

a) Increased sediment yield

IMPACTS: Construction of the intake works, in the Hololo River. There is one major river crossing for the pipeline – across the Hololo River. There are 1 or 2 borrow pits established in riverbeds to provide bedding material for the pipeline. All these activities could increase the amount of sediment in the Hololo River and other affected water courses. An increase in the amount of sediment in the river could in turn create more sandbanks and reduce the channel size. This could cause flooding during high flows.

PROPOSED MITIGATION MEASURES:

- The contractor is required to adopt standard river crossing designs for pipelines, which include prevention of erosion and sedimentation.
- The borrow pits should be located on the riverbank rather than in the river.

b) Damage to watercourse and riverine vegetation

IMPACT: Construction of the intake works, outgoing pipelines to the WTW, river crossings and the borrow pits will cause temporary and permanent damage to the riverbed and riparian areas with potential damage to the riverine vegetation. Removal of riverine vegetation – even if it is alien trees, can weaken riverbank stability, leading to bank destabilisation, undercutting and erosion during subsequent flood events.

PROPOSED MITIGATION MEASURES:

- In places where the pipeline crosses the river, stream or seepage areas, it must be buried below the streambed and protected against damage from erosion according to standard engineering principles.
- No stockpiling of construction materials in the floodplain or on the riverbanks.
- Minimise the amount of vegetation clearance in the pipeline servitudes on the riverbanks and through the floodplains. If possible, keep roots in place to maintain bank stability.

c) Contamination of water

IMPACT: Any construction works in or near the Hololo River and other affected water courses have the potential to pollute surface water resources and possibly the primary aquifer underlying the riverbed. Likely forms of pollution include hydrocarbon spills, particularly diesel, oil and grease from poorly serviced vehicles and equipment working in the river. Waste concrete and cement could also impact water quality.

PROPOSED MITIGATION MEASURES:

- All vehicles and equipment scheduled to work in the river must be inspected prior to operation to check for potential hydrocarbon leaks.
- Service records of all vehicles and equipment are to be kept and checked by the ECO to ensure that all equipment is being maintained as per schedule.
- ECO to keep a watching brief during any works in the riverbed and within 10m of watercourses.

- No vehicles or equipment to be serviced while in or near a surface watercourse. If emergency servicing is required, drip trays are to be used and precautionary measures put in place to minimise the impact of spills.
- The Contractor is to set up a bioremediation pad at the main camp to treat all soil contaminated with hydrocarbons. Records are to be kept of quantities treated and polyaromatic hydrocarbon (PAH) measurements. When the material is deemed to be ‘clean’ (i.e. below the Dutch Intervention Target of 40 mg/kg PAH, it can be used as backfill.
- No waste concrete or cement is to be disposed off in the riverbed.

Table 47: Summary of the impact(s) on watercourses.

PRE-MITIGATION						POST-MITIGATION					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
INCREASED SEDIMENTATION, SANDBANKS AND ISLANDS											
Longterm	Local	Moderate - negative	Moderately detrimental	Very likely	Moderate - negative	Longterm	Local	Low - negative	Moderately detrimental	Fairly likely	Low - negative
BANK DEGRADATION AND DISTURBANCE TO RIPARIAN VEGETATION											
Medium -term	Local	Low - negative	Slightly detrimental	Very likely	Low - negative	Mediumterm	Local	Negligible	Negligible	Fairly likely	Very low
DAMAGE TO WATERCOURSE											
Medium -term	Local	Moderat	Moderately detrimental	Definite	Moderate - negative	Mediumterm	Local	Low -	Slightly detrimental	Fairly likely	Low - negative

		e - negativ e						negative			
		CONTAMINATION OF WATER									
Shortter m	Sitespec ifi c	Modera t e - negativ e	Slightly detriment al	Fairly likely	Low - negative	Shortterm	Sitespec ifi c	Low - negative	Negligible	Unlikel y	Very low

7.1.2. Impacts on biodiversity

The project area does not have unique flora or fauna of major significance. That being said, the area does have diverse flora, characterised by a variety of grass species, forbs (herbs) mainly used for medicinal and food purposes, and trees utilised for fuel wood occur in sheltered spots such as along water courses and on hill slopes. Most of the areas impacted by the proposed project have been highly disturbed by intensive land use practises such as grazing, seasonal burning, and settlement encroachment. In terms of native fauna, very little remains.

a) Spread of weeds

IMPACT: Construction activities and construction vehicles could result in the spread of weeds.

PROPOSED MITIGATION MEASURES:

- Use topsoil from the area where it originated. Never use topsoil from areas with invasive plants in non-invaded areas.
- Do not dispose of cleared invasive plant material in areas without at least the same plant species.
- Remove weeds and exotics from rehabilitated areas.

b) Loss of plant species

IMPACT: Construction of the pipeline and reservoirs could result in loss of important medicinal, craft, and household species. However, this impact is unlikely since the pipeline will be largely within the already disturbed reserve and some reservoirs have been located to avoid sensitive plant species. The WTW has been located on agricultural land.

There are no endangered species in the project area to be affected by the project activities.

PROPOSED MITIGATION MEASURES:

- Demarcate the allowed construction area and ensure that all works stay within this area. Impose fines for disturbance beyond the allowable area.
- Transplant medicinal and bulbous plants found in the construction area. Plant these in similar soil conditions and to the same depth as they were before removalThe cutting of indigenous trees and clearing must be minimised and restricted to demarcated work areas only.

- Trees / bushes must only be cleared to provide essential access for construction purposes.
- No vegetative matter must be burnt or removed for firewood other than those removed during the grubbing and clearing phase. Such material can be made available at places accessible to the local inhabitants for firewood to prevent them from collecting it from stockpiles or other.
- Construction workers must be prohibited from collecting any plant material (firewood, medicine etc.) from the area in which work takes place, other than from the vegetation being cleared from the working areas.
- No indigenous or other plants may be purchased or sold under any circumstances.

c) Poaching and killing of animals

IMPACT: The influx of construction workers could result in the poaching and killing of animals, especially snakes. However, given the depauperate reptile population in the area and the small-scale of construction works within the larger area, the impact on fauna is considered to be very low.

PROPOSED MITIGATION MEASURES:

- Catching of wild animals (inclusive of reptiles, amphibians, birds and invertebrates, etc.) by any means, including setting of snares, poisoning, shooting and trapping is not allowed. All incidents of harm to any animal must be reported to the Environmental Control Officer (ECO).
- The Contractor is to report any problem animals (e.g. a snake that will not move off site on its own) to the ECO who will arrange for relocation.
- Anthills must not be disturbed unless it is unavoidable for construction purposes.

d) Faunal injuries

IMPACT: Open trenches act as pitfall traps for a variety of faunal species.

PROPOSED MITIGATION MEASURES:

- Areas opened for trenching shall be restricted to the minimum required to be worked in and closed up in a working day or as dictated by technical requirements such as length of pipe.
- Trenches are to be closed as soon as possible after services have been laid in them, to prevent them from posing safety hazards to people and animals and to prevent rainwater erosion.

- Trenches left open overnight must be fenced off to prevent animals (e.g. cattle, horses and donkeys) from being injured. Trenches to be inspected by the ECO each morning prior to work commencing.
- The contractor's representative must ensure that domestic and native animals belonging to the local community are kept away from unprotected works.
- Removal all pieces of wire, metal, wood or other foreign material after completion of the work in a specific area.
- All plastic material must be removed from areas where animals could ingest it.

e) Disturbance to avifaunal species

IMPACT: Disturbance and local displacement of grassland and riverine species through construction of intake works, WTW, pipeline, pump stations, reservoirs and associated human activity due to construction noise and activity.

PROPOSED MITIGATION MEASURES:

- Wetland areas are congregation areas for wetland species or terrestrial birds that drink. It is recommended that the construction area is clearly demarcated in these areas.
- Backfill and rehabilitate the pipeline trench as soon as possible after the pipeline has been laid.

f) Accidental fires

IMPACT: During the dry winter season and early summer there is a high risk of fires in the project area. Sparks, cooking fires, discarded cigarette butts all increase the potential fire risk. *Burning of grass and crop residues*

PROPOSED MITIGATION MEASURES:

- The Contractor shall take all reasonable and active steps to avoid increasing the risk of fire through their activities on site.
- The Contractor shall ensure that the basic fire-fighting equipment is available on site.
- Fires for heating or cooking shall only be permitted at designated sites in the construction camp. These sites will be approved at the discretion of the Site Engineer and ECO and shall be located away from any flammable stores or combustible materials.
- The disposal of any material by burning is prohibited.

- The Contractor shall be liable for all costs incurred by organisations sub-contracted to extinguish all fires started by any person(s) under their control. The Contractor shall be liable for all costs incurred to remediate burnt areas.
- No open fires are permitted.

Table 48: Summary of the impact(s) on biodiversity.

PRE-MITIGATION						POST-MITIGATION					
Duration	Extent	Intensity	Consequence	Probability	Significance	Duration	Extent	Intensity	Consequence	Probability	Significance
SPREAD OF INJURIOUS WEEDS											
Medium-term	Local	Minor - negative	Slightly detrimental	Very likely	Low-negative	Mediumterm	Sitespecific	Minor - negative	Slightly detrimental	Fairly likely	Low - negative
LOSS OF PLANT SPECIES											
Mediumterm	Local	Minor-negative	Slightly detrimental	Very likely	Low - negative	Mediumterm	Local	Minor - negative	Slightly detrimental	Fairly likely	Very Low - negative
POACHING AND KILLING OF ANIMALS											
Mediumterm	Sitespecific	Moderate - negative	Slightly detrimental	Fairly likely	Low negative	Mediumterm	Sitespecific	Low - negative	Slightly detrimental	Fairly likely	Very low negative
FAUNAL INJURIES											
Mediumterm	Sitespecific	Minor-negative	Slightly detrimental	Fairly likely	Low - negative	Mediumterm	Sitespecific	Minor - negative	Slightly detrimental	Fairly likely	Low - negative
DISTURBANCE TO AVIFAUNAL SPECIES											
Mediumterm	Local	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative	Shortterm	Local	Moderate - negative	Slightly detrimental	Unlikely	Very low

ACCIDENTAL FIRES											
Mediumterm	Local	Very high - negative	Highly detrimental	Certain	High - negative	Mediumterm	Sitespecific	Low - negative	Slightly detrimental	Fairly likely	Low - negative

7.1.3. Impacts on soil, land capability and land use

A desktop pedological study was conducted to establish the possible impacts of the proposed project on the soils in the project area.

a) Deterioration of soil potential (including quality)

IMPACT: Excavation/digging and backfilling of trenches may potentially deteriorate the soil potential due to disturbance of soil horizon sequences. A significant portion of land will be required for both *temporary and permanent* construction pipeline servitude. This will have an indirect impact on land capability and livelihoods. The WTW will permanently take about 2 ha of agricultural land.

PROPOSED MITIGATION MEASURES:

- In areas where the pipeline route crosses crop lands, the topsoil must be stripped and stockpiled separately from the underlying sub-soil and rock.
- After the pipe has been laid and covered with Selected Fill Material, the subsoil and rocky material must be backfilled first, followed by the topsoil. The final profile can protrude slightly above the natural ground level to allow for settlement of the backfilled material.
- All excess material in cropping areas must be removed from site to a designated stockpile area.
- In all other areas, all soil horizons can be excavated and stockpiled together adjacent to the trench. On completion of pipe laying, this material can be backfilled into the trench. The final profile can protrude slightly above the natural ground level to allow for settlement of the backfilled material.
- In non-crop areas, excess material can be spread in a thin layer onto the road reserve or removed to the spoil site. None of the excess material can be left in or within 10 m of a river crossing. In these areas, excess material must be removed to a designated spoil site.
- At the WTW works site and all reservoirs, topsoil must be stripped and stockpiled separately from subsoil for use in subsequent landscaping and rehabilitation of temporary works areas. Any excess material must be removed and disposed of at the designated spoil site.

b) Soil erosion/ loss

IMPACT: Possible soil erosion/soil loss, especially during the rainy season (November to March) along the pipeline servitude and at the reservoir construction sites, will be more severe where the pipeline crosses steep slopes and sections with soils with a high erosion potential. Soil erosion will ultimately add to the sediment in the rivers and further degrade the land.

PROPOSED MITIGATION MEASURES:

- Timing of actions such as excavating of trenches and availability of pipes, bedding material, and equipment should be coordinated as precisely as possible. Trenches should not be excavated unless pipes, equipment and the work team are ready for installation.
- Trenches should be dug in short workable sections to ensure that pipes can be installed, and trenches can be backfilled within a reasonable short time.
- Activities related to digging of trenches at steep sections and where there are erodible and clayey soils should be scheduled to occur outside of the rainy season, if possible.

c) Soil Contamination

IMPACT: Potential soil contamination by hydrocarbons caused by leaking mechanical equipment and accidental spillages. This could occur anywhere construction is taking place.

PROPOSED MITIGATION MEASURES:

- Prevent any spills from occurring as far as possible.
- If a spill occurs, it is to be cleaned up immediately and reported to the appropriate authorities.
- The Contractor is to set up a bioremediation pad at the main camp to treat all soil contaminated with hydrocarbons. Records are to be kept of quantities treated and PAH measurements. When the material is deemed to be ‘clean’ (i.e. when PAH measurements are less than the Dutch Intervention Target of 40 mg/kg), it can be used as backfill or disposed of at the designated spoil site.
- Equipment and vehicles are to be serviced in a correctly bunded area or at an off-site location. Service records are to be kept to ensure that all machinery is serviced as per schedule.
- Drip trays should be placed under leaking vehicles until repaired.

- Hydrocarbon drums to be stored in a bunded area.
- All active hydrocarbon dispensing areas are to be equipped with a drip dray or hard standing.
- All chemicals are to be kept in a ventilated, locked storage area with an impermeable floor.

Table 49: Summary of the Impact(s) on Soils and Land Capability.

PRE-MITIGATION						POST-MITIGATION					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
DETERIORATION OF SOIL POTENTIAL AND QUALITY											
Mediumterm	Sitespecific	Low - negative	Slightly detrimental	Certain	Low - negative	Mediumterm	Sitespecific	Low - negative	Slightly detrimental	Certain	Low - negative
POSSIBLE SOIL EROSION / SOIL LOSS											
Longterm	Local	High - negative	Highly detrimental	Very likely	High - negative	Longterm	Local	Low - negative	Moderately detrimental	Fairly likely	Low - negative
POTENTIAL SOIL CONTAMINATION											
Shortterm	Sitespecific	Low - negative	Negligible	Very likely	Low - negative	Shortterm	Sitespecific	Low - negative	Negligible	Fairly likely	Very low

7.1.4. Impacts on Cultural Heritage Resources

No known cultural resources are expected to be found at the WTW or the pump station sites. Ash heaps (which are an important element of Basotho culture) were not surveyed but are likely to occur.

The project is unlikely to affect any rock art sites or older archaeological artefacts, but care will need to be taken at all excavations.

a) Graves and ash heaps

IMPACT: Graves and ash heaps are an important part of Basotho culture, and their disturbance could cause anguish and stress to affected families.

PROPOSED MITIGATION MEASURES:

i. Avoid potential heritage and grave sites (as a first principle).

ii. Detailed planning of the pipeline route should aim to ***avoid*** as many graves and ash heaps as possible (as a first principle).

iii. All graves and ash heaps which cannot be avoided and will be affected by construction must be moved according to standard protocols:

- Exhumation and reburial shall only take place once the necessary consultation, fieldwork and legal processes have been completed.
- A contractor shall be appointed to perform the necessary work, and the terms of reference shall include liaison with custodians for necessary religious/traditional ceremonies to be performed.
- The timing and arrangements for the possible relocation and re-burial of the deceased shall be negotiated with the affected family and the results of this negotiation shall be recorded.
- The affected family should allocate an alternative piece of land for the re-burial.

The Water Commission shall bear the costs for:

- Exhumation; transport and re-burial of the deceased;
- A necessary compassionate allowance to satisfy the reburial requirements
- All the work associated with the burial; and

iv. The coffin and cloth liner, a replacement tombstone (if this existed at the site exhumed).

v. Should there be no tombstone, the Water Commission shall pay for an inscribed wooden tablet in a shape that meets the religious beliefs of the deceased and family members.

vi. The affected family shall be responsible for:

- Stating their preference for exhumation and re-burial;

vii. If needed, making the necessary exhumation and re-burial arrangements with the local authorities and notify the Water Commission; and

viii. Organising the ceremonial processes in accordance with their religious beliefs and/or customs.

ix. In sensitive areas (hill tops, old kraals, near existing residences), inspect excavations on a daily basis for possible heritage resources that may be uncovered by excavation works.

x. Cease construction activities locally if any heritage resources are found in excavations (as per the Chance Finds Procedures – see ESMP).

xi. Engage District Cultural Officer to advise on rescue activities.

Table 50: Summary of the Impact(s) on Cultural Heritage Resources.

PRE-MITIGATION						POST-MITIGATION					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
DISTURBANCE OF CULTURAL HERITAGE RESOURCES											
Long term	Site specific	Very high - negative	Highly detrimental	Very likely	Very high - negative	Medium term	Site specific	High - negative	Moderately detrimental	Very likely	Moderate

7.1.5. Impacts on palaeontological resources

b) Fossils

IMPACT: Palaeontological heritage resources may be disturbed during excavation of pipe trenches as well as for foundation excavations for the reservoirs, pump stations and the WTW.

PROPOSED MITIGATION MEASURES:

- Complete Paleontological Impact Assessment (PIA) study in the areas of highest fossil potential (i.e., where bedrock outcrops at or within 2 m of the surface), map all the fossil sites and compile a Chance Find Protocol.
- Provide training of the ECO and staff members of construction teams to identify and report expected fossils and provide information regarding the legal consequences if fossils are removed without a permit from the Competent Authorities.
- No Paleontological material is allowed to be removed from the construction site without the necessary permits by the Competent Authority. Impact on paleontological heritage (post-construction).

Table 51: Summary of the impact(s) on Palaeontology.

PRE-MITIGATION						POST-MITIGATION					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
IMPACT ON PALAEONTOLOGICAL HERITAGE (CONSTRUCTION)											
Long term	Site specific	Minor - negative	Slightly detrimental	Fairly likely	Low - negative	Long-term	Site specific	Minor - negative	Slightly detrimental	Fairly likely	Low - negative

7.1.6. Road and Traffic Impacts

No baseline study was done to assess traffic patterns within the vicinity of the project area. The presence of construction vehicles in the villages and construction works along the road reserve are likely to cause traffic and road safety risks. Waiting times at the border posts, especially for heavy vehicles, could also be extended. The impacts that are likely to be experienced during the implementation of the proposed development include the following:

a) Increased traffic

IMPACT: Increased-traffic congestion during construction due to an increased number of vehicles on the roads in the area and at the nearby border posts. This may inconvenience road users (especially during peak hours) and **could have adverse economic impacts.**

PROPOSED MITIGATION MEASURES:

- Prior to start of works along the main road, a traffic management plan shall be developed and approved by the Engineer and the Competent authority
- The most appropriate route (and border crossing) for large vehicles transporting equipment, materials and employees to and from the site shall be determined.
- The site access will be clearly sign posted.
- Traffic calming measures must be implemented.
- Materials and labour shall, as far as possible, be sourced locally.
- Deliveries should preferably be scheduled for off-peak hour traffic times, but during daylight working hours.
- Access roads should be planned.
- Where necessary, allow for alternative temporary access routes for other road users.
- Separation of the work areas along main roads with hard barriers.

b) Road safety

IMPACT: Construction works along the main roads and in the villages, pose road safety hazards for pedestrians (especially children)/ livestock), and other vehicles on the road.

PROPOSED MITIGATION MEASURES:

- Conduct a community awareness raising programme, focusing on schools.
- Install traffic signs along public roads used by the project.
- Allow for safe pedestrian crossings where necessary.

- Coordinate with local traffic police to enforce speed limits in construction areas.
- Provide driver training for all staff.
- Impose a zero-tolerance policy regarding alcohol and drugs.
- Ensure all project vehicles are serviced according to the maintenance schedule.

c) Damage to existing road infrastructure

IMPACT: The use of existing road infrastructure to deliver and transport the material to and from site may potentially damage some of the roads – and ultimately cause accidents. This could have significant economic consequences. Construction activities could also impact access road and tracks to houses, businesses, fields, grazing land, schools, clinics, etc.

PROPOSED MITIGATION MEASURES:

- Maintain or construct storm water control mechanisms where required.
- All equipment and/ or materials transported to or from site shall be appropriately secured to, or contained in, vehicles.
- All vehicles used during the project shall have the appropriate load-bearing capacity for the materials and/or equipment intended to be transported.
- Repair must be undertaken to fix any damages to public or private roads caused during construction.
- Provide safe temporary access to all houses, businesses, agricultural lands and community facilities where required and provide clear signage.

Table 52: Summary of the impact(s) on roads and traffic.

PRE-MITIGATION						POST-MITIGATION					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
INCREASED-TRAFFIC											
Medium term	Local	Moderate: - negative	Slightly detrimental	Definite	High - Negative	Medium term	Local	Moderate negative	Slightly detrimental	Definite	High - negative
ROAD SAFETY											
Long term	Local	High: - negative	Highly detrimental	Very likely	Very high-Negative	Long term	Local	Moderate negative	Moderately detrimental	Fairly likely	Moderate - negative
DAMAGE TO EXISTING ROAD INFRASTRUCTURE											
Short term	Local	Moderate: - negative	Slightly detrimental	Fairly likely	Low - Negative	Short term	Site specific	Negligible	Slightly detrimental	Unlikely	Very Low

7.1.7. Noise and Vibration

Most of the pipeline route transverses rural areas which typically have low ambient noise levels. The anticipated noise and vibration impacts associated with construction activities are discussed below:

a) Noise generation and vibration

IMPACT: Noise and vibration generation by construction vehicles and construction activities, such as the use of excavators and bulldozers, localised blasting, cement mixing, mobile generators, etc. Increased noise levels will be experienced on site and in areas within 200 m of construction activity. Noise and vibration impacts can affect learning in schools, clinics and other sensitive receptors and can cause stress. Noisy activities can also displace breeding birds.

PROPOSED MITIGATION MEASURES:

- Construction hours will be restricted to daytime Monday to Saturday and not on Sundays.
- Where construction activities are to take place near schools, they shall be rescheduled to avoid examinations period
- On-going noise monitoring shall be undertaken as part of construction monitoring
- Should construction have to continue after hours, all residents within 200m affected must be notified;
- All machinery and equipment must be maintained in good working order.
- The Contractor shall take preventative measures where practical to minimise complaints regarding noise and vibration nuisance from sources.
  All equipment shall be turned off when not in use.
- Prior to any particularly noisy processes e.g. blasting, the nearest affected landowners must be informed of the proposed timing of the specific works in their properties.
- If there are any blasting events, communities must be informed before the blasting takes place.
- Structures close to areas where major construction activities or blasting will take place must be inspected by the owner, the CLO and the construction manager before works start nearby to determine the current condition of all structures. A follow-up survey must be carried out after blasting and/or construction has finished to determine whether any compensation may need to be paid due to construction damage.
- Assess and manage all noise complaints.

Table 53: Summary of the impact(s) on noise and vibration.

PRE-MITIGATION						POST-MITIGATION					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
INCREASED LEVEL OF NOISE GENERATION											
Shortterm	Local	Moderate: -negative	Slightly detrimental	Definite	Moderate-Negative	Short term	Local	Moderate: -negative	Slightly detrimental	Definite	Moderate-negative

7.1.8. Impacts on Air Quality

No baseline air quality monitoring was undertaken in the project area to determine the ambient air quality. Air quality is currently affected by fires, ambient dust and vehicle exhaust emissions along the roads. The air quality at all the construction areas and their immediate surroundings will be negatively impacted during construction activities. The severity of the impacts will depend on whether the dust is very fine (<10 micron (PM10)) which is respirable, or larger than PM10 when it may be considered nuisance dust. Respirable dust can have adverse impacts on health in the absence of protection and those with existing respiratory problems will be affected.

Nuisance dust impacts household cleanliness, laundry, sensitive machinery and equipment, vegetation and can cause visibility problems on gravel roads. The types of dust that can be expected on the project site and the current level of exhaust gases along main roads are unknown. Air quality impacts that area likely to be experienced during construction are discussed below:

a) Air pollution from dust emissions

IMPACT: Dust emissions arising from loading/unloading/transportation of material, stockpiling of material, excavations, construction of access roads, drilling and blasting, borrow pit works, concrete mixing and driving on gravel roads. Dust from construction activities, can potentially have negative effects on households near the project site, causing health effects, nuisance and decreased road visibility.

PROPOSED MITIGATION MEASURES:

- Areas having to be stripped of topsoil for construction purposes must be kept to a minimum and only stripped when work is about to take place.
- Dust suppression is to be conducted during construction on all stockpiles and exposed ground located within 100 m of residential areas and on gravel roads used by construction vehicles.
- Dust suppression measures such as water or non-toxic chemical dust suppressants can be used. Any chemicals utilised must be of a biodegradable nature and approved by the ECO.
- Plan the site activities so that machinery and dust generating activities are located away from sensitive receptors (i.e. households), as far as possible.
- Limit the height and slope of material stockpiles to reduce wind entrainment. Stockpiles exceeding 1.5 m in height are more likely cause dust during windy conditions.

- Exposed stockpiles can also be sprayed with water, covered or orientated such that they are protected from wind erosion.
- Establishment and enforcement of vehicle speed limits on haul roads and construction camp to reduce the generation of dust.
- All access roads must be adequately compacted and periodically graded and maintained.
- Disturbed areas no longer used or required for construction purposes shall be re-vegetated immediately.
- No overloading of fine material must be permitted and where necessary the truck loads transporting fine material must be covered with a tarpaulin to prevent dust.
- Any dust complaints received from the community will be recorded, promptly investigated and addressed.

b) Air pollution from vehicle exhaust hazardous emissions

IMPACT: Construction vehicles are a source of noxious fumes and greenhouse gases. These emissions are hazardous to human health and can compromise air quality.

PROPOSED MITIGATION MEASURES:

- Monitoring of air quality shall be done as part of Construction Environmental monitoring
- Plant and equipment to function at an optimal level.
- Where possible low sulphur containing diesel to be used.
- All vehicles and equipment must be maintained and serviced according to manufacturer's specifications.
- Ensure all new plant / equipment being delivered to site has undergone inspection.
- Avoid unnecessary idling of vehicle engines while parked.
- Appropriate PPE must be worn at all times when working in areas exposed to hazardous emissions.

Table 54: Summary of the impact(s) on air quality.

PRE-MITIGATION						POST-MITIGATION					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
AIR POLLUTION FROM DUST EMISSIONS											
Medium term	Local	High: - negative	Moderately detrimental	Definite	High - Negative	Short term	Site specific	Moderate: - negative	Slightly detrimental	Definite	Low - negative
AIR POLLUTION FROM VEHICLE EXHAUST HAZARDOUS EMISSIONS											
Short term	Site specific	Moderate: - negative	Slightly detrimental	Very likely	Moderate-Negative	Short term	Site specific	Moderate: - negative	Slightly detrimental	Very likely	Low - negative

7.2. Social Impacts

Social impacts associated with the construction of the project relate to the following:

- Skills development.
- Loss of assets; reference RAP
- Impacts on livelihoods.
- Pressure on community facilities and services;
- Social ills due to presence of construction workers;
- Socio-political issues.
- Labour disputes
- Potential for Sexual Exploitation, Abuse and Harassment
- Potential for Gender Based Violence
- Possibility of poor labour practices by contractors
- Possibility of Occupational, Safety and Health issues; accidents; injuries and fatalities.

Note that the economic impacts of construction are addressed in section. 7.2.10 and health impacts are assessed in section. 10.2.11. Occupational Health and Safety risks are included in section. 10.2.12.

a) Skills development

IMPACT: The project contributes to skills development in the local communities. Local construction companies will be provided with the opportunity to use and enhance their skills. Community members will also be able to develop leadership skills when serving on Resettlement Working Groups, for example.

PROPOSED MITIGATION MEASURES:

- This impact can be enhanced if there are skills development requirements written into the contracts with sub-contractors. It can specify on-the-job training and opportunities to hone existing skills.
- Include women in the Resettlement Working Groups and provide capacity building training to them to develop their leadership skills.
- Provide unskilled workers with reference letters from the project for future use.

b) Loss of assets

IMPACT: During the construction phase of the project some assets will be affected on a temporary or permanent basis namely: ● **Structures** ● **Fields** ● **Trees (fruit and timber)** **In the case of fields, a portion of the servitude will be available for farming after construction has ceased and therefore the impact will be temporary in some areas. Permanent structures such as buildings will have to be relocated if they are in the pipeline servitude. It is unlikely that people will have to move out of their communities or that there will be a large-scale disruption of social networks due to resettlement.** **The social impact of resettlement tends to affect women more than men, due to their reliance on social and community networks. Vulnerable groups such as female headed and child-headed can also be affected more. People's assets are closely linked to their livelihoods and if the impacts are not mitigated properly, it can place already vulnerable people in a downward spiral of poverty. Cultural aspects may influence the compensation payments, especially if the rights-holders are men. Experience has shown that men and women use compensation money differently and that compensation paid to a male household head is not necessarily solely used for rehabilitation and restoration of livelihoods. Intra-household inequalities need to be noted.**

PROPOSED MITIGATION MEASURES:

- A RAP is compiled as part of this study.
- The project must compensate PAPs for all the affected assets. In the case of loss of crops, they must be compensated for the loss of crops for the period that they cannot use the fields. If structures are affected, they must be replaced by similar structures as per the instructions of the PAPs. The principle is that people should be in the same or a better position after the project impacts have been mitigated. Compensation amounts will be at full replacement costs value in accordance with the requirements of Lesotho Land Act 2010, Lesotho Lowlands Water Supply Scheme Compensation Policy (September 2021), and as well as with the AfDB Group's ISS (2023) on Involuntary

Resettlement (OS5) that stipulates that compensation offered to affected persons should be at full replacement cost.

- Ensure that women are included in Resettlement Working Groups and that meetings of these groups are arranged at times when it is convenient for women to attend.
- Ensure that women are involved in the preparation and review of resettlement plans.
- Include women in the discussions of compensation options.
- In the case of physical assets, compensation should rather be in kind than monetary to ensure that the asset is replaced.
- It is important that affected persons be offered multiple options for compensation and livelihood restoration. Replacement land, "topping up" or additional cash grants to purchase land, employment creation, and often a mix of options can be explored.
- A grievance mechanism must be developed to address any grievances due to the project or the RAP process.
- A CLO must be appointed to liaise with affected communities. It is important that communities have a designated person to communicate with about the project. The CLO can direct community enquiries to different parties within the project team.

c) Impacts on livelihoods

IMPACT: Impacts on livelihoods will differ between urban and rural areas. The servitude is a few metres wide, and it is unlikely that people will lose entire crops due to construction activities however, access to their land may be temporarily compromised for periods of days or weeks. **More significant impacts will occur in built-up areas where people may have erected structures in the road reserve or close to the road reserve. The pipeline does traverse some densely populated areas and may impact on the livelihoods of small businesses if the businesses need to relocate. There can be positive impacts on some businesses in the sense that the project activities will bring extra buying power to the area. It may also be negative if they cannot access their businesses, need to close down for a period of time or relocate to new premises that are not located near their customers.**

PROPOSED MITIGATION MEASURES:

- A Socio-economic census of the PAP's shall be undertaken as part of RAP development

- The RAP will provide guidelines on the relocation and compensation for different types of assets. The link between the assets of PAPs and their livelihoods must be established.
- In the case of relocation of small businesses, they must be moved within the same area or to an area where the customers of the business can still access it easily.
- The project must support small local businesses as far as possible by procuring goods and services from them.
- The RAP will include a livelihood restoration and enhancement programme. This programme must be developed with input from the PAPs whose livelihoods will be affected by the project.
- A grievance mechanism must be developed to address any grievances due to the project or the RAP process.
- A CLO must be appointed to liaise with affected communities. It is important that communities have a designated person to communicate with about the project. The CLO can direct community enquiries to different parties within the project team.
- Informal traders must be allowed to return to their old sites once construction has been completed.

d) Pressure on infrastructure due to presence of construction workers

IMPACT: Due to the nature of the construction process and the fact that mostly unskilled labour will be required, and the conditions pertaining to the use of local labour, it is not anticipated that there would be large numbers of construction workers entering the area. The increase in pressure on social and community infrastructure such as schools, clinics, need for housing and other resources is deemed to be of low significance. There may be some housing requirements for construction workers with special skills that cannot be found in the local communities. This could present potential economic opportunities to local communities.

PROPOSED MITIGATION MEASURES:

- Local people from villages close to the construction site must be recruited. If the construction train moves along to a next village, residents from that village must be recruited. In this way the economic benefits will remain in the local area, and the need for construction camps can be minimised.

- If housing is required for construction teams, it must be negotiated with the Chief in the area. The most suitable accommodation, whether it is construction camps or local facilities must be identified.
- No illegal structures may be erected. Housing for contractors must be formalised and it must be a contractual requirement.
- Any construction camps or areas where construction workers are housed must meet the requirements set out in the IFC standard for Workers' accommodation for construction camps.

e) Social ills due to presence of construction workers

IMPACT: Construction projects often attract optimistic work seekers from near and far that are looking for opportunities to improve their living standard through employment. Rumour of a proposed development is often enough to make people decide to move to the area. During the construction period jobs will be available. Some in-migration into the area can be expected. The in-migration of people to an area is often associated with a number of social ills, such as prostitution, drug and alcohol abuse, unwanted pregnancies, gender-based violence, increase in crime, increase in sexually transmitted diseases e.g., HIV/AIDS and cultural changes. **Many of the social ills related to the presence of construction workers will affect women more than men. Vulnerable groups such as child-headed households, young girls and poor people are more susceptible to be taken advantage of, because there are often economic benefits for them to get involved with construction workers. Impacts such as HIV and unwanted pregnancies are permanent and irreversible impacts. Women are often left unsupported to deal with these impacts.**

PROPOSED MITIGATION MEASURES:

- Employ as many local people as possible. Under no circumstances should foreigners be contracted.
- Do not employ any workers 'at the gate'. Work through existing job centres.
- All contractors should sign a code of conduct as part of their induction process. Induction must explicitly include aspects such as fraternising with local people (especially from vulnerable groups), prostitution, alcohol and drug abuse. Toolbox talks must be designed to include social and environmental aspects. A fining system must be put in place for any

transgressions affecting the community. It is important to instil respect for the community and their livelihoods from the beginning of the project.

- Develop a gender-specific outreach programme for the project. It can target schools, clinics and the youth, and should also include internal awareness formation. It must be presented in a culturally sensitive manner to ensure it does not create tension inside communities. NGOs already active in the area can assist with such programmes.
- A grievance mechanism must be developed to address any grievances due to the project or the RAP process.
- A CLO must be appointed to liaise with affected communities. It is important that communities have a designated person to communicate with about the project. The CLO can direct community enquiries to different parties within the project team.

f) Community Mistrust and scepticism

IMPACT: There are many community mistrust and scepticism issues associated with the past projects failures to deliver and follow-through in Lesotho that can potentially affect the project. Some community members may be sceptical because there have been previous consultations in the area for similar projects, but the schemes have never been implemented. They may feel that there are many examples in Lesotho where funds have been obtained for projects, but money has not been spent by the end of the project and therefore has had to be returned unused. Communities may also want the assurance that the project will continue, even if there is a change of government.

PROPOSED ENHANCEMENT MEASURES:

- Communities must be given regular feedback about the project. The Water Commission must develop a stakeholder engagement strategy to facilitate feedback. It is important to manage community expectations.
- The Water Commission cannot control many of the socio-political aspects. The best way to manage relationships with communities is through communication. Various means of communication such as press releases, radio and television interviews, and feedback to local structures can be used.

Table 55: Summary of the Social Impact(s).

PRE-ENHANCEMENT						POST- ENHANCEMENT					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
SKILLS DEVELOPMENT											
Mediumterm	Regional	Low - positive	Moderately beneficial	Fairly likely	Low - positive	Mediumterm	Regional	Moderate - positive	Moderately beneficial	Very likely	Moderate - positive
LOSS OF ASSETS											
Short-term	Local	Very high - negative	Moderately detrimental	Certain	High - negative	Short-term	Local	Moderate - negative	Slightly detrimental	Fairly likely	Low-negative
IMPACTS ON LIVELIHOODS											
Short-term	Local	Very high - negative	Moderately detrimental	Very likely	Moderate - negative	Short-term	Local	Low-negative	Slightly detrimental	Fairly likely	Low-negative
PRESSURE ON INFRASTRUCTURE DUE TO THE PRESENCE OF CONSTRUCTION WORKERS											
Short-term	Regional	Low -	Slightly detrimental	Very likely	Low - negative	Short-term	Regional	Negligible	Negligible	Very likely	Very low

		negative									
SOCIAL ILLS DUE TO PRESENCE OF CONSTRUCTION WORKERS											
Short-term	Regional	Moderate - negative	Moderately detrimental	Very likely	Moderate - negative	Short-term	Regional	Low - negative	Slightly detrimental	Very likely	Low - negative
SOCIO-POLITICAL ISSUES											
Long-term	Regional	High - negative	Highly detrimental	Fairly likely	Moderate - negative	Long-term	Regional	Moderate - negative	Highly detrimental	Fairly likely	Moderate - negative

7.2.1. Economic impacts

a) Employment opportunities

IMPACT: The project will create different employment opportunities, mostly in the short term. During the pre-construction phase there will be opportunities for local people to assist with social surveys. **During the construction phase there will be opportunities for skilled and unskilled labour. Construction companies often have a core skill of labourers with specialised skills that travel with them from site to site. In an area with high unemployment rates, the creation of jobs can be seen as a positive impact. The project may provide existing entrepreneurs with new opportunities and will also assist with the creation of new skills.** **Apart from the direct employment opportunities there will also be secondary opportunities such as transport, accommodation, meals and laundry services.**

PROPOSED MITIGATION MEASURES:

- Preference must be given to local people. The people in the villages closest to the project must be given the opportunity to work on the project. If the construction train moves along to a next village, residents from that village must be recruited. In this way the economic benefits will remain in the local area, and the need for construction camps can be minimised.
- Recruitment must be done in a fair and equitable manner that is acceptable to communities. Some of the communities feel that the councillors tend to be nepotistic, and that people should rather register at the local Chief's offices, where recruitment can be done on a first come, first served basis.
- The recruitment process must be gender-sensitive and be done in such a way that it is accessible to men and women.
- The recruitment process must not discriminate based on age. If people are physically able to do the work, they should be given the opportunity to do so.
- Skills from outside the area may only be used if the specific skill is not locally available.
- As far as reasonably possible, goods and services must be procured locally. Preference must be given to local service providers and entrepreneurs.

Table 56: Summary of economic impact.

PRE- ENHANCEMENT						POST- ENHANCEMENT					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
EMPLOYMENT OPPORTUNITIES											
Mediumterm	Regional	High - positive	Highly beneficial	Very likely	High - positive	Mediumterm	Regional	Very high - positive	Highly beneficial	Certain	Very high - positive

7.2.2. Health impacts

A construction project of this nature will have the following public health impacts:

- Spread of communicable diseases such as HIV and TB (addressed below);
- Accidents and injuries (addressed in s. 7.2.6);
- Respiratory diseases due to dust (PM10) (see s.7.2.8) ;
- Stress and other health responses to noise pollution and vibration (see s. 7.2.9).

a) Increase in HIV & other communicable diseases due to project activities

IMPACT
.
HIV and TB are already present in the project area. Due to the movement of people there may be an increase in the prevalence of these diseases in hotspots in the project area. This will increase the burden on health services.

PROPOSED MITIGATION MEASURES:

- The Water Commission should develop an in-house infectious diseases strategy to address health issues within the workforce and share it with their contractors. Align the strategy with community HIV strategies followed by NPOs. The strategy should include voluntary counselling and testing and training of peer educators.
- The Water Commission should prescribe a Health and Safety Programme for all contractors working on site, including safety consciousness and awareness training. The programme should also include relevant health aspects, e.g. sexual health, fatigue management, social health.
- Extend the workplace programme for HIV beyond the company's operations, and include all contractors, suppliers, transportation companies and local communities. The spread of HIV along transportation routes (roads) is well documented, so this component of the project (transportation of all goods and services to and from the project site) needs special attention.
  - Select suppliers who have in-house HIV programmes and policies in place;
  - Develop tailored BCC materials such as mirror hanger messages and bumper stickers;
  - Include condoms in the road safety kit;
  - Work with truck company managers to ensure that their drivers receive adequate HIV training;
- Develop a gender-specific outreach programme for the project. It can target schools, clinics and the youth, and should also include internal awareness formation. It must be

presented in a culturally sensitive manner to ensure it does not create tension inside communities.

Table 57: Summary of the impact on health.

PRE- ENHANCEMENT						POST- ENHANCEMENT					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
PUBLIC HEALTH											
Longterm	Regional	Very High negative-	Extremely detrimental	Very likely	Very high - negative	Long-term	Regional	High - negative	Highly detrimental	Very likely	High - Negative

7.2.3. Occupational health and safety impacts

a) Health and safety of construction workers

IMPACT: It is likely that many of the construction workers will be procured from local villages. The Labour Code Act (Act No. 94 of 1992) governs occupational health and safety requirements in Lesotho. Although some of the recruited workers may be familiar with health and safety requirements, it can be anticipated that a number of the workers may not have been exposed to these requirements before. There is a risk of injury to workers if the health and safety requirements are not adhered to.

PROPOSED MITIGATION MEASURES:

- All tenders from contractors must include a Health and Safety Plan.
- Health and Safety Plans must be submitted to the Water Commission before construction commences.
- Contractors must submit a Health and Safety Risk Assessment including measures for addressing and managing the risks before construction commences. Safe work procedures must accompany the H&S Risk Assessment.
- Contractors must conduct toolbox talks dealing with all possible risks including off work risks such as attacks by the host communities, trafficking in persons, substance abuse, etc. In addition to holding toolbox talks, contractors must report all incidents.
- Contractors must provide PPE to all workers and ensure they use it.
- Each construction team must have a person trained in First Aid on site and a clinic or First Aid centre must be established at the contractor’s camp.
- Other impacts to consider:
- Waste management – hazardous waste if any, construction materials – cement bags, waste oil and diesel, oil spills from vehicles and machinery etc
- Child labour
- Sexual and Gender Based Violence (SGBV), Sexual Exploitation Abuse and Harassment (SEAH)

7.3. Operations Impacts

7.3.1. Impacts on surface water resources, river flows

The impact assessment below therefore assumes that the *pre-mitigation* condition would be no IFR releases and the *post-mitigation* operations would allow for 15% of MAR. It also assumes that releases from 'Muela will be made to augment low flows.

a) Decreased water flow.

IMPACT: Abstraction of water from Hololo River will result in less water available for downstream users including farmers and domestic water users, specifically in the low flow months. Reduced flows could also affect riparian vegetation and the primary aquifers underlying the river.

PROPOSED MITIGATION MEASURES:

- The main mitigation measure is to supplement flows during low flow periods with releases from the existing 'Muela dam into Hololo River.
- In addition, mitigation can also include demand management such as: applying water restrictions during low flow periods, water cost structuring, awareness raising and water use restrictions.
- Determine an IFR release programme based on real-time river flows (viz. LHDA practices) to ensure that the required environmental flows are always maintained.
- Monitor downstream flows and the effects on: fish, invertebrates, downstream users, water quality.

b) Increased sediment deposition

IMPACT: Decreased flows will result in an increase in sediment deposition in the riverbed downstream of the intake works. This will increase the size of sandbanks and islands in the river, which in turn will reduce the channel width. This could result in bank over-topping during high flow periods

PROPOSED MITIGATION MEASURES:

- Increased sedimentation can be mitigated by maintaining the low flows by means of a release from 'Muela Dam.

c) Disposal of WTW Sludge

IMPACT: The treatment works will generate sediment and sludge. The plant has been designed to dry the sludge on land next to the WTW (see Figure 4.3) and then dispose the material at the designated spoil site or sell the

material for agriculture, fill or construction. Sludge will not be discharged into the river.

PROPOSED MITIGATION MEASURES:

- The amount of wastewater produced in the treatment process is likely to be 10% of the capacity of the treatment works. However, 50% of this is recovered and recycled to the inlet works. Therefore, the volume that will have to be dried and disposed of is relatively small.

d) Discharge from ‘Muela into Hololo river

IMPACT: A maximum of 3.75 million m^3 of water per annum is allowed to be transferred from

the Katse’Muela dam into Hololo River under an agreement in terms of the Lesotho Highlands Water Project Treaty. In some years some or all of this may not be used and the agreement allows for an amount of 15 million m^3/a to be ‘banked’ in Katse system for future use in the LLBWSS. Water will only be released as needed and protocols are already in place to inform all affected parties when releases will be made. As the Hololo falls within the Orange-Senqu catchment, downstream countries (South Africa, Botswana and Namibia) have been informed.

PROPOSED MITIGATION MEASURES

- A hydrological assessment is urgently required to determine the impact of water releases from ‘Muela on the hydrology of the Hololo River above the planned intake works. Such a study will inform what mitigation measures will be required.

Table 58: Summary of the impact(s) on surface water resources.

PRE- ENHANCEMENT						POST-ENHANCEMENT N	PRE- ENHANCEMENT				
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
DECREASED WATER FLOW											
Longterm	Regional	High-negative	Highly detrimental	Certain	High - negative	Longterm	Regional	Low - negative	Moderately detrimental	Fairly likely	Moderate - negative
INCREASED SEDIMENT DEPOSITION											
Longterm	Regional	Moderate - negative	Highly detrimental	Very likely	High-negative	Longterm	Regional	Low - negative	Moderately detrimental	Fairly likely	Moderate-negative
SLUDGE DISPOSAL											
Longterm	Sitespecific	Low-negative	Slightly detrimental	Very likely	Moderate - negative	Longterm	Sitespecific	Low - negative	Slightly detrimental	Fairly likely	Low - negative
TRANSFERS FROM ‘MUELA INTO THE UPPER HOLOLO RIVER											
Longterm	Regional	Unknown	Unknown	Certain	Unknown	Longterm	Regional	Unknown	Unknown	Unkown	Unknown

7.3.2. Impacts on Aquatic Ecology

The IFR has not been definitively calculated and therefore a conservative estimate of 15% MAR has been used in the water balance. The impact assessment below therefore assumes that the *pre-mitigation* condition would be no IFR releases and the *post-mitigation* operations would allow for 15% of MAR. It also assumes that releases from 'Muela will be made to augment low flows.

a) Impact of IFR releases on Ecological Category

IMPACT: The pre-mitigation impact implies that the present environmental state (PES) will change to a worse (degraded) state. Ecosystem services will be impacted and may become unsustainable. The change in the PES is due to flows that at times will be less than the estimated IFRs, especially during low flow periods and droughts. The in-stream habitat will be insufficient to maintain the in-stream biota and the resilience of the system could be affected and it may not be able to recover after drought conditions.

PROPOSED MITIGATION MEASURES:

- Ensure that an IFR of 15% is maintained in the river, by scheduling releases from 'Muela when required. Use a real-time monitoring system to ensure that releases are timed to meet the IFR requirements.
- Monitor downstream conditions to determine whether a 15% IFR is sufficient to meet ecological system needs and the requirements of downstream users.

b) Impact on in-stream biota

DOWNSTREAM IMPACT: This impact is linked to the change in Ecological Category. Fish and macro-invertebrates may be compromised due to insufficient habitat being available during prolonged drought and low flow times. The frequency of occurrence and abundance of the species present may be compromised. It is unlikely that species will be lost.

PROPOSED MITIGATION MEASURES:

- As above.
- Conduct a baseline survey of the biota in the Hololo River and compare species composition, diversity and water quality with data from ‘Muela. On the basis of this study, further recommendations may follow.

c) Impact on Riparian Vegetation

DOWNSTREAM IMPACT: The change in riparian vegetation status is linked to decreased base flows that may impact on the marginal zone. The marginal zone plays an important role in cover, refuge, feeding and breeding areas for the in-stream biota, therefore an impact on the vegetation can impact aquatic biota. It is unlikely that the upper riparian zones will be impacted on as these are more dependent on higher flows and flooding which will remain the same.

PROPOSED MITIGATION MEASURES:

- Ensure that an IFR of 15% is maintained in the river, by scheduling releases from ‘Muela when required. Use a real-time monitoring system to ensure that releases are timed to meet the IFR requirements.
- Monitor riverine vegetation in the Hololo River to determine any negative impacts resulting from transfers.
- Monitor downstream riverine vegetation to determine whether the 15% IFR is sufficient to maintain riverine vegetation.
- In addition to IFR releases, the riparian zone should also be protected from clearing and over grazing as this will also help to combat the impact of decreased flows.

Table 59: Summary of the Impact(s) on Aquatic Ecosystems.

PRE- ENHANCEMENT						POST- ENHANCEMENT					
Duration	Extent	Intensity	Consequence	Probability	Significance	Duration	Extent	Intensity	Consequence	Probability	Significance
IMPACT ON ECOLOGICAL CATEGORY											
Longterm	Local	High - negative	Highly detrimental	Very likely	High - negative	Longterm	Local	Moderate - negative	Moderately detrimental	Unlikely	Low - negative
IMPACT ON INSTREAM BIOTA (DOWNSTREAM)											
Longterm	Local	High - negative	Highly detrimental	Very likely	High - negative	Longterm	Local	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative
IMPACT ON RIPARIAN VEGETATION (DOWNSTREAM)											
Longterm	Local	Moderate - negative	Moderately detrimental	Certain	High - negative	Longterm	Local	Low - negative	Moderately detrimental	Fairly likely	Low - negative
IMPACT ON BIOTA AND RIPARIAN VEGETATION (UPSTREAM)											
Long-term	Local	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

7.3.3. Impacts on Water Quality

A decrease in flows can cause a deterioration in water quality due to decreased dilution and assimilative capacity. This is a natural consequence of seasonal variations in flow but could be exacerbated by abstraction of water for the LLWDSP III. Usually this results in increased salinity and concentration of impurities.

However, if flows in the Hololo River are augmented by water from 'Muela, dilution issues will not be a problem. **However, since no modelling has been carried out on the impact of 'Muela water on the water quality in the Hololo River, the impact cannot be assessed at this time.**

PROPOSED MITIGATION MEASURES:

- Modelling of the Hololo river with and without augmentation from Muela dam should be done to determine the extent of impacts that can be brought by the abstraction of water.

7.3.4. Social Impacts

The proposed project will bring a number of social benefits, primarily an assured supply of treated water. These benefits will only be realised once the existing distribution network has been upgraded and/or a new distribution system has been installed. The roll out of these works is to take place immediately after the construction works for the bulk water supply have been completed.

The impact assessment in this section is based on the assumption that the distribution system will be rolled out as planned.

a) Improved access to potable water

IMPACT: Communities indicated that there are already water sources in the area, but they are not fully utilised. There are also delays in the repair and maintenance of these water sources. This affects the availability of potable water at household level. This project will ensure reliable access to potable water, which will have significant knock-on effects on health, economic activity, wellbeing, etc.

PROPOSED MITIGATION MEASURES:

- This is a positive impact and ensuring that the new infrastructure is maintained and operated as intended will enhance this impact.

- The distribution system will need to be constructed and/or upgraded as soon as possible after the bulk water supply system has been installed to ensure that the benefits an improved water supply are actually realised.

b) Decreased water flow in Hololo River for downstream users.

IMPACT: Abstraction of water from Hololo River will result in less water being available for downstream users including farmers and domestic water users, specifically in the low flow months. Without augmentation of flows from 'Muela, this may have an impact on the livelihoods of the downstream users, especially people farming with cattle and those few farmers relying on the river for irrigation.

PROPOSED MITIGATION MEASURES:

- Release water from the existing 'Muela Dam to supplement the water in the Hololo River (as discussed above).
- Ensure that the 15% IFR releases are maintained during low flow conditions.
- Downstream water users must be informed about the potential impact in order to allow them to change their farming activities accordingly.
- A downstream water users forum should be established. This should include all the relevant stakeholders and decision-makers. The forum should meet at least three times a year. Communication between these stakeholders is critical.
- Monitor downstream users to determine whether the 15% IFR releases are sufficient to meet their needs.
- If vulnerable people's livelihoods are affected in a negative manner resulting in loss of livelihood, they must be assisted with recreating a livelihood. Once the full impact of the abstraction is understood, the Water Commission must investigate the impact on the livelihoods of downstream users in more detail.
- According to the SADC Protocol on Shared Watercourses, the Water Commission is responsible for informing the member states (South Africa, Namibia and Botswana) of the proposed water abstraction activity for the LLWDP III project. This is in process.

Table 60: Summary of the Social Impact(s).

PRE- ENHANCEMENT						**POST- ENHANCEMENT**					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
IMPROVED ACCESS TO POTABLE WATER											
Longterm	Regional	High - positive	Highly beneficial	Certain	Very high - positive	Long-term	Regional	Very high - positive	Extremely beneficial	Certain	Very high - positive
DECREASED FLOWS IN THE HOLOLO RIVER AND THE IMPACT ON DOWNSTREAM USERS											
Longterm	Regional	High - negative	Highly detrimental	Very likely	High - negative	Long-term	Regional	Moderate - negative	Highly detrimental	Fairly likely	Moderate - negative

7.3.5. Health Impacts during operations

a) Public Health

IMPACT: The project will be beneficial from a public health perspective, as the water would be clean and safe to use for human consumption. The United Nations SDGs (Goal 6) states that proper water and sanitation systems are at the core of sustainable development and critical for the survival and health of communities and the environment. Inadequate water systems pose health risks to communities that can be prevented. Contaminated water and poor sanitation are linked to the transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, polio and typhoid fever.   **The outbreak of preventable waterborne diseases can be reduced if access to water and sanitation in the project area is improved. This will have a positive impact on the health services in the area, and on public health in general.**

PROPOSED MITIGATION MEASURES:

- This is a positive impact, and it can be enhanced if sanitation services are improved in parallel with the provision of water to communities.
- Awareness programmes must accompany the roll out of this programme to ensure that personal hygiene is also improved.

Table 61: Summary of the Impact on Health during operations.

PRE- ENHANCEMENT						POST- ENHANCEMENT					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
PUBLIC HEALTH											
Longterm	Regional	High - positive	Highly beneficial	Very likely	High - positive	Long-term	Regional	Very high - positive	Extremely beneficial	Very likely	High - positive

7.3.6. Economic Impacts during operations

a) Economic growth

IMPACT: Once the project is implemented, it can contribute to economic growth in the area due to the improved water supply. People, especially women, will have more free time once the physical burden of collecting water is removed. The availability of water can encourage investments and industrial growth, especially in areas that are already known for industry. **The lowlands area is known for its agricultural produce, and a steady water supply can contribute to agricultural practices and food security. This will be a benefit to commercial and subsistence farmers. Subsistence farmers may get the opportunity to grow better produce, and to supplement their income through selling their products.** **There are high levels of unemployment and poverty in the project area. Economic growth will have a long-term positive impact on the area, especially the water supply project is aligned with other social and economic development projects.**

PROPOSED MITIGATION MEASURES:

- The Water Commission must align with other government departments such as the Ministry of Agriculture and Food Security, Ministry of Development Planning, Ministry of Health, Ministry of Local Government and Chieftainship Affairs and Ministry of Social Development to develop strategic plans for the future economic and social development of the area. The availability of water will unlock a number of opportunities for further development.
- Given the importance of agriculture as a livelihood strategy, especially for poor and vulnerable people, the connection between the availability of water and development of grassroots agricultural projects must be investigated and long-term social development projects should be planned in these sectors. The opportunity that the project presents in this regard must be optimised.

Table 62: Summary of the Economic Impacts

PRE- ENHANCEMENT						POST- ENHANCEMENT					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
ECONOMIC GROWTH											
Longterm	Regional	Moderate - positive	Highly beneficial	Fairly likely	Moderate positive	Long-term	Regional	High-positive	Highly beneficial	Fairly likely	Moderate - positive

7.3.7. Visual Impacts

a) Visual Impact on environment

IMPACT: The 28 reservoirs, 9 pump station and the WTW will all have a very slight visual impact on the environment. However, the landscape in the project area has been largely altered by human activities and settlement. The impact will be minimal.

PROPOSED MITIGATION MEASURES:

- Damage to the natural environment, especially rock outcrops, must be prevented or minimised.
- No painting or marking of natural features must be allowed. Only use temporary markers.
- Blasted areas and cut and fill slopes must be as rough as possible such that:
  - The natural surroundings are emulated as far as possible; and
  - The jagged edges facilitate the accumulation of soil and the subsequent establishment of vegetation.

Table 63: Summary of the Visual Impact.

PRE-MITIGATION						**POST-MITIGATION**					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**ignificance**
VISUAL IMPACT ON ENVIRONMENT											
Long-term	Regional	Low-negative	Moderately detrimental	Very likely	loderate negative	Medium-term	Local	Low - negative	Slightly detrimental	Fairly likely	Very Low -

7.3.8. Climate Change Impacts

a) The project will contribute to both climate mitigation and adaptation.

IMPACT: The Lesotho Lowlands Water and Sanitation Development Project Botha Bothe Phase 1 will generate greenhouse gas emissions during construction activities. This will be from movement of plants, machinery and material haulage. **During the project operational phase. The water abstraction from Hololo River will result in reduced flows for downstream communities. Thus affecting groundwater recharge and surface water availability for irrigation and other uses. This increasing climate change vulnerability of communities. On the other hand, the reliable supple of portable water for the project communities. Will improve their adaptive capacity to effects of climate change.**

PROPOSED MITIGATION MEASURES:

- System designed to use less pumping and incorporating use of mostly gravity and solar energy
- Contractor’s camp site where possible should connect to national grid and or use solar power. In an effort to reduce use of diesel-powered generators
- air emissions monitoring shall be implemented within the receptor communities
- all project vehicles should be in a state of good repair with no visible signs of exhaust fumes and or smoke
- The on-site servicing of vehicles and plant shall not be permitted
- No burning of waste especially plastics shall be allowed on site
- Contractors’ and their suppliers to adopt Recycle, reuse and reduce principles in their materials and inputs supply chain management
- Local recruitment shall be encouraged to reduce vehicular movements associated with the project
- Where possible materials and inputs shall be sources locally to reduce emissions associated with material haulage.
- Water use efficiency shall be encouraged as well as minimising system water losses during distribution.

- Local capacity building to be done as part of Operations and Maintenance phase planning to reduce commute associated with systems maintenance

Table 64: Summary of the Climate Change Impact.

PRE- ENHANCEMENT						POST- ENHANCEMENT					
Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**	**Duration**	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
VISUAL IMPACT ON ENVIRONMENT											
Longterm	Regional	Low-negative	oderately etrimental	Very likely	Moderate negative	Medium term	ocal	Low-negative	Slightly detrimental	Fairly likely	Very Low -

7.4. Impact Summary

The summary of the impact assessment for construction and operations, provided in Tables 10.19 and 10.20, shows the pre-mitigation rating and the post-mitigation assessment for each identified impact. The tables also indicate the level of confidence in the assessment. A ‘Low’ confidence rating means that the assessment has been based on intuition and that some major assumptions have been used in determining the rating. A ‘Moderate ’ confidence rating suggests that the assessment has been based on common sense, knowledge of similar construction projects and although there are no hard data to support the finding, the assumptions used are quite robust. A ‘High’ rating indicates that the impact rating is based on hard data, modelling results or other tangible evidence to support the finding.

7.4.1. Construction impacts

The impacts that are likely to be caused by the construction of the intake works in the river, the WTW, main and 9 pump stations, a 133 km long pipeline and 26 storage reservoirs are mostly predictable and typical of construction projects of this nature. It can be seen from Table 10.19 that the highest *pre-enhancement* negative impacts relate to:

- Impacts on graves and ash heaps.
- Road traffic safety.
- Transmission of communicable diseases.
- Accidental fires.
- Soil erosion and soil loss.
- Increased traffic.
- Air pollution from dust; and
- Loss of assets in the pipeline servitude and at the reservoir sites.

After enhancement is applied, the most severe impacts relate to the transmission of communicable diseases and traffic – partly because these impacts are difficult to mitigate against.

The construction of the project will also result in some positive impacts, notably on employment and skills development.

Table 65: Summary of Construction Impacts

Class of impacts	**Impact**	**Pre-enhancement assessment***	**Post- enhancement assessment***
Impact on water courses	Increased sediment yield, sandbanks, islands	Moderate	Low
	Bank degradation and disturbance of riparian vegetation	Low	Very low
	Damage to water courses	Moderate	Low
	Contamination of water	Low	Very low
Impact on biodiversity	Spread of weeds	Low	Low
	Loss of plant species	Low	Very low
	Poaching/killing of animals	Low	Very low
	Faunal injuries	Low	Low
	Disturbance of bird species	Low	Very low
	Accidental fires	High	Low
Impact on soils	Deterioration of soil potential	Low	Low
	Soil erosion/loss	High	Low
	Soil contamination	Low	Very low
Class of impacts	**Impact**	**Pre-mitigation assessment***	**Post-mitigation assessment***
Impact on cultural heritage	Disturbance of graves and ash heaps	Very high	Moderate
Impacts on fossils	Impact on fossils	Low	Low
Impacts on roads and traffic	Increased traffic	High	High
	Road safety	Very high	Moderate
	Damage to road infrastructure	Low	Very low
Noise and vibration	Noise and vibration	Moderate	Moderate
Air quality	Air pollution from dust	High	Low
	Air pollution from vehicle exhaust emissions	Moderate	Low
Social impacts	Skills development	Low positive	Moderate positive
	Loss of assets	High	Low

	Impact on livelihoods	Moderate	Low
	Pressure on community facilities and services	Low	Very low
	Increase in social ills	Moderate	Low
	Socio-political issues	Moderate	Moderate
Economic impacts	Employment opportunities	High positive	Very high positive
Public health	Increase in HIV and other communicable diseases	Very high	High

*The impacts are negative except where stated.

7.4.2. Operational Phase Impacts

Operational impacts will be caused by the abstraction of water at the intake works and the impacts that this will have on downstream users, hydrology and sedimentation. Other positive and negative impacts may be caused by: IFR releases, inter-basin transfers, supply of treated water to communities in the area, disposal of WTW sludge, and economic opportunities created by the availability of water.

The impacts of scheme operation are summarised in Table 10.9. It can be seen that the most significant negative impacts *prior to the application of mitigation* relate to:

- Decrease in water flows.
- Increase in sediment deposition.
- Impact of IFR releases on ecological status of river.
- Impact on in-stream biota (downstream).
- Impact on riverine vegetation (downstream).
- Decreased water flow in Hololo River for downstream users.

All of these can be mitigated to Moderate or better, primarily through inter-basin transfers and the strict application of rules regarding the IFR releases.

However, there are a number of impacts that cannot be assessed at this stage as no baseline studies have been done and the impacts modelled. These are:

- Discharge of ‘Muela water into Hololo River.
- Impact of ‘Muela water transfers on biota and riverine vegetation (upstream of the intake works).
- Impact on water quality during very low flow periods (without augmentation) due to a reduction in dilution.
- Impact on water quality due to “Muela transfers.

The project will also realise several significant benefits, such as:

- Improved access to potable water.
- Public health benefits from treated water supply.
- Economic growth.

Table 66: Summary of Operational Impacts

Class of impacts	Impact	Pre-enhancement assessment*	Post-enhancement assessment*
Impacts on surface water resources	Decrease in water flows	High	Moderate
	Increase in sediment deposition	High	Moderate
	Disposal of sludge from WTW	Moderate	Low
	Discharge of 'Muela water into Hololo River	Unknown	Unknown
Impacts on aquatic ecology	Impact of IFR releases on ecological status of river	High	Low
	Impact on instream biota (downstream)	High	Low
	Impact on riverine vegetation (downstream)	High	Low
Class of impacts	**Impact**	**Pre-enhancement assessment***	**Post-enhancement assessment***
	Impact of 'Muela water trasnfers on biota and riverine vegetation (upstream)	Unknown	Unknown
Impacts on water quality	Impact on water quality due to reduction in dilution	Unknown	Unknown
	Impact on water quality due to 'Muela transfers	Unknown	Unknown
Social impacts	Improved access to potable water	Very high positive	Very high positive
	Decreased water flow in Hololo River for downstream users	High	Moderate
Health	Public health benefits from treated water supply	High positive	High positive
Economic impacts	Economic growth	Moderate positive	Moderate positive
Aesthetics	Visual impact	Moderate	Very low

*The impacts are negative except where stated.

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1. Objectives of the ESMP

The main objective is to provide a framework of actions to manage negative impacts and enhance beneficial impacts of the project through design, construction and operation phases of the project. It is designed to give the Department of Environment confidence that the impacts are addressed and managed correctly to a sufficient level for issuance of an Environmental Licence for the proposed project to proceed. Each management action is designed to be practical, measurable and auditable. Specifically, the ESMP aims to:

- Draw attention to all the key environmental management requirements applicable to the project.
- Provide an environmental management planning document for incorporation into the construction tender and contract documents.
- Define and outline the functions, roles and responsibilities of persons accountable for effective environmental management.
- Outline mitigation measures and environmental specifications to minimise the extent of and to manage environmental impacts associated with the project.
- Identify the requirements for detailed Method Statements (construction phase) for certain aspects or activities; and
- Define requirements and procedures for environmental and social monitoring.

8.2. Environmental Management Process

The implementation of the ESMP is dependent on the involvement and cooperation of several key role players. The level of involvement and responsibilities of each of these role players will vary during different stages of the project, but they are all vital to the successful environmental and social management of the project.

Mitigation measures have been proposed to reduce both existing and potential impacts associated with proposed LLWDSP III development. In addition, mitigation measures are identified as either social or bio-physical measures. Social mitigation includes the measures used to mitigate effects such as noise, land use, and other effects to the human environment. Bio-physical mitigation includes measures that address impacts to the bio-physical environment, such as biological communities, vegetation, air quality, and others. It is also important to note that appropriate facility designs are key to mitigating environmental and social risks and impacts.

8.2.1. ESMP Implementation Structure

The project is implemented under the Ministry of Natural Resources with oversight of a Project Steering Committee (PSC) which meets bi-annually or on a need basis, and the records are shared with the Bank. The figure below illustrates the existing governance structure.

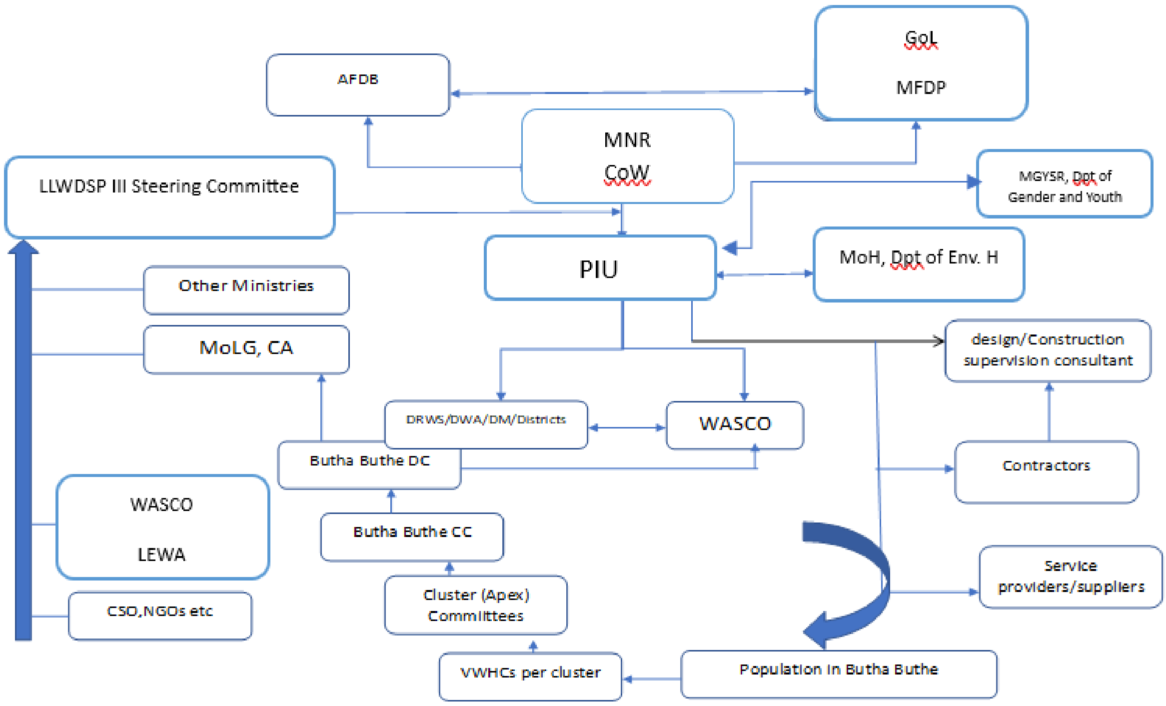

Figure 25: Organizational Structure for Implementation of ESMP.

a) Capacity Building Program

This component will address factors affecting overall capacity and financial sustainability of service providers responsible for operating and maintaining the water infrastructure, particularly the DWA, WASCO, and Local Authorities and Community Councils in the project area. Training and technical assistance for establishment of private and community operators (including O&M training) in peri-urban and rural areas will be extended to cover the settlements under additional financing as well.

The following capacity building activities shall be undertaken for the implementation of the project.

a) Development and operationalisation of a Water Sector Gender Strategy
b) Mainstreaming Gender, Environment, Climate resilience, and cross cuttings Issues
c) Support for inter-sector coordination to improve service delivery; especially between line sectors (environment, health, water supply and sanitation, nutrition, education, and local authorities).
d) Capacity building in M&E and data-related activities and improving overall sector data and monitoring system. Training of MoW staff to enhance their capacity in project and contract management and performance monitoring in the water sector.
e) Community sensitization, mobilization, formation, and training of village water health committees,
f) Training and technical assistance for establishment of private and community operators (including O&M training) in peri urban and rural areas as well as capacitating the technical teams from WASCO will backstop the community/private operators.
g) Promote reforestation and catchment management activities empowering communities to get involved in these activities during and after project implementation. The project will upgrade water resources monitoring networks in Botha Bothe district (surface water, groundwater, and water quality) and set up an early warning system through installation of Telemetry systems
h) Gender inclusive skills training and empowerment of women and youth, disabled persons in water and sanitation related economic opportunities within the project area. The project will support better training and bring it closer to the informal sector and local networks in Botha Bothe district. 325 youth will be targeted with this training during the project.

The institutional strengthening and capacity building costs are included in the table below.

Detailed Project Cost in USD						
	Unit	Quantity	Avg per unit	Total cost	GOL	AfDB
1. Water infrastructure development						
Water supply systems covering 3 settlements	1	1	11,022,591	11,022,591	0	11,022,591
Design & Supervision services	monthly	0		0	0	0
Total water infrastructure development				**11,022,591**	0	**11,022,591**
3. Institutional Strengthening, Capacity Building and Project Management						
3.1 Sector Development Support & Capacity Building						
Capacity building of communities (mobilisation & sensitisation)	contract	1	197,532	197,532	0	197,532
Early warning systems established and Hyromed upgraded.	contract	1	451,798	451,798		451,798
Youth Apprenticeship	unit	240	400	96,000	0	96,000
Training to enhance institutional capacity (FIDIC and E&S Training for PIU Staff)	unit	1	100,000.00	100,000	0	100,000
Total Sector support & capacity building			**749,730.00**	**845,330**	**0**	**845,330**
3.2 Project Management						
Office & MIS equipment- PIU & COW	unit	32	2,563.00	82,016	0	82,016
Project Auditing -environmental & social, & financial	contract	3	45,000.00	135,000	0	135,000
office space and utilities, general operating costs related to support staff, i.e. salaries, gradutíes, etc., office consumables, supplies, tax payments, etc.	unit	1	6,294,801.00	6,294,801	6,294,801	0
Implementation of ESMP	unit	1	10,056.00	10,056	10,056	0
Incremental Project operational costs	monthly	36	20,858.00	750,888	0	750,888
Recurrent time related supervision costs (6 key staff salaries)	monthly	36	38,000	1,368,000	864,000	504,000
Land Acquisition & compensation costs	unit	1	476,114.00	476,114	317,409	158,705
Total Project Management			**6,887,392.00**	**9,116,875**	7,486,266	**1,630,609**
Total Institutional Strengthening, Capacity Building and Project Management			**7,637,122.00**	**9,962,205**	7,486,266	**2,475,939**
OVERALL TOTAL				**13,498,530**		

Figure 26: Project implementation costs including Institutional strengthening and capacity building.

8.3. Roles and Responsibilities

The following environmental management positions are required within the project implementation team to ensure effective implementation of the provisions of the ESMP.

8.3.1. The Project Owner

8.3.1.1. Commissioner of Water

The Commissioner of Water (CoW), on behalf of the Executing Agency, is the applicant of the authorisation, the developer of the project and the Contractor's and Engineer's Client. Under the Lesotho environmental law, applicants are accountable for the potential impacts of activities being undertaken as well as managing these impacts. CoW, therefore, has the overall environmental responsibility to ensure that the implementation of the ESMP complies with legislation as well as with the conditions of the Environmental Licence (Record of Decision).

Principal Secretary may delegate environmental compliance / responsibility to nominated agents such as

- Engineer
- DoE

The holder of the authorisation must submit an environmental audit report upon completion of the construction and rehabilitation activities.

The environmental audit report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the Environmental Licence conditions as well as the requirements of the ESMP.

This ESMP will be made available to all contractors that tender for construction contracts in order for them to cost for its implementation.

8.3.1.2. Project Implementation Unit

The PIU through its specialists, especially the Project Engineer (Water and Sanitation Engineer) will be responsible for the construction supervision of the project. The PIU will, thus monitor the implementation of the project in coordination with the Consultant for daily, weekly and monthly compliance reports and implementation progress of the project.

The PIU will also undertake monitoring and ensure the adherence and compliance of the project in liaison with the Consultant in the implementation of the ESMP, through its office of Environmental and Social Safeguards which also has the obligation to ensure that resettlement and compensation issues within the project are addressed within specifications.

8.3.1.3. An Independent Environmental and Social Auditors

The PIU may appoint an Independent Environmental and Social Auditors (IESA) to monitor and audit compliance and report environmental and social compliance to the PIU for reporting to DoE. Once appointed, the name and contact details of the IESA must be submitted to the DoE. The IESA will:

- Keep records of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ESCO;
- Confirm that the requirements of the ESMP are communicated, understood, and
- implemented by personnel on site;
- Manage scheduled audits and inspections on contractors' performance on site.
- Monitor ESMP compliance through scheduled site visits and inspections during the pre-construction, construction and rehabilitation/decommissioning phases;

Submit compliance reports to PIU for onward submission to DoE.

8.3.2. Consultant AEC-Mafube (JV)-Project Construction Supervisor

The Consultant is responsible for the construction supervision of the project. The PIU will appoint a consultant who will be responsible to oversee the overall implementation of the project as well as to ensure compliance with the ESMP. The consultant shall appoint an Environmental and Social Safeguards Specialist (ESSS). The ESSS will ensure that the provisions of ESMP are complied with by contractors during the implementation of the project, by monitoring the contractor.

The appointed ESSS shall:

- Inform contractors of the Record of decision (RoD) and ESMP obligations, as well as the Method Statements to be prepared, environmental training to be undertaken in terms of this obligation.
- Conduct a pre-construction site inspection to identify all sensitive environments, habitats and No-Go areas.
- Prepare a pre-construction audit report, which will include a photographic record of the site and will report on the key features of the site. The photographic record of the site shall serve as a measuring staff against which rehabilitation will be measured post construction.

- Conduct regular monitoring to ensure that the system for implementation of the ESMP is operating effectively. The audit shall check that a procedure is in place to ensure that:
  - The ESMP and the Method Statements being used are the up-to-date versions;
  - Emergency procedures are in place and effectively communicated to personnel; and
  - The monitoring programme shall consist of the following as a minimum:
    - First monitoring no later than 1 month after the construction commences; and
    - thereafter monitoring at monthly intervals
- A post construction audit within 1 week after contractors have moved off site. This is to ensure that contractors have met all his environmental and social obligations in terms of the ESMP.
- Compile monthly reports for distribution to the PIU.
- Approve Method Statements and deviations from the ESMP through the PE.
- Recommend to the PE the issuing of work stoppage for any environmental damage caused on site, or non-compliance with the Environmental Specifications.
- Recommend to the PE the removal of person(s) and/or equipment not complying with the specification; and
- Compile a final closure report for submission to the PIU, once construction has been completed.

8.3.3. Contractors

Contractors are responsible for construction activities (this includes construction of water treatment works area, transmission and distribution lines as well as the associated substation etc.), within the conditions of the ESMP. Contractor will be answerable to the Project Engineer through the Project Construction Supervisor for all environmental issues associated with the project.

Contractors will, therefore, respectively, appoint Contractor's Health and Safety Officer (CHSO), Contractor's Environmental and Social Control Officer (ESCO), and Contractor's Community Liaison Officer (CCLO). These officers' roles and responsibilities include:

a) Contractor's Health and Safety Officer (CHSO) will be tasked with the following:

- H&S implementation throughout construction. The HS officer must be available on a daily basis to ensure compliance with the HSP and to prepare regular site inspection reports. Specific tasks of the HS include, but are not limited to the following: Ensuring a copy of the HSP is available on site;

- Undertake daily and weekly site inspections including photographic monitoring to ensure compliance of all employees with the requirements of the HSP;
- Advise/recommend actions to address issues relating to Health and Safety for the well-being of workers
- Environmentally educate and raise the awareness to the Contractor and project employees regarding OHS, HIV/AIDS, and other diseases etc.;
- Maintain HS incident register to record incidents that occur on site as a result of the activities associated with the contract.
- Compile weekly reports of all activities and incidents on site and consolidate weekly reports into monthly report and submit to the EM for review.
- Attend regular site meetings to report on Health and Safety issues.
- Compile a Health and Safety Management Plan.
- Daily inspections to ensure that the Health and Safety Plan is being adhered to.
- Keep a site diary in which events and concerns of health and safety significance are recorded.
- Where incidents are of a serious nature, the Department of Labour and the PIU must be contacted.

8.3.3.1. The Contractor's Environmental and Social Control Officer (ESCEO)

Contractor's Environmental and Social Control Officer will:

Provide Environmental Awareness training for Contractors Engineers, foremen, site staff and any visitors to the site. A record of all training and visitors' induction must be kept on site; Maintain and manage an environmental incidents and non-conformance register.

- Liaise with the Consultant's ESSS
- Compile Method Statements setting out, in detail, how management actions contained in the ESMP and Environmental Specifications will be implemented;
- Ensure a copy of the ESMP, Environmental Specifications, all agreed Method Statements, and legislation documents are available on site, as well as the following:
    - Method Statement Register;
    - Waste Disposal Register;
    - Communication/Complaints Register (Stakeholder and Authorities);
    - Hazardous Substances Register & Material Safety Data Sheet (MSDS); and
    - Environmental Monitoring Reports.

- Ensure the construction work conducted is done within the framework of the ESMP and Environmental Specifications and applicable legislation daily;
- Advise /recommend actions to address issues that have an adverse impact on the environment including the social environment;
- Ensure approved waste management practices are implemented daily;
- Advise the Contractor on the rectification of any pollution, contamination or damage to the construction site, rights of way and adjacent land;
- Attend regular site meetings to report on environmental aspects and bring environmental concerns to the attention of the ESSS
- Undertake daily and weekly site inspections including photographic monitoring to ensure compliance of all employees with the requirements of the ESMP;
- Develop and maintain various registers and checklists;
- Present the environmental awareness induction and training to all staff, Contractors and Subcontractors, monitoring the environmental awareness training for all new personnel on-site and keeping records of attendance.
- Conduct regular toolbox talks;
- Conduct environmental education and awareness training of the Contractor employees that includes sensitization regarding sensitive areas and 'No Go' areas such as rivers, wetlands, graves and ash heaps, etc.;
- Establish and maintaining an environmental incident register to record incidents that occur on site because of the activities associated with the contract. Ensure correct procedures are followed in the event of an environmental incident;
- Compile weekly reports of all activities, instances of non-compliance, and incidents on site and consolidate weekly reports into a monthly report and submit to the HSEM for review; and
- Compile a completion checklist for the project, carried out when all construction works related to the project have been completed and the site has been cleared of all construction related-debris, materials or equipment not forming part of the permanent works. This checklist will audit the Contractor's compliance with the ESMP throughout the construction phase and this checklist, together with a final written report, will be submitted to the HSEM.

8.3.3.2. Contractor's Community Liaison Officer (CCLO)

Contractor's Community Liaison Officer will:

- Keep the local communities advised about the general progress of the construction works.

- Interact with the surrounding communities on behalf of the Contractor and act as a link between these communities, and the Contractor to identify key issues and concerns within the community, as well as identify and communicate grievances, and keep a complaint register.
- Give advance notification to the local communities when particular project-related activities will commence and finish, particularly those which might inconvenience the inhabitants of the area or against which they should take safety precautions.
- Receive and respond to complaints from the general public about matters related to the works.
- Ensure that remedial and corrective action is taken whenever necessary in response to complaints received from the public.
- Arrange tours of the works by approved visitors.
- Address all compensation-related complaints and issues to satisfaction of all parties.
- Advise and educate stakeholders regarding compensation matters.
- Facilitate and participate in the dilapidation surveys to be undertaken by the Contractor’s representative; and
- Inform local stakeholders of employment opportunities using approved recruitment strategy and structures
- Keep local leadership and communities informed at regular and minuted meetings about plans for the Contract and the progress of its implementation;
- Inform local labour of their conditions of temporary employment to ensure their timeous availability;
- maintain a complaints (grievance) register and document how the complaints are resolved;
- Keep records (including photographic evidence) of all impacts on individually owned property, residential buildings;
- Monitor, record and redress incidents of accidental damage to property during construction, and keeping records of reinstatement.

8.4. Environmental Monitoring

The Environmental Management Plan shall be monitored following implementation to ensure that:

- Environmental operational controls are being effectively applied.
- Unpredicted impacts are identified, and remedial action is taken; and
- The project objectives listed above are being met.
- Responsibilities for monitoring and compliance requirements are detailed in the Project Environmental mitigation & Monitoring Tables.
- Monthly reports are provided to the General Manager for review. The performance of projects against environmental objectives is reviewed on a quarterly basis.

Monitoring is an integral part of the ESMP as it establishes how the project is performing against objectives set in the ESMP. A schedule and procedures for monitoring and reporting will be developed by the Contractor at the outset to:

- Identify any negative impacts from construction activities;
- Assess the effectiveness of control measures;
- Demonstrate compliance with regulatory conditions and objectives and targets set in the ESMP; and
- Identify if further controls/corrective action is required.

Under the project, different types of key aspects to monitor during construction include but not limited to:-

- Ambient air
- Dust;
- Noise;
- Water Quality;
- Hazardous materials management;
- Waste management;
- Biodiversity;
- rehabilitation
- Cultural heritage.

Contractors' work sites must be monitored during construction, under the guidance of the CEO and the CLO who are responsible for reporting the monitoring to EO , who in turn will be required to report to the Safeguards Specialist. The Safeguards Specialist will establish a pre-construction baseline of noise levels, air and water quality, which will be used to assess the results of the Contractor's monitoring during construction.

8.4.1. Ambient Air Monitoring

Ambient air quality monitoring plays an important role in assessing existing and potential risks to air quality. There is no pre-construction Baseline ambient air quality study conducted to determine ambient air concentrations for contaminants of concern related to this project. Concern from air quality are particulate matter (PM) and metals. Air quality in the project area is primarily influenced by the villagers (through burning of fuel for cooking and heating) in the vicinity of the project.

a) Air quality Standards

The PM 10 and PM 2.5 compose primary particles that are emitted directly into the atmosphere and include soil-related particles and carbon particles from fossil fuel combustion. The standards that will apply during construction are those contained in the SANS 1929 - 2011 guidelines as Lesotho does not presently have its own standards.

Table 71: Accepted Air Quality Levels

	Annual mean	24-hour mean
PM 10	20	50
PM 2.5	10	25

The types of activities associated with the construction of the project that may impact on ambient air levels are mainly vehicle and plant exhaust systems and burning of fossils fuels. Site management will be focused on mitigating off-site impacts, which are often detected through public complaints. The contractor will take all reasonable and practical steps to minimise such impacts. The frequency of monitoring will be monthly.

8.4.2. Noise

During construction noise will be monitored at specific sites, such as Batching plant, around construction areas and possibly in areas where sensitive receptors are located. Noise complaints will be managed through the formal grievance procedure, whereby records of any noise-related complaints will be captured on a grievance register, identifying the nature of the complaint, and documenting the action taken. All complaints will be investigated, and feedback provided to the complainant.

The activities affecting the existing sound levels in the area sound sources from road traffic in the vicinity of areas planned for development, and other human related and nature-based sounds. Time of Noise level monitoring will be during the day (07:00 to 18:00). During construction stage major source of noise is expected to be generated from transport vehicles which include excavator, trucks concrete mixing equipment etc.

In terms of SANS 10103:2008 LAeq, the A-weighted equivalent sound level using the 'I' (Impulse) dynamic response characteristic expressed in dB(A) the appropriate parameter to present noise levels expressed in predominantly in rural area with the generally low ambient noise levels typical of rural environments.

Frequency of monitoring

Data collection will be done monthly.

a) Noise Standards

The construction activities of the proposed project are likely to increase the local noise levels temporarily during the construction period. The expected noise levels to be maintained should be as follows based on IFC EHS Guidelines 1.7, since Lesotho does not presently have national standards:

Table 67: Community Noise Level Values

Receptor	Leq (dBA) day	Leq (dBA) night
Receptor	Leq (dBA) day	Leq (dBA) night
Residential/industrial/educational	55	45
Rural	45	35

8.4.3. Water Quality Monitoring

Water quality monitoring will assess alkalinity, Escherichia coli (bacteria), pH, electrical conductivity (EC), total dissolved solids (TDS), total suspended solids (TSS), biological oxygen demand (BOD), chemical oxygen demand (COD), and hydrocarbons. All samples are to be analysed by an appropriately accredited laboratory and an auditable paper trail maintained of the sampling and analysis process.

Sites will be monitored both up and downstream of construction works of intake during construction and into the defect's liability and operational phases.

Frequency of monitoring

Data will be collected monthly.

a) Water Quality Standards

The analysis of the chemical and microbiological constituents will be carried out in accordance with the relevant Water quality standards.

- Lesotho portable water standards
- Lesotho industrial effluent
- SANS standards
- WHO standards 2017
- IFC 2007

The water samples will be collected on a monthly basis. These will be collected upstream and downstream of intake works on the Hololo River. All analysis will be done at the preferred laboratory by Client.

8.4.4. Hazardous Materials Monitoring

The CEO will monitor (on an ongoing basis) Contractor performance against the measures included in the Hazardous Materials Management section of this ESMP. Monitoring will include (but not be limited to):

- Periodic site inspections;
- Periodic reporting by Contractors regarding preventative maintenance programs;
- Spill reporting at the time of the incident;
- Spill response drills; and
- Reporting on spill training.

During periodic site inspections any missing response equipment, personal protection equipment, or documentation will be replaced or improved, as necessary. Each spill reported will be reviewed by the CEO and actions identified where possible to improve the site's overall planning. Updates/revisions will be made.

8.4.5. Waste Monitoring

The main goal of waste monitoring is to provide assurance that the mitigation and management measures are being met and are successful. Specific objectives of verification and monitoring are to:

- Verify that the waste management measures are being implemented.
- Verify the performance of personnel in implementing the waste management measures.
- Monitor the success of the measures stipulated in Table 4; and
- Evaluate the need for remedial or corrective action to:
  - Improve performance or personnel.
  - Improve success of the management measure; or
  - Introduce new measures to address existing or new waste-related impacts.

8.4.6. Biodiversity Monitoring

a) Alien Invasive Plants

The main monitoring requirement for terrestrial flora and fauna during the construction phase relates to monitoring of alien invasive plants, which will be continued throughout the defect's liability phase and into early operation in accordance with an Alien Invasive Plant Management Method Statement. It should be continued until alien invasive plant encroachment caused by construction is of no or little risk to adjacent habitats or arable land.

8.4.7. Demobilisation from Site & Rehabilitation Monitoring

Demobilization from site and rehabilitation monitoring is required to ensure that the mitigation measures are implemented to an acceptable level in order that long term rehabilitation is successful. There is thus a need to carefully monitor the progress of the physical aspects of rehabilitation (soil stripping, overburden handling and landform development, and soil replacement) during the construction and defects liability phases, and the progress of re-establishment of the desired final land use (i.e. to a state where the land use is as close to the pre-construction environment as possible). Implementing rehabilitation in a phased manner simultaneously with the progression of construction for those works areas that are no longer required will provide a longer lead time for monitoring of rehabilitation before the defect's liability period is completed.

8.4.8. Cultural Heritage Monitoring

Monitoring for cultural heritage during the construction phase will be done through implementation of a Chance Find Procedure (CFP). This is of relevance to graves and possible artefacts associated with previous settlements that may not be visible at the surface.

8.4.9. Monitoring Matrix

The following is the monitoring matrix with monitoring indicators. The matrix indicates the cost estimate for monitoring. The estimated cost for monitoring is USD60,000 (M1,140,000).

Table 68: Monitoring Matrix

Partial Impact	**Specific Indicators**	**Objectives and standards**	**Monitoring and control frequency**	**Cost (USD)**	**Responsibility**	
					Permanent Following up	**Occasional Following up**
Soil erosion	Visual inspection of construction sites and access roads	Avoid damage in the medium / long term	Once a year	Operational cost	Surveillance office (consultant supervising)	Ministry of Environment
Water quality	pH, TSS, turbidity, phosphorus, BOD, coliform bacteria, temperature, visual observations (presence of oil, litter, etc.)	Avoid a significant deterioration of the basic conditions	Twice a year	20,000 (M380,000)	Surveillance office (consultant supervising)	Ministry of Environment
State of vegetation	Visual inspection of construction sites and access roads	Avoid a significant deterioration of the basic conditions Planting of 2 plants for 1 cut plan	Continuous during the preconstruction and construction	20,000	Surveillance office (consultant supervising)	Ministry of Environment
	Reforested area compared to deforested area			(M380,000)		
Air quality	Arrosal with water of construction sites and access road	Avoid a significant deterioration of the basic conditions Verification by number of dust complaints	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising)	Ministry of Environment
Noise levels	Measurement level	World Bank / IFC HSE guidelines and national standards (Noise levels below 70 dB immediately off-site and below 65 dB near sensitive receptors, such as schools and healthcare facilities)	Continuous during the preconstruction and construction	10,000 (sono meters) (M190,000)	Surveillance office (consultant supervising)	Ministry of Environment
Damage to properties in the neighborhood	Visual inspection of construction sites	Avoid significant deterioration of basic conditions	Continuous during the preconstruction and construction	Included within the budget of the resettlemen	Surveillance office (consultant supervising)	Communities

	construction and access roads, as well as properties used for crops, livestock and other activities	Number of people compensated for damage		t Action Plan		
Employment and Economic Development	Consultation Checking the basis of data of workers	Proportion of local workers among the contractor's employees 85% minimum (distinction to be made between men and women) Employ 40% women among local workers	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Communities
		Established and estimated jobs (exclude construction workers)	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Communities
		Restore as much trade that was lost due to this project as it is inventoried in the CLO reports (if applicable)	Every 3 months during the activity's pre-construction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Communities
Cultural and archaeological heritage	Number of complaints for destroyed / damaged cultural heritage elements	No Complaints	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Communities
Gender Relations	Percentage of women among construction company employees	40 % minimum	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Communities

	Number of cases of violence sexual involvement of project employees (distinction to be made between vulnerable groups, including children)	No cases of sexual violence	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Communities
	Proportion of issues resolved through the grievance mechanism	100% (All issues resolved)	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Communities
	Number of complaints related to worker behavior	No complaints	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Resettlement committees
Communities and social cohesion	Proportion of children and students who get an education during the reconstruction of their schools affected by the transmission line	100% (All children have access to education in reconstructed schools in the project area)	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Resettlement committees
Community health and safety	Accidents involving electrocution, project vehicles and community members or assets	No accidents	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Communities
	Number of harassment cases sexual abuse / rape of minors (including pregnancies)	No case of pregnancy	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Communities
	Number of work cases of children	No case of child labor	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Communities

	Number of people accessing to HIV / AIDS services	100% (Everyone has access to HIV / AIDS services)	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Communities
	Number of complaints about the project	No complaints about the project	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising) and Community liaison officer CLO	Communities
Health and security workers	Number of violations of the labor and employment law and other applicable obligations identification of the workers to the code of conduct, employment contracts and labor rights	No complaints	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising)	Ministry Environment/Work Labor inspection
	Proportion of workers having received health and safety training	100% (All workers have been trained)	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising)	Ministry Environment/Work Labor inspection
	Proportion of duly reported occupational accidents	100% (Any accident has been reported)	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising)	Ministry Environment/Work Labor inspection
	Number of warnings received for violation and non-compliance of health and safety rules	No warnings received from non-compliance with health rules and security.	Continuous during the preconstruction and construction	Operational cost	Surveillance office (consultant supervising)	Ministry Environment/Work Labor inspection
ESMP Audit			Once a year	USD 10,000 (M190,000)		
Total Cost excluding operational costs				**USD60,000 (M1,140,000)**		

8.5. Record Keeping

Project Site record keeping must be maintained in an orderly fashion in both electronic and hard copy forms with the intent of ensuring easy reference The CEO will be responsible for maintaining all records in relation to the ESMP requirements on site. The ECO will, therefore, maintain an environmental site file containing, as a minimum, the following documents: Most recent version of the ESMP., Health and Safety Management Plan.

Such records will be made available to the Engineer's representatives on request during any audits, as well as at any time as requested by officials of the DoE and / or the Client. Typically, these records will include:

- Daily Environmental Management Reports / Checklists;
- Monthly summaries of daily reports;
- Incident and non-conformance report as well as an Incidents register;
- Environmental awareness training records;
- Waste management records;
- Monitoring schedule;
- Monitoring databases (e.g. noise, dust, water quality);
- Spill clear up records;
- Register of hazardous substances;
- Water use records - construction water;
- Waste transfer notes (including hazardous waste); and
- List of "toolbox talks" topics.

Record keeping must be done in an orderly fashion with the intent of ensuring easy reference. Records include Registers (e.g. training register or complaints register). The Contractor / CEO's filing system or structure would typically include the following documents:

- Environmental Policy;
- Environmental and Social Management Plan (this document);
- Method Statements;
- Procedures;
- Work Instructions;
- Registers;
- Photographs; and
- Checklists.

The CEO and CLO (Contractor's representatives) will contribute to / participate in the following:

- Weekly environmental toolbox talks;

- Weekly reports and monthly reports to be submitted to the Engineer;
- Environmental monitoring;
- Weekly report to EO;

  in addition
- Final design documents and diagrams issued by the Contractor of environment relevance.
- Communication detailing changes of design/scope that may have environmental implications.
- Monthly summaries of daily reports
- Site monitoring reports.
- Complaints register.
- Environmental Induction and Awareness raising training manual and attendance registers.
- Incident and accident reports. Emergency preparedness and response plan.
- Records of disciplinary procedures. Monthly site construction meeting minutes. Relevant permits including the Record of Decision issued by Department of Environment (DoE).
- Safe work Procedures and All Method Statements from the Contractor.

The Consultant's Environmental and Social Safeguards Specialist (Engineer's representative) will contribute to and participate in the following:
Compilation of a monthly report to the Project Engineer (Water and Sanitation Engineering) detailing environmental compliance, audit summaries and incidents for all Contracts being managed by the Project Engineer.

- Consolidate information for monthly reports to the Client;

8.6. Reporting

The ECO shall be required to complete a weekly environmental checklist and a monthly report for submission to the EM. While the EM will compile monthly monitoring reports for submission to WC which would be shared with DoE, African Development Bank (AfDB) and interested stakeholders.

8.7. Environmental Awareness and Training

Continuous awareness training on environmental, health as well as safety issues during the project will take place in the form of daily/ weekly toolbox talks. Thus, relevant or site-specific environmental matters, incidents and issues shall form part of the contractor's toolbox talk sessions. It is also recommended that the toolbox talks are conducted in an interactive way so as to ensure that all employees and foremen understand the content and purpose of the ESMP requirements. The contractor shall keep records of the subjects discussed in the toolbox talk sessions for auditing purposes by the EM.

The Contractor must ensure that all people involved in the project (including sub-contractors, visitors, inspectors, casual workers, etc.) are aware of and familiar with the environmental requirements for the project. A register must be kept of all persons accessing the site and their induction training, including date. All people who are involved with the project are aware of the environmental requirements for the project. The Contractor has the responsibility to provide the site foreman with environmental training and to ensure that he is capable of passing the information to all the construction staff. Training of the construction staff shall include:

- How construction activities can impact on the environment and what can be done to
  mitigate such activities;
- Possible disturbance to birds, animals, and reptiles, and their respective habitats shall be minimised;
- Construction staff shall be made aware of what possible archaeological or historical objects look like and to notify the EER if such an object is found;
- Management and minimising of waste;
- Maintenance of equipment to prevent the accidental discharge or spillage of fuel, oil,
  lubricants, and another chemical;
- Emergency procedures and incident reporting;
- Making staff aware of the dangers of fire during regular tool box talks;
- Local traditions and practices;

Regularly reinforce, amongst construction workers, the importance of respecting local traditions and practices through toolbox talks. In this regard encourage the participation of locally recruited construction workers to assist in reinforcing this point;

Topics that should be included in toolbox talks include, but are not limited to:

- Safety rules.
- Occupational health.
- Basic health hygiene.
- Alcohol and drug abuse.
- HIV and AIDS.
- COVID-19.
- Protection of areas beyond those demarcated for construction works.
- Water conservation.
- Water pollution.
- Fires and fire management.
- Emergency response and evacuation procedures e.g. in the event of fire, electrocution, etc.;
- Relationships with the local communities.
- Chance Find Procedures Litter and waste management.
- Management of hydrocarbon spills.

The Contractor will ensure that construction staff are aware of the following rules:

- No alcohol or drugs are allowed on site;
- No firearms allowed on site;
- Pets are not allowed on site;
- Firewood may not be harvested from the site or from adjacent areas;
- Trespassing on neighbouring properties is forbidden;

Moreover, as construction continues, an effort must be made by the ECO to assess the training needs of workers on site. If necessary, additional training on environmental requirements must be conducted to ensure all workers understand the risks involved and how to adequately implement mitigation measures.

8.8. Adaptive Management

The Environmental and Social Management plan (ESMP), once approved, remains an adaptable document, principle-based and able to respond to environmental changes and variations in the impact experienced. The ESMP should never be administered in a rigid manner, but in a more site-focused manner to deal well with all environmental and social responses required to any specific issue experienced during further project phases. The ESMP is thus seen to be a 'living' document that should be changed when necessary. All changes and deviations in the ESMP must however be communicated to the Department of Environment (DoE) in writing, seeking support and/or approval for required amendments, prior to the implementation of such.

8.9. ESMP Inclusion in Contract Documentation

This ESMP shall form part of the Contract Documentation, and it is the Contractor's responsibility to ensure that he/she is familiar with the contents and requirements of this document.

8.10. Pre-Construction Environmental Submittals

The Contractor is required to complete risk assessment for every phase of work carried out and submit Method Statements for approval before construction can commence. This section outlines the controls, procedures and standards that must be submitted to the Project Engineer (PE) for approval prior to construction commencement. All environmental aspects shall be managed by the Environmental Control Officer (ECO) appointed by the Contractor for the duration of the construction phase and overseen by the Project Engineer through the Environmental Manager (EM).

8.11. Waste Management Control

The Contractor must compile a Method Statement that provide details regarding how solid and liquid waste generated on the construction site and site camp will be collected, stored, transported and disposed of. The Method Statement must describe the expected solid and liquid waste types, quantities, methods and frequency of collection and disposal, as well as location of disposal sites. The Method Statement shall further include methods of minimising, controlling, collecting and disposing of contaminated water, and details of any hazardous substances/materials to be used, together with the transport, storage, handling and disposal procedures for the substances. The details of any service provider(s) appointed to manage the task must also be provided.

8.12. Safety Considerations

The Contractor must compile a Health and Safety Management Plan (HSMP) that states the health and safety precautions that will be implemented to ensure the safety of all staff, and general public during the construction period. This shall include protective clothing requirements for all types of construction activities on site, e.g., protection against dust, noise, falling objects, work at heights etc., must comply with the requirements of the Lesotho Labour Code Order of 1992.

8.13. Emergency Preparedness Plan and Procedures

The contractor must submit an Emergency Preparedness Plan (EPP) that includes all relevant emergency procedures that will be implemented in case of accidents and incidents. The EPP must also include the risk reduction measures to be implemented including fire-fighting equipment, fire prevention procedures, electrocution prevention procedures as well as spill kits. Activities that may be addressed in the environmental emergency procedures include, for example, accidental exposure of employees to hazardous substances, veld fires and accidental spillages of hazardous substances. These procedures should include as a minimum:

- A list of key personnel to be contacted in the event of an emergency;
- Details of emergency services applicable to the various areas along the power line route, e.g. clinics, police station, etc.;
- Actions to be taken in the event of different types of emergencies;
- Incident recording, progress reporting and remediation measures required to be implemented;
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release; and
- Training plans, testing exercises and schedules for effectiveness.

8.14. Storm Water and Erosion Control

The Contractor must compile a Storm Water Management Plan (SWMP) that describes how storm runoff and potential erosion within the construction footprint will be managed. The plan must include proposed management measures and designs.

8.15. Existing Services and infrastructure

Prior to construction commencing, the Contractor must take cognisance of the position of existing services and infrastructure, e.g. roads, pipelines, etc., that may get damaged due to construction activities. The Contractor must ensure that existing services are not damaged or disrupted unless required by the Contractor and with the permission of the PE. The repair and reinstatement of any infrastructure that is damaged or services that are interrupted during construction will be done at the expense of the Contractor and shall receive top priority over all other activities.

8.16. Site Establishment and Management

10.16.1. Site Identification

The Contractor must determine the site for the construction camp in collaboration with the Local Community Councillors, Chiefs and landowners before moving onto site as the indiscriminate location of construction workings may result in community conflict, increased erosion potential, destruction of vegetation and waste generation.

The Contractor must submit to the PE for approval a Method Statement that includes a site layout plan at least 7 days before construction commences. The layout plan must include a graphical representation with detailed notes of location, layout and method of establishment of the construction camp and must include the following aspects as a minimum:

- All Contractor's buildings, and/or offices.
- Lay down areas.
- Storage facilities; and
- Any other infrastructure required for running of the project.

Prior to construction commencing, the Contractor, and PE shall inspect the site and identify any sensitive environments in the vicinity of the proposed construction camp. Where necessary, demarcate the construction footprint areas using materials as specified by the PE. These may include fencing, rope, hazard tape, wire mesh, or other approved materials or means. The Contractor will be required to maintain all demarcation fencing and other demarcating materials for duration of construction activities or as otherwise instructed by the PE.

The location of the site must take into consideration the need to be further than 50 meters away from a water body in a location that prevents storm water runoff from entering a water body. The risk of public nuisance through, for example, noise generation, visual intrusion, light pollution or disruption to access must also be taken into account by the Contractor during the site selection process.

The construction camp should be of sufficient size to accommodate the needs of all Subcontractors that may work on the project. The Contractor must ensure that site camp is fenced and provided with a lockable access gate to prevent vandalism, theft and unauthorized entry by the public, where necessary. A photographic record of the area earmarked for the site camp must be produced prior to site establishment. This will serve as the benchmark against which rehabilitation will be measured and to its original condition once the project has been completed and must not use the land for the site camp for the purpose other than for the proper carrying out of the works under the contract.

10.16.2. Demarcation of Working and 'No-Go' Areas

The Construction Site shall be divided into working areas and 'No-Go' areas and shall be marked on appropriate plans for reference. Working areas are those areas required by the Contractor to construct the works and as approved by the PE. No-go areas are generally those large areas outside the designated working areas, and may include, but are not limited to:

- Any areas outside the designated 'site construction area';
- Privately owned land (unless a formal agreement has been signed for access, use or impact);
- Watercourses; and
- Natural or special features and sensitive environments.

The Contractor shall ensure that all 'No-Go' areas are demarcated and that no unauthorized entry, litter, stockpiling, dumping or storage of equipment or materials shall be allowed within the demarcated 'no-go' areas.

8.17. Rehabilitation and Reinstatement Management Plan

The Contractor shall develop a Rehabilitation and Reinstatement Management Plan (RRMP) that outlines the measures that will be used to rehabilitate and reinstate all disturbed areas, to the satisfaction of the PE and the EM and community leadership structures. Rehabilitation and Reinstatement shall:

- Be undertaken in line with the rehabilitation and Reinstatement Management Plan for approval by the PE and EM;
- Be required for all specified areas disturbed by the works and site camp;
- Ensure that all specified areas disturbed by the works are returned to similar or better state than before the construction works commenced;
- Be undertaken in a progressive manner, i.e. rehabilitation must commence once works are complete in a particular area. A program of progressive rehabilitation will provide

an opportunity to assess whether or not the methods employed are suitable and successful. Where rehabilitation of an area is not successful, the Contractor will rehabilitate at no additional cost to the Proponent;

- Include, but not limited to, the following activities:
    - Clearance of rubble associated with construction, including removal of surplus materials, litter etc.;
    - Removal of all soils contaminated by hydrocarbons by excavation to the depth of contaminant penetration and remediated;
    - Backfilling and contouring using stockpiled subsoil removed during site clearing;
    - Finishing and grading of final levels of all disturbed areas shall be consistent with the rehabilitation management plan;
    - Ripping along the contour of compacted disturbed areas, including stockpile areas, to a depth of 150mm prior to the replacement of topsoil, except where otherwise specified by the PE;
    - The eradication of young invasive/alien species that may have grown up during the construction period in the impacted and rehabilitated areas; and
    - The removal of visually detracting or environmentally unacceptable piles of waste.
- Areas compacted by vehicles during construction must be scarified to allow penetration of plant roots and the regrowth of natural vegetation.

9. Implementation of the ESMP

The Environmental and Social Management Plan (ESMP) must be implemented on condition of approval, with full compliance, to enhance positive impacts and avoid/minimise significant negative impacts. The mitigation measures are detailed in Table 73. Monitoring and reporting on actions taken is required on a regular basis.

Table 69: Environmental and Social Management Plan for Project Planning and Construction

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Implementation Responsibility	Budget / Resources	Deadline for completion	Monitoring/Oversight
PLANNING AND DESIGN PHASE							
Obtain permits and permissions	Construction commencing without all legally required permits and permissions (i.e. borrow pits, water uses, tree removal licenses)	▪ Develop an environmental document control system/register where all permits and permissions will be filed, and updates stored. ▪ Refer to Table 3.2 for details of possible licenses.	All permits and permissions obtained prior to the specific work commencing on Site.	COW LLWDSP III PIU Consulting Engineer	USD 750, 000.00	Prior to construction commencement	EM Implementing Agent Prior to construction
Community liaison	Community discontent Delays in construction program	▪ Develop stakeholder engagement strategy ▪ Liaison structures are to be established with local police to monitor social changes during the construction phase. ▪ Liaison should be established with existing crime control organisations. ▪ Liaison structures should be established with authorities (chiefs, councillors, mayors)	Officially appointed CLO on site. Liaison structures with relevant people established A grievance mechanism is	COW LLWDSP III PIU Consulting Engineer	USD 25,000.00	Prior to construction commencement and direct engagement of communities	EM Once-off

		▪ A suitably qualified community liaison officer (CLO) should be appointed (preferably form the local community) ▪ A grievance mechanism should be developed to deal with any issues that might arise due to construction activities ▪ A complaints register should be developed	established to deal with issues and complaints Complaints are recorded and dealt with efficiently				
Contractor's Environmental Control Officer mobilised to site	Inadequate implementation and monitoring of environmental requirements on site if the environmental officer is not on site.	■ Appoint a suitably qualified Contractor's Environmental Control Officer (ECO).	Officially appointed ECO on site.	Contractor	USD 0	Prior to construction commencement	EM Once-off
Develop environmental induction training	Inadequate compliance to the	■ Develop an environmental induction training program that addresses all the aspects listed in s. 8.3 of this ESMP.	Environmental induction training program	Contractor	USD 20,000.00	Prior to construction	EM Once-off

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
program for all staff and labour.	environmental requirements.	■ Environmental issues to be incorporated to toolbox talks (see s. 8.3 of this ESMP).	available when staff and labour mobilised to site			commencement	
Planning and design of camp sites – offices, staff and labour accommodation, stores, equipment maintenance workshops, etc.	Environmental degradation, unnecessary removal vegetation, loss land, social impacts, air quality, quality and impacts	■ The planning and design for the construction camp and construction site must ensure that there is a minimum impact on the environment. These areas must be kept to a minimum Footprint size. ■ A method statement is required from the Contractor at tender stage that includes the layout of the camp, management of the ablution facilities, access routes, power supply and wastewater management. The method statement must be approved by the Engineer. ■ As far as possible the construction camp must be located on already disturbed land with existing access roads if possible.	Camp sites established as per proposed mitigation measures. No unnecessary environmental degradation. Limited number of camp sites. Camp sites located on previously disturbed areas (where possible).	COW LLWDSP III PIU Consulting Engineer	USD 0	Prior construction camp sites	Engineer Once-off

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		▪ As far as possible the construction camp must be located more than 500 m from schools, hospitals, clinics, churches, spiritual sites and residential areas. ▪ A site plan must be submitted to the Engineer for approval. ▪ Develop a waste management plan. ▪ Develop a storm water management plan. ▪ Design water supply and sanitation infrastructure. ▪ Make provision for a clinic or First Aid station at the camp.					
Security details during construction activities	Theft Vandalism Safety of site	▪ All staff associated with the project, as well as visitors to site must be clearly distinguishable (company overalls with company logo), hard hat.	Appropriate clothing and PPE provided to all staff and visitors	Contractor	USD 0	Prior to construction	Engineer Continuous

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
	jeopardised	▪ The contractor shall take reasonable measures against trespassing on private property	Secure and adequate fencing and access control				
	Injury to trespassers resulting in lawsuits	▪ The contractor will be responsible for his own security arrangements and shall comply with all site security instructions ▪ Gates shall be installed where necessary. ▪ All gates shall be fitted with locks and be kept locked at all times during the construction phase. Gates shall only be left open on request of the Landowner ▪ Protect and maintain existing private property, fences and gates ▪ Respect the open or closed status of gates for the duration of the construction period	24-hour security evident onsite	Contractor	USD 0		

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
Survey and mark out construction servitude	Environmental degradation Unnecessary removal of vegetation, Loss of land	▪ The planning and design for the construction servitude must ensure minimum impact on the environment, community assets, graves, ash heaps and other aspects of cultural heritage, woodlots, fruit trees, croplands, houses and businesses ▪ The bulk of the construction servitude should overlap with the road servitude, there should be minimal impact on the landowners. ▪ Existing access points should be located to minimise modification of existing topography and removal of trees. ▪ The appointed ECO should have a good understanding of the local flora to make sound recommendations with regards to the final setting out and demarcation of work areas.	Construction servitude marked as per proposed mitigation measures and the RAP No unnecessary environmental degradation	COW LLWDSP III PIU Consulting Engineer	USD 0	Prior to construction commencement	EM Prior to demarcation of all sites

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
Survey river cross-sections for post-construction riverbank reinstatement	Increased erosion and sedimentation	■ Design of the crossing and flood protection structures to be in line with best engineering practice.	River crossings are designed as per engineering drawings	COW LLWDSP III PIU Consulting Engineer	USD 0	Prior to construction commencement	EM Prior to construction
Arrangements with individual land users	Inadequate community consultation during surveying and site demarcation	■ Appoint a suitably qualified Community Liaison Officer (CLO).	Effective communication with individual land users.	COW LLWDSP III PIU Consulting Engineer	USD 0	Prior to construction commencement	EM Once-off
Air, water and noise monitoring	No baseline is available to determine air, water and noise impacts	■ Ambient air quality and water quality baseline must be determined and recorded before commencement of construction. ■ Ambient noise levels must be determined and recorded before commencement of Construction. Silencers / approved and specified muffler systems must be included for heavy machinery / vehicles to reduce noise generated.	Baseline data available for at least 3 months before construction commences	COW LLWDSP III PIU Consulting Engineer	USD 55,000.00	At least 3 months prior to site establishment	Engineer Monthly

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		■ Monitoring to be conducted as per the Monitoring Protocols in Table 8.3.					
CONSTRUCTION PHASE							
Site clearing and site. establishment at the WTW, pump stations, reservoirs and along the pipeline	Decrease in floral diversity Increased potential for erosion and soil loss. Introduction of exotic or invasive plants	■ Protected or endangered species of plants shall not be removed unless they are interfering with construction. Where such species must be removed, the necessary permits shall be obtained from the respective authorities. ■ All protected species not to be removed must be clearly marked and such areas fenced off if required. ■ In sensitive environments such as pristine or valuable vegetation and sensitive social environments, the working servitude may be reduced. ■ Vegetation clearing should occur in a phased manner in accordance with the construction program to minimise impacts.	No trees and vegetation removed outside the construction footprint No litigation due to unauthorized removal of vegetation.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 0	Prior to construction, during construction and decommissioning	EM During all site clearance activities

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		■ The removal of all economically valuable trees or vegetation shall be negotiated with the relevant landowner(s) and/or communities before such vegetation is removed. ■ Plants outside of the construction area are not to be disturbed, destroyed or removed. ■ Big trees with large root systems shall be cut manually and removed. ■ The Contractor will be held liable for the replacement of any plant or feature under the protection of local by-laws, provincial ordinances or national legislation that is removed or damaged by the Contractor's negligence or mismanagement. The ECO will indicate which plants or features to be avoided. ■ No vegetation clearing in the form of destumping, scalping or uprooting shall be allowed on					

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		river and stream banks, unless authorized by the Engineer. ■ The appointed Environmental Control Officer (ECO) should have a good understanding of the local flora to make sound recommendations with regards to the management of disturbed areas.					
	Intentional or unintentional killing of fauna on site Loss of fauna due to habitat distance Obstruction to faunal migratory patterns. Potential decrease in faunal populations	■ Protect excavation and trenches and monitor for any trapped wildlife and livestock. ■ Ensure that all construction personnel are provided with appropriate training in ecological awareness, as appropriate to their work activities. ■ The contractor must ensure that the site is kept clean and free of rubbish that could potentially attract animal pests, and that rubbish bins are scavenger proof.	No evidence of domestic animals on site. No litigation concerning stock losses and animal deaths No visible impediment of faunal corridors. Trenches are not left open for long distances or for	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 15,000.00	Prior to construction, during construction and de-commissioning	EM Continuous

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		■ The contractor must report problem animals or vermin to the Engineer. ■ Ensure that domesticated and livestock animals belonging to the local community are kept away from the construction works. ■ No hunting or trapping wild or domesticated animals may be permitted.	long periods at a time. No hunting or poaching of fauna				
		■ The contractor may under no circumstances make use of pesticide or poison to control unwanted animals without permission from the ECO or considering alternative measures. ■ No wild animal may under any circumstance be handled, removed or interfered with. ■ No wild animal may under any circumstance be hunted,					

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		snared, captured, injured or killed. This includes animals perceived to be vermin and snakes. ▪ The Contractor must regularly undertake checks of the surrounding natural vegetation, in fences and along game paths to ensure no traps have been set. Remove and dispose of any snares or traps found on or adjacent to the site. ▪ Where there is a potential problem area that may be contributing to pest infestation, it must be inspected by the ECO and a professional pest control to make recommendations that should be implemented					
	Spread of alien vegetation to other environments. Decrease in rehabilitation	▪ Wash all mobile equipment and vehicles prior to mobilisation to site. ▪ Alien vegetation growing on topsoil stockpiles must be removed.	Alien plants / seeds are prevented from being introduced on site and spreading to surrounding areas.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 3,000.00	Prior to construction, during construction and decommissioni ng	EM Monthly

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
	success due to presence of alien invasive species	■ All sites disturbed by construction activities must be monitored for exotic or invasive plant species and weeds. ■ Alien vegetation spread to other disturbed portions of the site must be controlled. ■ Invasive species and weeds must be destroyed before they reach seed formation stage. ■ Chemical removal shall be used in accordance with manufacturer's specification for weeds where mechanical eradication / control is no longer effective. ■ The type of chemical to be utilized must be determined in consultation with herbicide consultant and the ECO. ■ Those exotic / invasive plants or weeds which cannot be eradicated by means of herbicides, need to be manually removed from site.	Alien plants are eradicated and removed from site.				

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		■ Exotic plant material removed must be removed from the site and destroyed so that seeds and propagating material does not remain at the site. ■ Follow-up clearing for weeds and exotics should take place. ■ Herbicides must be applied by persons holding a Pest Control Operators license. ■ Control the type of material imported to site to minimise the spread of weeds and alien invasive plants.					
Earthworks and excavations at the WTW, pump station and reservoir sites and along the pipeline route	Topsoil, sub-soil and rock removal, stockpiling, replacement and disposal in croplands	■ Topsoil to be stripped to a maximum depth of 300 mm and stockpiled separately in piles no more than 1.5 m high. ■ Do not stockpile topsoil in drainage lines. ■ Topsoil stockpiles must be above the 1:50 year flood line. ■ Stockpile topsoil in windrows parallel to the excavation.	Topsoil is stored separately stripped and replaced. Topsoil is required.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 5,000.00	Construction Budget	EM Throughout construction

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		■ All grass and other vegetation should be left on the topsoil stockpiles so that they colonise the area after construction. ■ Excavate the sub-soil and rock and stockpile separately from the topsoil. ■ If the sub-soil is suitable, replace in pipeline trench or other in other temporary excavations. ■ The replace the stockpiled topsoil to fill the trench, allowing for some future settlement. ■ Excess excavated material to be removed and disposed of at the designated spoil site. ■ The width and depth of the trench, as well as the working place (footprint) adjacent to the trench must be specified in the form of a method statement that will have been approved by the Engineer.					

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
	Topsoil, sub-soil and rock removal, stockpiling, replacement and disposal in all non crop areas	• Excavate all material from earthworks and stockpile in mounds no higher than 1.5 m high. • If the sub-soil is suitable, replace in pipeline trench or other in other temporary excavations. • If possible, spread the rest of the excavated material in a thin layer on the surface surround the pipeline trench in the road reserve, or remove it to the designated spoil site for disposal.	Excavated material is stockpiled and replaced as required. Excess material is disposed of at a designated spoil site	Contractor	USD 3,000.00		EM Throughout construction Throughout construction
	Disposal of excess excavated material in non-designated areas or watercourses	■ Identify a central spoil site for the disposal of all excess excavated material; or ■ Negotiate with the local municipality to determine if the excess material can be used as cover material at the local landfill site	A spoil site is designated and used for the disposal of all material, unless otherwise determined.				

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
	Air pollution from vehicle movements, earthworks, excavations	■ All temporary stockpiles must not be higher than 1.5 m to reduce wind erosion. ■ In dry winter months all stockpiles must be protected from wind erosion. ■ All exposed areas and unpaved access roads must be adequately treated to lower dust emissions – either through regular watering or by spraying roads and disturbed areas with suitable dust binder chemicals. ■ Enforce speed limits to reduce generation of dust. ■ Monitor air quality against baseline.	Dust monitoring indicates that emissions are within the guideline limits. No complaints regarding air pollution received from community members and landowners. Air quality monitoring results.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 3,000.00		

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
	Noise pollution and vibration from vehicle movements, earthworks, excavations	■ All machinery and equipment must be maintained in good working order. ■ Limit construction activities after working hours, on Sundays and public holidays. ■ A complaints register must be kept on Site to record any complaints received by the public. ■ Monitor noise levels against baseline. ■ Conduct a structure condition survey prior to blasting or the use of very heavy equipment to determine the pre and post-work structural condition	No complaints regarding noise pollution received from members community and landowners. Noise level monitoring results. Condition survey monitoring undertaken and compensation paid where required	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 6,000.00		EM Monthly

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
Non-hazardous waste management at the camp and all construction sites	Environmental pollution because of improper waste management and disposal	■ Develop and implement a Waste Management plan. ■ Identify waste types which may be re-used or recycled. ■ Identify and implement ways in which to reduce, re-use and/or recycle waste. ■ Ensure sufficient number of waste bins and skips are strategically placed around the site to encourage workers not to litter and for temporary storage of construction waste. ■ Ensure waste bins and skips are emptied regularly. ■ Erect a bunded waste collection facility on site where waste can also be sorted for re-use or recycling. ■ Identify designated approved waste disposal sites to dispose waste.	No litter or large amounts of construction waste seen on site. Employees aware of importance of recycling waste. Marked bins for recyclable materials. Bunded waste collection facility erected on Site. Bins and skips emptied regularly. Waste management plan implemented on Site.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 500.00	Requirements to be implemented prior to construction commencement and throughout construction period	EM Weekly

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
Hazardous waste management at the camp and all works areas	Soil and water pollution from the incorrect storage and disposal of hazardous waste	■ Create a bioremediation pad at the camp to dispose of all hydrocarbon contaminated soil. ■ Add Bio Zorb or other patented material to the bioremediation pad as per the manufacturer's instructions. ■ Water the site as required. The soil moisture should be adjusted at the beginning of the process and then controlled within the target range of 70-80% of field capacity (field capacity is the amount of water a soil can hold). The soil should not be allowed to dry out at any time. ■ Monitor the bioremediation pad using a PAH detector or equivalent instrument. ■ Once the material is 'clean' (PAH = <40 mg/kg) dispose of it at the designated spoil site. Dispose of all greasy rags, air filters, oil filters, brake linings, welding rods,	Bioremediation site set up and operating Hazardous waste kept in a bunded controlled access area Waste manifests show that all hazardous waste has been safely disposed.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 30,000.00		EM Weekly

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		fluorescent tubes, waste paint and chemicals, empty cement bags, etc in drums, hazardous waste containers for removal from site and disposal at the Holfontein hazardous waste disposal site in Gauteng, South Africa. ■ Store all hazardous waste in a bunded, access-controlled area.					
Ablution facilities in the field	Open defecation causes pollution and a health risk Women working on site require privacy	■ Assess how many mobile/field toilets will be required, making allowance for male and female users. ■ Place temporary ablution facilities at least 100 m from any watercourse. ■ Toilets are to be provided at a ratio of 1 toilet per 15 workers and must be situated in close proximity to all work areas. ■ Toilets are to be maintained and properly equipped and shall be serviced regularly by a reputable contractor and contents shall be removed to a licensed disposal facility.	Ablution facilities for men and women are provided as required. Records show regular cleaning and waste disposal at a licensed site. All toilets are removed once construction is complete in each work area.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 0	Prior to construction in each new area After construction is complete	EM Weekly

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		■ Disposal certificates must be filed by the contractor. ■ Once construction ceases in an area, remove portable toilets.					
Disruption of utilities and services such as water, power, due to construction activities	Community discontent Delay in program	■ All reasonable precautions must be taken to avoid damage to existing services, such as water, power. ■ Prior to construction the location of existing services in the area must be confirmed and no go areas demarcated if necessary. ■ Potentially affected service providers must be consulted regarding their requirements prior to construction. ■ Construction workers should avoid working or placing equipment in close proximity to areas which might cause disruptions, where possible. ■ Any damage to existing infrastructure shall be repaired immediately. ■ Where pipelines are found along the route, the depth of the pipes under the surface shall be	No disruptions take place In the event disruptions take place, they are planned. No community discontents Service providers are made aware whenever. construction activities might result in disruptions.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 0	Requirements to be implemented during construction lifecycle	

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		determined to ensure that proper protection is afforded to such structures. ■ All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties. Speed limits shall be enforced in such areas					
		■ and all drivers shall be sensitized to this effect. ■ Upon completion of the project all roads directly damaged by construction activities shall be repaired					
Storage handling hazardous materials	Unsafe storage of hazardous materials. Safety hazard.	■ Compile and maintain an updated inventory of all hazardous materials including fuel, oils and concrete admixtures stored within the Site. ■ Keep Material safety Data Sheets on site at all times at all hazardous material storage areas.	Up to date inventory of hazardous materials stored on site. Storage area contains bunds and signage as required.	Contractor ECO	Prior to construction commencement and throughout construction period.		EM Monthly

Activity	**Potential Impact**	**Mitigation Measures**	**Performance Indicator**	**Responsibility**	**Budget / Resources**	**Deadline for completion**	**Verification: responsibility and frequency**
		■ All containers must be clearly labelled with the contents of the container. ■ Ensure that all those handling hazardous materials have been trained on the safe storage and handling. ■ Construct suitably bunded areas to contain 110% of the total capacity of the hazardous material stored to prevent any possible spillages of fuels and other hazardous substances and materials. ■ All storage areas must be locked at all times. ■ All storage areas shall have the standard warning signage attached. ■ The required First Aid provisions shall be provided e.g. eye wash, basin, etc.	Storage areas to be locked at all times. MSDS sheets known to supervisory staff and present at the storage sites Hazardous materials awareness and basic spill response training for emergency response personnel.		Inventory to be kept updated throughout construction period.		

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
Potential sterilization in the carrying capacity of the soil.	■ All spills (minor and major) must be cleaned and remediated within 24 hours of occurrence. ■ Cement must be delivered in sound and properly secured bags or in approved bulk containers. ■ Cement products in bags must be stored in storage containers to be provided at the construction camp and should only be opened when needed. ■ Where necessary, the ECO shall designate an area where concrete batching is to take place (on an impermeable surface).	No release of contaminated water or concrete waste into the natural environment. Waste concrete is disposed of at the designated spoil site. Immediate removal and remediation of all spills. Cement bags must be disposed of as waste at a licensed waste disposal facility. Washing of concrete delivery trucks should only be undertaken in a designated and bunded wash bays. Concrete drying procedure should be developed, and any accidental spills should be cleaned up immediately. Locate the batch plant and/or concrete mixers far from sensitive receptors to reduce the impact of noise and dust.		LLWDSP III PIU Consulting Engineer Contractor ECO	USD 5,000.00		

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
	■ Concrete batching areas should not be located in or near water courses ■ Internal drainage and sumps to be provided to contain storm water runoff and spills. ■ Limit concrete mixing to single sites where possible. ■ No spillage of cement or cement-contaminated water into soil will be permitted. All cement contaminated water must be collected for evaporation prior to disposal, and any contaminated soil will be removed and disposed of at a						

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
	registered waste disposal site. ■ Waste concrete to be disposed at the spoil site. ■ Cement mixers shall be placed on trays and no cement mixing will take place on the soil surface or permeable surfaces. ■ Dispose of all visible remains of excess cement and concrete after the completion of tasks.						

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
Noise pollution from casting of concrete and vehicle movements	■ Silencers / approved and specified muffler systems to vehicles and equipment to reduce noise generated. ■ All machinery and equipment must be maintained in good working order. ■ Limit construction activities after working hours, on Sundays and public holidays. ■ A complaints register must be kept on Site to record any complaints received by the public. ■ Monitor noise levels against baseline.	No complaints regarding noise pollution received from community members and adjacent landowners. Noise monitoring results.		LLWDSP III PIU Consulting Engineer Contractor ECO	USD 0	Throughout construction period	

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
Refuelling maintenance construction equipment	Environmental pollution as result of spillages of fuel and oils.	▪ The contractor shall take all reasonable steps to prevent the pollution of soil and/or groundwater by fuels and oils as a result of his activities. ▪ Hydraulic oil and temporary fuel supply (if required) shall be placed within a bunded area (to accommodate 110% of the storage capacity) ▪ All machinery to be inspected thoroughly for fuel, lubrication and hydraulic oil leakages before mobilisation to Site so as to ensure they are in proper working condition to minimise breakdowns etc. ▪ In the event of spillage, the contaminated soil shall be removed and disposed of at a registered hazardous waste landfill site or the bioremediation pad at the contractor's cost. Proof of disposal shall be kept for auditing purposes.	No soil contamination evident on Site. No vegetation or water contamination on Site. Spills cleaned up immediately.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 15,000.00	Throughout construction period	

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
Mobilizing staff and labour to the sites	Potential spread of HIV/AIDS and other diseases. Injuries and death from accidents	■ Prepare and implement an HIV and TB awareness campaign for health education of workers (including posters, free condoms, etc.). ■ Allow for regular HIV voluntary counselling and treatment for all staff. ■ The camp site must be kept in a hygienic and safe state at all times. ■ Enforce the use of PPE at all times. ■ Hold driver education and safety training. ■ Only employ certified equipment operators to use equipment. ■ Apply a zero-tolerance policy for drugs and alcohol on site and for all transport drivers ■ Maintain all vehicles and equipment in good running order.	Records of HIV and TB awareness training. Records of HIV and TB counselling and testing. OH&S audit results are positive	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 500.00	Requirements to be implemented prior to construction commencement and throughout construction period	Engineer's Manager OH&S

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		■ Ensure all measures outlined in Appendix E are implemented where relevant.					
Fire management	Loss of arable land, grazing land, woodlots, trees, houses and other assets due to runaway fires	■ No open fires shall be permitted on site. ■ Smoking shall only be permitted in designated smoking areas in the site and cigarette but disposal bins provided. ■ A fire officer shall be appointed by the contractor who shall be responsible for coordinating rapid, appropriate responses in the event of a fire	No loss of land and other assets due to fire No reported fires on Site or in the surrounding area.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 1000.00	Throughout the construction period	Engineer Continuously

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		■ Firefighting equipment must be kept at accessible places on site. ■ Firefighting equipment must be serviced regularly and kept in good working condition.	No complaints received from the public.				

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
Transportation of equipment, materials and concrete on access routes	Road accidents Disruption of traffic Community discontent	▪ Ensure proper road signage on site is erected prior to construction. ▪ Where construction will affect existing roads (e.g. pipeline crossings) or where construction takes place in urban areas, traffic is to be diverted or otherwise managed to minimise disruption to the public.	No vehicle collisions due to construction activities. Adequate signage erected in and around Site. Roads in good condition.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 0	Requirements to be implemented prior to construction commencement and throughout	

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
	Deterioration of road surface	■ Ensure all drivers are licensed. ■ Ensure all vehicles to be used on site are roadworthy. ■ Where required, personnel should be deployed to warn on-coming vehicles and pedestrians of construction works. ■ Plant operators and particularly drivers of haul and concrete trucks are to be continuously made aware of other road users. ■ Project-related roads shall be kept in a good condition and damage repaired. ■ Enforce speed limits. ■ Warn border authorities at the Caledonspoort, Maputsoe Bridge and Peka border crossings of additional traffic.				construction period	

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
Restriction of access during pipeline construction	Pipeline construction may impact on people's access to fields, grazing land, schools, clinics, houses, and businesses	■ All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties. ■ Safe alternative access must be provided to houses, schools, clinics, fields, grazing land and businesses at all times. ■ Speed limits shall be enforced in such areas and all drivers shall be sensitized to this effect. ■ Upon completion of the project all roads directly damaged by construction activities shall be repaired	No disruption to access. Alternative access is provided.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 0	Throughout the construction period	Engineer Continuously
Storm water / wastewater management	Impact on wellbeing the and the reproduction potential of aquatic biota. Potential decrease in ground water quality.	■ The Contractor must identify sources of process water and quantify quantities for approval and monitoring by the Engineer. ■ The Contractor shall implement a storm water management system for the area, especially along	Water quality of streams and rivers are maintained within the predetermined seasonality baseline levels.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 0	Throughout the construction period	EM Weekly

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		access roads and internal vehicle tracks.					
	Potential decline in the use of water for activities on site. Impact on health of the community relying on the water for domestic use. Decrease in ground water and surface water quality. Decrease in the populations of aquatic microorganisms.	• Temporary storm water diversion measures should be implemented during the construction of the pipeline. • The Contractor shall supply a wastewater management system at the camp that will comply with legal requirements and be approved by the Engineer. • Wash bays, service areas and fuel storage areas may not be located within the 1:100-year flood line or horizontal distance of 100m (whichever is greater) of a watercourse or drainage line. • Bio-degradable detergents may be used. • Workshops, refuelling depots and washing areas shall be	No evidence of pollutants released into streams and rivers. No erosion caused by construction activities. No evidence of pollutants being released into ground water. No evidence of toxins in drinking water				

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
	Decrease in floral reproductively. Potential decline in the use of water for activities on site. Toxicity and threat to human health.	bunded to prevent leaching to the ground. ● Water from wash bays, service areas and fuel storage areas must be discharged into oil separators and sumps. Oils collected in this manner should be retained in a safe holding tank and removed from site by a specialist oil recycling company for disposal at approved waste disposal sites. ● No drainage from fuel storage areas shall be permitted. ● Never hose oil or fuel spills into storm water drain or sewer, or into the surrounding natural environment. Any contaminated storm water and other run-off from the site shall be contained. Any spill which may contaminate water must be treated according to the approved spill management method statement the Contractor compiled. ● Contain oil or fuel spills in water using an approved oil absorbent fibre.	The quality of the water from upstream of construction and downstream of construction will not differ with more than 10%. No evidence of erosion and sedimentation caused by construction activities.				

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		● Grey water not deemed suitable for dust suppression by the Engineer must be stored in sealable marked containers and disposed of with another wastewater. Wastewater as well as spilled fuel collected within bunded areas and refuelling areas shall be disposed of as hazardous waste. ■ Drainage lines are not to be altered, and these areas should be level with the surrounding land once subsidence has occurred diversion berms can be installed to direct all wastewater to a catchment area. ■ Do not locate sand washing plants or associated settlement ponds within the 1:50 year flood line or within a horizontal distance of 100m (whichever is greater) of a watercourse. ■ Prevent the discharge of water containing polluting matter or visible suspended materials directly into drainage lines or streams.					

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		■ Deflect any unpolluted water/runoff away from any dirty area. ■ Where necessary, turbid water pumped from excavations within rivers must be passed through a sand filter or settling pond before being released back into the river. Ensure that no storm water is allowed to enter any drainage installation for the reception, conveyance, storage and or treatment of sewage. ■ Ensure that water passing through vehicle wash bays and workshops pass through oil separators before passing into the conservancy tank. ■ No roads shall cut through river- and stream banks as this may lead to erosion causing siltation of streams and downstream dams. ■ No residue or substance which causes or is likely to cause pollution of a water resource may be placed in any trench or excavation.					

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		■ No material stockpiling should take place within a water course. ■ Erosion and sedimentation into channels must be minimized through the effective stabilisation (gabions and Reno mattresses) and the revegetation of any disturbed riverbanks. ■ During construction through a drainage line, the majority of the flow must be allowed to pass down the stream. In-stream diversions should be used rather than the construction of new channels. ■ Bank destabilisation, vegetation removal and erosion must be minimized. Erosion sensitive zones shall be clearly marked and avoided where possible. ■ Provide temporary surface water drainage or sediment traps where necessary. ■ Bank destabilisation, vegetation removal and erosion must be minimized. Erosion sensitive					

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		zones shall be clearly marked and avoided where possible. ■ Provide temporary surface water drainage or sediment traps where necessary.					
Local procurement services	Boost to the local economy through supply of goods and services	■ Identify an area to cater for informal traders. ■ Prevent / discourage informal traders from establishing stalls in unsuitable locations. ■ Procure food, cleaning services, etc from local providers as far as possible.	Area demarcated for informal traders.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 15,000.00	Requirements to be implemented prior to construction commencement and throughout construction period	EM Monthly
Cut and fill activities	Negative effect on sense of place of the surrounding area. Visual impact	■ No vegetation shall be pushed into heaps or left lying all over the veld. ■ Shape cut and fill slopes to emulate the natural surroundings.	No disruption of the natural and existing landscape characteristics.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 15,000.00	Throughout construction period	EM Monthly

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		▪ Shape areas to correct contours to within a tolerance of 300mm. ▪ Trim areas already shaped to within an acceptable tolerance, with all undulations following a smooth curve. Ensure that final trimmed levels make provision for the specified depth of the reapplied topsoil.					
Removal of graves, ash heaps	Emotional impact for families	■ Follow the grave removal protocol described in the RAP (Appendix B)	No complaints received.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 0	Prior to construction	EM Ongoing
Disturbance of cultural heritage sites and fossils	Loss of important cultural and physical heritage	■ Follow the Chance Finds Procedure set out in the Bank Operational ISS OS 8. ■ Provide training to site foremen, employees and ECO.	Site foremen are all aware of the procedures to follow in the event of finding cultural and physical heritage resources.	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 25,000.00	Throughout the construction period	EM Ongoing

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
			The correct protocols are followed.				
Demobilising of site camps, temporary construction sites, laydown areas	Long term land degradation, source of erosion. Weed invasion.	■ All infrastructure, buildings, plinths, concrete foundations, rebar, construction waste, introduced material, scrap metal, cables, fencing, storage tanks, containers, etc must be removed from site on completion of the works. ■ Backfill any excavations and depressions using saved sub-soil material. ■ Apply topsoil from stockpile to a depth of 300 mm and contour to blend in with the surrounding landform. ■ Remove any excess excavated material to the spoil site. ■ Rehabilitate the spoil site by shaping it to blend in with the surrounding landform and spreading topsoil over it to a depth of at least 300 mm using saved soil previously stripped	All sites are decommissioned and rehabilitated as required. No visual scars remain. All sites are made safe. Utilities and businesses are re-instated	LLWDSP III PIU Consulting Engineer Contractor ECO	USD 1000.00	On completion of construction	EM At end of contract

Activity	Potential Impact	Mitigation Measures	Performance Indicator	Responsibility	Budget / Resources	Deadline for completion	Verification: responsibility and frequency
		from the spoil site and any other suitable material. ■ Reinstate any drainage lines that may have been disturbed. ■ Rip and scarify any temporary access roads which are to be no longer used and apply topsoil if available. ■ Develop a revegetation plan for areas where natural re-growth may not be possible. ■ In urban areas, re-instate any businesses that were moved temporarily during construction. ■ Re-instate and services and utilities that were moved. ■ Identify redundant construction materials which may be re-used by the community and make available. ■					

10. ESMP Monitoring Plan

10.1. Construction phase

Monitoring during construction will take the form of:

- Inspections (visual and document checking).
- Watching briefs.
- Actual measurements.

The ECO will be required to conduct daily and weekly **inspections** of all work sites to check for the aspects listed in Table 12.2 below. The ECO shall prepare a short weekly inspection report, as well as a monthly report for submission to the Engineer's Environmental Manager (EM). Any urgent matters and non-compliance issues shall be reported to the site foreman and the EM as soon as they arise (or at least within 24 hours). Note that occupational health and safety (OHS) monitoring will be the responsibility of the OHS Manager appointed by the contractor.

Table 70: List of key aspects to be monitored, frequency and responsible person.

Aspect to be inspected	Frequency	Responsible person
Litter and waste management (hazardous and non-hazardous)	Daily	ECO
Soil contamination from hydrocarbon spills	Daily	ECO
Disposal of waste concrete	Weekly	ECO
Hazardous materials storage, handling and disposal of containers	Weekly	ECO
Fuel management	Daily	ECO
Stormwater drainage and sumps	Weekly	ECO
Oily water separator(s)	Weekly	ECO
Erosion and siltation directly attributable to construction works	Weekly	ECO
Portable toilets and effluent disposal	Weekly	ECO
Workshops	Weekly	ECO
Spoil dump	Weekly	ECO
Topsoil management	Weekly	ECO
Working within demarcated areas	Daily	ECO
Disturbance of identified plants and trees	Weekly	ECO
Rehabilitation and revegetation of disturbed areas	Weekly	ECO
Informal job seeker settlements developing near the contractor's camp	Daily	CLO, EM
HIV awareness training and voluntary counselling and testing	Monthly	ECO, CLO
Road safety awareness training	Monthly	CLO
Compensation payments	Monthly	WC, EM, CLO
Resettlement	Monthly	WC,EM, CLO
Grave/ash heap removals	Daily in affected areas	ECO, CLO

Application of gender policy	Monthly	ECO
Application of employment policy and practices	Monthly	CLO, EM
Local procurement	Monthly	CLO, EM
Notification of affected persons in advance of blasting, disruption of utilities, disruption of access, noisy activities, etc	As needed	ECO
Building condition surveys	Before and after heavy construction works and blasting close to buildings	CLO, EM Engineer
Maintenance of Complaints Register	Daily	CLO, EM

In addition to the site inspections listed above, the ECO will be required to keep a **watching brief** at the following sites:

- Excavations in areas of high paleontological potential i.e. where excavations exceed 2 m in hard rock areas;
- Excavations in areas with a high archaeological potential e.g. near old ruins;
- Excavations close to where graves and ash heaps have been identified;
- All river and donga crossings;
- Construction of the intake works.

The watching brief will require the ECO to conduct an awareness training session with the site foreman and all construction workers who may be working in the sensitive areas listed above, including the production of visual material to alert people what to look for. The training sessions must also include:

- A detailed explanation of the Chance Find Procedures to be followed if any artefacts or fossils are found during pipeline excavation or reservoir construction.
- Procedures to be followed if graves are found during pipeline and reservoir construction.
- Emergency procedures in the event of major hydrocarbon spills into a water course (including dongas) during construction of the pipeline and intake works.
- Procedures to be followed for minor hydrocarbon leaks and spills in any water course.

The watching brief will require the ECO to be present on site at all times during work in these sensitive areas. During construction, the following data must be collected as per the **monitoring protocols** in Tables 12.3 To 12.4 below:

- Air quality (PM10 and total suspended particulates (TSP).
- Noise.
- Water quality.
- Aquatic ecology (fish and invertebrates).

- Weather.
- HIV/AIDS and TB.

Table 71: Protocol for Air Quality Monitoring.

Component of Protocol	Description
Monitoring objectives	To ensure that dust does not become an environmental, health or safety issue. To comply with air quality standards based on WHO standards and guideline limits.
Responsible person	Environmental Control Officer
Equipment	Dust buckets, stands, scales, filter paper, oven, drying pans to monitor total suspended particulates (TSP) PM10 monitors and filters to monitor respirable dust.
Equipment maintenance/calibration	Calibrate scales as per manufacturer's instructions. Send PM10 monitors for annual servicing and calibration.
Monitoring locations	Erect labelled dust buckets and PM10 monitors outside sensitive receptors where construction will take place within 200 m. Dust buckets and PM10 monitors need to be protected from theft and therefore the sites need to be carefully selected, and the landowner/user may need to be paid a small sum to have the monitoring instrument(s) on their property and to protect them. Sensitive receptors includes schools, clinics and hospitals, churches, residential areas. Conduct visual observations during routine inspections at all work sites to check amount of dust emissions and efficacy of dust suppression measures.

Monitoring methodology	Collect buckets once a month and cover each bucket before taking them to be dried and weighed. The procedure for weighing total suspended particulates (TSP) samples is: • Add sufficient water to each bucket to ensure that all the dust can be removed; • Label and weigh each dish to be used and record weight; • Pour the contents of each bucket into a clearly labelled oven-proof dish; • Dry for 24 hours at 110°C; • Weigh and record the total and net weights in milligrams (mg) on a data form. The filters in the PM10 monitors shall be collected daily and taken to the laboratory for weighing. The chain of custody process to be followed is as follows: • Each filter paper must be placed in a clearly labelled plastic bag (with date and sample location) and sealed to prevent ingress of dust; • The samples must be registered on the sample register as they are delivered to the laboratory; • The laboratory manager shall sign off the receipt of each batch of samples; • The laboratory manager shall enter the results on the computer, print the results and sign off on the results. The following equipment is needed to analyse the PM10 samples: • Drying oven;
Component of Protocol	**Description**
	• Oven-proof dishes; • Enclosed laboratory scale. The analytical procedure to weigh PM10 samples is as follows: • Place filter papers into the oven and dry for 24 hours at 110°C; • Weigh and record net weight (dust minus filter paper) in micrograms (µg). Once the laboratory manager is satisfied with the results, the samples can be discarded. The maximum allowed turnaround time for the samples in the laboratory is 2 days. Weekly site inspections.
Parameters to be monitored	Total suspended particulates (TSP) Respirable dust (PM10) Visible, blowing dust; dust accumulations downwind of the works area and stockpile sites, crusher plants, concrete batch plants; dust erosion patterns.
Monitoring frequency	TSP: monthly PM10: daily Weekly visual inspections

Ad-hoc monitoring requirements	Install dust monitoring equipment at the property of any complainant and monitor as above for the duration of works occurring within 200 m of the complainant.
Incident and complaints procedures	Following an incident or complaint, or if dust issues become critical to health and safety, erect dust buckets downwind of problem areas, leave for one month or for the duration of works in that area, collect the samples and weigh as per the normal procedure described above. Complete the incident or complaints registers.
Data management	The ECO shall fill in a log for each monitoring episode, which shall be captured onto an excel spreadsheet. All results to be entered onto an excel spreadsheet.
Data analysis and interpretation	The data shall be interpreted in terms of trends in relation to specified standards. Interpret data in terms of construction activities and incidents and antecedent weather conditions.
Other data requirements	Weather conditions in the month prior to monitoring (especially rainfall, temperature, wind)
Data reporting	The ECO shall provide feedback on dust issues at the monthly meetings and in the monthly report.
Frequency of reporting	The results of air quality monitoring must be included in the monthly report to the Engineer's Environmental Manager.

Table 72: Air Quality Standards

Parameter	Average short-term limits	Average daily dust fall over 30 days (residential)	Average daily annual limits	Exceptions / exceedances
TSP	-	600mg/m²/d (RSA)	200mg/m²/d (UK) (warning level)	The *monthly* fallout rate of 600mg/m²/d is not to be exceeded more than 3 times per year or for 2 consecutive months
PM10	50µg/m³/day (EU and WHO)	-	40µg/m³/d (EU) (maximum allowable) 20µg/m³/d (WHO)	*Daily* fallout limit not to be exceeded more than 35 times per year

Table 73: Protocol for Noise Monitoring

Component of Protocol	Description
Monitoring objectives	As there are no noise standards in Lesotho.
Responsible person	Environmental Control Officer
Equipment	Portable type Integrating Sound Level Meter, mounted on a tripod
Equipment maintenance/calibration	Calibrate according to manufacturer's instructions
Monitoring locations	At selected sensitive receptors when construction occurs within 200 m. Sensitive receptors include: schools, clinics and hospitals, churches, residential areas.
Monitoring methodology	Conduct pre-activity noise audit to determine the baseline. Take readings for one hour during a period when the noisy activity is occurring.
Parameters to be monitored	LAmax LA90 LAeq
Monitoring frequency	Weekly for the duration of construction in a given area with sensitive receptors.
Ad hoc monitoring requirements	On receipt of complaints about noise.
Incident and complaints procedures	Take noise readings in response to a complaint received and complete Complaints register.
Data management	The ECO shall fill in a log for each monitoring episode, which shall be captured onto an excel spreadsheet.
Data analysis and interpretation	The data shall be interpreted in terms of baseline noise, noise contributed by the construction activity or the activity causing the complaint, and the prevailing weather conditions (e.g. wind, cloud cover).
Other data requirements	None.
Data reporting	The ECO shall provide feedback on noise issues at the monthly meeting and in the monthly report.
Frequency of reporting	The results of any noise monitoring must be included in the monthly report to the Engineer's Environmental Manager.

Table 74: Noise Standards

	WHO Guidelines	World Bank IFC EHS Guidelines	South African Guidelines (SANS 10103)
Day time (07h00–22h00) near residential, institutional and educational establishments	55	55	55
Night-time (22h00-07h00) near residential, institutional and educational establishments	45	45	45
Daytime and night-time in industrial and commercial areas		70	

Table 75: Protocol for Monitoring Water Quality.

Component of Protocol	Description
Monitoring objectives	To ensure compliance with the Lesotho standards (Tables 12.8 and 8.9 below)
Responsible person	Environmental Control Officer
Equipment	Portable pH and conductivity/total dissolved solids (TDS) meter. poly-aromatic hydrocarbons (PAH) meter. Plastic water sample bottles, waterproof pens to label bottles. Glass bottles for microbiological samples. Cooler box and cold blocks to preserve samples until analysed. An accredited laboratory, with facilities to detect the following parameters: pH, electrical conductivity, TDS, Total Hardness, Total Alkalinity, calcium (Ca), magnesium (Mg), ammonia (as N), nitrate as NO_3, sulphate (SO_4), phosphate (PO_4), iron (Fe), manganese (Mn), Aluminium (Al), suspended solids, turbidity, *E. coli*, total coliforms.
Equipment maintenance/calibration	Keep portable pH/TDS sensor clean by washing with distilled water after use. Dry and store correctly. Calibrate with buffer solutions prior to every use. Calibrate PAH meter according to manufacturer's instructions.
Monitoring locations	**Permanent sites:** At IFR monitoring site immediately downstream of 'Muela transfer discharge point. At IFR monitoring site upstream of water intake point at Qalo. At IFR monitoring site immediately downstream of intake point. **Temporary sites:** Upstream and downstream of any pipeline river crossings where there is perennial flow.

Monitoring methodology	**Chemical samples**: rinse out plastic sample bottles three times with target water and discard rinse water downstream. Submerge sample bottle in flowing stream or deepest part of pool and fill. Seal and label and place in cooler box. Fill out a sample register, noting other parameters such as: odour of water, presence of algae, presence of salt crystals, micro-fauna in water, evidence of water use by wildlife and livestock, other nearby activities such as sand winning, laundry, water collection by local people. Keep samples cold until delivered to the Laboratory.
Component of Protocol	**Description**
	Microbiological samples: use sterilised glass bottles. Take sample as above and keep cold. Deliver to the lab within 24 hours of sample collection. Obtain sign-off from lab manager for sample delivery.
Parameters to be monitored	pH, electrical conductivity, TDS, Total Hardness, Total Alkalinity, calcium (Ca), magnesium (Mg), ammonia (as N), nitrate as NO_3, sulphate (SO_4), phosphate (PO_4), iron (Fe), manganese (Mn), Aluminium (Al), suspended solids, turbidity, E. *coli*, total coliforms.
Monitoring frequency	**Construction phase**: Monthly: all (when water flowing). **Operations phase:** Quarterly (when water flowing)
Ad hoc monitoring requirements	Following a complaint or major pollution incident, samples are to be taken as above from all affected water courses and boreholes, placed in a cooler box and sent to the laboratory for analysis. The scope of the analysis is to be determined based on the nature of the pollutant involved.
Incident and complaints procedures	As per ESMP.
Data management	The ECO shall fill in a log for each monitoring episode, which shall be captured onto an excel spreadsheet. All results must be captured onto an excel spreadsheet.
Data analysis and interpretation	The data shall be interpreted in terms of trends in relation to specified standards (see Tables 6.9 and 6.10). Interpret data in terms of construction activities and incidents and antecedent weather conditions.
Other data requirements	Weather conditions in the month prior to monitoring (especially rainfall)
Data reporting	Graphs and narrative.
Frequency of reporting	The results of water quality monitoring must be included in the monthly report to the Engineer's Environmental Manager.

Table 76: Lesotho Water Quality Standards (applicable to this project)

Determinant	Unit	Recommended limit	Maximum permissible limit	Crisis limit
Electrical conductivity	MS/m (25°C)	70	300	400
pH	pH unit	6.0 – 9.0	5.5 – 9.5	4.0/>11.0
Turbidity	NTU	1.0	5.0	10.0
Chloride	Mg/l Cl	250	600	1200
Ammonia	Mg/l NH_4	1.0	2.0	4.0
Calcium	Mg/l Ca	150	200	400
Total Hardness	Mg/l $CaCO_3$	300 max.	650 max.	1 300 max.
Magnesium	Mg/l Mg	70	100	200
Nitrate	Mg/l NO_3	6.0	10.0	20.0
Sodium	Mg/l Na	100	400	800
Aluminium	µg/l Al	150	500	1 000

Table 77: South African target water quality standards for aquatic and domestic use (for parameters not listed in Table 80 above)

Parameter	Units	Target Water Quality Range for no adverse effects for aquatic ecology	South African Drinking Water Standards SANS 241:2015
Total dissolved solids	mg/l TDS	Change <15% from ambient	1,000 (WHO)
Sulphate	mg/l SO_4	-	500
Phosphate	mg/l PO_4	-	-
Iron	mg/l Fe	-	0.3
Manganese	mg/l Mn	-	0.1
Suspended solids	mg/l TSS	0 - 100	25
Total coliforms	Count/100 ml	-	<10
E. coli	Count/100 ml	-	None detected

Table 78: Protocol for Monitoring Aquatic Ecology, downstream users and channel Morphology.

Component of Protocol	Description
Monitoring objectives	To ensure that the IFR releases of 15% are adequate to maintain the determined ecological condition. To determine the impacts of water transfers from 'Muela Dam on the Hololo River.
Responsible person	Environmental Control Officer or aquatic ecologist consultant
Equipment maintenance/calibration	
Monitoring locations	**Preliminary monitoring sites** Site immediately upstream of Hololo River, 'and at Muela transfer discharge point. Site upstream of water intake point at Qalo. Site immediately downstream of intake point. Any other sites identified by the aquatic ecologist
Parameters to be monitored	Fish Invertebrates Riverine vegetation Sediment and erosion patterns Sand bank and island development Water quality (see Protocol in Tables 8.9 and 10 above). Any other components as identified by the aquatic ecologist.
Monitoring frequency	Seasonally (high and low flow conditions (or as determined by the aquatic ecologist)
Ad hoc monitoring requirements	
Incident and complaints procedures	As per ESMP.
Data management	The aquatic consultant shall enter all information onto a data base.
Data analysis and interpretation	The data shall be interpreted in terms of trends in relation to specified minimum requirements and baseline data. Interpret data in terms of augmentation releases, water abstraction and antecedent weather conditions.
Other data requirements	Weather conditions in the month prior to monitoring (especially rainfall). Flow data. 'Muela water release data.
Data reporting	Graphs and narrative.
Frequency of reporting	The results of IFR and water release monitoring must be included in a report to the DoE and relevant authorities.

Table 79: Weather Monitoring

Component of Protocol	Description
Monitoring objectives	To ensure that the IFR releases of 15% are adequate to maintain the determined ecological condition. To determine the impacts of water transfers from 'Muela Dam on the Hololo River.
Responsible person	Environmental Control Officer or aquatic ecologist consultant
Equipment maintenance/calibration	
Monitoring locations	**Preliminary monitoring sites** Site immediately upstream of Hololo River, 'and at Muela transfer discharge point. Site upstream of water intake point at Qalo. Site immediately downstream of intake point. Any other sites identified by the aquatic ecologist
Parameters to be monitored	Fish Invertebrates Riverine vegetation Sediment and erosion patterns Sand bank and island development Water quality (see Protocol in Tables 8.9 and 10 above). Any other components as identified by the aquatic ecologist.
Monitoring frequency	Seasonally (high and low flow conditions (or as determined by the aquatic ecologist)
Ad hoc monitoring requirements	
Incident and complaints procedures	As per ESMP.
Data management	The aquatic consultant shall enter all information onto a data base.
Data analysis and interpretation	The data shall be interpreted in terms of trends in relation to specified minimum requirements and baseline data. Interpret data in terms of augmentation releases, water abstraction and antecedent weather conditions.
Other data requirements	Weather conditions in the month prior to monitoring (especially rainfall). Flow data. 'Muela water release data.
Data reporting	Graphs and narrative.
Frequency of reporting	The results of IFR and water release monitoring must be included in a report to the DoE and relevant authorities.

11. Operational Phase

The monitoring to be carried out during the operation and maintenance of the water supply scheme is listed in Table 6.12. Note that this will need to be expanded into a detailed monitoring plan prior to scheme commissioning.

Table 80: Aspects to be monitored during Scheme Operation and Maintenance.

Aspect to be monitored	Responsibility
River morphology (erosion, siltation, sand banks, bank stability, etc)	IFR Specialist
River flows at: • Upstream of the Hololo River intake point • Downstream of the Hololo River intake point	Scheme Operator, LLWDP III
Aquatic ecology indicators (fish, invertebrates, riverine vegetation)	IFR Specialist
Downstream users	LLWDP III
'Muela releases	LHDA, LLWDP III, Scheme Operator
Maintenance of IFR flows (at monitoring sites established prior to construction – see Table 8.11)	Scheme Operator, LLWDSP III
Water quality (at sites established prior to construction – see Table 8.8)	Scheme Operator
Provision of water as per design specifications	LLWDP III
Quality of treated water	Scheme Operator, DWRS, WASCO
WTW sludge disposal	Scheme Operator
Erosion at reservoir sites and pipe purge points	Scheme Operator, DoE
Economic benefits	Ministry of Local Government
Consultation with downstream users	Scheme Operator
Prevalence of water-borne diseases	Ministry of Health

12. CONCLUSIONS AND RECOMMENDATIONS

The design review activities have minimal impact on the environment and there are no cultural heritage artifacts to be transacted. The activities are within similar environmental and social setting as the original design. Stakeholder engagement for the design review has created necessary awareness amongst the communities.

During periods of *average flow,* the available water in the Hololo River (without augmentation) is anticipated to be adequate however, critical period is the dry season which may have a long-term average *minimum flow*. Water Resources Modelling using the latest hydrological data done as part of the different studies have shown that there is strong requirement to strengthen the water resources of Hololo river from 'Muela dam during the dry season with low flow periods.

Of the *known* impacts, the project benefits outweigh the temporary and relatively small scale, temporary impacts of construction and the permanent impacts of the proposed scheme. The landscape and biophysical environment in the project area have been significantly altered and degraded, and the impact assessment has been conducted based on the relatively low sensitivity of the environment and the high vulnerability of the local communities to water shortages and poor quality of water. Any further delays in project implementation will pose a considerable risk and could result in social conflict and perpetuation of the poverty cycle.

However, the main mitigation measure to minimise the impact of water abstraction on downstream ecosystems, hydrology and users (i.e. water transfers from the existing 'Muela Dam), may cause significant impacts on the receiving Hololo River environment. It is also suggested that a new IFR calculation needs to be done, using the 2008 IFR report on the conditions in the Hololo River as a benchmark. Once the IFR has been finalised, it is recommended that a comprehensive monitoring programme should be put in place to monitor downstream impacts once the scheme is in operation in order to determine whether the IFR flows is sufficient or not to meet hydrological, ecological and user needs.

It is also recommended that downstream users on the Hololo River should be consulted prior to project construction (this could be done during the IFR survey). It is also recommended that the key stakeholders who have not yet been consulted, should be contacted.

ANNEXES

ANNEX A: Terms of Reference

TERMS OF REFERENCE (TORs) FOR CONSULTANCY SERVICES TO REVIEW ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND DEVELOPMENT OF RESETTLEMENT ACTION PLAN (RAP) FOR ZONE 1

1. Introduction

1.1 Lesotho Lowlands Water Supply Scheme

A feasibility study of the Lesotho Lowlands Water Supply Scheme (LLWSS) was started in 2003 and a Final Report was published by Parkman Ltd (UK) in 2005. Its findings and recommendations were approved and accepted by the GoL in May 2005.

The Lesotho Lowlands Water Supply Scheme (LLWSS) was started with the primary purpose of improving water supply to the Lowlands settlement with populations in excess of 2500 for domestic, institutional and industrial purposes. The aim of the project is to support the introduction of technically, economically, socially, environmentally and financially viable, bulk-treated water supply system. The LLWSS is expected to include:

- Development of new water resources
- Treatment of water as necessary
- Transfer of water to demand areas
- Bulk storage of treated water at suitable locations serving those centres

In the Lowlands, these 2005 recommendations included the preliminary designs of (5) treated bulk water supply schemes serving (8) water demand zones falling into three regions, i.e. the Northern, Central and Southern Regions. The 8 water demand zones are:

- Zone 1 Botha – Bothe
- Zone 2 Hlotse / Maputsoe
- Zone 3 Peka / Mapoteng
- Zone 4 Maseru / Mazenod / Roma
- Zone 5 Morija / Matsieng
- Zone 6 Mafeteng
- Zone 7 Mohale's Hoek
- Zone 8 Quthing

In 2008 under EDF funding, Lowlands Water Joint Venture was engaged to produce conceptual designs, tender documents and financial/economic analysis of the LLWSS. In accordance with the Lesotho environmental legislation, a detailed Southern, Central & Northern Environmental & Social Impact Assessment (ESIA) and associated Environment & Social Management Plan (ESMP) Reports were also prepared and completed in 2010. These reports were then approved by the Department of Environment in 2010. Due to the changing environmental and social context, the reports had to be revised.

In 2018, SMEC International submitted an updated report of the 2010 ESIA and ESMP reports and prepare Environmental & Social Management Framework, Resettlement Policy Framework and a Generic Environmental Management Plan all in accordance with the World Bank's Safeguard Policies. The review and update is nearing completion of report for 2018 to meet current environmental and social requirements as at 2022.

The Consultant will have to zoom into Zone 1 while reviewing the ESIA, the ESMP and developing the Resettlement Action Plan (RAP) in consideration of the previous completed designs and assessments studies.

1.2 Broad Description of the Zone 1 Project

This zone (Zone 1) will be served by a bulk water supply scheme using direct river abstraction (Hololo River), water treatment, 15 pumping stations and conveyance through 108.2km pipelines ranging in diameter from 80mm to 700mm to approximately 30 reservoirs near target settlements.

Abstraction will be from the Hololo River just below the road bridge crossing to Qholaqhoe, with the treatment works located near Qalo. The intake to the water treatment works is situated on the Southern bank of the Hololo River and is designed to abstract surface water with submersible pumps housed in a reinforced concrete pump station. The design of the intake is based on the assumption that there will be sufficient flow in the river for eventual peak intake abstraction of 0.774m3/s, as well as providing for the environmental inflow requirements (IFR) downstream of the intake as far as the Mohokare River and any other abstractions upstream of the intake.

2. Objectives

2.1 Main Objective

The objective of this consultancy is to review Environmental and Social Impact Assessment (ESIA), the associated Environmental and Social Management Plan (ESMP) for the Lesotho Lowlands Bulk Water Supply Scheme (LLBWSS) for Zone 1, taking into consideration the African Development Bank's Integrated Safeguards System (ISS) together with the designs and previous assessment studies of 2018. The ESIA will be prepared to guide design team on the detail design of the project based on understanding of its environmental and social consequences to facilitate protection, restoration and enhancement of the environment. The ESMP will provide detailed guidance on the implementation of the mitigation measures, which have been recommended.

The ESIA should inform the Government of Lesotho, the Lesotho Water Commission, national water utilities, interested and affected parties and other stakeholders about the potential environmental and social risks and impact associated with the project activities. This will include potential impacts upstream and/or downstream of the facilities such as water abstraction units.

.

2.2 Specific Objectives

2.2.1 Environmental and Social Impact Assessment

The ESIA for the proposed Lesotho Lowlands Bulk Water Supply Scheme (LLBWSS) - Zone 1 will be carried out with the following objectives:

- Description of the project background and objectives of the project
- Describe the baseline environmental, economic and social cultural setting of the project Area of Influence (Including a location map and layout diagram)
- Review national, regional, international policy, legal and administrative framework relevant to the development of the project; and provide a summary

of the applicable national and International Standards including the AfDB Integrated Safeguards System and the Operation Safeguards (OSs)

- Description of the main impact assessment steps to be followed as required by the National Environmental Regulatory Authority and the methodology used in updating the ESIA.

- Identify the positive and negative environmental and social impacts of the project and propose feasible mitigation measures to address negative impacts and enhancement measures for positive impacts;

- Identify project beneficiaries and describe their current social and economic conditions and their views on the proposed project activities and the anticipated impacts and mitigation measures. Pay special attention to vulnerable groups among the beneficiaries (e.g. the elderly, the poor, female-headed and child headed households, and other socially excluded groups);

- Identify the biophysical, socio-economic, cultural and health and sanitation impacts that the project will have on aspects of the biological, physical and social environment, and to evaluate and determine the significance of these impacts.

- Outline project activities that will be undertaken during implementation of the project and Carry out Project Alternative analysis and provide a set of recommendations for the project design to avoid and /or minimise the negative impacts and maximise the positive impacts of the project. Evaluate project alternatives and advise on the most appropriate alternative taking into account, a combination of environment, economic and social dimensions;

- Conduct stakeholder mapping and carry out public consultations with all affected and interested stakeholders including NGOs and CBOs and describe disclosure requirements; and develop a Stakeholder engagement plan and grievance redress mechanism based on consultations.

- Prepare a detailed Environmental and Social Management Plan (ESMP) that describes in detail mitigation measures, a detailed monitoring process and scheduled and a description of any training support that may be needed as well as the institutional structure to guide the implementation of the ESMP; and include a cost of all ESMP and Monitoring Measures including for implementation of the ESMP; Stakeholder Engagement Plan (SEP) and Grievance Redress Mechanism (GRM);

- Carry out a gender impact analysis and determine gender differentiated impacts and describe the gender differentiated mitigation and enhancement measures in order to explore the project’s opportunities to contribute to closing gender gaps relative to the project.

- Carry out Institutional Capacity assessment of the Executing Agency for ESMP implementation Monitoring and reporting and where there are gaps indicate the technical human and financial resources required

- Prepare an Environmental and Social Impact Assessment (ESIA) compliant to the relevant authorities, and detailing findings and recommendations.

Environmental and Social Impact Assessment Requirements

The Environment Act (2008), Part V has provisions for environmental management and protection including the need to carry out Environmental Impact Assessment (EIA) for projects listed in its First Schedule – Part A. Therefore, the ESIA content and level will be in line with the Lesotho EIA Regulations and Environment Act (2008) as well as the African Development Bank Manual/Procedures and other international protocol requirements to which Lesotho is a signatory.

- The ESIA will also address the following African Development Bank Safe-guard Policies and Guidelines 2023:
    - OS 1 – Assessment and Management of Environmental and Social Risk and Impact
    - OS 2 – Labour and working conditions
    - OS 3 – Resources Efficiency and Pollution Prevention and Management
    - OS 4 – Community Health, Safety and Security
    - OS 4 – Indicative Outlines of an Emergency Preparedness and Response Plan
    - OS 5 - Land Acquisition, Restrictions on Access to Land and Land Use and Involuntary Resettlement
    - OS 6 - Habitat and Biodiversity Conservation and Sustainable Mangement of Living Natural Resources
    - OS 7- Vulnerable Groups
    - OS 8 –Cultural Heritage
    - OS 9 - Financial Intermediaries
    - OS 10 – Stakeholder Engagement and Information Disclosure
    - OS 10 – Grievance Mechanism
- African Development Bank Industry Sector Guidelines for Water and Sanitation.

Project Area

This Zone will be served by a bulk water supply scheme using direct river abstraction, water treatment, pumping stations and conveyance through pipelines to storage tanks near target settlements. Abstraction will be from the Hololo River just below the road bridge crossing to Qholaqhoe, with the treatment works located near Qalo. When there is insufficient flow in the Hololo River water will be released from the Highlands Water Project via 'Muela Dam and the Nqoe River into the Hololo River. The infrastructure has been designed to accommodate future growth at the Botha-Bothe Industrial Estate being developed by Lesotho National Development Corporation (LNDC). The settlements to be served in Zone 1 are:

1	Botha Bothe	11	Selomo

2	Makhunoane	12	Makong
3	Qholaqhoe	13	Phooko
4	Seboche	14	Rampais Nek
5	Phelantabe	15	Nqechane
6	Khukune	16	Jonathane
7	Qalo	17	Pitsi's Nek
8	Serutle	18	Khabo
9	Tabolane	19	Katamelo
10	Rasekila		Kotsonkoane
	Maloseng		Majara
	Mopeli		

ANNEX B: Project Area Flora List

Table 81: List of Plants Species observed from the Project Area ((c) ESIA 2008)

Scientific Name	Common Name	Sesotho Name	Uses	Locality
Stachys aethiopica	African Stachys	Bokhatha	Medicinal and ornamental	Widespread in grassland
Stoebe vulgaries	Zigzag Bush	Sehalahala	Fuel wood	Disturbed areas
Sutera floribunda	Kerribos	Boluma	Ornamental	Occasional
Themeda triandra	Red grass	Seboku	Fodder	widespread
Trichoneura grandiglumis	Tumble grass	Joang-ba-tsela	Fodder	widespread
Trichoneura gradiglumis	Hairy rident grass	Motsoalle	Climax grass, fodder	Grassland areas
Vernonia natalensis	Silver Vernonia	Ilelefa	Medicinal and ornamental	widespread
Wahlenbergia krebsii	Fairy Bell-flower	Tenane	vegetable	Short grassland area
Xysmalobium undulatum	Milkwort	Poho Tšehla	Medicinal	Disturbed
Searsia dentata (Rhus dentata)	Nana-berry	Lebelebele	Firewood	Rocky outcrops
Searsia lancea (Rhus lancea)	Karee	Tšinabele	Firewood	Rocky outcrops
Searsia pyroides (Rhus pyroids)	Wild currant	Kolitšana	Medicinal	Common
Selago galpinii	Selago	Tšitoanyane	Ornamental	Common
Senecio asperulus	Senecio	Moferefere	Medicinal	Short grassland area
Setaria pallidefusca	Garden bristle grass	Lehola la Lipere (Teele)	Fodder and rope making	Cultivated areas
Silene undulate	Gunpowder plant	Lithotoana	Medicinal	Occasional
Rhynchosia totta	Yellow carpet bean	Sebalibetloa	Medicinal and food	Grassland
Rubus cuneifolius	American bramble	Monokotšoai oa linoha	Food	Near settlements
Rubus rigidus	White bramble	Monokotšoai oa bana	Food	Near settlements
Rumex lanceolatus	Smooth dock	Khama-khamane	Medicinal	Near river crossings
Salix babylonica	Weeping willow	Moluoane	Firewood, construction	Riverine
Salvia verbenacea	Wildesalie	Mosisili	Medicinal	Common in grassland areas

Satyrium longicauda	Blushing bride	lekoesha	Love charm	Widespread
Scabiosa columbara	Wild scabious	Selomi	Medicinal and ornamental	Widespread
Paspalum dilatatum	Dallis grass	Bohloa	fodder	Disturbed areas
Passerina montana	Mountain Passerina	Lekhapu	Firewood	Z1R10 (Botha Bothe Domestic reservoir)
Pellaea calomelanos	Blue rock fern	Lepata-maoa	Medicinal	Rocky outcrops
Pennisetum clandestinum	Kikuyu	Kikoejoe	grazing	Disturbed areas
Scientific Name	**Common Name**	**Sesotho Name**	**Uses**	**Locality**
Populus canescens	Poplar	Papoliri	Firewood and construction	Widespread
Pinus sp.	Pine tree	Phaena	Firewood and construction	Widespread
Rhamnus prionoides	Glossy leaf	Mofifi	Medicinal and firewood	Rocky areas
Rhoicissus tridentata	Bushman's grape	Morara-oa-thaba	food	Rocky areas
Leucosidea sericea	Ouhout	Cheche	Firewood	Rocky slopes
Melinis nerviglumis	Bristle-leaved redtop	Boleea	grazing	grassland
Mentha aquatica	Water mint	Koena-e-nyane	Medicinal	River and stream crossing
Mentha longifolia	Wild spearmint	Koena-ea-thaba	Medicinal	Riparian or marshy areas
Metalasia densa	Blombos	Lehlohlo	Firewood	Widespread
Microchloa caffra	Pincushion grass	Joang-bamatlapa	grazing	Grassland
Jamesbrittenia aurantiaca	Cape saffron	Phiri-ra-hlaha-e nyane	Medicinal	Grassy areas
Kalanchoe thyrsiflora	Wild peach	Lekhatsi	Construction	Rocky outcrops
Leonotis intermedia	Broad leaved Leonotis	Moseneke	Medicinal	Rocky outcrops
Helichrysum dasycephalum	Geelseweja artjie	Bohloko	Fumigant	Grassland
Helichrysum nudifolium	Hottentot's tea	Mohlomela-tsie	Medicinal	Common
Hermannia depressa	Rooi-opslag	Seletjane	Medicinal	Grassland

Heteropogon contortus	Spear grass	Seloka	Grazing	Widespread
Homeria pallida	Tulp	Teele	Rope making	Weed in disturbed areas
Hyparrhenia hirta	Common thatch grass	Qokoa	Construction	Widespread
Hypericum lalandi	Spindly hypericum	Bohlokoana	Medicinal	Wet areas
Myrsine africana	Cape myrtle	Moroka-pheleu	Medicinal	Rocky outcrops
Gerbera ambigua	Botterblom	Moarubetso	Medicinal	Grassland
Gerbera piloselloides	Swartteebo ssie	Tsebe-ea-pela	Medicinal	Grassland
Harpochloa falx	Caterpillar grass	Bohole	Grazing	occasional
Halleria lucida	Tree Fuchsia	Lebetsa	Spear shafts	Near sandstone outcrops
Helichrysum adenocarpum	Pink everlasting	Senkotoana	Medicinal	Z1R10, Botha Bothe Domestic Reservoir
Helichrysum aereonitens	Gouesewej aartjie	Tooane-poli	Cultural	Common
Helichrysum caespititium	Speelwonderblom	Phate-ea-ngaka	Medicinal	Grassland
Helichrysum chionosphaerum	Tiny snowball everlasting	Molepelle	Medicinal	common
Elionurus muticus	Silky grass	Hlooko	medicinal	common
Scientific Name	**Common Name**	**Sesotho Name**	**Uses**	**Locality**
Eragrostis curvula	Weeping love grass	Moseea	Grazing	Widespread
Eragrotis capensis	Heartseed love grass	Baroana	Grazing	Widespread
Eragrotis chloromelas	Curly leaf	Moseeka	Grazing	Widespread
Eragrostis plana	Tough love grass	Molila	Grazing	Widespread
Eragrostis racemosa	Narrow heart love grass	Baroana	Grazing	Widespread
Euclea crispa	Blue guarri	Mohlakola	Firewood	Widespread in rocky areas
Euphorbia striata	Fine leaved Felecia	Leholo	Firewood	Common
Gazania krebsiana	Common Gazania	Tsikitlana	Medicinal	widespread
Cyperus rupestris	Russet rock sedge	Taoane	Medicinal	Rocky areas
Cyperus semitrifidus	sedge	Hlohoana-ntso	Grazing	Rocky grasslands

Datura stramonium	Thorn apple	Letjoi	Medicinal	Cultivated and disturbed areas
Dicoma anamola	Aambeibo ssie	Hloenya	Medicinal	Occasional
Digitaria ternata	Blackseed finger grass	Moeane	Grazing	Very occasional
Diospyros lyciodes	Firesticks	Perekisi-tsa makhoaba	Grazing	Occasionally seen in rocky outcrops.
Eleusine corocana	Goose grass	Molia-ngoetsi	Medicinal	Grassland
Chrysocoma ciliata	Bitter bush	Sehalahala	Firewood	Hilly areas
Clematis brachiata	Traveller's joy	Morara-oamafehlo	Medicinal	Rocky areas
Cliffortia nitidula	Starry rice bush	Lenyofane	Firewood	Above sandstone outcrops
Commelina africana	Yellow Commelina	Khopo	Medicinal	Common
Cotyledon orbiculata	Pig's Ears	Sereleli	Medicinal	Sandstone outcrops
Crinum densiflora	Orange River lily	Mototse	Medicinal	Occasional
Cyanotis speciosa	Doll's powder puff	Khotsoana	Medicinal	Grassland areas
Cymbopogon excavatus	Turpentine grass	Moshanyana-oa marallaneng	Grazing	Widespread
Cynodon dactylon	Couch grass	Mohloa	Erosion control	Widespread
Berkheya multijuga	Thorny Berkheya	Mohatollo	Medicinal	Grasslands
Berkheya setifera	Buffalo-tongue Berkheya	Leleme-la-khomo	Medicinal	Widespread
Artemisia afra	Wormwood	Lengana	Medicinal	Widespread
Aristida diffusa	Iron grass	Lefielo	Broom making	Widespread

ANNEX C: Project Area Reptile List

Table 82: List of Reptiles found within the project area.

Common Name	Scientific Name	Status
Speckled Mountain Skink	*Trychylepis punctatissima*	Common
Burchell's Sand Lizard	*Pedioplanis burchelli*	Common
Drakensburg Crag Lizard	*Pseudocordylus melanotus subviridis*	Common
Southern Rock Agama	*Agama atra*	Common

ANNEX D: Here after are some photos of Community Gatherings Photos for information dissemination for getting their views on the project

Figure 27: Ngoajane Community Gathering.

Figure 28: Ha Majara Community Gathering.

Figure 29: Ha Khabo Community Gathering.

Figure 30: Joint Community Gathering at Koenaneng with Police Department.

ANNEX E: Chance Find Procedure

ANNEX F: Stakeholder Engagement Report