ESWATINI WATER SERVICES CORPORATION

DRAFT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE NHLANGANO - SIPHAMBANWENI WATER SUPPLY AND SANITATION PROJECT

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ACRONYMS

ABBREVIATION	FULL TERM
AIDS	Acquired Immune Deficiency Syndrome
BID	Background Information Document
BOD	Biological Oxygen Demand
C-EMP	Contractor Environmental Management Plan
CERC	Contingency Emergency Response Component
CMAC	Conciliation, Mediation and Arbitration Commission
CMP	Comprehensive Mitigation Plan
COD	Chemical Oxygen Demand
CSO	Central Statistics Office
CTA	Central Transport Administration
DWA	Department of Water Affairs
EC	Electrical Conductivity
EAARR	Environmental Audit Assessment and Review Regulations
ECC	Environmental Compliance Certificate
ECO	Environmental Compliance Officer
EEA	Eswatini Environment Authority
EEC	Eswatini Electricity Company
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EMA	Environmental Management Act (No. 5 of 1992)
ENPF	Eswatini National Provident Fund
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESSs	Environmental and Social Standards
EWR	Environmental Water Requirement

EWSC	Eswatini Water Services Corporation
EU	European Union
FCCC	Framework Convention on Climate Change
GBV	Gender Based Violence
GIIP	Good International Industry Practice
GRM	Grievance Response Mechanism
HIV	Human Immunodeficiency Virus
IAP	Interested and Affected Party
IEE	Initial Environmental Evaluation
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
IPF	Investment Project Financing
L&FS	Life & Fire Safety
LTAS	Long-Term Adaptation Scenarios
MOA	Ministry of Agriculture
MW	Megawatt
NGO	Non-Governmental Organization
NO_X	Nitrogen Oxides
OP	Operational Policies
PCR	Project Compliance Report
PES	Present Ecological State
PPE	Personal Protective Equipment
PRSAP	Poverty Reduction Strategy and Action Plan
PSPF	Public Service Pension Fund
RAP	Resettlement Action plan
RFP	Request for Proposals
RPF	Resettlement Policy Framework
SADC	Southern African Development Community

SDG	Sustainable Development Goals
SEP	Stakeholder Engagement Plan
SISOMA	Siphofaneni-Somntongo-Matsanjeni
SNL	Swazi Nation Land
SO_X	Sulphur oxides
ToR	Terms of Reference
TDS	Total Dissolved Solids
TB	Tuberculosis
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
WHO	World Health Organisation
WWTP	Wastewater Treatment Plant

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Structure of the Report

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EXECUTIVE SUMMARY

This Environmental and Social Impact Assessment (ESIA) has been prepared by Eswatini Water Services Corporation (EWSC) for Nhlangano - Siphambanweni Water Supply and Sanitation Project (NSWSP) Project Components.The proposed project is a USD $45 million Investment Project Financing that will target improved access to water supply and sanitation and increase the resilience of water supply in the Shiselweni region. It will also strengthen sector institutions and policies for drought and disaster risk management, water resources management and water supply. The project will include 4 components, as follows: (1) Water Supply Extension, (2) Improved Sanitation Access, (3) Project Management and Institutional Strengthening, and (4) Contingency Emergency Response. The project will include 4 components, as follows: (1) Resilient Water Access and Management, (2) Improved Sanitation Access, (3) Project Management, and (4) Contingency Emergency Response.

- **Component 1: Resilient Water Access and Management.** This component will provide financing to increase potable water supply coverage in the Shiselweni region, improve long-term management of water resources, investment planning and sustainability of water supply service provision, and build resilience to climate and disaster risks, with a focus on droughts.
    - Sub-component 1.1: Improved Water Access. This sub-component will provide financing to ESWC for the expansion of the water supply transmission and distribution systems that will increase potable water access to an additional 18,478 people in rural areas and small towns from Nhlangano to Siphambanweni and interconnect the Nhlangano and Lavumisa water supply systems, including a transmission pipeline, reservoirs, pumping station and distribution network, as well as the detailed engineering designs and construction supervision activities. This sub-component will also support the EWSC on efficiency improvements, including areas such as energy efficiency, strategic asset management and non-revenue water reduction.
    - Sub-component 1.2: Resilient Water Management. This sub-component will focus on improved long-term management of water resources, investment planning and sustainability of water supply service provision, particularly in rural areas, which will contribute towards increasing these areas' resilience to droughts. DWA will lead the implementation of this component.
    - Sub-component 1.3: Improving Eswatini's Drought Preparedness and Resilience. This sub-component will concentrate on building resilience to climate and disaster risks, with a focus on droughts frequency and intensity. Activities financed under this component include the development and implementation of a drought monitoring and early warning system, as well as the development of a framework that will allow for a comprehensive country-wide assessment of potential climate and disaster risks. NDMA will lead the implementation of this component.

- **Component 2: Improve Sanitation Access.** This component will build on the ongoing work that has been done by the Environmental and Health Department on appropriate technology/sanitation service delivery for rural domestic sanitation to arrive at an open defecation-free corridor in the three tinkhundla (Zombodze, Hosea and Shiselweni I) that will benefit from improved access to water services.

  This component will finance a range of sanitation interventions aimed at reducing the incidence of water-related diseases and improving the quality of life of the beneficiaries in the project area, including: (i) expand access to domestic sanitation services in the project area; (ii) assess and pilot the use of appropriate

technologies for on-site sanitation in informal settlements, health centers and schools; (iii) pilot Baby-WASH (Water Supply, Sanitation and Hygiene) interventions in households with children under 1000 days old; (iv) undertake complementary sanitation communication and behavior campaigns (including menstrual hygiene management), supply chain enhancement and consistent behavior change programs to create sustained behavior change and buy-in to the project outputs; (v) support the establishment of a rural water supply and sanitation information system that will assess the functionality of water supply and sanitation services over time in order to better inform policy formulation, planning and resource allocation for the provision of better quality and more sustainable water supply and sanitation services. This component will also provide support to strengthen institutions, policies, data collection and planning, and long-term sustainability of sanitation services. In addition, the implementation of this component will also contribute to the reduction in the volume of untreated fecal sludge ending up in water bodies, helping reduce water stress by avoiding the pollution of water resources, therefore augmenting the availability of water supply that can be used in situations of water stress. This component will also enhance directly human capital through improved sanitation and hygiene infrastructure and related-behaviors, targeting women and children, the most vulnerable people in society.

- **Component 3: Project Management.** This component will provide project management support including operating costs, the preparation of progress reports, independent audits, as well as support on project financial, procurement, environmental and social management, as needed.

- **Component 4: Contingency Emergency Response (Zero Budget).** This component will support potential disaster recovery needs by providing immediate response to an eligible crisis or emergency, as needed. This may consist of immediate support in assessing the emergency's impact and developing a recovery strategy or the restructuring of existing, or provision of new, Investment Project Financing, and may also include operating costs, supply of critical parts and equipment, minor civil works rehabilitation, supply of fuel, rent of generators, as well as rapid transportation of chemicals and critical parts by express mechanisms.

Project Development Objectives (PDO)

The Project Development Objective is to increase access to improved water supply and sanitation services in targeted areas of Eswatini.

PDO Level Indicators

The PDO level results indicators are as follows:

a. People provided with access to improved water sources (number);
    i. People provided with access to improved water sources - Female
b. People provided with access to improved sanitation services (number);
    i. People provided with access to improved sanitation services - Female
c. People reached through hygiene behaviour awareness campaign.

Purpose of the Environmental and Social Impact Assessment (ESIA)

The improvement of access to potable water will likely be associated with adverse environmental and social risks and impacts. In line with the Eswatini's Environmental Impact Assessment (EIA) laws and regulations, and the World Bank Environmental and Social Framework (ESF), an Environmental and Social Impact (ESIA) assessment is

required to anticipate and identify the adverse environmental and social risks likely to occur and develop cost effective and feasible mitigation measures by applying the mitigation hierarchy.

Project Description

The objective of the proposed project is to improve access to improved water supply and sanitation services in targeted areas in Eswatini and strengthen the regulatory framework for national rural water supply and sanitation service provision.

It entails installation of 61 km of gravity mains and 3 km of pumping mains at various stages; connected to 244 km of laterals supplying homesteads, offices, clinics, schools. The pipeline will be connected to an existing water supply pipeline which services the population from Siphofaneni, Somntongo and Matsanjeni Tinkhundla (SISOMA) project and as such will start at Nhlangano to Siphambanweni. A pump station with a small solar power plant will be constructed to provide the power required for pumping. The project also includes the construction of 24 kiosks. This is a structure where water is sold to people who may not be connected to the water supply. It helps increase the reach of the water supply so that even those segments of society with no house connections can still have affordable potable water distribution point (public standpipe). The main water treatment plant in the area is at Masibini with a production capacity which may be upgraded to 30Ml per day (such production possible based on the above abstraction permit information). To date, the water treatment plant produces only 3.5ML a day to cater for Nhlangano and Mahamba areas. This caters for a population of 16'500 residents with the current number of connections being 3'300. This still leaves the plant with spare capacity of above 6.5ML per day which can then be channeled towards the study area for this project, thus making the station work closer to its available production capacity. The connection will be made from the pipeline that originates from the existing 10 Mega litre Reservoir at 1180m MSL at Maseyisini. There will be three proposed reservoirs, at Mhlosheni, Florence Christian Academy and Hluthi, each with a 3.2 ML capacity.

World Bank Environmental and Social Standards (ESSs)

The Project will apply relevant World Bank Environmental and Social Standards (ESSs) to protect against adverse impacts on the bio-physical and social environments. The following ESSs are relevant to the project:

ESS	Description
ESS 1.	Assessment and Management of Environmental and Social Risks and Impacts
ESS 2.	Labor and Working Conditions
ESS 3.	Resource Efficiency and Pollution Prevention and Management
ESS 4.	Community Health and Safety
ESS 5.	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
ESS 6.	Biodiversity Conservation and Sustainable Management of Living Natural Resources
ESS 8.	Cultural Heritage
ESS 10.	Stakeholder Engagement and Information Disclosure.

Project Activities

The design, construction and operation activities associated with the project are described below to the possible extent known and based on the preliminary survey report. Additional activities will be included during the preparation of the detailed design report.

Preconstruction Phases Activities

a) *Detailed Study Design*: EWSC procured a consulting firm to prepare a detailed design of the proposed project which may vary albeit not significantly from the feasibility study design currently under preparation and will equally update this draft ESIA report to detailed design ESIA.

b) *Acquisition of Right of Way***:** Prior to commencement of construction activities, the contractor will have to possess the Right of Way (ROW), through a site hand over which will be facilitated by EWSC where the pipeline, laterals reservoirs and pumphouses will be constructed.

c) *Obtaining Necessary Permitting Requirements:* A number of environmental and social permitting requirements will be required to be obtained by contractor for this project as per the statutes of the Government of Eswatini before the construction commences.

Construction Phase Activities

Key activities during the construction stage including equipment and construction material is presented to the extent known and is subject to change depending on final methodology that will be adopted by the contractor. Activities during the construction will include among others: -

- Clearing and grubbing
- Excavations
- Installation of main pipeline and associated laterals
- Civil works
- Construction of power station and associated solar power plant
- Construction of kiosks
- Mechanical works

Operational Phase (Distribution laterals and Kiosks)

Once constructed, distribution will be operated year-round, 24 hours daily; supplying potable water to the Nhlangano – Siphambanweni population. EWSC will ensure continuous maintenance timely in conformance with pipeline maintenance processes. All maintenance will include:

- Routine maintenance
- Structure maintenance
- Environmental maintenance
- Emergency works
- Property management

- Pipeline and assets management

Materials and Construction Equipment

The following equipment and materials will be required for use during the construction phase of the transmission and distribution pipeline. The actual quantities and type of machinery and materials will be determined during the preparation of detailed design and will be reflected in the comprehensive ESIA. It is expected that construction materials like cement, concrete, gravel, water, aggregate etc. will be sourced from local suppliers and will not require the need for opening material sites (quarries, borrow pits etc.) to source the same. The following table shows the materials and construction equipment that will be utilised in the proposed project.

Table Material and Equipment

Equipment	**Source**
Trucks	Local and international suppliers
Excavators	Local and international suppliers
Cranes	Local and international suppliers
Cable drum	Local and international suppliers
Reel and tensioner	Local and international suppliers
Materials	**Source**
Cement	Local suppliers
Sand	Local suppliers
Concrete	Local suppliers
Aggregate	Local suppliers

Positive Impacts

Increased Water Supply

The project entails the bulk supply of water in the project area. Presently, a high percentage of the population in the project area drink untreated water from dams, rivers and unprotected wells; some of which are hand dug. Water from these sources is commonly shared with livestock. In addition, borehole water supply is unreliable and at times muddy. The proposed project will ensure reliable supply good quality water.

Employment/Job Creation

Project needs include labour force; therefore, semi and unskilled labour will be sourced locally to provide significant employment opportunities. It is anticipated that the project will provide direct employment during the construction phase and another operational stage (through the operation of the kiosks).

Business Growth

Improved reliability and quality of water supply will stimulate business and entrepreneurial activities leading to increased commercial and residential water demand in the Shiselweni region. Moreover, the construction of the pipeline and distribution laterals and power station including operation of the kiosks will require materials and

equipment which will be sourced locally and internationally and will in-effect boost the local business enterprises through supply of locally available materials and equipment. Water is a significant trigger of economic growth and establishment of small and micro-enterprises by the local communities. Businesses are likely to increase due to the presence of improved water hence spur economic growth.

Security

Presence of clean water will be of beneficial impact to the local communities in terms of general security as a result of water. This is because the responsibility for fetching water, combined with recurring droughts and floods, results in women facing an increased risk of gender-based violence, as they must walk farther distances to water sources. Through improved access of water (i.e., located closer to home, adequate volume of supply, better quality of water and regularity of supply) the project will directly improve the situation of women, elderly and youth in the targeted areas of Eswatini.

Gender Based Violence (GBV)

Access to potable water would go a long way towards alleviating the daily household burdens of women, giving them more time, improving their health and enhancing their livelihoods. The burden to collect water for cooking, and other domestic needs falls primarily on women and children (more than 59% in the project area). water will contribute significantly to their safety and productivity as they will have more time to perform other tasks. The social studies undertaken during the preparation of this report revealed 51% of the beneficiary population take less than 45 minutes to collect water, and 49% spend more than an hour. This shows that the water sources are significantly far away from homesteads. This activity can, and often does, take women away from other, more economically profitable, opportunities such as employment or even farming. Children often must miss school or arrive late to collect water. In some cases, children and women must walk long distances to water sources. Besides opportunity costs, many find themselves in danger along the route to and from water sources. The availability of easily accessible potable

Education and Health Facilities

The educational and health facilities in the project area will be connected to the main pipeline and this will improve the quality of services. Inadequate access to potable water can cause an increase in mortality rates as water as a result of waterborne diseases. Water from the rural water service is less reliable and less trusted, while surface and groundwater are subject to weather-related shortages that, when long-lasting (as in the most recent drought) can result in significant increases in water-borne diseases, in particular, diarrhea, but also cholera. Generally, poor water supply affects health by causing chronic and by limiting productivity and maintenance of personal hygiene. The availability of potable water will cause a significant decline in mortality rates and generally improve the health of the beneficiary population.

Improved Service Delivery

EWSC customers along the Nhlangano Matsanjeni corridor will experience an improvement in quality of water supply service (e.g., distance to water, pressure and daily hours of service). The total population of the three target Tinkundla (Zombodze (14,231), Hosea (14,733) and Shiselweni I (9,269)- total 38,233) will benefit from improved sanitation

services (through either: new infrastructure, supply chain enhancement, behaviour change campaign, sanitation marketing campaign, hygiene campaign, private sector enhancement). Baby WASH interventions will target all households with children under 3 year's old living in the household (assuming approximately 8 percent of households). Additionally, there will be improved service delivery to enterprises and the population across the water sector in general remains one of the positive benefits that will arise from the project. Institutions such as schools, shops and clinics stand to benefit and that will enhance their ability to better deliver their various service to the public.

Increased Food Security

Water scarcity has a huge impact on food production as it is key to food security. Without water, people do not have a means of watering their crops. This is because agriculture requires substantial amounts of water is required for irrigation processes. Currently, most people in the project area (82.3%) drink water from untreated/unsafe water from dams, rivers and unprotected wells; some of which are hand-dug. This water is also shared with livestock including cattle and goats, which presents a health risk as various communicable and zoonotic diseases can be transmitted first from the animals and then spread within the population. Through the provision of potable water to the people located in the project area, water more will be available for crop production and livestock growth. The beneficiary population will be able to water their gardens and provide water to various livestock which are both sources of food.

Improved economic growth

Better access to clean water, sanitation services and water management creates tremendous strategy for economic growth as its availability has a potential for various investments and gains across domestic, industry and irrigation. This project will be a catalyst for local development and economic activity and help reduce extreme poverty and promote shared prosperity. Furthermore, the value of time savings is the largest component of economic benefits as a result of the project as the beneficiaries will no longer have to access water from relatively distance sources.

Adverse Impacts

The potential negative impacts during construction are generally short-term, temporary and reversible which can be reduced or eliminated by known mitigation measures. Many of the impacts will only occur at active construction sites during the construction stage. The key social risks and impacts associated with the project are associated with the construction labour management, loss of assets, private land and restriction to land use, potential impacts on GBV, community health and safety risks during pre-construction and construction phases of the project. The following table presents the summary of negative impacts and proposed mitigation measures.

Adverse Impact	Mitigation Measure
Site Establishment	• In identification of site offices, areas which are already disturbed will be considered as first priority to minimise disturbance of virgin land. • The contractor shall restrict all activities to the designated areas on the construction layout plan. • Establishment will be done in a manner that avoids environmentally sensitive areas like wetlands and streams. • Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses. • All waste generated in the project, including builder's rubble will be disposed in an approved waste disposal facility, in accordance with the Waste Regulations, 2000. • Cleared surfaces will be regularly sprayed with water to minimize dust. Locals will be given first preference in hiring of skills that are available in the community.
Land Acquisition Impacts	• The ESWC/NSWSP shall be responsible for compensating and paying resettlement assistances to all property owners/PAPs at full replacement cost prior to commencement of civil works. • There shall be no gender bias. The Corporation will draw up and implement a Resettlement Action Plan (RAP) to mitigate component 1 related economic and physical displacement impacts. Existing Resettlement Framework Policy (RFP) shall guide the preparation and implementation of the subsequent RAP. • Land affected by component 1 activities will be compensated after consultations and negotiations conducted in good faith by both parties (affected and ESWC) before construction commences according to the current market land values given by the Valuator. • In case of disagreements the issues must be referred to the project GRM. • Consultations will be undertaken especially with all affected PAPs (landowners, and household members on the, business owners, tenants, landlords, vulnerable people and squatters), the consultation will inform PAPs about their rights and choices as well as the valuation processes, negotiations, awards, and dispute resolution processes. • The ESWC/NSWSP and PAPs will agree on compensation and resettlement assistance terms by signing letters of offer and acceptance. • Community Liaison Officers (CLOs) will be designated by the Traditional authorities to facilitate communication with the communities during implementation (See Eswatini's Administration Framework). • The PAPs will be notified of the works which will extend into Swazi Nation Land (SNL) prior to implementation and will further be alerted when construction works extend close to their dwellings, The CLOs are instrumental during construction when project activities begin to affect SNL that has been used up for the construction of homesteads.
Land Use Change	• Construction of the pipeline will be managed such that sections falling on farming areas are completed in the shortest possible time. • PAPs using agricultural land will be engaged, and compensation and resettlement assistances will be paid at full replacement cost for time when production cannot take place. The cooperation will draw up and implement a Resettlement Action Plan (RAP) to mitigate component 1 related displacement impacts.
Increase Invasion by alien weeds into adjoining areas	• Progressive rehabilitation will be done to avoid the establishment of alien invasive species in cleared areas. • Removal of invasive plant species, whenever possible, cultivating native plant species. Once the establishment of an alien invasive species has been detected, the contractor will take steps such as eradication, containment and control, to mitigate the adverse effects.
Depletion of Water Resources	• There will be logical choice of water supply for construction and dust suppression will be from surface water bodies close to the project area. • Indiscriminate harvesting of water resources without a permit will not be done. • The lowest minimum flow rate of Mkhondvo River (which is the worst-case scenario in 5 years) can accommodate the allocated quota of 1,866,240m^3 per year. It therefore leaves enough water for downstream use and aquatic life. The corporation shall ensure that abstracted volume is within the allocated quota.
Water Pollution	• The design of the pipeline will be such that at places where it crosses water bodies it will be suspended (attached to bridges) to avoid pollution.

	• Digging will only done when pipes are ready to be laid, open trenches will be covered within 24hrs to minimise erosion of soil material. • Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses. • Stockpiled material will be kept away from water bodies to prevent sedimentation of water bodies. • The contractor will draw up and implement a chemicals management plans, display signs, control access to chemicals and handle chemicals in accordance with their MSDSs. • Only trained personnel will handle hazardous material, procedures for handling spillages will also be in place. • All topsoil removed during construction will be stockpiled close to the site for rehabilitation purposes. The Contractor will ensure that stockpiles are not will be placed in areas where run-off will be a problem even during the dry season as this will cause water erosion and that they are arranged such that they are not exposed to the wind.
Loss of flora and vegetation cover	• The contractor will zone out working areas to reduce ecological destruction. • Disturbed natural sites will be restored through environmental rehabilitation; restoring topsoils and (re-)introduce genetic species similar to those destroyed in order to re-establish the natural local ecology. • Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses. EWSC will ensure that there will be no indiscriminate site clearances, and that workers will be educated on the Plant Protection Act so as to be able to identify all legally protected ones.
Soil Erosion and Contamination	• Clearing will only be done when equipment and personnel are ready to start work on that area. • Topsoil and subsoil will be stripped and stockpiled for rehabilitation after completion. • Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses. • Vehicles and machinery will be regularly serviced. There will be no servicing done on site. This will ensure that the vehicles do not leak fuel into the soil. However, if there are any spills, the contaminated soil will be scooped and stored in hazardous waste marked bins which will then be treated using bioremediation on site. During construction, care will be taken that substances used in construction that may pollute nearby water bodies are properly stored and residues do not find their way into the river but are properly disposed of.
Waste Management	• The contractor will prepare a waste management plan and provide labelled waste receptacles during the construction period. • Employees will also be taught on the importance of proper waste management during toolbox talks to ensure that they are adequately sensitized about waste management. • The contractor will additionally ensure segregation of all wastes from source. Special waste like tonners, cartridges and florescent tubes will be placed in separate, marked bins and will be stored in containers for environmentally sound disposal in accordance with the Waste Regulations, 2000. Disposing of rubble and other waste will be done appropriately and on a regular basis during the construction phase of the proposed project.
Loss of cultural and archaeological artefacts	In cases where a discovery is made, the ENTC will be notified immediately. The Environmental and Social Assessment will confirm the existence of tangible or intangible cultural heritage at project sites and will include guidance regarding how to manage any negative impacts.
Blasting Impacts	It is not anticipated that there will be blasting in the project, in the event that it is needed, the contactor will draw up and implement a blasting management plan
Pump House Impacts	The contactor will draw up and implement a waste management plan in line with the Waste Regulations of 2000.
Increase in Road Accidents	The contractor will ensure that flaggers and all traffic control signage is put up to control traffic. A traffic study will also be done by the contractor. No work will be done during the peak hours when traffic flows are high. Traffic warning signs will be erected indicating possible construction vehicles driving in and out of site. Drivers and operators of heavy machinery will be properly trained.
Access Impacts	• The contractor will ensure that access roads leading to business/residential are kept open at all times for easier accessibility and that these provide safe and convenient passage. • Where this cannot be avoided, the contractor will ensure that periods of closure are keep minimum.

	• Access roads will be maintained during the construction period. PAPs whose accesses to their properties and means of livelihoods denied or restricted by component 1 activities shall be compensated by EWSC.
Changes in Population Dynamics	• Local people will be prioritized for employment. • Additional staff which is not available in the project area will be outsourced by the contractor. • There will be no camp site established for housing the project team. • The contactor will draw up a recruitment policy that ensures screening of potential employees. This contractor recruitment policy will be required to also ensure that there is equal access to all jobs and also equal payment without the discrimination to gender, religion, ethnicity, and disability, social and political affiliations. • Local Non-governmental Organizations (NGOs) such as Family life association of Swaziland (FLAS), Population Services International (PSI), and Implementing AIDS Prevention and Care (Project) (IMPACT) will be engaged to assist in awareness raising on anti-social behaviors.
Gender Based Violence	• The contractor will enforce legislation and take action against employees found to have committed acts of gender-based violence. • The contactor will draw up recruitment policy that ensures evaluation of potential employees. • Relevant NGOs aforementioned will be engaged to assist in awareness raising on anti-social behaviors. • GBV Action plan shall be prepared
Child Labour	• The contractor will draw up and implement a recruitment policy that is in-line with national and international laws and against child labour. • Zero tolerance policy on human trafficking and child labor shall be implemented
Security Impacts	• Security will be maintained 24hrs a day on site. There will be signs restricting a day on site. • There will be access control and maintenance of entrance register into the site • Security staffs shall be training and sanitized on GBV/SEA
Site Water and Sanitation	• Adequate drinking water and proper sanitation facilities will be provided (for each sex where conditions warrant). • Temporary chemical toilets will be put on site to ensure proper sanitation and avoid pollution of groundwater and surface water resources.
Dust	• Cleared surfaces will be watered to suppress dust, including spraying with water. • The vehicles working on this project will be required to observe a speed limit of 40 km/h to minimise the emission of dust. • The Contractor will ensure that stockpiles are not be placed in areas where run-off will be a problem even during the dry season as this will cause water erosion and that they are arranged such that they are not exposed to the wind. • Areas for storage of stockpiles will be graded to a uniform surface. It shall be free of all vegetation and other debris, and free from stones. • Moreover, the stockpiles will be sprinkled with water regularly, thus abating dust emission. • Topsoil that will be stripped and stored with as little compaction as possible, and only on non-wet days. • All stockpiles will be stored without exceeding 1m height and those which are three months older will be re-seeded. • Furthermore, the contractor will rehabilitate natural slopes to reduce environmental impact and erosion, using the stockpile of overburden material.
Emissions	• All vehicles will be serviced regularly and monitored for emissions
Noise	• Construction activities will be confined to daytime and noise and the noise levels will only affect the nearby areas for a relatively short time. • A buying policy that includes consideration of noise for all new items of plant will be adopted. • It will be ensured that plant and vehicles are properly maintained. • Enclosures will be used for noisy plant such as pumps or generators. • Rubber linings will be used in chutes and dumpers to reduce impact noise.
Increase in HIV/AIDS Prevalence	• An HIV/AIDS awareness campaign will be done for the workers. • The contractor will also ensure the provision of condoms for both male and female employees in the ablution facilities. •
Storm water Management	• A storm water management plan will be drawn up to ensure that rainwater is channelled to existing drainage lines with minimal contamination.
Water Resource Impacts	• The proponent will ensure that abstraction volume do not exceed the allowable limit in the permit granted by the Ministry of Natural Resources and Energy.
Atmosphere and Aesthetics	• Cleared surfaces will be watered to supress dust. • The vehicles working on this project will be required to observe a speed limit of 40 km/h to minimise the emission of dust.

	• There will be regularly spraying of untarred road surfaces • Machinery to be used during project implementation will be properly serviced to ensure that unnecessary noise is not emitted while the machines are at work. • Baffle mounds or noise fences will be used to provide screening since the area is a noise sensitive environment.
Community Health and Safety	• A maintenance plan will be developed and implemented to ensure regular maintenance of water supply infrastructure. This will include proactive testing of pipes and other infrastructure. • The materials chosen for the water supply system will durable with easily obtainable spare parts. • Community will be sensitized if there are anticipated disruption to service and fixing water supply issues. • All leaks will be addressed in the shortest time possible.
Occupational Health and Safety	• There will be regular OHS training of personnel involved in maintenance and operation of the water supply infrastructure • EWSC has an OHS policy and plan, which new employees will be inducted on. • Relevant personnel Protective Equipment will be provided for all employees and employees will be encouraged to use it. • Access to high risk areas will be limited to highly trained personnel. • There will be proper warning signs for areas that are of high risk. • First aid representatives will be part of every maintenance crew and every area/section of work to ensure availability and accessibility. • Firefighting equipment will be put in place and properly serviced. Fire drills will be dome for workers and fire assembly points demarcated.
Increase in Power Usage	• Power conservation measures will be put in place. • Pumping will only be done when it is necessary, and equipment not in use will be switched off. Works will be sensitised of energy conservation
Wastage of Water	• Communities will be trained on water billing, water conservation and management.
Mismanagement of Kiosks	• ESWS will train kiosks operators and monitor their operations to ensure that they do not experience challenges that may lead to closure.
Treatment Plan	• The quantity of solids generated by the water treatment process is minimised through optimizing coagulation processes; • Use of ferric and alum sludge will be balanced to bind phosphorous (e.g., from manure application at livestock operations) without causing aluminum phytotoxicity. • Land application after testing for levels of heavy metals will be done before this is used for land application. • Sludge may require special disposal if the source water contains elevated levels of toxic metals, such as arsenic, radionuclides, etc.; • Regenerate activated carbon will be returned to the supplier. • Residual waste that cannot be recycled will be stored in designated containers and disposed of in Compliance with the Waste Regulations, 2000.
Wastewater Impacts	• Land application of wastes with high dissolved solids concentrations is generally preferred over discharge to surface water subject to an evaluation of potential impact on soil, groundwater, and surface water resulting from such application; • Filter backwash is recycled into the process. • Reject streams, including brine, is treated tested for quality before being returned to the river, in compliance with the Environmental Management Act, 2002 and the Water Act, 2003.
Chemicals management	• Alarm and safety systems, including automatic shutoff valves that are automatically activated when a chlorine release is detected are installed in the Water Treatment plant. • Containment and scrubber systems are in place to capture and neutralize chlorine should a leak occur. • Corrosion-resistant piping, valves, metering equipment, and any other equipment coming in contact with gaseous or liquid chlorine are used, and kept free from contaminants, including oil and grease. • Chlorine is stored away from all sources of organic chemicals, and protect from sunlight, moisture, and high temperatures. • Sodium hypochlorite is stored in cool, dry, and dark conditions for no more than one month, and used with equipment constructed of corrosion-resistant materials; • Calcium hypochlorite will be stored away from any organic materials and protect from moisture; fully empty or re-seal shipping containers to exclude moisture. • Calcium hypochlorite will be stored for up to one year; • The amount of chlorination chemicals stored on site is minimised while maintaining a sufficient inventory to cover intermittent disruptions in supply; • A prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures has been developed and will be implemented. • A plan for responding to accidental releases has been developed and implemented.

	• A material safety Data Sheet (MSDS) is in place to ensure a sound chemicals management approach.
Air Emissions	• Air monitoring will be conducted periodically to assess the air emissions level at the treatment plant. • The employees at the water treatment plant will be provided with appropriate PPE to prevent the inhalation of volatile chemicals.
Water System Leaks and Loss of Pressure	• It will be ensured that construction meets applicable standards and industry practices such as conducting regular inspection and maintenance; implementing a leak detection and repair program (including records of past leaks and unaccounted-for water to identify potential problem areas) and replacing mains with a history of leaks of with a greater potential for leaks because of their location, pressure stresses, and other risk factors.
Solid Waste Impacts	• Waste will be recycled as far as practically possible by identifying and giving waste to licenced recyclers. • All employees will be sensitized on proper waste management. • Special waste like E-waste, old pumps, waste oils will be given to licenced recyclers. • Oil swabs, spent ad expired chemicals and other hazardous waste will be placed in separate, marked bins and will be stored in containers for environmentally sound disposal in accordance with the Waste Regulations, 2000. • Disposing of waste will be done appropriately and on a regular basis in an approved Waste disposal site.
Water Discharges	• The flush water will be discharged into a separate storm sewer system with storm water management measures such as a detention pond, where solids can settle, and residual chlorine consumed before the water is discharged; • Erosion during flushing will be minimised by avoiding discharge areas that are susceptible to erosion and spreading the flow to reduce flow velocities.
Aging infrastructure	• The proponent will counterbalance the impact of aging infrastructure and construction materials by properly managing the integrity of the pipeline and all associate infrastructure. • This will include; the use of durable construction materials and regular maintenance of the pipeline and all its associated infrastructure. • Easily degrading materials will not be sourced for this project.
Excavation damage	• Security personnel will be placed at locations such as the reservoirs and pump house to ensure that none of the infrastructure is damaged. • Communities will also be sensitized on the importance of protecting the pipeline and its laterals for the guaranteed provision of potable water. • All offenders will be punished by the local Police Department.

A separate document, which is the Environmental and Social management Plan (ESMP) has been prepared and acts as an integration document to cover the design, construction, commissioning and operation and maintenance of the each of the project components. It has identified key environmental issues during the impact assessment study across the project and further provides plans for their effective management. It will ensure that all undue or reasonably avoidable adverse impacts of the project are prevented and that the positive benefits are enhanced.

ESMP Implementation

For an effective integration of environmental and social standards into the project implementation, the Contractor will need to adopt the ESMP presented in this ESIA and prepare a comprehensive Construction Environment and Social Management Plan (C-ESMP) that will provide the key reference point for compliance.

RPF and site-specific RAP implementation

A Resettlement Policy Framework has been prepared by the EWSC to guide the preparation of site-specific RAP/ARAP. Surveyors will be provided training to prioritize avoidance and minimization of impact. The social officer in EWSC will have the overall responsible for preparation and implementation of RAP with support of consultants and in close consultation with Chief's Royal council members and Project Affected Persons (PAPs). Activities that will cause physical displacement and/or economic displacement shall not commence prior to completion of

resettlement and compensation payment. Disbursement of compensation and resettlement assistance completion report shall be condition of site handing over to the contractor.

Stakeholder Engagement Plan implementation

EWSC has prepared a Stakeholder Engagement Plan proportional to the nature and scale of the project impacts and risks and will be updating the same from time to time. The community Liaison Officers shall be engaged by the project to liaison with the local stakeholders and project affected community. Main stakeholders have been identified in the SEP and need for their engagement throughout the project cycle has been outlined. The ESIA and RPF further details out the enhanced requirement to engage with the project affected during preparation and implementation of ESIA/ESMP and RAP. The project specific Grievance Mechanism has also been detailed out based on existing EEC procedures and within the legal and cultural framework with no cost to the project affected. The GRM will be further enhanced based on the findings of the comprehensive ESIA and detailed designs.

EWSC Project Implementation Unit

A Project Implementation Unit (PIU) will be established within EWSC with full time qualified environmental and social standards specialists who will provide environmental and social standards support on the implementation of the Project ESMP, RAP and other mitigation plans and to ensure compliance and support corrective action. The Client (EWSC) already has a competent environmental specialist, and Occupational and Health and Safety officers, and one will be assigned to ensure compliance of the project. The social Specialist along with the Community Liaisons Officers (CLOs) to be engaged by EWSC will ensure that project affected participate in the project and their concerns are addressed and impacts are mitigated as per E&S standards. The GoKE shall be responsible for providing funding for covering compensation and resettlement assistance costs. The amount required for financing RAP shall be deposited to a separate escrow account that will be opened and maintained by ESWC.

Project Supervision Engineer

The Project Supervision Engineer will be charged with the responsibilities of supervision, review of site reports, preparation of monthly progress reports, prepare and issue appropriate instructions to the Contractor and monitor ESMP implementation.

Contractor

The Contractor will internalize the ESMP/C-ESMP, prepare monthly progress reports and implement instructions issued by the Supervision Consultant. The Contractor will also undertake ESIA Studies for sites outside the project zone and seek appropriate EEA Licenses. The Contractor, therefore, will engage qualified Environmentalist and Social Experts on full time basis to interpret the C-ESMP and advice on the implementation of the same, as well to the Counterpart Personnel for the Supervision Expert. The full Contractor's Team will comprise of the key staff cadres as specified in the Bidding Document. Contractor shall also have Labor Management Plan (LMP), Code of Conduct (CoC), GBV Action Plan, Stakeholder Engagement Plan (SEP) and GRM as per Labour Management procedures of EWSC.

Eswatini Environment Authority

The Eswatini Environment Authority (EAA) is responsible for ensuring environmental compliance in the country and will undertake surveillance on the project implementation and review compliance performance based on the supervision monitoring reports.

Public Consultations

The consultation process was carried out in accordance with the requirements of the Eswatini Environment Authority (EEA) and the Environmental and Social Standards (ESSs) of the World Bank (ESS10 – Stakeholder Engagement and Information Disclosure in conjunction with ESS1 – Assessment and Management of Environmental and Social Risks and Impacts). Public consultation, disclosure and stakeholder engagement are key requirements of the World Bank because when done effectively, they can improve the environmental and social sustainability of projects and as well as allow these stakeholders to make significant contribution to successful project design and implementation. It assists also in the management of environmental and social impacts. The requirements for stakeholder engagement in projects require that stakeholder consultation and engagement should start as early as possible in the project cycle; continue throughout the life of the project; be free of external manipulation, interference, coercion, or intimidation; where applicable enable meaningful community participation; and be conducted on the basis of timely, relevant, understandable, and accessible information in a culturally appropriate format.

Wide ranges of stakeholders have been engaged and will continue to be engaged in this project; ranging from the Government Line Ministries, the community and other stakeholders. Noteworthy is that these consultations were carried out at both Regional and Constituency Level. At the Regional level, the following groups of people were engaged; constituency leadership (Bucopho, Tindvuna), development partners (World Vision, Red Cross), security forces (Police, Correctional, USDF), the youth (ENYC) and Government (CTA, Education, Commerce, Rural Water, Health). For the Constituency Level, these groups of people were consulted; the youth, water committees, WASH community representatives, social workers (Bagcugcuteli), traditional authorities and community police. The public consultation process began in March 14, 2019 has been so far inclusive and productive. A total of 225 stakeholders have been engaged of which 139 (62%) are male and 86 (38.2%) are female. During the consultation exercises, the following issues were raised and discussed;

- Project Timelines
- Resettlement & Compensation
- Employment
- Movement of Laterals
- Water Abstraction
- ESIA Process
- Socio-economic Issues
- Water Kiosks
- Pipeline Coverage
- Appointment of Contractor
- Existing Water Committees and Schemes

Disclosure of ESIA

The World Bank disclosure policies require that an ESIA report for the projects is made available to project affected groups, local NGOs, and the public at large. Public disclosure of ESIA document is also a requirement of the Eswatini environmental procedures. EWSC in collaboration with the EEA will make available copies of the ESIA in strategic locations and offices of the ministries. Public notice in the media should be used to serve as information source to the public. However, the ESIA will have to be advertised in the local newspaper. After approval by the Bank, the ESIA will be disclosed on its website and also on EWSC's website. The approved version will also be available at the local EEA offices and may be used for reference for future studies.

ESMP Monitoring Plan

The following table summarizes the ESMP monitoring plan for the proposed project.

Project Activity/Aspect	**Parameter**	**Indicator**	**Implementation Route/Plan**	**Institutional Responsibility** **Monitoring Responsibility**	**Frequency**	**Project Phase**	**Monitoring Cost Estimates USD**
Impact of Flora	Visual Inspection	Bare soil Soil Erosion	ESMP	Contractor Project Manager/Supervising Engineer	Monthly	Construction and operation	To be finalized once detailed designs are completed
Air emissions and quality of dust	Dust fallout	Bad Odour Use of PPE Health and Safety Plan in use Record of induction for workers Active dust suppression	ESMP	Contractor Supervising Engineer	Monthly	Construction and operation	To be finalized once detailed designs are completed
Safeguarding community health and safety	Visual Inspection Incident and accident records	Induction training records Safety working procedure Maintenance of complaints log and resolution process; and Evidence of effective Grievance Mechanism Photographs of appropriate fencing; and signage around site perimeter and where identified through risk assessment process.	SEP Project performance Grievance Mechanism	Contractor Supervising Engineer	Daily	Prior to and during Construction and operation	To be finalized once detailed designs are completed
Safeguarding Worker Occupation Health and Safety	Health and safety records Visual inspection Active and passive monitoring	audits of PPE use, maintenance of disciplinary records, etc. Records of inductions, trainings & toolbox talks Good "housekeeping" on site Worker Grievance Records & resolution	OHS Management system	Contractor Supervising Engineer	Daily	Construction and operation	To be finalized once detailed designs are completed
Labor Influx	Verification of records Consultations	Number of community complaints	ESMP/LMP/CoC	Contractor Supervising Engineer	Daily	Construction and operation	To be finalized once detailed

Project Activity/Aspect	Parameter	Indicator	Implementation Route/Plan	Institutional Responsibility Monitoring Responsibility	Frequency	Project Phase	Monitoring Cost Estimates USD
		Frequency of consultations conducted Number of awareness campaigns conducted					designs are completed
Storage of hazardous materials and chemicals	Spillages Visual inspection	MSDS for all store Chemicals Functioning storage containers Chemical usage records	Waste Management Plan	Contractor Supervising Engineer	Monthly Audit Review	Construction	To be finalized once detailed designs are completed
Traffic concerns	Visual inspection	Records of accidents involving project vehicles Banks men shall be used to direct vehicle traffic around construction sites and hazards during working hours (Health and Safety Plan). Plan approved by project manager barriers and signage	Traffic Management Plan	Contractor Supervising Engineer	Daily	Construction and operation	To be finalized once detailed designs are completed
Public Awareness and Community perceptions	Community Consultations	Grievance management records & resolution process Evidence of Occurrence-Event report	Stakeholder Engagement Plan Grievance Mechanism	Contractor Supervising Engineer	Monthly	Construction and operation	To be finalized once detailed designs are completed
Noise	dB(A)	Measure included in design and procurement plans Hearing protection and PPE in use Record of equipment maintenance	ESMP	Contractor Supervising Engineer	Monthly	Construction and operation	To be finalized once detailed designs are completed
Soil Erosion	Visual inspection	Bare soil Soil pillars	ESMP	Contractor Supervising Engineer	Weekly	Construction and operation	To be finalized once detailed designs are completed
Solid waste management	Domestic refuse, metallic scraps,	Documented Approvals for placement of wastes,	Comprehensive waste management plan	Contractor Supervising Engineer	Daily	Construction and operation	To be finalized once detailed designs are completed
Land Acquisition, displacement and restrictions on land use	Consultations Site Visits	Records of compensation completion & completion rate Progress on RAP/LRP implementation Compliance with RPF/RAP and national legislation	RPF RAP/LRP	EWSC	Daily	Prior to and during Construction	To be finalized once detailed designs are completed
Cultural Heritage	Visual inspection	Records of Chance Find Procedures activated	ESMP (Chance Finds Procedures)	Contractor Supervising Engineer	Daily	Prior to and during Construction	To be finalized once detailed designs are completed
Supply Chain	Reporting	Bidding documents and Contracts Supply chain performance on ESS2 compliance	ESMP Bidding documents	Contractor Supervising Engineer	Weekly	Construction and Operation	To be finalized once detailed designs are completed

Project Activity/Aspect	Parameter	Indicator	Implementation Route/Plan	Institutional Responsibility: Monitoring Responsibility	Frequency	Project Phase	Monitoring Cost Estimates USD
GBV/SEA	GBV Action Plan	GRM	GBV/SEA Monitoring Plan	Contractor Supervising Engineer, EWSC	Dialy	Throught the project	
Child Labor and Human Trafficking							

Proposed Implementation budget

The estimated costs prior to getting detailed designs stand as outlined in the following table.

Stage	Estimated Cost
Pump House 1 (Fitted)*	3,000 000.00
Reservoir Automation and Telemetry (x3)	1,500 000.00
Intermediate Storage Reservoirs (3 x 3.2Ml, 1x 1 Ml	33,000 000.00
Pumping and Gravity Mains and accessories 61km**	61,000 000.00
Land Purchases and Servitudes	5,500 000.00
Lateral networks 244km	61,000 000.00
Subtotal	165,000 000.00
Design and Supervision 10%	16,500 000.00
Contingencies 5%	8,250 000.00
Total	189,750 000.00
Total Estimated Cost	**189,750 000.00**

*Pumphouse costs include a building, pumps and accessories, MCC, Automation, SEC connection

**Pumping and Gravity pipeline costs include pipes, bends and valves

- Civil Works include excavation, manholes, anchor blocks, road crossings
- The construction phase project is expected to be completed between 24-36 months.

Solar Power generation Costs

The pumps designed for the pump house require 180kva with an 8 hour pumping operation per day resulting to 6’480kwh/day. Assuming the plant will be able to produce up to 10’000kwh per day, thus results in at plant estimated cost of E8’000’000.00 for capital outlay plus E2’000’000.00 for operational and maintenance costs, the initial capital

and running costs are **E10'000'000.00**. This is compared to the facility charge of E120'000.00 per month, will be recouped in 7 years or less (not considering rate increases each year).

Other Issues to Consider

- Extra funding for laterals through community schemes
- Community involvement in the identification of areas for kiosks to cover those with no finance for personal connections.
- Any land relocations and compensations to be done according to legislation with the Ministry of Agriculture that covers for such incidents (National Resettlement Policy).
- Unskilled labour will be hired locally as much as possible to prevent population influx and to provide a source of livelihood during project implementation.
- Utilising the new Environmental and Social Framework from World Bank in the design and implementation of the project.

Recommendations

The adverse environmental impacts that will result from the execution of the Nhlangano - Siphambanweni Integrated Water Supply Project have been identified and it is recommended that the following aspects be considered by the EWSC prior to implementation:

- The mitigation measures recommended for the proposed project are outlined in the preceding chapters of this report particularly Chapter 9 and are also contained within the Environmental and Social Mitigation Plan (ESMP) compiled for the project. The ESMP is a detailed plan of action prepared to ensure that recommendations for enhancing positive impacts and preventing negative environmental impacts are implemented during the lifecycle of a project. The ESMP should also form part of the contract for the Contractor who will be responsible for the construction of the proposed project.

1 INTRODUCTION

1.1 Context and Background

Eswatini Water Services Corporation (EWSC) is proposing to establish an integrated water supply and sanitation project from Nhlangano to Siphambanwei in the Shiselweni region of Eswatini. The project entails installation of 61 km of gravity mains and 3 km of pumping mains at various stages; connected to 244 km of laterals supplying homesteads, offices, clinics, schools. The project also will consider sanitation options for communities in the project area. A small solar power plant will be constructed to provide the power required for pumping. The project also includes the construction of 24 kiosks. It will also strengthen sector institutions and policies for drought and disaster risk management, water resources management and water supply. The project will include 4 components, as follows: (1) Water Supply Extension, (2) Improved Sanitation Access, (3) Project Management and Institutional Strengthening, and (4) Contingency Emergency Response.

EWSC was established in by the Water Services Act, 1992. The objectives of the Corporation is to abstract, store, transport, purify and collect water, convey, treat and dispose sewage in areas specified in the schedule of the Water Services Act. The Corporation is mandated to:

- Prepare schemes for the development of water resources and for the supply of water and construct, maintain and operate such schemes.
- Keep under constant review the quality, reliability and availability of water supplies.
- Control and regulate the production, treatment, storage, transmission, distribution and use of water for public purposes.
- Design, construct, acquire, operate and maintain water works for the purpose of supplying water for public purposes and
- Inspect and advise on the management, collection, production, transmission, treatment, storage, supply and distribution of water.

1.2 Rationale for the Project

The water supply and sanitation infrastructure in Eswatini is fully developed in the urban areas especially in cities in the Manzini and Hhohho regions. This has left a gap in water supply and sanitation for peri-urban and rural areas. In some cases, there are growth nodes or business areas that have not been declared towns, but have a lot of economic activity. The Shiselweni region is one of the regions where potable water supply has been lagging behind. In 2015, the EWSC embarked on a project, in partnership with the European Union, to supply potable water for the Shiselweni region covering three Tinkhundla centres: Siphofaneni, Somntongo and Matsanjeni (SISOMA project). The water supply was from the Jozini dam, which is shared with the Republic of South Africa. This included a pipeline that runs along the MR 11 from Lavumisa to Siphambanweni. In a bid to increase the capacity to supply water to Nhlangano town, the EWSC constructed a water treatment plant at Masibini, Nhlangano (on the way to Mahamba) in 2015. The production capacity of this treatment plant may be upgraded to 30Ml per day. To date, the water treatment plant produces only 3.5ML a day to cater for Nhlangano and Mahamba areas. This caters for a population of 16’500 residents with the current number of connections being 3’300. The EWSC is now planning to integrate the SISOMA project network (which ends at Siphambanweni) to the Nhlangano Water supply (which is running under capacity).

The interconnection of the Nhlangano and Lavumisa Water Supply systems will provide increased water security to the Shiselweni region, while the institutional strengthening component will contribute to increased overall water security and resilience, as it will provide a framework for early measures that can be taken on the onset of drought in order to mitigate its impact. In Shiselweni the burden of water collection falls predominantly on women, who are three times more likely than men to be responsible for fetching water. It is a woman's responsibility to source water in 66 percent of households without water on site, whereas men are responsible for the task in 21 percent of households. A child under age 15 fetches water in remaining households – young girls are slightly more likely to do so. In addition, in the drought and flood prone region of Shiselweni, fetching water takes longer than in other regions – 30.8 percent of all households spend 30 minutes or more each day on water collection, while the national average is 20 percent.

The project will directly benefit 18,478 people (based on 2017 population data) in domestic households located in the Shiselweni region of the country through improved water access. In addition, improved water services will be provided to 4 health clinics and 32 schools in the three target tinkhundla which is estimated to reach 2,000 people and 5,600 people, respectively. The total beneficiaries for improved water access as a result of the project will be 26, 078. The number of household beneficiaries is estimated to increase to 22,938 by 2047. The population is assumed to be 65 percent rural and 35 percent urban.

1.3 Purpose of the Environmental and Social Impact Assessment (ESIA)

The overall objective of the assignment is to undertake an Environmental and Social Impact Assessment (ESIA) study, develop an associated Environmental and Social Management Plan (ESMP), and prepare a generic Environmental and Social Management Plan (ESMP) for the sanitation component for submission to the Eswatini Environment Authority and the World Bank. The mitigation and management measures proposed should be appropriate to the significance of the identified impacts. The specific objectives are:

(a) To produce a project inception report outlining how the assignment will be carried out
(b) To conduct a public Scoping Meeting and produce a Scoping Report thereof
(c) To undertake an Environmental and Social Impact Assessment (ESIA) focusing on the Water Supply Extension (Component 1);
(d) To prepare a Generic Environmental and Social Management Plan focusing on the Improved Sanitation Access (Component 2);
(e) To prepare an Environmental and Social Management Plan (ESMP) and any other related mitigation or management plans as highlighted in the scope of services or as required by the Environment and Social Commitment Plan (ESCP)

As part of preparation for the Project, and according to the Environmental Audit, Assessment and Review Regulations (2000), Eswatini Water Services Corporation (EWSC) has submitted a project brief underlining an outline of the proposed project institutions to the Eswatini Environment Authority (EEA). In conformance with the

Regulations, EWSC submitted a project brief to Eswatini Environmental Authority (EEA) and the proposed Project was assigned as a Category 3 project by EEA (See Appendix 1)

The purpose of preparing this draft Environmental and Social Assessment for (activities associated with construction and operation of the pipeline, associated laterals, pump house and solar power plant) is to meet the requirements of the ESF directive of the Bank which indicates the need to prepare draft environmental and social assessments before appraisal of the Project. The preliminary assessment is meant to give an understanding of the level of environmental and social risks and impacts and how they will be mitigated.

Concurrent to carrying out this preliminary ESIA, EWSC has prepared and will disclose a Resettlement Policy Framework (RPF), a Stakeholder Engagement Plan (SEP), and a Labour Management Plan (LMP). EWSC has completed procuring the services of a suitably qualified Environmental and Social consulting firm to undertake a comprehensive Environmental and Social Impact Assessment (ESIA) in accordance with the Eswatini Environment Act No. 5 of 2002, the World Bank ESF the World Bank Group General Environmental, Health and Safety (EHS) Guidelines, and the World Bank Group EHS guidelines for Water and Sanitation. The ESIA will be prepared concurrently with the detail design preparation for the Project in order to inform the detailed design.

1.4 Scope of the ESIA

The scope and level of work involved in the preparation of the ESIA shall be proportional to the project's potential environmental and social risks and impacts which is rated moderate under the World Bank ESF and Category 3 under the Eswatini Environmental Management Act, No. 5 of 2002. As the project is being financed by the World Bank (WB), the Environmental and Social Impact Assessment (ESIA), the Environmental and Social Management Plan (ESMP) and the generic Environmental and Social Management Framework (ESMP) for the sanitation component should meet the requirements of both the World Bank and the Eswatini Environment Authority.

1.5 Objective and Need for the Proposed Project

This project is in line with the United Nations Sustainable Development Goal 6 (SDG 6) which is a goal aimed at ensuring availability and sustainable management of water and sanitation for all. It is also indicated, within the same report, that in the year 2017–2018, 157 countries reported average implementation of integrated water resources management of 48 per cent. According to the latest Eswatini household income and expenditure survey (Central Statistics Office, 2016), 41.75% of the population has access to clean water, while 53.68% of the population have access to proper sanitation. The Shiselweni region has the lowest access to improved sources to drinking water and lowest access to proper sanitation. The Nhlangano Siphambanweni project will contribute positively on this indicator. The Environmental Health Growth and Development pillars of the poverty reduction strategy and action plan PRSAP (2006-2022) have realized that there is a need to improve the quality of life access to potable water and sanitation services in some areas of Eswatini.

1.6 Project Development Objectives

The project development objective is to increase access to improved water supply and sanitation services in targeted areas in Eswatini and strengthen the the capcity for rural water supply and sanitation service dilivery at the national level

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1.7 Project Activities

The design, construction and operation activities associated with the project are described below to the possible extent known and based on the preliminary survey report. These activities will be implemented to meet the aforementioned development objectives of the proposed project. Additional activities will be included during the preparation of the detailed design report.

1.7.1 *Preconstruction Phase*

- *Detailed Study Design*: EWSC procured a consulting firm to prepare a detailed design of the proposed project which may vary albeit not significantly from the feasibility study design currently under preparation and will equally update this draft ESIA report to detailed design ESIA.
- *Comprehensive ESIA Report:* This draft ESIA report will be updated to include the specifics as outlined in the detailed design. The ESIA will be submitted to the Eswatini Environment Authority (EAA) for approval as per the regulations of the country and at the same time submitted to the Bank for clearance. This draft ESIA recognizes that there are certain gaps that can only be addressed during the preparation of detailed design report.
- *Obtaining Necessary Permitting Requirements:* A number of environmental and social permitting requirements will be required to be obtained by contractor for this project as per the statutes of the Government of Eswatini before the construction commences. These include among others the Environmental Impact Assessment License issued by the EEA.

1.7.2 *Construction Phase Activities*

Key activities during the construction stage including equipment and construction material is presented to the extent known and is subject to change depending on final methodology that will be adopted by the contractor. Activities during the construction will include among others:

- *Clearing and excavations*: Once the project receives its final permits, construction crews will begin clearing or trimming the transmission route where necessary. This includes clearing trees and brush to provide construction crews and their equipment safe access to the work site. When construction is complete, disturbed areas will be restored. Native shrubs and ground cover are allowed to regrow
- *Installation of main water pipes*: the next step is the installation of the water pipes. The workers will set aside the topsoil carefully (which will be reused). After installation of the pipes, the excavations will be covered. There are no trenches which will be left uncovered for more than 48 hours.
- *Construction of planned laterals and water kiosks:* after the main pipe has been constructed, the associated laterals and kiosks will be constructed to facilitate the distribution of water to institutions and homesteads.

- *Construction of solar power plant:* the solar power plant will also be constructed concurrently with the installation of the pipes. This will include site clearing, excavations and the construction of the power plant. An access road will also be constructed for use during operation to enable vehicles to pass through to the solar plant.
- *Construction of reservoirs:* the reservoir constructions will also run parallel with the construction of the pipeline. Its construction will also involve site clearing, levelling and erection of the reservoir. An access

Table 1: Specification of Pipeline

Pipeline Parameter	Gravity 250mm	Pumping 200mm	Gravity 200mm
Liquid density @ 20deg (kg m-3)	998.2	998.2	998.2
Liquid viscosity @ 20deg (Pa s)	0.001005	0.001005	0.001005
Gravity (m s-2)	9.81	9.81	9.81
Pipe diameter (m)	0.25	0.20	0.20
Pipe length (m)	20’100	2’700	40’100
Pipe roughness (m)	0.0000015	0.000061	0.0000015
Pipe cross-sectional area (m2)	0.049087385	0.031415927	0.031415927

1.7.3 *Operational Phase (Distribution laterals and Kiosks)*

Once constructed, distribution will be operated year-round, 24 hours daily; supplying potable water to the Nhlangano – Siphambanweni population. EWSC will ensure continuous maintenance timely in conformance with pipeline maintenance processes. All maintenance will include: -

- Routine maintenance
- Structure maintenance
- Environmental maintenance
- Emergency works
- Property management
- Pipeline and assets management

1.8 Materials and Construction Equipment

Materials and Construction Equipment

The following equipment and materials will be required for use during the construction phase of the transmission and distribution pipeline. The actual quantities and type of machinery and materials will be determined during the preparation of detailed design and will be reflected in the comprehensive ESIA. It is expected that construction materials like cement, concrete, gravel, water, aggregate etc. will be sourced from local suppliers and will not require the need for opening material sites (quarries, borrow pits etc.) to source the same. The following table shows the materials and construction equipment that will be utilised in the proposed project.

Table 2: Material and Equipment

Equipment	**Source**
Trucks	Local and international suppliers
Excavators	Local and international suppliers

Compactors	Local and international suppliers
TLB	Local and international suppliers
Reel and tensioner	Local and international suppliers
Lorries	Local and international suppliers
Materials	**Source**
Cement	Local suppliers
Sand	Local suppliers
Concrete	Local suppliers
Aggregate	Local suppliers
Water pipes	Local and international supplies
Reinforcement bars	Local supplies
Solar Panels	Local and international suppliers
Pipes of different sizes and materials (steel pipes, SDPE, uPVC and Concrete)	Local and international suppliers
Pumps	Local and international suppliers
Water	Local suppliers
Sand (Plaster and River)	Local suppliers
Cement	Local suppliers
Reinforcements	Local suppliers
Valves	Local and international suppliers
Water meters	Local and international
Blocks	Local suppliers
Crush stone	Local suppliers
Timber (roofing)	Local suppliers
Roof Sheets	Local suppliers

1.9 Description of Proposed Reservoirs

A connection will be made from the pipeline that originates from the existing 10 Mega litre Reservoir at 1180m MSL at Maseyisini. The following are the proposed reservoir positions:

Reservoir B at Mhlosheni at CH 22+800, 1161m MSL with a 3.2ML capacity.

A sump just before Mhlosheni, at CH 22+500 with a 1 ML capacity

Reservoir C at Florence Christian Academy at CH 45+100, 853m MSL with a 3.2ML capacity.

Reservoir D at Hluthi at CH 52+800, 849m MSL with a 3.2 ML capacity.

1.10 Description of Proposed Pump house and Solar Power Supply

There will be 1 pumphouse that will be located next to the 1Ml sump at CH 22+500. The proposed pumps for the pump house require 180kva with an 8-hour pumping operation per day resulting to 6’480kwh/day. The aim is to move towards greener technology hence the solar component will be built in the components of the pump houses to be constructed (Solar panels on roof tops and reservoir tops). The energy capacity will be approximately 300KW since this energy will mostly be used for supplementary needs. Ultimately, the viability of it will be confirmed by the design consultant as it is meant to be an alternative power supply to the booster pump station.

1.11 Description of Proposed Kiosks

There are 24 kiosks that have been proposed for this project. The proposed locations for the kiosks are spread throughout the three areas that form part of the project scope. The purpose of the kiosks is to provide potable water at low rates to individuals who may not be able to afford home installations. The operator of the kiosks is selected by the community through local water committees in the constituencies. The following figure shows proposed locations of the kiosks.

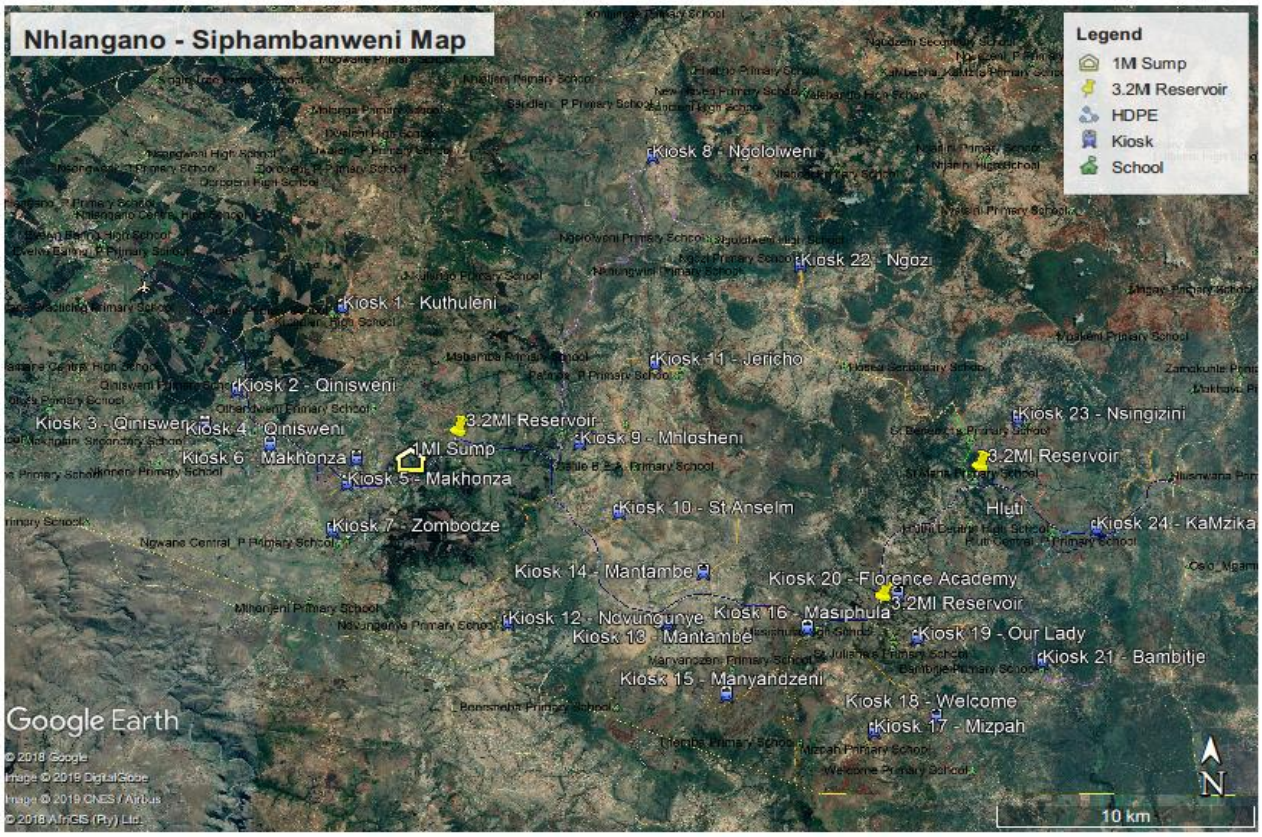


Figure 1:Proposed Distribution of Kiosks

1.12 Key Off-site Investments

Raw water for the project will be sourced from the Mkhondvo River via an existing water abstraction into a Water Treatment Plant (WTP).The main water treatment plant in the area is at Masibini (about 10km from Nhlangano town) with a production capacity which may be upgraded to 30Ml per day (such production possible based on the above abstraction permit information, refer to Appendix 3). To date, the water treatment plant produces only 3.5ML a day to cater for Nhlangano and Mahamba areas. This caters for a population of 16'500 residents with the current number of connections being 3'300. This still leaves the plant with spare capacity of above 6.5ML per day which can then be channelled towards the study area for this project, thus making the station work closer to its available production capacity. The project is an extension of an existing water treatment and supply system at Masibini, Nhlangano. A connection will be made from the pipeline that originates from the existing 10 Mega litre Reservoir at 1180m MSL at Masibini

1.13 Burrow pits and Spoil sites

There are no burrow pits and spoil sites planned for the project. However, if there is a need as the designs are developed further, the contractor will prepare a Contractor Environmental Management Plan (C-EMP).

2 STUDY METHODOLOGY

The report outlines the various methods which were used to engage with stakeholders.

2.1 ESIA Process in Eswatini

According to the Environmental Audit Assessment and Review Regulations (EAARR) of 2000 promulgated under the Environmental Management Act (EMA) of 2002, the construction of the integrated water supply and sanitation project may have a significant detrimental impact on the environment. Thus, an Environmental and Social Impact Assessment (ESIA) must be conducted prior to the issuing of the Environmental Compliance Certificate (ECC) by Eswatini Environment Authority (EEA) for project implementation. Section 32 of the Environmental Management Act, 2002 emphasises that no person shall undertake any project that may have a detrimental effect on the environment without the written approval of the EEA. MTK Sustainable Technologies was appointed by the EWSC in March 2019 to undertake the ESIA process for the proposed project and obtain the Environmental Compliance Certificate (ECC) required prior to the implementation of the project.

The ESIA process includes the development of an Environment and Social Management Plan (ESMP) which provides mitigation and management measures for the pre-Construction, construction and operation phases of the proposed project based on the findings of the Environmental and Social Impact Assessment study. Requirements of the Eswatini Regulatory Framework and World Bank Standards have been adopted for the proposed project. The World Bank sustainability framework articulates the importance of environmental and social sustainability as well as access to information. The ESIA has been prepared in accordance with both the World Bank (WB) Environmental and Social Standard1 (ESS1) and applicable environmental procedures in Eswatini. Accordingly, the ESIA will address the potential environmental and social impacts of the proposed sanitation program to be implemented as part of the project.

Figure 3 illustrates the EIA process in Eswatini.

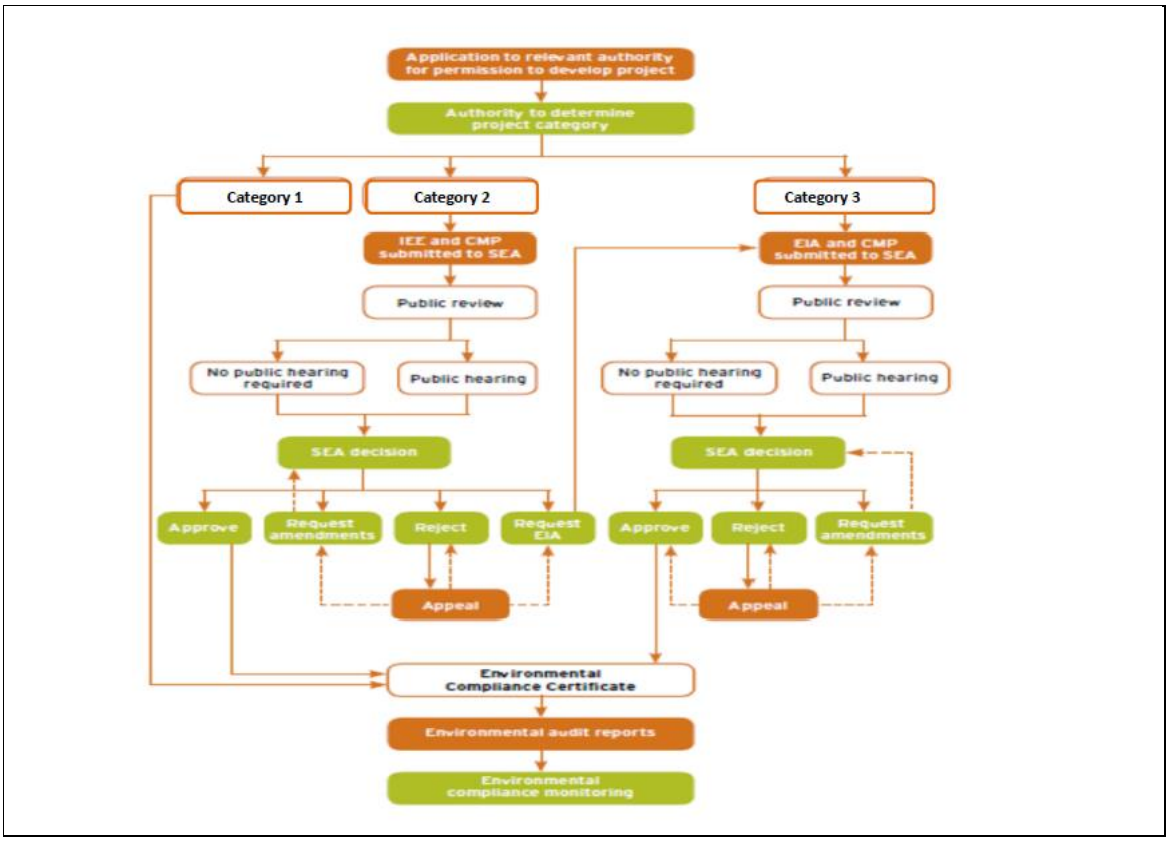


Figure 2

Various surveys are conducted, such as socio-economic surveys. This and social issues have been addressed. According to the flow of the environmental process in Eswatini, the EEA has approved the scoping report submitted. The following step is the submission of the ESIA to the EEA for review.

2.2 Geographical Project Location

The project is located in the Southern part of Eswatini, in the Shiselweni region. The larger project area is found in the area between Nhangano and Siphambaweni, along the MR11, Nhlangano-Lavumisa Road. Figure 2 shows the location of the project area within the country. Figure 3 shows the locality map of the project.

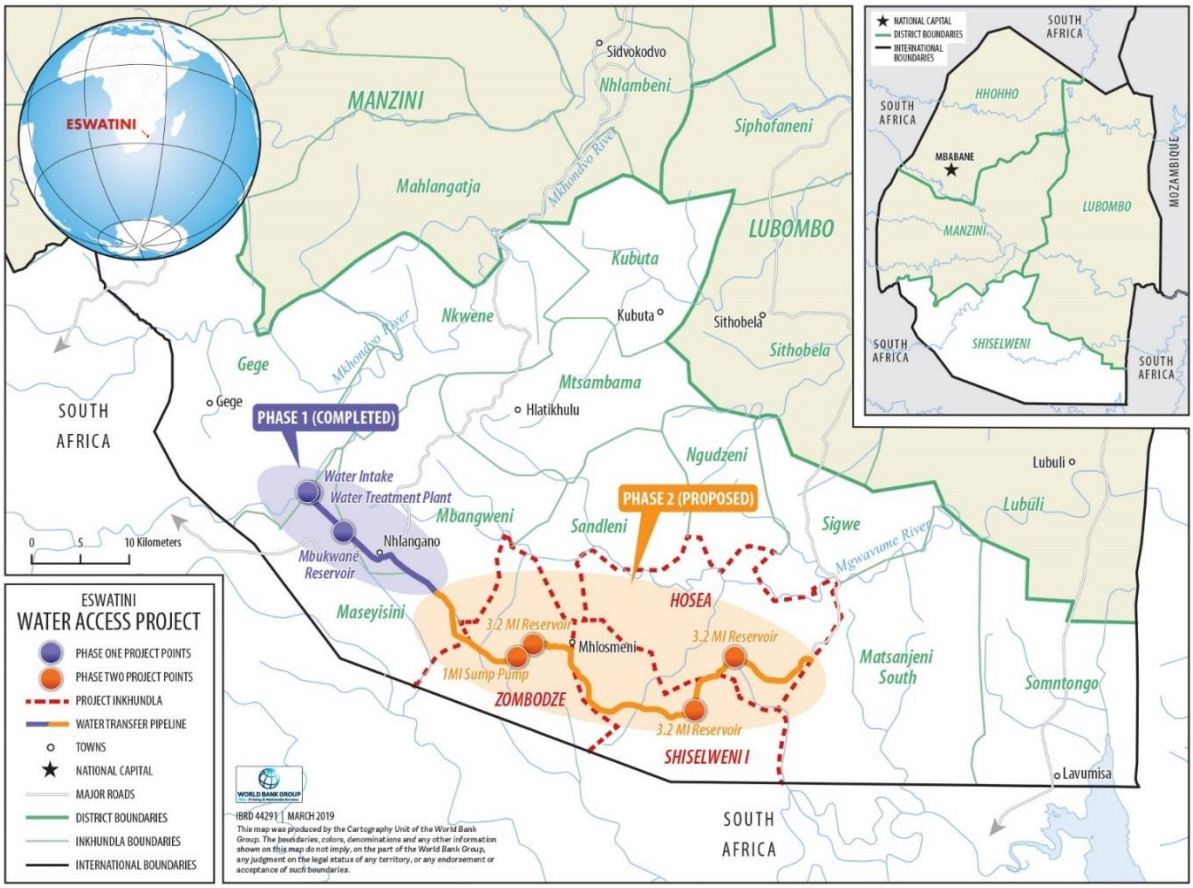


Figure 3: Map of Eswatini showing location of project area and affected Tinkhundla

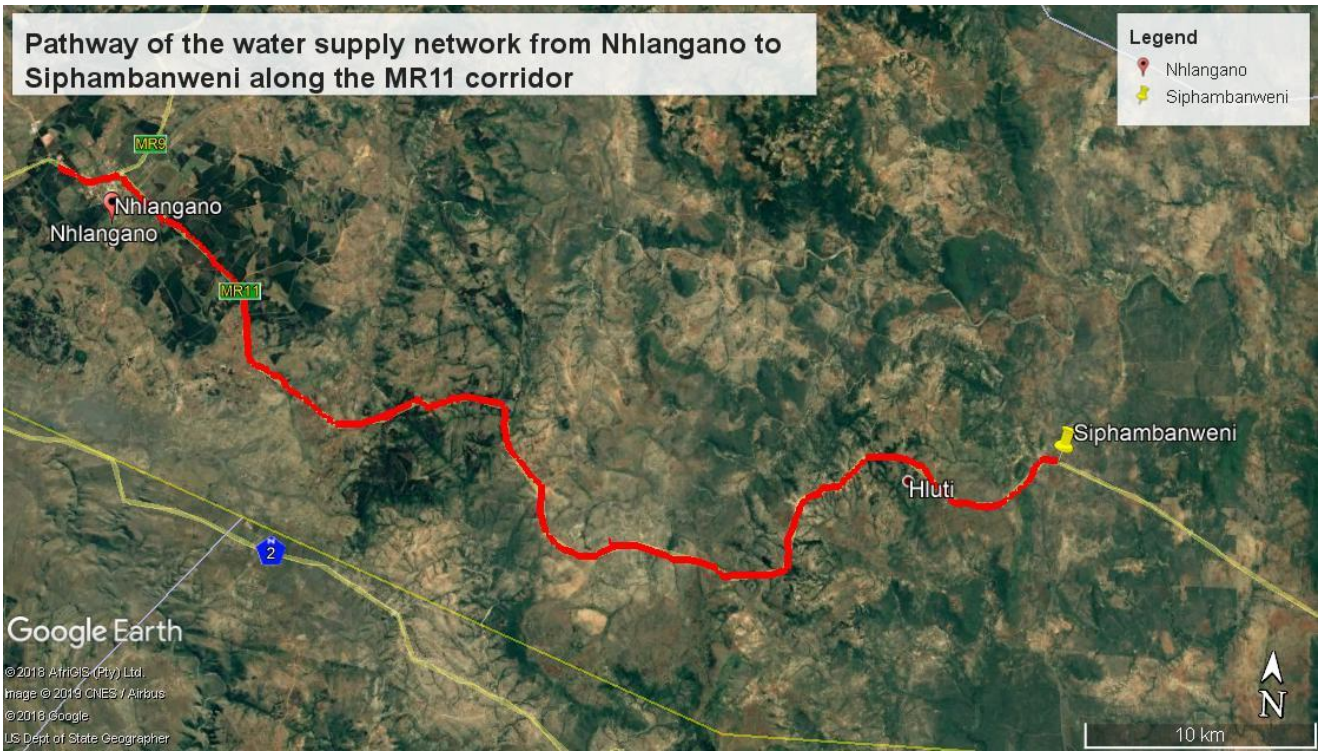


Figure 4: Locality map of the project area

The ESIA was informed by a conceptual report. The final ESIA will be subject to the availability of the final detailed designs. Therefore, this ESIA is a preliminary version which will be updated at a later stage.

2.3 Initial Visit

An initial orientation visit involved a tour of the study area was conducted by the consultants, with Eswatini Water Services Corporation Team to understand the geographic scope and context of the project. This also provided a basic scan of the environment to identify areas potentially or directly affected by the proposed project as well as tentative impact areas requiring further investigation.

2.4 Desktop study

A desktop study was done for the legislative review, as well as other literature on the site and its surroundings. This review also included reports from the Central Statistics Office (CSO). The desk study also included collection of secondary data (weather information, traffic flow data, crime statistics from the Hluthi police station, water quality data from the Department of Water Affairs). Reports and information already collected and compiled by Eswatini Water Services Corporation and the World Bank was also reviewed and used to form part of the report.

2.5 Consultations

During the process of the ESIA, consultations were made with Interested and Affected Parties (IAPs), a majority of these being the residents of the affected communities. When the ESIA process was started, EWSC had already started conducting public meetings. These meetings were held at Zombodze Emuva Inkhundla, Hosea Inkhundla and Shiselweni 1 Inkhundla. The minutes of these meetings were reviewed, and they informed the understanding of the community's view of the project. Issues raised in the meetings were used as part of the scoping phase of the ESIA.

Further consultations will be done with traditional authorities in and around the project area and other stakeholders like government departments and relevant parastatals and NGOs that are active in the project area. Consultations will not be limited to this initial stage of the ESIA process but will be continued with throughout the life cycle of the project.

2.6 Field surveys

The consultant conducted a physical survey of the site and made observations that informed the assessment. Detailed surveys are still to be done as the ESIA process advances.

2.7 Specialist studies

2.7.1 Socio-Economic Impact Study

2.7.1.1 Desktop Study

This involves the review of secondary data from past reports from accredited sources such as the CSO. These reports include the latest household income and expenditure survey and population and housing census.

2.7.1.2 Primary data collection

2.7.1.2.1 Qualitative data

The main approach will be that of ***'appreciative enquiry'*** which helps people recall their situation before implementation of the initiative; their current situation as well as anticipating their future given certain changes which will enhance the positive impacts and mitigate against negative impacts. These groups will include:

- Women
- Youth
- Girls
- Local leaders
- Church leaders
- Vulnerable people

The discussions will focus on:

- Community health and safety in particular reference to access to water and sanitation
- Identifying disadvantaged and vulnerable groups or individuals in the community
- Current land use and possible restrictions resulting from project activities
- Cultural heritage
- Recommendations for labour and working conditions for project
- Sustainable management strategies for water; sanitation and natural resources

- Inclusion

2.7.1.2.2 Key Informant interviews

Additional information will be collected through a series of key informant interviews which will run concurrently with quantitative data collection on social facilities available including catchment areas and numbers accessing facilities where possible. This information will be summarized in a tabulated form covering:

- Traditional Leaders (at Umphakatsi)
- Local government representatives (at Inkhundla)
- Health workers (at Clinic)
- Educationalists (at schools)
- Emergency services (at Police station)
- NGOs active in the area (if any)

2.7.1.3 Quantitative data

2.7.1.3.1 Survey Methodology and Coverage

The affected communities (at chiefdom level) were identified and a list was compiled. A questionnaire has been designed for conducting socio-economic survey of the project area. This questionnaire will be administered by use of face to face interviews of household members, especially the head of the household by field enumerators. The following topics will be covered in the standard questionnaire:

- Demographics (household listing covering, health, employment, parental status and education for children less than 17 years of age and households deaths).
- Household characteristics (housing structure and type, household assets and amenities owned and used by households)
- Water and sanitation (drinking water source, distance to and from the water source, toilets used)
- Food Consumption and Nutrition, which will look into issues of food consumed by households using a seven-day recall, their main source, meals consumed per day by households.
- Inputs to households livelihoods
- Households expenditure

2.7.1.3.2 Data Processing and Analysis

The data from the field will be entered into a computer using a data entry application developed using CSPro software. SPSS will be used for data cleaning, tabulation and analysis. Most tables will use the basic variables namely as, community, sex, and age categories.

This data will culminate in a 'snap-shot' of the affected communities to predict impacts of the project and generate recommended mitigation measures to be put in place.

2.7.2 Ecological Assessment

The main objective of the ecological assessment was to determine the plant, bird and mammal species richness within the project area for the proposed development. It also ensures the identification of any threatened and endemic species with the project area and further identifies potential threats to the vegetation. Overall, the study assesses the extent of ecological impacts and prescribes appropriate mitigation measures to eliminate or limit the negative impacts that have been identified and where possible enhance beneficial impacts.

2.7.3 Aesthetic/ Visual Assessment

The overall aim of Aesthetic/Visual Impact Assessment was to determine the aesthetic impact and current landscape quality (scenic views, visual sensitivity) of the proposed development. Visual observations of the project area was used to determine the physical state of the area. Pictures were also taken so that a record of the area before the start of the project is determined.

2.7.4 *Noise and Air quality*

Noise levels have been measured using a noise meter shown in photoplate 1.

Photoplate 1: Noise meter used

The points used in measuring the noise was mainly where sensitive receptors like schools, clinics and churches are in close proximity.

Secondary data on particulate matter and gases like NOx and SOx is not available for the area. There is also no equipment for measuring these parameters in country.

2.7.5 Water Quality Assessment

The area has a few seasonal streams. Water samples will be collected (where there is water) and sent to the laboratory for analysis. It should be noted, however, that some are inaccessible. The parameters that will be measured will include Total Suspended Solids, nitrates, phosphates, COD, BOD, turbidity, pH, TDS and coliforms. This data will be analysed, and the results compared with Schedule 1 (Water Quality Standards) outlined in the Water Pollution Control Regulations, 2010.

2.8 Institutional and Capacity Assessment

The key success of the development will be the design of an appropriate institutional structure for all stakeholders. This is to boost confidence to all concerned that the methods of communication, delivery of all related activities and identifiable key players' roles and responsibilities will ensure successful implementation of the project.

Key issues that will need to be assessed in the ESIA will include:

- Review of existing organizational structures for the development and make recommendations.
- Identification and recommendation of roles and duties of relevant stakeholders including community participation.
- Identification of recommendations needed for implementation and enforcement of improved standards and better practices.

2.9 Evaluation of Impacts

2.9.1 Methodology of Assessment

This section is the methodology used to assess the significance of the potential environmental and social impacts. For each impact, the **EXTENT** (spatial scale), **MAGNITUDE** (size or degree scale) and **DURATION** (time scale) are described. These criteria are used to ascertain the **SIGNIFICANCE** of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The following tables show the scales used to assess these variables and defines each of the rating categories.

Table 3: Assessment criteria for the evaluation of impacts

Criteria	**Category**	**Description**
Extent or Spatial Influence of Impact	Regional	Beyond a 20 km radius of the site
	Local	Within a 20 km radius of the site
	Site specific	On site or within 100 m of the site
Magnitude of Impact	High	Natural and/ or social functions and/ or processes are *severely* altered
	Medium	Natural and/ or social functions and/ or processes are *notably* altered
	Low	Natural and/ or social functions and/ or processes are *slightly* altered
	Zero	

		Natural and/ or social functions and/ or processes remain *unaltered*
Duration of impact	Construction period Medium Long Term	Up to 7 years Up to 10 years after construction More than 10 years after construction

The **SIGNIFICANCE** of an impact is derived by taking into account the temporal and spatial scales and magnitude. The means of arriving at the different significance ratings is explained in Table 4.

Table 4: *Impact Significance*

Rating	Level of Criteria Required
High	High magnitude with either a regional extent and medium term duration or a local extent and long term duration
Medium	Medium magnitude with any combination of extent and duration except site specific and construction period or regional and long term
Low	Low magnitude with a site specific extent and construction period duration

Once the significance of an impact has been determined, the **PROBABILITY** of this impact occurring would be determined using the rating systems outlined in Table 5. It is important to note that the significance of an impact should always be considered in concert with the probability of that impact occurring.

Table 5: Definition of Probability Ratings

Probability Ratings Criteria	Description
Definite	Estimated greater than 95 % chance of the impact occurring.
Probable	Estimated 5 to 95 % chance of the impact occurring.
Unlikely	Estimated less than 5 % chance of the impact occurring.

3 LEGAL REQUIREMENTS

This chapter identifies the applicable lender requirements and national standards. Where national legal standards are not as stringent as international requirements, the project will be required to defer to the most stringent requirement except in cases where that would contravene national law or where this is found to be unusually onerous. The ESIA for the Nhlangano-Siphambanweni Integrated water supply has been prepared according to the following legislation: The Constitution, Environmental Laws, International Standards, Normative Acts, and Regulations as well as applicable guidelines and procedures. Along with the national regulations, Eswatini is signatory to a number of international conventions, including those related to environmental protection. For the majority of disciplines, where there is a difference between national Eswatini's standards and World Bank ESS, the Bank ESS will prevail.

3.1 Eswatini Legal Framework

The Eswatini Environment Authority (EEA), a parastatal under the Ministry of Tourism and Environmental Affairs, is an institution that has the mandate to ensure that environmental legislation is adhered to. The EWSC is governed by the three enabling legislations namely: Water Services Corporation
Act No.12 of 1992, The Water Act No. 7 of 2003, as well as the Public Enterprises Unit (Control and Monitoring) Act, 1989 (which establishes Eswatini Water Services Corporation as a category a parastatal). There are various other laws that deal with specific sectors of the environment such as water, flora, and land management, enforced by different government departments.

3.1.1 Environmental Management Act, No. 5 of 2002

This is the framework law for environmental management in the country. It outlines the principles that govern environmental Management and Institutional framework for national environmental management. It outlines the tools and processes to be used for environmental management, pollution and waste management mechanisms and public participation. It also outlines provisions for compliance and enforcement of the Act. All projects established in the country need to adhere to the provisions of the Act, as it is a framework environmental law.

3.1.2 Waste Regulations, 2000

They regulate the management of all types of waste in Eswatini. It outlines the functions of the Eswatini Environment Authority and local authorities. It outlines provisions for the storage, collection and disposal of waste in urban areas as well as in waste control areas (in non-urban areas). It outlines requirements for carriage, and general management of waste as well as obligation for different types of wastes. The project will generate solid waste, especially during the construction phase, which should be managed in accordance with these regulations.

3.1.3 Environmental Audit, Assessment and Review Regulations, 2000

It states the processes and criteria for project screening, categorization and public participation for new projects. It spells out the requirement for environmental audits for operations that are cause for concern for the EEA. The process and formats for compilation of environmental audits, Environmental Impact Assessments, Initial

Environmental Evaluation and Comprehensive Mitigation Plan. The process for the preparation of this report, including the structure of the ESIA is guided by these regulations.

3.1.4 Eswatini Environmental Screening Process

The project was classified as Category 3 by Eswatini Environment Authority (EEA) which meant that a full Environmental and Social Impact Assessment (ESIA) process needs to be undertaken and approved by EEA prior to implementation. MTK Sustainable Technologies, was appointed by the EWSC to undertake the EISA process for the proposed project and to obtain the Environmental Compliance Certificate (ECC) required prior to the implementation of the project. The EISA not only considered the project as proposed, but also considered different alternatives, including the “no project” alternative. The assessment concluded that the implementation of the project as proposed and outlined herein is the preferred option.

A key part of ESIA process was stakeholder engagement. These include public meetings, focus group discussions and one-on-one meetings. Findings from the consultations were incorporated into the ESIA report. : Eswatini Environmental Assessment Process

A project brief was prepared and submitted to the EEA and the project was given Category 3 (see Appendix 1), which required EWSC to undertake a full Environmental and Social Impact Assessment (ESIA), before commencement of the project. The main purpose of the ESIA is to determine whether it is environmentally, socially, technically and economically feasible to implement the project. This is done with the objective of identifying potential positive and negative impacts of the project and proposing measures to minimize negative impacts and enhance positive ones. On the basis of this category, the ESIA is to be undertaken in various stages as follows:

Stage 1: Scoping

This is a stage where an environmental scan of potential issues is evaluated though a consultative exercise. This is where the public is informed about the project. The exercise helps to get the public’s comments/concerns and also assist to identify people likely to be affected by the development. The public consultation informs the ESIA process of environmental, social issues and other environmental concerns which may arise over and above those that environmental assessment professionals may predict. It is of paramount importance to obtain contributions from the public or interested parties which will ensure that all impacts that may arise from the project, be they negative or positive, are adequately addressed.

A scoping meeting for this project was held on 4 April 2019 and the scoping report is attached (see Appendix 2).

Stage 2: ESIA/ESMP

The second stage of the process includes conducting surveys and compiling an ESIA report. is a continuation of consultations with the community through questionnaires, interviews etc. It also involves specialist studies like ecological, water quality and social assessments. All the information collected is then used to compile an ESIA report. The ESIA report identifies positive and adverse impacts that the project is likely to have on the environment. An ESMP is then developed to propose measures to enhance positive impacts and minimize or prevent adverse impacts. The ESIA and ESMP reports are submitted to the Eswatini Environment Authority

(EEA) for review. Once the EEA is satisfied that the reports adequately addresses all impacts of the project, the reports are taken for public review.

Stage 3: Public Review

This involves review of the prepared ESIA/ESMP document to ensure that all public comments and environmental After review by the EEA, documents are circulated in strategic places for review by interested and affected (IAPs). This helps to ensure that concerns which were raised during stage 1 are adequately addressed in the ESIA. When the EEA is satisfied that all public concerns about the project have been adequately addressed in the ESIA, an Environmental Compliance Certificate (ECC) is issued.

3.1.5 The ESIA report is a preliminary version prepared based on a desktop conceptual design of the project and will be finalized pending completion of feasibility studies and detailed design (s). Water Pollution Control Regulations, 2010

These regulations control discharges made into water bodies. They outline responsibilities for operators, water authorities and the Eswatini Environment Authority in water pollution control. They provide water quality objectives as well as effluent standards. During the construction and operational phases of the project, wastewater will be generated, whose management should be in accordance with these regulations. In addition, due to the fact that the project is located in close proximity to the Mkhondvo River, these regulations would need to be complied with.

3.1.6 Air Pollution Control Regulations, 2010

These regulations are aimed at controlling emissions into the atmosphere. They outline responsibilities for operators, the meteorology department and the Eswatini Environment Authority in air pollution control. They provide air quality standards for the most common air pollutants. During the construction phase, air pollutants like airborne dust will be generated. The control of adverse impacts from air pollution is by means of these regulations.

3.1.7 Flora Protection Act, No. 10 of 2001

The Flora Protection Act No.10/2001 is an Act that aims to protect indigenous flora and to provide for matters incidental thereto. It prohibits any person from plucking, gathering, cutting, uprooting, injuring, breaking or destroying a plant of any species that is listed in the Schedule to the Act. This Act repealed the Flora Protection Act of 1952. Any flora species found on site should be managed in compliance with this act.

3.1.8 Factories, Machinery and Construction Works Act, 1972

Safety and health of workers. Especially noise limit of 65dBA and dust limit of 150µg/m^3. During the construction phase workers will be exposed to a number of safety and health risks. In the process of ensuring workers safety, this act needs to be adhered to.

3.1.9 The Water Act, No. 7 of 2003

This Act seeks to harmonize the management of water resources in the country. Its provisions include the establishment of a National Water Authority and of a Water Resources Master Plan. This plan will contain an inventory of the total water resources of Eswatini, and a comprehensive programme of action in which the maximum value can be obtained from this resource for the benefit of the people of Eswatini. The project, by its

nature is a water dependent project. As such, issues of water availability and water allocation will be very important, especially during the operational phase of phase of the project.

3.1.10 The Eswatini Administration Order No. 6/1998

This is an Order-in Council to provide for the administration of Eswatini Affairs. Section 25 of the Order provides for the iNgwenyama to issue, inter alia orders regulating the following - as long as they do not conflict with any other law in force in Eswatini-: preventing the pollution of any water resources, and the obstruction of any water course; prohibiting, restricting or regulating the cutting of trees; controlling the sale, supply, use, possession or cultivation of noxious plants; regulate the burning of grass or bush; preventing soil erosion and for the protection and construction of anti-soil erosion works; and providing for the protection and preservation of game and the destruction of vermin. During the construction and operational phase of the project, there is a potential for soil erosion and pollution of water resources, which makes this administrative order relevant to the project.

3.1.11 The Kingdom of Eswatini Constitution Act No.1/2005

This is the supreme law in Eswatini. Section 210 (2) provides that the state shall protect and make rational use of its land, mineral, water resources as well as its fauna and flora, and shall take appropriate measures to conserve and improve the environment for the present and future generations. The constitution is binding on all Eswatini citizens including implementation of projects in the country as it is the supreme law of the country.

3.1.12 The Eswatini National Trust Commission Act No.9 / 1972.

It established the Eswatini National Trust Commission (ENTC) is a body corporate established by the ENTC Act of 1972. The ENTC's key objectives are both to preserve the cultural heritage and to conserve the natural heritage of the Kingdom of Eswatini. It emphasizes the irreplaceable value of the national heritage. The Commission is charged with the general supervision and control of the Eswatini Centre and other declared institutions, national parks, nature reserves, monuments, relics and antiques. If during project implementation, items of cultural significance are discovered, the Eswatini National Trust Commission needs to be involved.

3.1.13 Occupational Health and Safety Act, 2001

Outlines the responsibilities of employer, employee and the government in occupational health and safety issues. It establishes a tripartite advisory committee to advise the ministry of Labour on these issues. Occupational health and safety is not the sole responsibility of the employer. The employees through the health and safety committee should also contribute toward application of the occupational health and safety standards. Having site workers during the construction phase means that all precautions outlined in the act for the protection of their health and safety needs to be adhered to.

3.1.14 Public Health Act, 1969

This Act makes provisions for public health and for incidental or connected matters. It lists communicable diseases and outlines procedures for their management. During the implementation of this project, there may be incidences of communicable diseases, including some waterborne diseases. The procedures outlined in this act may then be used.

3.1.15 The Water Services Act, 1992

This Act established the Eswatini Water Services Corporation as the sole provider of water services in the urban areas (water supply, and sewage treatment and disposal) and to control the abstraction of raw water from boreholes in those areas for which it is responsible. The project is being developed and implemented by the Eswatini Water Services Corporation, whose mandate is outlined in this Act.

3.1.16 Construction Industry Council Act, 2013

Regulates the construction industry in Eswatini. It requires all companies in this industry that are operating in the country to register with the Construction Industry Council. EWSC will be required to use contractors and other service providers that are registered with the council.

3.1.17 Standard Building Act and Regulations of 1969

This legislation provides for the promotion of uniformity in the law, and building standards relating to the erection of buildings, water supply and connection, drainage and sewer etc. in the areas of jurisdiction of local authorities. The local authority shall issue the necessary permits and authorisations for any excavation or building work to be conducted in any area under its control. Relevant regulations are those pertaining to building lines – to allow for services, zoning of areas, siting of areas, access etc. The project involves the development of water supply infrastructure, and therefore its activities will have to comply with this act and its regulations.

3.1.18 Human Settlements Authority Act of 1988

The act established the Human Settlements Authority and its objects and functions. It provides policy support to Government and the orderly development of human settlements by allowing for and outlining procedures for the establishment of Human Settlements. It also makes provision for the development of human settlement development plans, the revocation or modification of development plans and finance mechanisms for the supply and maintenance of improved shelter and infrastructure.

3.1.19 The Forests Preservation Act no 28 of 1910

This Act protects indigenous timber land. The Minister of Agriculture has to grant permission for clearing and cultivating any government or Swazi National Land within 30 yards of an area in which indigenous vegetation is growing. Thus any person who recklessly sets fire to any indigenous or brushwood is deemed to be guilty of an offence. The Act is relevant in view of the fact that the project activities may involve clearing of vegetation during construction and also during operation through maintenance of the wayleaves.

3.1.20 Acquisition of Property Act, 1961

This Act provides the authorization and procedures for compulsory real property acquisition for public purposes and provides for settlement of compensation through the establishment of a Board of Assessment. The Act states that structures affected by acquisition identified by the Ministry of Housing and Urban Development (MHUD). After identification of the properties, an independent valuation is sought then based upon the outcome, residents in affected areas are invited to negotiate with the GoKE on an individual basis. Once agreement is reached the residents are compensated prior to relocation. In cases where the resident cannot reach agreement with the offered compensation, the Minister of Housing requests convening of the Board of Assessment which is

constituted by the Chief Justice who appoints a judge to be the chair of the Board. Once established, the Minister gazettes the announcement on the Board of Assessment by legal notice. The decision on compensation by the Board of Assessment will be legally binding for the Ministry and the resident.

3.2 Land Administration in Eswatini

There are different land tenure systems in Eswatini. The project cuts across two land tenure systems. These are Title Deed Land (TDL) and Swazi Nation Land (SNL). These land tenure systems affect the engagement approach used to have access to the required land.

Swazi Nation Land (SNL) is held in trust by the King for the Swazi Nation and is governed, managed and allocated by Chiefs on behalf of the King. The most important political unit in the project area is the Chiefdom which constitutes the traditional authority structure. In rural Eswatini the chiefdom is the highest authority on Swazi Nation Land (SNL). Ultimately the chiefs are answerable only to the king with regards to chiefdom they govern. The chief has an *Indvuna* or headman and a *Bandlancane* or inner council to work with. These structures make up the Traditional Authority. The traditional authority allocates land and settles disputes. The chief works bandlancane to allocates land to Swazi nationals through Kukhonta (asking for land in a traditional way). When permission is given for the use of land, a cow is paid to the chief. In cases where the chief and/or his council are active, they also direct development activities within the community. For this reason, the traditional authority is very important in establishing the legitimacy of a project, its acceptance in the community and its sustainability.

For TDL, an individual owns the land. Engagements for access to TDL therefore involves compensation payments mutually agreed upon with the respective landowners regarding loss of land. In SNL, compensation engagements are only limited to loss of productivity benefits accrued from the use of the land.

3.3 Relevant National Policies

3.3.1 Gender equity

Since 2000, a series of significant legislation relating to gender equity in Eswatini has come into being including the new constitution. The situation may be summarized as follows:

- Under the UDP a 99-Year Lease was introduced which provided equal access to land regardless of gender;
- The Constitution of the Kingdom of Eswatini (2005), as well as protecting fundamental rights of all citizens (Section 14), specifically enshrines the rights of women (Section 28) to equal treatment, political, economic and social opportunities and commits the Government to enhancing their welfare, and provides for equal access to land irrespective of gender (Section 211). Furthermore, according to Section 28 (3) women may not be compelled to undergo or uphold any custom “to which she is in conscience opposed.
- The Gender Unit in the Ministry of Home Affairs has identified Constitutionalism and Law Reform as a priority and they have drafted a Program of Action with the assistance of UNDP. Currently the Constitution has two provisions explicitly stating the protection from gender discrimination and inequality before the law based on gender. Sections 14 and 28 enshrine gender equality reforms and redress previous legislation such as the Marriage Act of 1964, the Deeds Registry Act of 1938 and the Intestate Succession Act of 1953 and other inheritance laws.

3.3.2 Poverty Reduction Strategy and action Plan, 2006

To the incidence of absolute poverty from 69% in 2001 to 30% in 2015 and to totally eradicate it by 2022.

- Creation of an environment that will empower the poor to participate actively in development initiatives.
- Empowering the poor to generate income and reduce inequalities.

- Fair distribution of benefits through the fiscal policy.
- Human capital development.
- Improving governance and strengthening of institutions

The availability of more potable water will impact positively on the livelihood of the Eswatini population.

3.3.3 Draft National Climate Change Strategy and Action Plan, 2014

To enhance the adaptive capacity of Eswatini to climate change in order to achieve sustainable development and contribute to the better quality of life for the Eswatini nation. Since this is a water supply related project, it will be affected by weather patterns.

3.3.4 National Water Policy (draft) 2011

To achieve sustainable development and management of water resources in the country through integrated planning. The integrated water supply project will involve the abstraction of water activities of which are addressed by the policy.

3.3.5 Fresh Water Fisheries and Aquaculture Policy in Eswatini, 2011

To ensure sustainable and regulated access to fish resources in order to achieve an equitable balance between socio economic needs and ecosystems health. The project may affect fish species in the Mkhondvo River and some tributaries.

3.3.6 National Development Strategy, 1997

By the year 2022, the Kingdom of Eswatini will be in the top 10% of the medium human development group of countries founded on sustainable economic development, social justice and political stability.

- Economic development for the country.
- Reduce poverty levels in the country by empowering the poor to generate income and reduce inequalities.
- Harmonization of programmes undertaken in the country in order to achieve first world status.

This project contributes to the economic development of the country because it addresses water supply Eswatini.

3.4 International Laws

Eswatini is a signatory to the Convention on Biological Diversity and is thereby obligated to develop a national strategy for the conservation of biodiversity. Several other international conventions (UN Convention, Helsinki Rules of the International Law Association and revised SADC Protocols) specify criteria for equitable and reasonable utilisation of Trans boundary Rivers, such as:

- Natural factors as (hydrology, climate etc.)
- Social and economic needs
- Population dependent on watercourse
- Effects on uses in other watercourse states
- Existing and potential uses

- Conservation, protection, development and economy of use and the costs of measures
- Availability of alternatives of comparable value.

The key International/regional legislation relevant to the project is the SADC Shared Watercourse Systems Protocol (an Intergovernmental Water Agreement). The main thrust of the protocol, which is a legally binding document, is to ensure efficient conservation of the scarce resources and equitable sharing of water. The Mkhondvo River, which passes through the project area is a shared river basin between South Africa, Eswatini and Mozambique, therefore the project requires compliance with the Interim Inco Maputo Agreement (2002).

3.4.1 UN (Rio) Convention on Biological Diversity

Eswatini is a signatory to this convention since 5 June 1992 and ratified the convention on 26 July 1994. The Convention has three main objectives which are the conservation of biological diversity, the sustainable use of the components of biological diversity and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. Since the project will involve vegetation removal for construction purposes, compliance to this Convention is important.

3.4.2 Convention on International Trade Against Endangered Species (CITES)

The Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

3.4.3 The Ramsar Convention for the conservation and sustainable utilization of wetlands

The Ramsar Convention (formally known as the Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilization of wetlands, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. This was an Intergovernmental negotiation for an international agreement to phase out ozone depleting substances concluded in March 1985 which saw the adoption of the Vienna Convention for the Protection of the Ozone Layer. This Convention encourages intergovernmental cooperation on research, systematic observation of the ozone layer, monitoring of CFC production, and the exchange of information.

3.4.4 Kyoto Protocol

The Kyoto protocol was signed by Eswatini in 2005. The convention pertains to the United Nations framework on Climate Change. The 3rd Conference of the Parties (CoP3) to the Framework Convention on Climate Change (FCCC) in Kyoto in December 1997 introduced the Clean Development Mechanism (CDM) as a new concept for voluntary greenhouse-gas emission reduction agreements between industrialized and developing countries on the project level. The project will involve the use of power for pumping. The source of this power has an impact on the emission of greenhouse gases which contribute to climate change.

3.4.5 The 1992 United Nations Framework Convention on Climate Change (UNFCCC)

The primary purpose of the convention is to establish methods to minimize global warming and in particular the emission of the greenhouse gases. The UNFCCC was adopted on 9th May 1992 and came into force on 21st March 1994. The Convention has been ratified by 189 states. Eswatini ratified the Convention on 30th

August1994. EEA is the focal point for the Convention. The project will involve the use of power for pumping. The source of this power has an impact on the emission of greenhouse gases which contribute to climate change.

3.4.6 Convention on the Rights of the Child

The Convention on the Rights of the Child (CRC), 1989 is the most comprehensive compilation of international legal standards for the protection of the human rights of children. The CRC is also the most widely ratified international human rights treaty, ratified by all countries in the world, with the exception of one (the United States). The Convention acknowledges children as individuals with rights and responsibilities according to their age and development (rather than the property of their parents or as victims), as well as members of a family and community. Underlying the Convention are four main principles: non-discrimination, the best interests of the child, the right to life, survival and development and the right to participation. The recruitment of labour in this project should comply with this Convention by prohibiting the employment of children.

3.4.7 International Labour Organization

The International Labour Organization (ILO) is built on the constitutional principle that universal and lasting peace can be established only if it is based upon social justice. The ILO has generated such hallmarks of industrial society as the eight-hour working day, maternity protection, child-labour laws, and a range of policies which promote workplace safety and peaceful industrial relations.

The key ILO Conventions applicable to the proposed project include:

- To promote and realize standards, and fundamental principles and rights at work.
- To create greater opportunities for women and men to secure decent employment.
- To enhance the coverage and effectiveness of social protection for all.
- To strengthen tripartism and social dialogue.

The key ILO Conventions applicable to the proposed water project include:

- Equal Remuneration Convention (1951) (No. 100) - Calls for equal pay and benefits for men and women for work of equal value.
- Discrimination (Employment and Occupation) Convention (1958) (No. 111) - Calls for a national policy to eliminate discrimination in access to employment, training, and working conditions, on grounds of race, colour, sex, religion, political opinion, national extraction or social origin, and to promote equality of opportunity and treatment.
- Minimum Age Convention (1973) (No. 138) - Aims at the abolition of child labour, stipulating that the minimum age for admission to employment shall not be less than the age of completion of compulsory schooling.

Worst Forms of Child Labour Convention (1999) (No. 182) - Calls for immediate and effective measures to secure the prohibition and elimination of the worst forms of child labour which include slavery and similar practices, forced recruitment for use in armed conflict, use in prostitution and pornography, any illicit activity, as well as work which is likely to harm the health, safety, and morals of children.

3.4.8 Convention on the Elimination of all forms of Discrimination against Women

The Convention on the Elimination of all forms of Discrimination against Women (CEDAW) places explicit obligations on states to protect women and girls from sexual exploitation and abuse. Universal Declaration of Human Rights (Article 7), the UN Charter (Articles 1, 13, 55, and 76) and the International Covenant on Civil and Political Rights (Article 24) reaffirm the freedoms and rights of all children, including internally displaced children. The project has to ensure that women and girls are protected from all forms of abuse, sexual exploitation and discrimination.

3.5 World Bank Environmental and Social Framework

The Environmental and Social Standards (ESSs) set out the requirements for the GoKE/ESWC (Borrowers) relating to the identification and assessment of environmental and social risks and impacts associated with Siphambanweni Water and Sanitation Project (NSWSP) to be supported by the Bank through Investment Project Financing (IPF).

The Environmental and Social Standards (ESSs) that the GoKE/ESWC and the NSWSP shall comply include the following: -

- **ESS 1**. Assessment and Management of Environmental and Social Risks and Impacts
- **ESS 2**. Labor and Working Conditions
- **ESS 3**. Resource Efficiency and Pollution Prevention and Management
- **ESS 4**. Community Health and Safety
- **ESS 5**. Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
- **ESS 6**. Biodiversity Conservation and Sustainable Management of Living Natural Resources
- **ESS 8**. Cultural Heritage
- **ESS 10**.Stakeholder Engagement and Information Disclosure.

ESS7 is not relevant to the Project currently as there are no identified vulnerable or marginalized groups with identities and aspirations that are distinct from mainstream groups as defined under ESS7.

ESS9 is not relevant to the project as the project will not use financial intermediaries as an instrument for channeling funds to the beneficiary communities in the project area of influence.

In line with ESS1, EWSC will prepare an ESIA and ESMP for the proposed project. In line with ESS2 and 4, EWSC will prepare Labour Management Plan (LMP) and Community Health and Safety Management Plan (CHSMP). Also, to fulfill the requirements of ESS 5, EWSC will prepare a Resettlement Policy Framework to guide preparation of RAPs at design stage and a Stakeholder Engagement Plan (SEP) is prepared to fulfill the requirements of ESS 10.

3.6 Environment, Health and Safety Guidelines

The World Bank Group Environment, Health and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). They define acceptable pollution prevention and abatement measures and emission levels in World Bank financed projects. The Project will apply the General Guidelines, including (i) Environmental, (ii) Occupational Health and Safety, (iii) Community Health and Safety, and (iv) Construction and Decommissioning, as well as the Guidelines for Water and Sanitation.

3.6.1 The General EHS Guidelines

Environmental

- Air Emissions and Ambient Air Quality
- Energy Conservation
- Wastewater and Ambient Water Quality
- Water Conservation
- Hazardous Materials Management
- Waste Management
- Noise
- Contaminated Land

Occupational Health and Safety

- General Facility Design and Operation
- Communication and Training
- Physical Hazards
- Chemical Hazards
- Biological Hazards
- Radiological Hazards
- Personal Protective Equipment (PPE)
- Special Hazard Environments
- Monitoring

Community Health and Safety

- Water Quality and Availability
- Structural Safety of Project Infrastructure
- Life and Fire Safety (L&FS)
- Traffic Safety
- Transport of Hazardous Materials
- Disease Prevention
- Emergency Preparedness and Response

Construction and Decommissioning

- Environment
- Occupational Health and Safety
- Community Health and Safety

3.7 Description of World Bank Environmental and Social Standards

The Siphambanweni Water and Sanitation Project (NSWSP) to be supported by the Bank through Investment Project Financing are required to meet the following Environmental and Social Standards:

Table 6: WB ESSs

Standard	Objective	Applicability
ESS1 Assessment and Management of Environmental and Social Risks and Impacts	To identify, evaluate and manage the environment and social risks and impacts of the project in a manner consistent with the ESSs. To adopt a mitigation hierarchy approach to: (a) Anticipate and avoid risks and impacts; (b) Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels; (c) Once risks and impacts have been minimized or reduced, mitigate; and (d) Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible . To adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities resulting from the project. To utilize national environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate and also promote improved environmental and social performance, in ways which recognize and enhance Borrower capacity.	ESS1 applies to all projects supported by the Bank through Investment Project Financing and is therefore applicable in this project.
ESS2 Labor and Working Conditions	To promote safety and health at work. To promote the fair treatment, non-discrimination and equal opportunity of project workers. To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate. To prevent the use of all forms of forced labor and child labor. To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law. To provide project workers with accessible means to raise workplace concerns.	Its applicability depends on the type of employment relationship between the Borrower and the project worker and it is established during the environmental and social assessment described in ESS1.For the implementation of this project, labour (ranging from unskilled to skilled) will be required.

Standard	Objective	Applicability
ESS3 Resource Efficiency and Pollution Prevention and Management	To promote the sustainable use of resources, including energy, water and raw materials. To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. To avoid or minimize project-related emissions of short and long-lived climate pollutants. To avoid or minimize generation of hazardous and non-hazardous waste. To minimize and manage the risks and impacts associated with pesticide use.	The applicability of this ESS is established during the environmental and social assessment described in ESS1. EWSC will be required to consider ambient conditions and apply technically and financially feasible resource efficiency and pollution prevention.
ESS4 Community Health and Safety	To anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and non-routine circumstances. To promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure, including dams. • To avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials. To have in place effective measures to address emergency events. To ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.	The applicability of this ESS is established during the environmental and social assessment described in ESS1. This ESS addresses potential risks and impacts on communities that may be affected by project activities. Occupational health and safety (OHS) requirements for project workers are set out in ESS2, and measures to avoid or minimize impacts on human health and the environment due to existing or potential pollution are set out in ESS3.
ESS5 : Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	To avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring project design alternatives. To avoid forced eviction. To mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use by: (a) providing timely compensation for loss of assets at replacement cost and (b) assisting displaced persons in their efforts to improve, or at least restore, their livelihoods and living standards, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher. To improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure. To conceive and execute resettlement activities as sustainable development programs, providing sufficient investment resources to enable displaced persons to benefit directly from the project, as the nature of the project may warrant. To ensure that resettlement activities are planned and implemented with	This ESS applies to permanent or temporary physical and economic displacement resulting from the following types of land acquisition or restrictions on land use undertaken or imposed in connection with project implementation: (a) Land rights or land use rights acquired or restricted through expropriation or other compulsory procedures in accordance with national law; (b) Land rights or land use rights acquired or restricted through negotiated settlements with property owners or those with legal rights to the land, if failure to reach settlement would have resulted in expropriation or other compulsory procedures; (c) Restrictions on land use and access to natural resources that cause a community or groups within a community to lose access to resource usage where they have traditional or customary tenure, or recognizable usage rights . This may include situations where legally designated protected areas, forests, biodiversity areas or buffer zones are established in connection with the project; (d) Relocation of people without formal, traditional, or recognizable usage rights, who are occupying or utilizing land prior to a project specific cut-off date; (e) Displacement of people as a result of

Standard	Objective	Applicability
	appropriate disclosure of information, meaningful consultation, and the informed participation of those affected.	project impacts that render their land unusable or inaccessible; (f) Restriction on access to land or use of other resources including communal property and natural resources such as marine and aquatic resources, timber and non-timber forest products, fresh water, medicinal plants, hunting and gathering grounds and grazing and cropping areas; (g) Land rights or claims to land or resources relinquished by individuals or communities without full payment of compensation; and (h) Land acquisition or land use restrictions occurring prior to the project, but which were undertaken or initiated in anticipation of, or in preparation for, the project. This ESS does not apply to impacts on incomes or livelihoods that are not a direct result of land acquisition or land use restrictions imposed by the project. Such impacts will be addressed in accordance with ESS1. 6. This ESS does not apply to voluntary, legally recorded market transactions in which the seller is given a genuine opportunity to retain the land and to refuse to sell it, and is fully informed about available choices and their implications. However, where such voluntary land transactions may result in the displacement of persons, other than the seller, who occupy, use or claim rights to the land in question, this ESS will apply.
ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources	This standard aims to protect and conserve biodiversity, the variety of life in all its forms, including genera, species and ecosystem diversity and its ability to change and evolve; which is fundamental to sustainable development.	This policy is triggered by any project (including any sub-project under a sector investment or financial intermediary) with the potential to cause significant conversion (loss) or degradation of natural habitats, whether directly (through construction) or indirectly (through human activities induced by the project).
ESS7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	It recognises the possibility of vulnerability of indigenous people owing to their culture, beliefs, institutions and living standards and that it may further get compromised by one or other project activity throughout the life cycle of the project. This standard underlines the requirement of minimizing adverse impacts on indigenous people in the project area, respecting the local culture and customs, fostering	The policy is triggered when the project affects the indigenous people in the project area.

Standard	Objective	Applicability
	good relationship and ensuring that development benefits are provided to improve their standard of living and livelihoods.	
ESS8 Cultural Heritage	It aims to protect the irreplaceable cultural heritage and to guide project proponents on protecting cultural heritage in the course of project operations.	This standard is triggered when a project finds items of cultural significance.
ESS9 Financial Intermediaries (FIs	The standard identifies that strong domestic capital and financial markets and access to finance are important for economic development, growth and poverty reduction. FIs are required to monitor and manage the environmental and social risks and impacts of their portfolio and FIs subprojects. They also develop and maintain, in the form of an Environmental and Social Management System (ESMS), effective environmental and social systems, procedures and capacity for assessing, managing, and monitoring risks and impacts of subprojects, as well as managing overall portfolio risk in a responsible manner.	Applicable when there are Ifs in the project area.
ESS10 Stakeholder Engagement and Information Disclosure	This ESS 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 sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.	
World Bank Group Environmental, Health and Safety Guidelines	The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. The guidelines include;- Environmental ▪ Air Emissions and Ambient Air Quality ▪ Energy Conservation ▪ Wastewater and Ambient Water Quality	These guidelines will be followed during the preparation of mitigation measures. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific

Standard	Objective	Applicability
	▪ Water Conservation ▪ Hazardous Materials Management ▪ Waste Management ▪ Noise ▪ Contaminated Land Occupational Health and Safety ▪ General Facility Design and Operation ▪ Communication and Training ▪ Physical Hazards ▪ Chemical Hazards ▪ Biological Hazards ▪ Radiological Hazards ▪ Personal Protective Equipment (PPE) ▪ Special Hazard Environments ▪ Monitoring Community Health and Safety ▪ Water Quality and Availability ▪ Structural Safety of project Infrastructure ▪ Life and Fire Safety (L&FS) ▪ Transport of Hazardous Material ▪ Disease Prevention ▪ Emergency Preparedness and Response Construction and Decommissioning ▪ Environment ▪ Occupational Health and Safety ▪ Community Health and Safety	environmental assessment. These EHS Guidelines give specific guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities. Cross referencing is made to various other sections of the General EHS Guidelines. Employers and supervisors are obliged to implement all reasonable precautions to protect the health and safety of workers. Preventative, measures will be introduced to ensure OHS. They also provide guidance in the preceding environmental and occupational health and safety sections, specifically addressing some aspects of project activities taking place outside of the traditional project boundaries, but nonetheless related to the project operations, as may be applicable on a project basis. These issues may arise at any stage of a project life cycle and can have an impact beyond the life of the project. Construction activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers and local communities. The incidence of road accidents involving project vehicles during construction should be minimized.
WBG EHS Guidelines for Sanitation	Impoundment should prevent adverse impacts to the quality and availability of groundwater and surface water resources	Where the project includes the delivery of water to the community or to users of facility infrastructure (such as hotel hosts and hospital patients), where water may be used for drinking, cooking, washing, and bathing, water quality should comply with national acceptability standards or in their absence the current edition of with WHO Drinking Water Guidelines. Groundwater and surface water represent essential sources of drinking and irrigation water in developing countries, particularly in rural areas where piped water supply may be limited or unavailable and

Standard	Objective	Applicability
		where available resources are collected by the consumer with little or no treatment. Project activities involving wastewater discharges, water extraction, diversion or impoundment should prevent adverse impacts to the quality and availability of groundwater and surface water resources. . Drinking water sources, whether public or private, should at all times be protected so that they meet or exceed applicable national acceptability standards or in their absence the current edition of WHO Guidelines for Drinking-Water Quality. Air emissions, wastewater effluents, oil and hazardous materials, and wastes should be managed according to the guidance provided in the respective sections of the General EHS Guidelines with the objective of protecting soil and water resources. Project activities should not compromise the availability of water for personal hygiene needs and should take account of potential future increases in demand. The potential effect of groundwater or surface water abstraction for project activities should be properly assessed through a combination of field testing and modeling techniques, accounting for seasonal variability and projected changes in demand in the project area.

Table 7: Applicable E&S Standards

Standard Triggered by the Project	Yes/No	Reasons
ESS1 Assessment and Management of Environmental and Social Risks and Impacts	Yes	Project investments are likely to have potential significant adverse environmental and social impacts.
ESS2 Labor and Working Conditions	Yes	This standard is extremely applicable as the project will employ workers to execute the project. It ensures that working conditions are favourable to both the employee and employer.
ESS3 Resource Efficiency and Pollution Prevention and Management	Yes	This standard is applicable in that there is a possibility of pollution into the water resources as well as air quality.

Standard Triggered by the Project	Yes/No	Reasons
ESS4 Community Health and Safety	Yes	The project activities for the Nhlangano - Siphambanweni Integrated Water Supply Project are likely to cause health and security risks if not managed properly.
ESS5 : Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Yes	The Nhlangano - Siphambanweni Integrated Water Supply Project may involve the acquisition of land for construction purposes.
ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources	Yes	Project activities may be located in or close to areas with unique flora or fauna. The Nhlangano - Siphambanweni Integrated Water Supply Project will try to avoid or mitigate threats to biodiversity arising from project activities and where this cannot be avoided relevant mitigation measures will be in place.
ESS7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	No	The country does not have undeserved traditional local communities, and as such this standard does not apply.
ESS8 Cultural Heritage	Yes	There are no known items of cultural significance in the proposed project area. In cases where these are found, notification procedures will be followed to ensure protection of cultural heritage of the area and the country.
ESS9 Financial Intermediaries (FIs)	No	There are no FIs identified for this project, therefore it not triggered by the project, nor is it applicable.
ESS10 Stakeholder Engagement and Information Disclosure	Yes	The proposed Nhlangano – Siphambanweni Integrated Water Supply project will require extensive stakeholder engagement because its success will depend on how it is received by the communities. In addition, its design will have to be informed by the involvement of the affected communities and other stakeholders.

Comparative Analysis of Applicable ESSs and Eswatini's National Regulations

Table 8:Comparative analysis

ESF Objectives	National Laws and Requirements	Gaps	Recommended Action
ESS 1 Assessment and Management of Environmental and Social Risks and Impacts			

To identify, evaluate and manage the environment and social risks and impacts of the project in a manner consistent with the ESSs.	**Environmental Management Act No 5 of 2002** provides for subjecting proposed projects to Environmental and Social Impact Assessment (ESIA) studies as a mechanism for identifying, evaluating and managing environmental and social impacts of projects. **The Environmental Audit, Assessment and Review Regulations, 2000,** issued under the Eswatini Environmental Authority Act, 1992, and the Environmental Management Act, 2002, underline processes that must be taken for any proposed project in order to predict and evaluate likely environmental impacts under studies such as the ESIA. **Section 32 of the Environmental Management Act, 2002** emphasizes that no person shall undertake any project that may have a detrimental effect on the environment without the written approval of the EEA.	No significant gaps between Performance Standard 1 and the various national laws.	Apply national laws
◘ To adopt a mitigation hierarchy approach to: i) Anticipate and avoid risks and impacts; ii) Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels; iii) Once risks and impacts have been minimized or reduced, mitigate; and iv) Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible.	**Environmental Management Act No 5 of 2002** provides for subjecting proposed projects to Environmental and Social Impact Assessment (ESIA) studies as a mechanism for identifying, evaluating and managing environmental and social impacts of projects. **The Environmental Audit, Assessment and Review Regulations, 2000,** issued under the Eswatini Environmental Authority Act, 1992, and the Environmental Management Act, 2002, underline processes that must be taken for any proposed project in order to predict and evaluate likely environmental impacts under studies such as the ESIA. These include scoping, screening, impact identification using hierarchical process, mitigation etc. **The EAARR 2000** provide for categorization of projects based on risk factors i.e. category 1, 2 and 3.	No significant gaps between ESS 1 and the various national laws	Apply national laws

	Section 32 of the Environmental Management Act, 2002 emphasizes that no person shall undertake any project that may have a detrimental effect on the environment without the written approval of the EEA. The legal framework and regulations do not provide for offset mechanism as a compensation.		
◘ To adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities resulting from the project.	National laws and regulations do not address the risk that adverse impacts will fall on disadvantaged on vulnerable people.		Apply ESS1 with respect to this requirement which is not a requirement in Eswatini's statutory regulations
◘ To utilize national environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate.	Eswatini Government has in place relevant environmental and social institutions, regulations, laws, systems and procedures that support sustainable development through ensuring assessment, development and implementation of projects in a sustainable manner. These include: :- **Institutions:-** • Eswatini Environmental Agency (Refer to section xx on roles including systems). **Laws, Regulations and Procedures:**	The Project will rely on National laws and regulations supplemented by measures defined in the full ESIA.	Apply either of the two due to insignificant differences.

	• The Environmental Audit, Assessment and Review Regulations, 2000 • Environmental Management Act No 5 of 2002 • Waste Regulations of 2000 • Water Pollution Control Regulations of 2010 • **The Air Pollution Control Regulations, 2010,** provide for the control of air emissions during project implementation.		
◘ To promote improved environmental and social performance, in ways which recognize and enhance Borrower capacity.		The Project in itself is an opportunity for EWSCEEC to strengthen its environmental and social management systems.	Apply ESS1 with respect to this requirement
ESS 2 Labor and Working Conditions			
• To promote safety and health at work	**1. The Occupational Health and Safety Act, 2001** This Act provides for the safety and health of both employees and the public, especially during the construction phase of proposed projects, and specifies processes to be undertaken in order to ensure that safe and health practices are adhered to and implemented at work. **2. Factories, Machinery and Construction Works Act, 1972** The Act provides for the protection of workers' health from harmful effects such as fumes, dust, excessive noise and other harmful impacts. This is applicable to contractors as well.	No significant gaps between ESS 2 requirement and the various national laws	Apply national laws
• To promote safety and health at work.	**The Occupational Safety and Health Act 9, 2001** • This Act provide for the safety and health of persons at work and at the workplace and for the protection of persons other than persons at the workplace against hazards to safety and health arising out of or in connection with the activities of persons in the workplace and to provide for other matters incidental thereto. • **S.9** – entrusts the employer to ensure the safety and health of all its employees, and also to; • Mitigate risks of exposure to danger of its workforce;	No significant gaps between ESS 2 requirement and the various national laws	Apply national laws

	• Provide personal protective clothing or equipment to employees exposed to wet, dusty, noisy or any conditions that might expose the employees to harsh or dangerous conditions; • Train its workers to perform their work in order to avoid exposure to danger or injury; and • Inform employees of any known hazards or disease associated with the work. **The Factories, Machinery and Construction Works Act 17, 1972** • This legislation provides for the registration of factories and the regulations of working conditions and the use of machinery at factories, construction works and other premises and for matters incidental thereto • The Act mandates the office of the Labour Commissioner to monitor and inspect any working environment or structure to determine its suitability. • The office of the Labour Commissioner is also required to investigate incident or accident involving any person injured in connection with the activities of the employer. **The Workman's Compensation Act 7, 1983** • It provides for the compensation and medical treatment of workmen who suffer injury or contract diseases in the course of their employment. • The scope of its application extends to not an injury or accident that occurs within the workplace but also while the employee is travelling by reasonable means and within any reasonable route between the workplace and his place of residence • In terms of the Act, Workman is any person who has entered into the works under the contract of service or of apprenticeship or of traineeship whether the contract is express or implied, is oral or in writing whether the remuneration is calculated by time or work done.		
• To promote the fair treatment, non-discrimination and equal opportunity of project workers.	**The Employment Act 5/1980** • **S29** – prohibits employers from discriminating against any person on grounds of race, colour, religion, marital status, sex, national origin, tribal or clan extraction, political affiliation or social status.	No significant gaps between ESS 2 requirement and the various national laws	Apply national laws

	• **S30** – makes it an offence to discriminate against any person as envisaged in **S29**. Such employer if found guilty shall be liable on conviction to a fine not exceeding E3,000.00 or imprisonment not exceeding 1 year or both. • **S96** – mandates employers to accord female employees the same treatment as their male counterparts in the workplace and also pay them 'equal pay for equal work'.		
• To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate.	**The Employment Act 5/1980** • **S29** – prohibits employers from discriminating against any person on grounds of race, colour, religion, marital status, sex, national origin, tribal or clan extraction, political affiliation or social status. • **S30** – makes it an offence to discriminate against any person as envisaged in **S29**. Such employer if found guilty shall be liable on conviction to a fine not exceeding E3,000.00 or imprisonment not exceeding 1 year or both. **S96** – mandates employers to accord female employees the same treatment as their male counterparts in the workplace and also pay them 'equal pay for equal work'. **The Occupational Safety and Health Act 9, 2001** • This Act provide for the safety and health of persons at work and at the workplace and for the protection of persons other than persons at the workplace against hazards to safety and health arising out of or in connection with the activities of persons in the workplace and to provide for other matters incidental thereto.	No significant gaps between ESS 2 requirement and the various national laws	Apply national laws

	The Workman's Compensation Act 7, 1983 • It provides for the compensation and medical treatment of workmen who suffer injury or contract diseases in the course of their employment. • The scope of its application extends to not an injury or accident that occurs within the workplace but also while the employee is travelling by reasonable means and within any reasonable route between the workplace and his place of residence In terms of the Act, Workman is any person who has entered into the works under the contract of service or of apprenticeship or of traineeship whether the contract is express or implied, is oral or in writing whether the remuneration is calculated by time or work done.		
• To prevent the use of all forms of forced labor and child labor.	**The Employment Act 5, 1980 (Part XIV) – Forced Labour** • **S144** – prohibits all works or service which is extracted from any person under the threat of any penalty and for which the said person has not offered himself voluntarily. • **S147** – states that, if any person acting in an official capacity coerces any person under his charge, that person shall be held personally liable and shall be liable to a fine not exceeding E3,000.00, or imprisonment not exceeding one year or both. The Country ratified both the ILO Minimum of Age Convention (C138) and the ILO Worst Forms of Child Labour Convention (C182) in 2002. It also signed the African Charter on the Rights and Welfare of the Child in 1992 but has not yet ratified it. **The Employment Act 1980** • **S97** – Prohibits the employment of children below the age of 15. **The Children's Protection and welfare Act 6, 2012** • **S234** – Minimum age of engagement for children is 15 • **S236** – children below the age of 18 cannot be engaged in any form of hazardous employment	No significant gaps between ESS 2 requirement and the various national laws	Apply national laws

	• **S248** – any person who employs under age children I liable on conviction to a minimum fine of E100,000.00 or 5 years' imprisonment or both for a first offender. For a second offender, it is imprisonment of not less than 10 years.		
• To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law.	The country has ratified the numerous ILO Conventions aimed at ensuring that member states do protect the notion of collective bargaining. These Conventions include; ILO Convention 87 on Freedom of Association and Protection of the Right to Organize and the ILO Convention 98 on the Right to Organize and Collective Bargaining. Section 32 (2) of **The Constitution of Eswatini, 2005** on the Rights of Workers, guarantees all workers of their right to freely form, join or not join a trade union for the promotion and protection of the economic interest of that worker; and collective bargaining and representation. The Industrial Relations Act 2000 (as amended) was enacted to give effect to the collective bargaining, amongst other purposes. Section 4 (c) to (e) of the Act allows for the collective negotiation of terms and conditions of employment. Part 4 of **The Industrial Relations Act 2000 (as amended)** deals with the registration and/or formation of Employee, Staff and Employer Organizations, Federations and International Organizations. In terms of S. 26 (3) of the Act a minimum of six employees can form a trade union by obtaining a Certificate of Registration through the office of the Labour Commissioner (S.27). Once registered, a trade union can recruit any employees who falls within its bargaining unit with that particular employer. S.42 (9) states that once the union has recruited more than fifty percent of the employees in respect of which it seeks recognition, the union can then apply for recognition with the employer. The employer is obliged to recognize the trade union if it meets the required threshold. If, however the union membership is below the threshold the employer is not obliged to recognize the union but can exercise its discretion. Once a union is recognized, it has the right to bargain or negotiate for and on behalf of its members and also to represent them at the workplace.	No significant gaps between ESS 2 requirement and the various national laws	Apply national laws
• To provide project workers with accessible means to raise workplace concerns.	In implementing an effective dispute management system consideration must be given to the disputed resulting from the following: 1. Disciplinary action	• No significant gaps between ESS 2 requirement and the various national laws	• Apply national laws

	2. Individual grievances 3. Collective grievances 4. Negotiation of collective grievances **1. <u>Disciplinary Procedure</u>** **The Code of Good Practice: Resolution of Disputes at the Workplace** which is in terms of **S109** of **The Industrial Relations Act 2000(as amended)** at Clause 4.2 requires employers to establish a fair and effective disciplinary procedure in the workplace, which should be in line with Clause 11 (Fair Procedure). The procedure is as follows: a) Conduct an investigation to determine whether there are grounds for a hearing to be held; b) If a hearing is to be held, the employer is to notify the employee of the allegations using a form and language that the employee can understand; c) The employee is to be given reasonable time to prepare for the hearing and to be represented by a fellow employee or a union representative; d) The employee must be given an opportunity to respond to the allegations, question the witnesses of the employer and to lead witnesses; e) If an employee fails to attend the hearing the employer may proceed in with the hearing in the absence of the employee; f) The hearing must be held and concluded within a reasonable time and is to be chaired by an impartial representative; g) A dismissed employee must be given the reasons for dismissal and the right to refer the dispute concerning the fairness of the dismissal to the Conciliation, Mediation and Arbitration Commission (CMAC). **2. <u>Individual Grievance Procedure</u>** **Clause 4.3** requires every employer to have a Formal Grievance Procedure which should be known and explained to the employee. The Code recommends that such procedure should at least: a) Specify to whom the employee should lodge the grievance; b) Make reference to time frames to allow the grievance to be dealt with expeditiously		

	c) Allow the person to refer the grievance to a more senior level within the organization, if it is not resolved at the lowest level. d) If a grievance is not resolved the employee has the right to lode a dispute with CMAC. **3. <u>Collective Grievances and Disputes resulting from the negotiations of Collective agreements</u>** **Clause 4.4** and **4.5** of the Code deals with the handling of collective grievances as raised by the employees. This procedure is usually contained in the Recognition Agreement the parties sign from the onset. What is common to these disputes is that in the event the parties fail to resolve the dispute, either can lodge a dispute with CMAC and subsequently the Industrial Court.		
ESS 3 Resource Efficiency and Pollution Prevention and Management			
◘ To promote the sustainable use of resources, including energy, water and raw materials.	The Constitution of the Kingdom of Eswatini Act, 2005 (Act No: 001 of 2005) obliges the State to in the interest of the present and future generations, to protect and make rational use of its land, mineral and water resources as well as its fauna and flora, and shall take appropriate measures to conserve and improve the environment. In terms of section 216(1) every person has the responsibility to promote the protection of the environment and section 216(3) obliges the State to ensure a holistic and comprehensive approach to environmental preservation and shall put in place an appropriate environmental regulatory framework. **The Environmental Management Act, 2002,** provides and promotes the enhancement, protection and conservation of the environment, as well as sustainable management of natural resources. The Flora Protection Act of 1958 provide for the sustainable management and utilization of floral resources.		

	The Forests Preservation Act no 28 of 1910 provide for the sustainable management and utilization of forest resources. **The Water Act, 2003,** provides for the sustainable use and management of water resources in the country as well as for the control of pollution.		
◘ To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.	The Environmental Audit, Assessment and Review Regulations, 2000 requires ESIA studies to be conducted as a mechanism for identification of adverse impacts on projects on the human health and environment and requires the determination of mitigation measures (avoid, minimize, mitigate, compensate) when such impacts are identified. Waste Regulations of 2000 provide the regulatory measures for waste management in order to minimize pollution from project activities. Water Pollution Control Regulations of 2001 provide for measures geared towards minimising pollution of water by project activities by establishing standards. **The Air Pollution Control Regulations, 2001,** provide for the control of air emissions during project implementation.	No significant gaps between ESS 3 requirement and the various national laws	Apply national laws
◘ To avoid or minimize project-related emissions of short and long-lived climate pollutants.	**Ozone Depleting Substance Regulations, 2003,** provide for the elimination and avoidance of products that deplete the ozone layer. Eswatini does not have regulations regarding Green House Gases	Significant gaps between ESS 3 requirement and the various national laws as appertains to emission prevention from climate related pollutants.	Apply ESS 3 requirements

◘ To avoid or minimize generation of hazardous and non-hazardous waste.	**The Waste Regulations, 2000,** under the Environmental Management Act, provide for the management of solid and liquid waste disposal. They emphasize on the appropriate handling, transportation, treatment and final disposal of waste. **The Building Act, 1969,** underlines the prohibition of illegal structures and requires the removal and disposal of all waste materials in an appropriate manner during project implementation.	No significant gaps between ESS 3 requirement and the various national laws	Apply national laws
◘ To minimize and manage the risks and impacts associated with pesticide use.	Eswatini has no specific regulations governing use and management of pesticide wastes. However, the waste management regulations, 2000 include hazardous wastes.		Apply ESS 3 requirements.
ESS 4 Community Health and Safety			
• To anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project lifecycle from both routine and non-routine circumstances.	**The Public Health Act, 1969,** provides for the establishment of processes to ensure public health at all phases of a project. It also provides for steps to take should there be any incident from the project affecting the public and lays out responsibilities for actions to be taken. **The Occupational Health and Safety Act, 2001,** provides for the safety and health of both employees and the public, especially during the construction phase of proposed projects, and specifies processes to be undertaken in order to ensure that safe and health practices are adhered to and implemented at work.	No significant gaps between ESS 4 requirement and the various national laws	Apply national laws
• To promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure, including dams.	National laws and regulations do not have specific provisions.	Significant gaps between ESS 4 requirement and the various national laws as appertains to promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure	Apply ESS 4 requirements.

• To avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials.	**The Road Traffic Act, 2007,** provides for the compliance of all road users and for those organizations such as EEC conducting works on and/or along public roads. **The Waste Regulations, 2000,** under the Environmental Management Act, provide for the management of solid and liquid waste disposal. They emphasize on the appropriate handling, transportation, treatment and final disposal of waste. **The Public Health Act, 1969,** provides for the establishment of processes to ensure public health at all phases of a project. It also provides for steps to take should there be any incident from the project affecting the public and lays out responsibilities for actions to be taken.	No significant gaps between ESS 4 requirement and the various national laws	Apply national laws
• To have in place effective measures to address emergency events.	Eswatini does not have laws or regulations that specifically address emergency events	Significant gaps between ESS 4 requirement and the various national laws.	Apply ESS 4 requirements.
• To ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.	Eswatini does not have laws or regulations specific to security personnel	Significant gaps between ESS 4 requirement and the various national laws.	Apply ESS 4 requirements.
ESS 5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement			
ESS5: Para(10): Eligibility Classification ◘ Persons who have formal legal rights to land or assets ◘ Persons who do not have formal legal rights to land or assets, but	◘ Section 211(3) of the Constitution notes that "a person shall not be deprived of land without the due process of the law and where a person is deprived, that person shall be entitled to prompt and adequate compensation… ◘ Section 14 (1) (d) of the Constitution guarantees the right of all individuals the protection from deprivation of property without compensation.	All person are protected by the law regardless of their social or economic standing, age or disability so long as they occupy land earmarked for the proposed project.	Given that the National laws guarantees the protection of all occupiers of land to be affected by land acquisition, it is recommended that the EWSCEEC applies the National laws and ESS5 where the need arises. The more stringent will prevail.

have a claim to land or assets that is recognized or recognizable under national law; ◘ Persons who have no recognizable legal right or claim to the land or assets they occupy or use.	◘ Section (14) (1) (c) secures the right of individuals to protection of their property rights. ◘ In as much as The Constitution does not specifically classify the different categories of eligibility of a person to be deprived of land without due process as required by ESS5 classification. Section 20(1) and (2) provides thus; ◘ S.20(1) – all person are equal before and under the law in all spheres of political, social, economic and cultural life and in every other respect and shall enjoy equal protection of the law; Section 20(2) further states that for the avoidance of any doubt, a person shall not be discriminated against on the ground of gender, …, or social or economic standing…, age or disability.		
◘ To avoid forced eviction	The Constitution of Swaziland 2005, on the protection and promotion of fundamental rights and freedoms of the individual guarantees protection from deprivation of property without compensation (S.14(e)) Section 211(3) of the Constitution notes that *"a person shall not be deprived of land without the due process of the law and where a person is deprived, that person shall be entitled to prompt and adequate compensation for any improvement on that land or loss consequent upon that deprivation unless otherwise provided by law."* S.54 of the Electricity Act, 2007 and S.3 of the Acquisition Act, 1961 requires consent from the property owner. If however the property owner does not consent due process is then followed.	There is a significant gap with respect to forced evictions. There are no laws or regulations protecting squatters or encroachers on government land and this provides an opportunity for the government to undertake forced evictions without due compensation as provided by ESS 5.	Apply ESS 5 requirements
◘ To mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use by: (a) providing timely compensation for loss of assets at replacement cost and (b) assisting displaced persons in their efforts to	S.15 of the Acquisition Act identifies the factors that needs to be considered when determining compensation, namely: - a) market value of the property b) damages sustained by the person interested by severing of any land c) damages sustained by reason of the acquisition injuriously affecting any other property of the person d) any reasonable expenses incidental to a change of residence or business as a consequence of the acquisition	While the acquisition of property act applies to all PAPs affected by the proposed project with regards to the procedure for acquiring and compensation, it is silent on the issue of allocation of land of equal production use or potential or with similar or improved services. It only mentions compensation in terms of monetary value.	Apply ESS 5 requirements

improve, or at least restore, their livelihoods and living standards, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.	The factors listed in **S.15** of The Acquisition of Property Act 10, 1961 in essence requires that the person affected by the acquisition should be placed in a position he was had he not been affected by the move if not better **S.9 & 10** of the Acquisition of Property Act articulates the procedure for settlement of disputes for compensation by the Board of Assessment as appointed in terms of S.10.	Also no transfer of Stamp duty is payable in respect of any transfer of title etc. is mentioned explicitly...	
◘ To improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure.	The resettlement procedure will be done within the purview of the law in particular S.15 of the Acquisition of Property Act and the Constitution. All affected persons will be compensated fairly.	The national legislation does mention that a person shall not be discriminated however, does not explicitly requires that additional support shall be provided to address needs of vulnerable group or to improve their living conditions.	Apply ESS5 and work with local authorities and resettlement committees to address the needs of the vulnerable groups.
Loss of access to natural resources	There is no national legislation which deals with the loss of access to natural resources.	There is gap with ESS5	Apply ESS 5 requirements
◘ To ensure that resettlement activities are planned and implemented with appropriate disclosure of information, meaningful consultation, and the informed	No legislative requirement for disclosure of resettlement Plan. Although the **The Environmental Audit, Assessment and Review Regulations, 2000 does require consultations of the ESIA and mitigation plans.**	There is gap with ESS5	Apply ESS 5 requirements

participation of those affected.			
ESS 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources			
◘ To protect and conserve biodiversity and habitats.	**The Constitution of the Kingdom of Swaziland Act, 2005,** provides that the country and all who reside in it shall protect and make rational use of its land, mineral, water resources as well as flora and fauna. It also underlines that appropriate measures to attain sustainable living through the conservation and enhancement of the environment. **The Environmental Management Act, 2002,** provides and promotes the enhancement, protection and conservation of the environment, as well as sustainable management of natural resources. **The Flora Protection Act, 2001,** provides for the protection of indigenous flora and encourages the eradication of alien and/or invasive plant species. **The Game Act, 2001,** provides for the protection of birds and mammals against any illegal and harmful activities, such as poaching. **The Plant Control Act, 1981,** provides for the control, movement and growth of plants.	No significant gaps between ESS 6 requirement and the various national laws	Apply national laws
◘ To apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could	The **Environmental Management Act, 2002, PART II-Fundamental Purpose & Principles**, mentions the precautionary principle and the need to take into account the needs of the present and future generations.	No significant gaps between ESS 6 requirement and the various national laws	Apply national laws

have an impact on biodiversity.			
◘ To promote the sustainable management of living natural resources.	**The Constitution of the Kingdom of Swaziland Act, 2005,** provides that the country and all who reside in it shall protect and make rational use of its land, mineral, water resources as well as flora and fauna. It also underlines that appropriate measures to attain sustainable living through the conservation and enhancement of the environment. **The Environmental Management Act, 2002,** provides and promotes the enhancement, protection and conservation of the environment, as well as sustainable management of natural resources. **The Flora Protection Act, 2001,** provides for the protection of indigenous flora and encourages the eradication of alien and/or invasive plant species. **The Game Act, 2001,** provides for the protection of birds and mammals against any illegal and harmful activities, such as poaching. The **Natural Resources Act, 1975,** promotes the conservation and improvement of all living natural resources within the country. **The Water Act, 2003,** provides for the sustainable use and management of water resources in the country as well as for the control of pollution. The Forests Preservation Act no 28 of 1910 provide for the sustainable management and utilization of forest resources.	No significant gaps between ESS 6 requirement and the various national laws	Apply national laws

◘ To support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities.	Eswatini does not have requirements specific to supporting the livelihoods of local communities, and inclusive economic development.	Significant gaps between ESS 4 requirement and the various national laws.	Apply ESS 6 requirements.
ESS 7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities **NOT APPLICABLE**			
ESS 8 Cultural Heritage			
◘ To protect cultural heritage from the adverse impacts of project activities and support its preservation.	**The National Trust Commission Act, 1972,** provides for the operation of cultural institutions and the proclamation of national parks, monuments and matters incidental thereto. The EswatiniSwaziland National Trust Commission is the parastatal organisation responsible for the conservation of nature and the cultural heritage of the Kingdom of EswatiniSwaziland. **Environmental Management Act No 5 of 2002** provides for subjecting proposed projects to Environmental and Social Impact Assessment (ESIA) studies as a mechanism for identifying, evaluating and managing environmental and social impacts of projects. This includes cultural resources. **The Environmental Audit, Assessment and Review Regulations, 2000,** issued under the Eswatini Environmental Authority Act, 1992, and the Environmental Management Act, 2002, underline processes that must be taken for any proposed project in order to predict and evaluate likely environmental impacts under studies such as the ESIA. This includes cultural resources.	No significant gaps between ESS 6 requirement and the various national laws	Apply national laws

	Section 32 of the Environmental Management Act, 2002 emphasizes that no person shall undertake any project that may have a detrimental effect on the environment without the written approval of the EEA.		
◘ To address cultural heritage as an integral aspect of sustainable development.	Eswatini does not have requirements specific to addressing cultural heritage as an integral aspect of sustainable development.	Significant gaps between ESS 8 requirement and the various national laws.	Apply ESS 8 requirements.
◘ To promote meaningful consultation with stakeholders regarding cultural heritage.	Eswatini does not have requirements specific to consultations regarding tangible or intangible cultural heritage.	Significant gaps between ESS 8 requirement and the various national laws.	Apply ESS 8 requirements.
◘ To promote the equitable sharing of benefits from the use of cultural heritage.	Eswatini does not have requirements specific to equitable benefit sharing from the use of cultural heritage	Significant gaps between ESS 8 requirement and the various national laws.	Apply ESS 8 requirements.
ESS 9 Financial Intermediaries **NOT APPLICABLE**			
ESS 10 Stakeholder Engagement and Information Disclosure			
◘ To establish a systematic approach to stakeholder engagement that will help Borrowers identify stakeholders and build and maintain a constructive relationship with them, in particular project-affected parties.	The Environmental Audit, Assessment and Review Regulations, 2000 requires stakeholder consultation during the ESIA preparation process. Specifically during the scoping phase, the proponent must conduct stakeholder consultation. The EAA also allows for public hearing during the EIA process , where - (a) after examining the IEE and/or EIA report and accompanying CMP for the proposed project, it is of the opinion that the project is of such a sensitive or significant nature that the public should have the opportunity to make submissions or comments at a public hearing; or (b) the public	Significant gaps between ESS 10 requirement and the various national laws.	Apply ESS 10 requirements.

	concern over the project is great and the number of written and substantiated objections exceeds ten." EAAR Regulations, sec. 12(1)		
◘ To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be taken into account in project design and environmental and social performance.	There are no clear regulations on how to assess the level of stakeholder interest and support for a project.	Significant gaps between ESS 10 requirement and the various national laws.	Apply ESS 10 requirements.
◘ To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project lifecycle on issues that could potentially affect them.	There are no clear regulations on how to provide means for effective and inclusive engagement with project-affected parties throughout the project lifecycle on issues that could potentially affect them.	Significant gaps between ESS 10 requirement and the various national laws.	Apply ESS 10 requirements.
◘ To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and	EAAR Regulations, sec. 11(1). Provides for public notice of the availability of the EIA which must be published in the Government Gazette, on the EswatiniSwaziland Broadcasting Service, and in a newspaper circulating in EswatiniSwaziland twice a week and for two consecutive weeks. The EM Act and EAAR Regulations, sec. 11(1). Requires the Authority to distribute copies of the EIA and CMP to concerned and affected ministries, local authorities, parastatals, and non-governmental organizations.	No significant gaps between ESS 10 requirement and the various national laws	Apply national laws

appropriate manner and format.	The Authority shall publish "a detailed statement of the decision for public inspection." EAAR Regulations, sec. (15)(6)(c) "Any person may request from the Minister, the Authority or any other organ of Government any information relating to the environment that is not available in the registry but that could reasonably assist that person in contributing to the enhancement, protection and conservation of the environment and the sustainable management of natural resources." EM Act, sec. 51		
◘ To provide project-affected parties with accessible and inclusive means to raise issues and grievances, and allow Borrowers to respond to and manage such grievances.	EAAR Regulations, sec. 12(2)The Authority shall "call upon any party who has an interest in the outcome of the public hearing, including the project proponent, the authorising agency, the commenting agency and any other person, to attend the public hearing or solicit in writing comments from other government agencies or offices with expertise or regulatory power over the proposed project."	No significant gaps between ESS 10 requirement and the various national laws	Apply national laws
◘ To establish a systematic approach to stakeholder engagement that will help Borrowers identify stakeholders and build and maintain a constructive relationship with them, in particular project-affected parties.	The Eswatini Environment Authority has a systematic approach to stakeholder engagement during the EIA process. See below:- EAAR Regulations, sec. 11(1). Provides for public notice of the availability of the EIA which must be published in the Government Gazette, on the EswatiniSwaziland Broadcasting Service, and in a newspaper circulating in EswatiniSwaziland twice a week and for two consecutive weeks. The EM Act and EAAR Regulations, sec. 11(1). Requires the Authority to distribute copies of the EIA and CMP to concerned and affected ministries, local authorities, parastatals, and non-governmental organizations.	No significant gaps between ESS 10 requirement and the various national laws during preparation phase. However, no explicit mention of stakeholder engagement during implementation/construction and operation phase.	Apply ESS 10

	The Authority shall publish "a detailed statement of the decision for public inspection." EAAR Regulations, sec. (15)(6)(c) "Any person may request from the Minister, the Authority or any other organ of Government any information relating to the environment that is not available in the registry but that could reasonably assist that person in contributing to the enhancement, protection and conservation of the environment and the sustainable management of natural resources." EM Act, sec. 51 EAAR Regulations, sec. 11(1). The Authority shall "invit[e] objections, comments or submissions from interested and affected persons. . . ." EAAR Regulations, sec. 11(1). EAAR Regulations, sec. 12(2) The Authority shall "call upon any party who has an interest in the outcome of the public hearing, including the project proponent, the authorising agency, the commenting agency and any other person, to attend the public hearing or solicit in writing comments from other government agencies or offices with expertise or regulatory power over the proposed project."		

3.8 Alignment of WB and Eswatini Legislation Relevant to ESIA

Both the World Bank safeguards policies and Eswatini laws are generally aligned in principle and objective:

- Both require screening/categorization of projects in order to determine environmental analysis is needed.
- Both require public participation and input to inform ESIA reports.
- Eswatini recognizes other sectoral laws while WB has environmental and social standards for specific interests.
- The Bank requires that stakeholder consultations be undertaken during planning, implementation and operation phases of the project. EEA requires consultations during planning and before implementation of the project. During implementation and operational phases, the public are free to bring forth any environmental, social, safety or health issue they might have as a result of the implementation of the project.
- Monitoring of projects during implementation is required by EEA

4 PROJECT DESCRIPTION

4.1 Location of the Project Area

Eswatini is situated in the easterly part of the Southern African subcontinent about 3 degrees south of the Tropic of Capricorn. The country is landlocked, bordered by South Africa almost wholly with a small portion bordered by Mozambique in the easterly direction. From the grassland of the Highveld in the west, the land falls down through the Middleveld to the bushveld plains of the Lowveld and rises again to the plateau of the Lubombo Mountains. Eswatini has four administration regions namely Hhohho, Manzini, Shiselweni and Lubombo (refer to figure 4). The regions are administered by Regional Administrators. The Capital city of the country is Mbabane while the largest city of the country is Manzini. The proposed project is located in the Shiselweni Region of Eswatini. The proposed project covers a major part of this region. The largest town in this region is Nhlangano, and this is where all the regional offices are located. The proposed project comprises a 64 km pipeline that runs from Nhlangano to connect to a water supply network that comes from Lavumisa at Siphambaneni. It runs along the MR 11 (Nhlangano- Lavumisa) Road.

Figure 5 shows Eswatini with its neighbouring states.

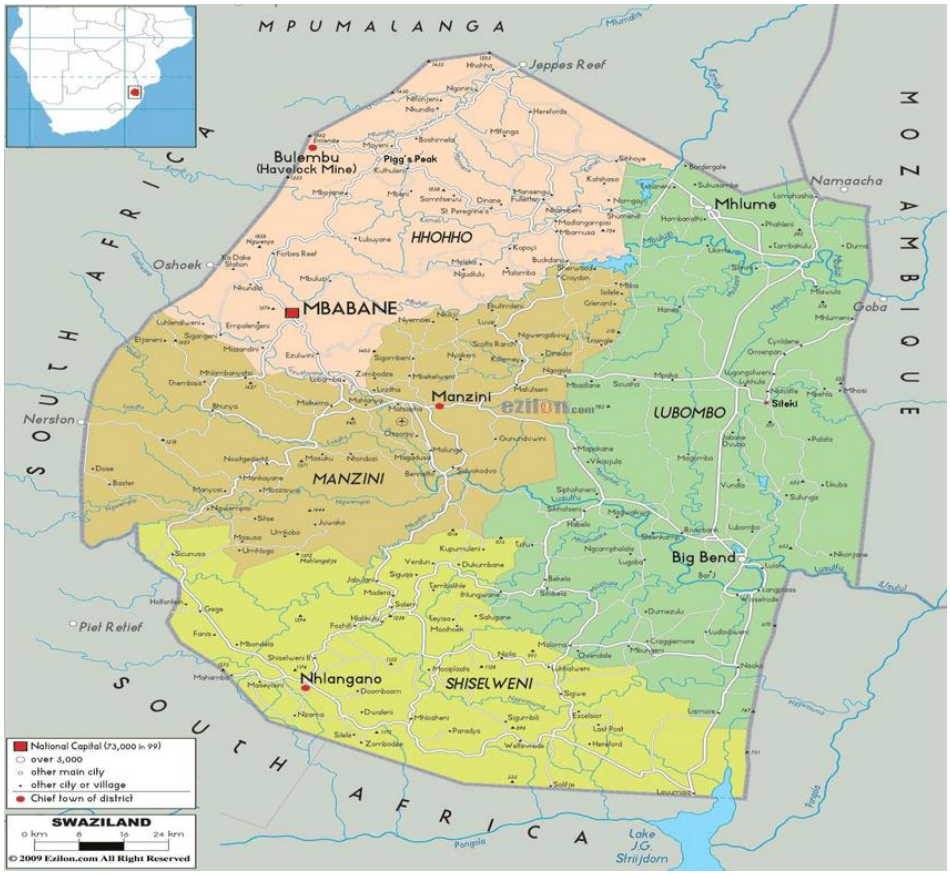


Figure 5: Regions of Eswatini

4.2 Proposed Project Outline

4.2.1 Introduction

The project entails installation of 61 km of gravity mains and 3 km of pumping mains at various stages; connected to 244 km of laterals supplying homesteads, offices, clinics, schools. The pipeline will be connected to an existing water supply pipeline which services the population from Siphofaneni, Somntongo and Matsanjeni Tinkhundla (SISOMA) project and as such will start at Nhlangano to Siphambanweni. A pump station with a small solar power plant will be constructed to provide the power required for pumping. The project also includes the construction of 24 kiosks. This is a structure where water is sold to people who may not be connected to the water supply. It helps increase the reach of the water supply so that even those segments of society with no house connections can still have affordable potable water distribution point (public standpipe).

A connection will be made from the pipeline that originates from the existing 10 Mega litre Reservoir at 1180m MSL at Masibini. There will be three proposed reservoirs, at Mhlosheni, Florence Christian Academy and Hluthi, each with a 3.2 ML capacity. An additional 1ML sump will be constructed, with a solar power supply unit. The components of the project are outlined below:

4.2.2 Existing Water Treatment Plant

Raw water for the project will be sourced from the Mkhondvo River via an existing water abstraction into a Water Treatment Plant (WTP).The main water treatment plant in the area is at Masibini (about 10km from Nhlangano town) with a production capacity which may be upgraded to 30Ml per day (such production possible based on the above abstraction permit information, refer to Appendix 3). To date, the water treatment plant produces only 3.5ML a day to cater for Nhlangano and Mahamba areas. This caters for a population of 16’500 residents with the current number of connections being 3’300. This still leaves the plant with spare capacity of above 6.5ML per day which can then be channeled towards the study area for this project, thus making the station work closer to its available production capacity. A picture of the WTP is attached in photo plate 2.

Photoplate 2: Existing Masibini Water Treatment Plant

4.2.2.1 *Abstraction Works*

Water is abstracted form the river via an intake structure comprising of a weir, low level pump station and rising main to the treatment works. The function of the weir is to direct water to the intake works during periods of low flow in the river. A flood protection wall exists to at the lower end of the site in order to provide access to the raw water pump station chamber during times of minor flooding. The weir is approximately 60m long with a maximum height of 0.3m above river bed level with the intake structure at the right of the river bank, to the eastern side. The intake structure is sized to handle the ultimate capacity of the scheme but will be equipped in phases.

In Phase 1, a pumping capacity of 275L/s has been provided. The pumping station transfers water to the treatment plant through a pipeline sized to covey the ultimate capacity of the works.

4.2.2.2 *Treatment works*

Include coagulant dosing facilities, flocculation, clarification, rapid gravity filtration in dual media filters and sludge treatment all to the EWSC Potable Water Standards (see attached Appendix 8A). Certain elements of the plant have designed and constructed to provide for the full future capacity of the plant. These include:

- The backwash water recovery system and the treated water sump, low lift pump station and high lift pump station.
- A high-level pump station with a treat water storage reservoir
- A pumping main to the reservoir site
- A terminal reservoir located at a high point
- Gravity trunk distribution pipelines to Nhlangano and Mahamba

- A housing scheme for plant operations staff

Treatment works follow the stages outlined below

- Chemical addition and coagulation
- Flocculation
- Clarification
- Dual media rapid gravity filtration
- Chlorination
- Backwash water recovery
- Sludge treatment
- Low lift pump station

4.2.2.2.1 Chemical addition and flocculation

Chemicals used in treatment works are as follows: Coagulation – Alum, liquid form delivered by tanker, pH Stabilization – Soda ash packaged in granular form in 50kg bags, Flocculent – polyectrolyte, liquid form in plastic carboy that can be fed into the dosing plant.

Dosage is adjusted according to the quality based on the hourly control tests and flow rates of raw water. A sample of a typical test chart is attached. Chemical dosing pumps with variable capacity have been provided for each chemical.

4.2.2.2.2 Flocculation

A baffled channel for flocculation is used for raw water, a duplication channel will be provided for Phase 2.

4.2.2.2.3 Clarification

Chemically conditioned water and flocculated water undergoes settling under gravity in clarifies or settling tanks. 4 No 25m diameter circular clarifiers are required for the ultimate capacity of the plant, 2 clarifiers are used in Phase 1. Inflow from flocculation tacks is delivered to each clarifier. Settled water from the clarifiers discharges into a common collector pipe/channel conveying settled water to the filtration plant. Sludge from the clarifiers flows by gravity to sludge drying beds. The clarifiers have a center feed with a cantilever peripheral lauder and a conical bottom to facilitate the thickening and removal of the sludge.

4.2.2.2.4 Dual Media Rapid Gravity Filters

Settled water from the clarifiers flows to dual media gravity filters where the residual suspended solids in the water are removed in the filtration process. Details of the filters are given below.

Table 9: Filter Specifications

	Unit	Phase 1	Phase 2
Number of filters	No	6	9
Area of filters	m^2	96	144
Filter loading rate at AADF	m/h	4.3	6.7

Filter loading rate at PADF	m/h	6.5	9.26

The dual media filter will consist of a layer of anthracite media over a layer of silica sand media. Provisional properties of the filter media are given below. The effective size ratio of anthracite to sand of about 2 ensures that mixing at the media interface is kept to a minimum.

Properties of filter media

Table 10: Properties of Filter Media

Property	Unit	Anthracite	Sand
Media depth	Mm	550	450
Specific gravity		1.7	2.65
Effective size	Mm	1.2	0.6-0.7
Uniformity coefficient		1.5	1.5

When the accumulation of suspended solids in the filter bed results in a decrease in the volume of water being treated or excess headloss in a filter bed the filter will be backwashed to remove the accumulated solids and restore the filter performance. When backwashing of a filter bed is required, the filter bed is removed from duty and partially drained. Backwashing of the filter beds involves an initial air scouring of the filter bed by passing air through the filter media followed by backwashing with chlorinated water drawn from the filter plant clear well.

In the air scour cycle air is passed through the bed for 3 to 5 minutes to agitate the filter media and scour settled solids off the filter media. This is followed by a backwashing cycle which water is pumped up through the filter media at a rate that causes the expansion of the filter media and results in the removal of solid particles from the filter in the backwash water. The backwashing cycle lasts between 3 to 10 minutes. Backwash waster is conveyed to the backwash water recovery system from where the recovered water is recycled.

4.2.2.2.5 Chlorination

The filtered water is disinfected by the addition of chlorine to the water. The chemical dosage is adequate to provide a safe drinking water that is free form pathogens and a residual chlorine concentration in the treated water pumped into the distribution system. Chlorine dosing comprises of:

- Chlorine storage building with cradles meter (load cells) to store 4 x 69kg liquid chlorine cylinders (Phase 1) and 8 x 69kg liquid chlorine cylinders (Phase 2)
- Chlorine manifold with heaters/evaporators, automatic flow proportion dosing units and change over units
- Injector pumps
- Safety equipment including gas leak detectors, emergency shower and gas masks, etc and ventilation fans
- Associated piping, instrumentations and electrical equipment.

- Dilution water is supplied from the filters
- Chlorine is added to the filtered water at the filter water clear well prior to pumping from the low lift pump station to the treated water sump at the high lift distribution pump station

The maximum chlorine dosing rate at AADF for Phase 1 will be 4.8 mg/l. The average contact time in the treated water sump at the ultimate AADF is 10 minutes.

The design of the chlorination facility complies with the requirements of SABS 0298: 1999- Indirect Small to Medium sized Gas Chlorination Systems for the Disinfection of Water Equipment.

4.2.2.2.6 Backwash water recovery

Backwash water from the backwashing of the filters and supernatant liquor from the decanting of the sludge treatment lagoons is conveyed to the backwash water recovery tanks from where the water is pumped at a constant rate to the works inlet.

4.2.2.2.7 Sludge treatment

Sludge that is removed in the clarifiers is conveyed to a sludge holding tank from where it is pumped to fabric sludge dewatering bags where the sludge is dewatered and dried to a dry solids content that allows the sludge to be removed from the bags for disposal. The drainage water from the under-drainage system is collected and conveyed to the backwash water recovery tank from where the water is recycled to the works inlet. The sludge removed from the clarifiers have a concentration of 1 to 2% dry solids and to dewater to a concentration of about 20-25% in the sludge dewatering bags before being air dried.

4.2.2.2.8 Low lift pump station

Because of the relative levels and restrictions of the site, treated chlorinated water is pumped from the clear well at the filter plant to the treated water sump at the high level distribution pump station. The pump station is constructed to accommodate the pumps required for the ultimate development of the works but is equipped for Phase 1 only.

4.2.2.3 *High Level Distribution Pump Station*

The high-level distribution pump station is required to pump treated water to the terminal reservoir at Nhlangano Town. The pump station with its associated treated water sump were constructed in Phase 1 for the ultimate works capacity but will be equipped in phases. In Phase 1 a pumping capacity of 0.260m3/s has been provided.

4.2.2.4 *Existing 450 Diameter Pumping Main*

The existing 450 diameter ductile iron pumping main to the Nhlangano Reservoir, while adequate for Phase 1 of the scheme, is too small to convey the peak demand flows for the scheme's ultimate peak capacity. The very high flow velocities in this pipeline under ultimate demands gives rise to very high friction losses with the result that the total dynamic head on pipeline will exceed the pressure rating of the pipeline. To accommodate Phase 2 demands, a duplicate 450 diameter pipeline will be required.

4.2.2.5 *Terminal Service Reservoir*

From the treated water sump. Water is pumped by high lift pumps via the ESWC pipeline to a new circular 10MLreservior located near Nhlangano which is sized to cater for Phase 1. The 10ML reservoir together with the old 2ML reservoir provide 24hours storage in the system at the average annual daily demand for Phase 1. The reservoir is constructed with reinforced concrete.

4.2.2.6 *Special Provisions*

A telemetry system is in place to monitor and control the distribution pumps and the reservoir level in order to minimize losses through overflows. The abstraction facility of the plant uses electricity powered, currently 2 out of out of 3 (each 132MW) pumps are used, which are operated only on day time. The extra pump may be used when there is need for more water in the plant, furthermore operation times can be increased to increase the capacity.

4.2.3 Main pipeline

This component entails construction of a 21km 400mm Ductile Iron gravity, 3km 400mm Ductile pumping and 41km 250mm ductile iron gravity mains with isolation, air, scour valves and are supply tee junctions. The proposed main pipeline will be connected at 1100m MSL near Nhlangano Correctional at CH 0+000. The other main connection will be at the other end of the pipeline to the existing 200mm pipe at 415m MSL Siphambanweni. A pump and 1 ML Sump at Zombodze at CH20 + 700, 1103 MSL. Figure 6 shows the proposed profile of the pipeline.

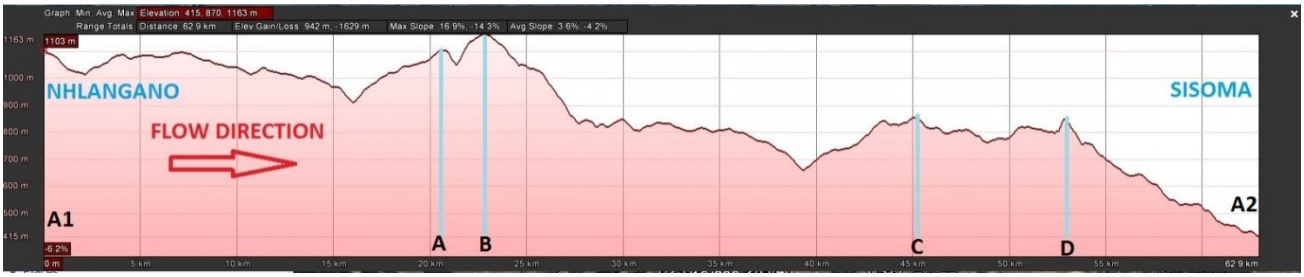


Figure 6: Pipeline profile

The proposed pipeline will be constructed allow the road reserve on the right side of the road in the Nhlangano direction from Masibini. This design aspect is mainly to avoid electricity lines and permanent structures. The pipeline is predominantly on the right side of the road until the Nhlangano Galp filling station junction, where it passes behind the preschool in an open space to avoid concrete paving and driveways. The route of the pipeline adheres to the right side, with a few road crossings until the Casino Royal Hotel, where there is a crossing on the MR11 road to the left to avoid the hotel driveways and concrete paving.

At Ecinisweni Primary School there will be about 4 road cuttings on MR11 to allow for the pipeline crossing to the school and other communities, this includes a provision for the standby pipeline crossing in case of maintenance. At the Hluthi town, the route remains on the left side of the MR11 road until Siphambanweni, passing behind the shops at the junction to avoid concrete driveways into the shops. The proposed pipeline will have nodes at different points. Table 11 shows the points where the nodes will be located.

Table 11: Pipeline Major Nodes

Markers		Longitudinal Distance (km)
Start	End	
A1	A	20.1
A	B	2.7
B	C	22.3
C	D	7.7
D	A2	10.1

Figure 15 shows the site map for the connection point of the main pipeline at Nhlangano correctional. This is the beginning of the main pipeline at Nhlangano. The main distribution line will predominantly be buried in normal terrestrial land, however the route crosses 4 streams namely: Mahosha, Mthongwane, Mantambe and Mdakane. On sites where the route crosses streams, there will be no excavation instead the pipeline will be elevated and hinged onto bridges. It should be noted, however that detailed designs are still to be developed, and therefore some design information may change.

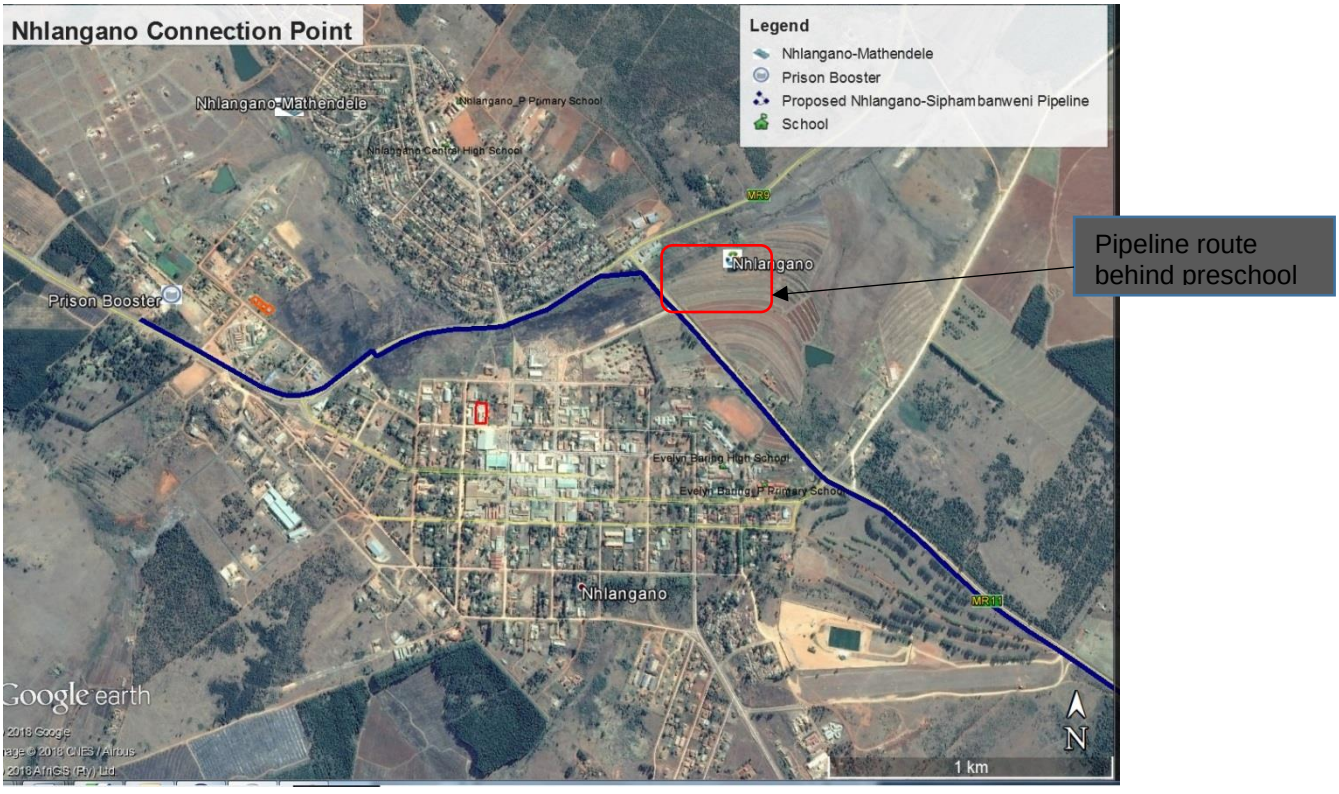


Figure 7: Nhlangano Connection Point

4.2.4 Proposed Main Laterals

Many of the areas along the main pipeline route have laterals in various sizes that terminate at schools and villages. The proposed network is 243km but there is room for expansion under other community or government

led projects. The following areas are the proposed distribution points from the main pipeline which are along the road reserve:

- Ekuthuleni Primary School junction
- Makhonza
- Ecinisweni
- Mhlosheni
- Galile
- Mantambe
- Bhejisa

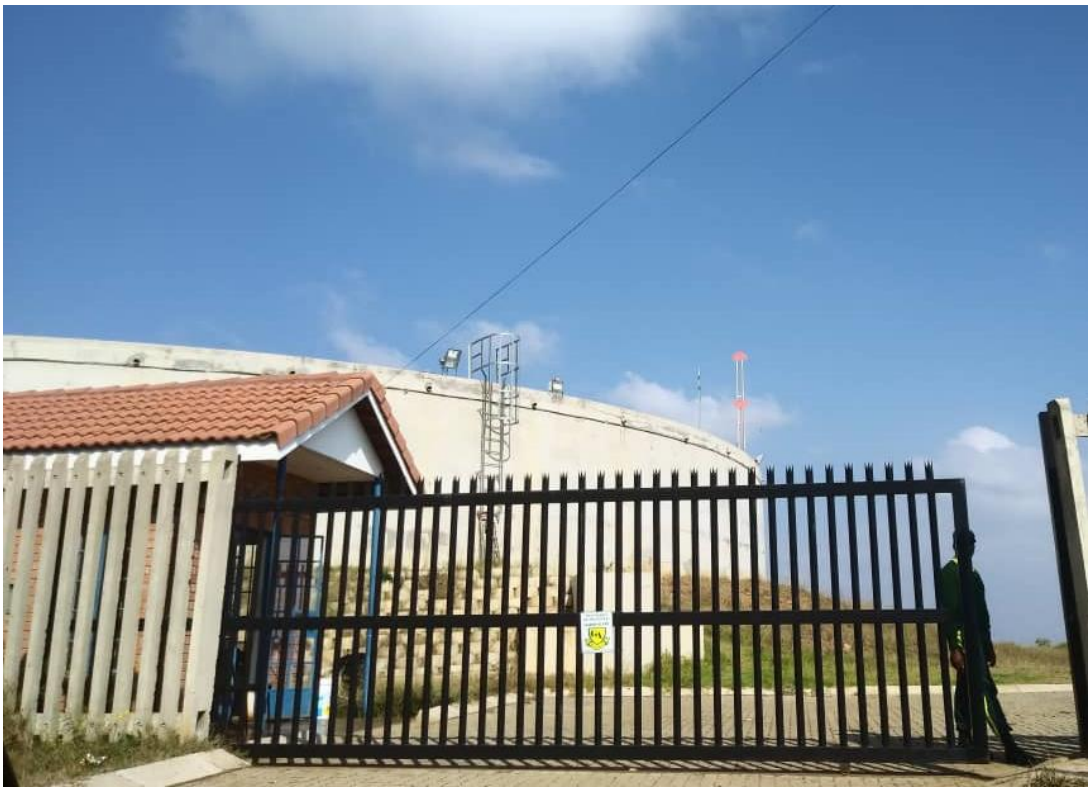
Distribution will be done on both the left- and right-hand side in the proposed areas. In these proposed areas, there are establishments including schools, multiple homesteads, commercial establishments and health facilities. Noteworthy is that a sump, pump station and solar power supply will be erected at Mhlosheni.

The process of installation includes clearing of about 3m working space, digging trenches which are 1m wide and 1.5m in depth, laying of pipes, covering with soil material and stabilization of material, and finally rehabilitation of disturbed areas. Potential impacts shall be assessed, and appropriate compensation and resettlement assistance shall be paid to PAPs who shall be disturbed and affected by these project activities. The following photoplate illustrates a typical pipeline installation.

Photoplate 3: Typical Pipeline Installation

4.2.5 Existing and Proposed Reservoirs

A connection will be made from the pipeline that originates from the existing 10 Mega litre Reservoir at 1180m at Masibini, the following photoplate shows the 10ML reservoir.



Photoplate 4: Existing Masibini Reservoir

The following are the proposed reservoir positions:

Reservoir B at Mhlosheni at CH 22+800, 1161m MSL with a 3.2ML capacity.

Reservoir C at Florence Christian Academy at CH 45+100, 853m MSL with a 3.2ML capacity.

Reservoir D at Hluthi at CH 52+800, 849m MSL with a 3.2 ML capacity.

Land requirements of these reservoirs shall be assessed and where there is/are need(s) for land acquisition, PAPs shall be paid compensation and resettlement assistances in line with provisions stated in the entitlement matrix of the RPF.

4.2.5.1 *Mhlosheni Reservoirs*

A 1ML sump will be constructed about 22.6km from the Nhlangano town together with a pump station powered by a solar plant as part of the project. Approximately 200m away from the sump, is the site for the Reservoir B at Mhlosheni at a high point of 1161m MSL with a capacity of 3.2ML. Figure 8 indicates the reservoir and pumphouse sites at Mhlosheni.

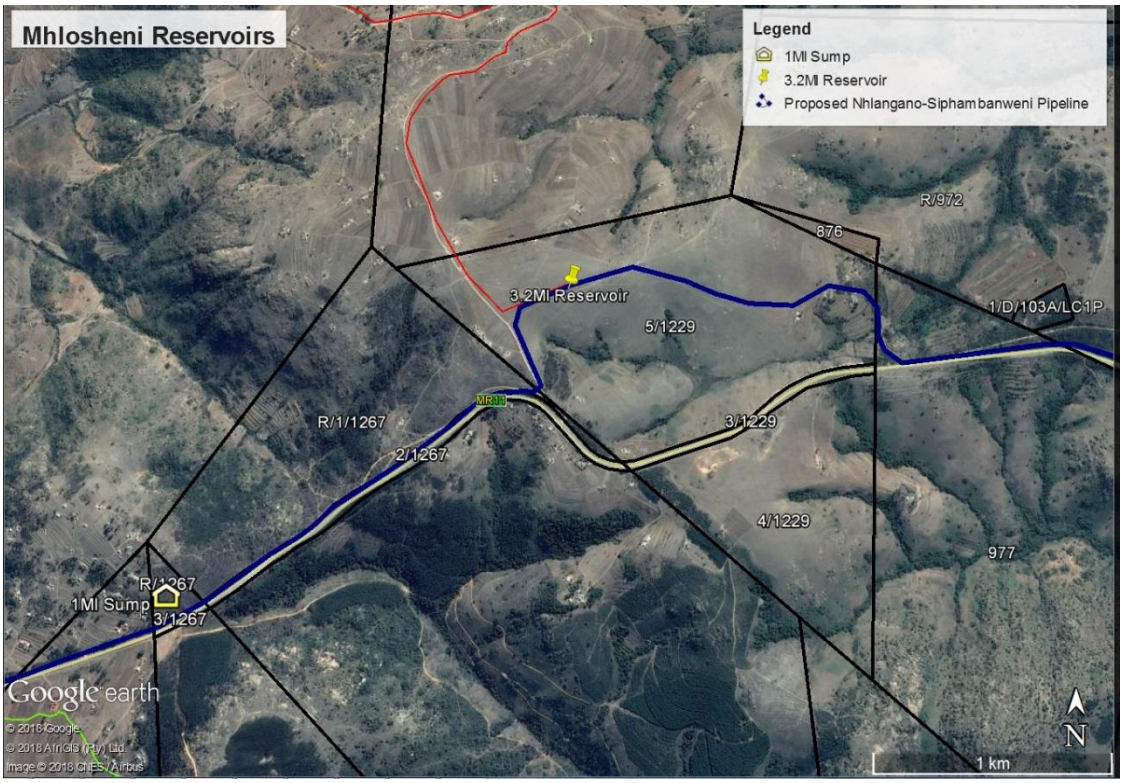


Figure 8: Mhlosheni Pumphouse and Reservoir Site

4.2.5.2 *Florence and Hluthi Reserviors*

Reservoir C will be constructed 45.1km away from Nhlangano, at Florence Christian Academy, at an elevation of 853m MSL and a capacity of 3.2ML. Reservoir D will be located at Hluthi, 52.8km from Nhlangano at 849m MSL with a 3.2 ML capacity. Figure 9 shows the reservoir site at Florence Christian Academy and Hluthi.

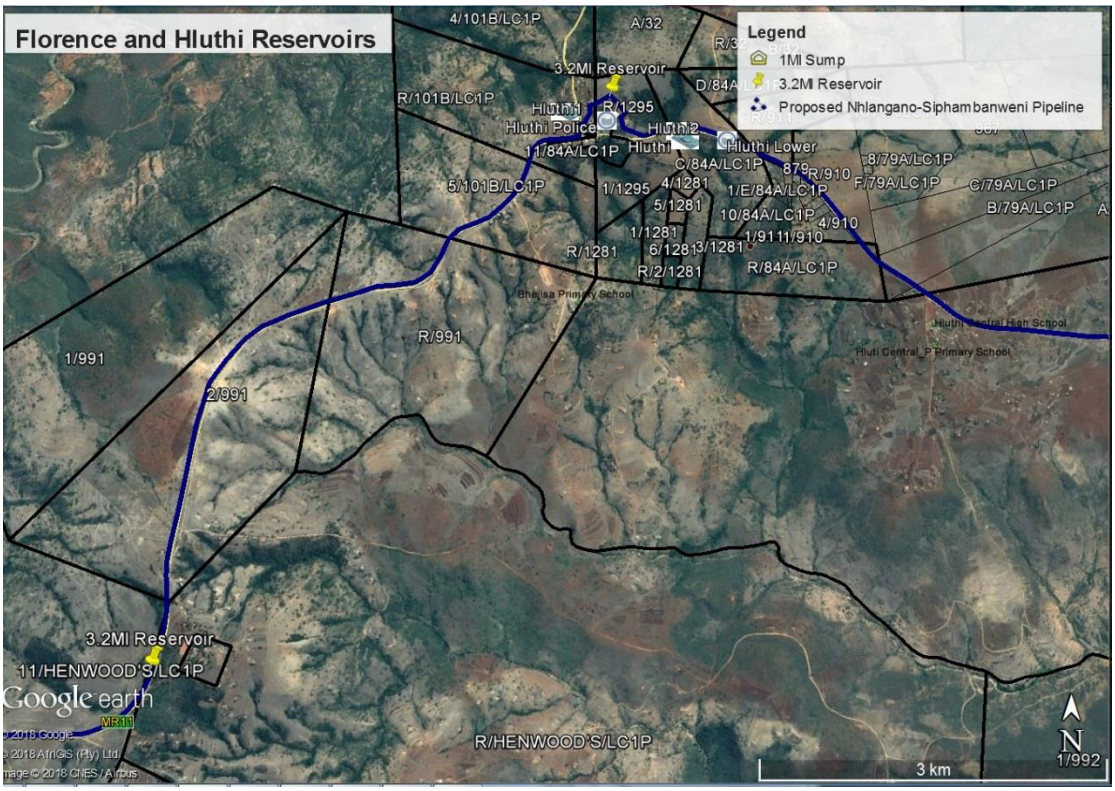


Figure 9: Florence Christian and Hluthi Reservoir Sites

4.2.6 Nhlangano Network Extensions

EWSC currently has plans to develop networks for a population of 23610 people with 154km of pipe network to cover the following areas (which are in SNL and along road reserve):

- Makhonza (E8.1M for 39km of network) to cover 4300 population
- Mashekesheni and Ngwane (E4.1M for 19km of network) to cover 2910 population
- Mbangweni (E4.5M for 36km of network) to cover 3300 population
- Ngelane (E2.8M for 13km of network) to cover 2300 population
- Nsongweni (E2.5M for 11km of network) to cover 800 population
- Qinisweni (E5.2M for 14km of network) to cover 6500 population
- Maseyisini (E3.8M for 22km of network) to cover 3500 population

Land requirements of the "Network Extension" shall be assessed and where there is/are need(s) for land acquisition, PAPs shall be consulted and be paid compensation and resettlement assistances in line with provisions stated in the entitlement matrix of the RPF.

Figure 10 and 11 show lateral connections to the main pipeline:

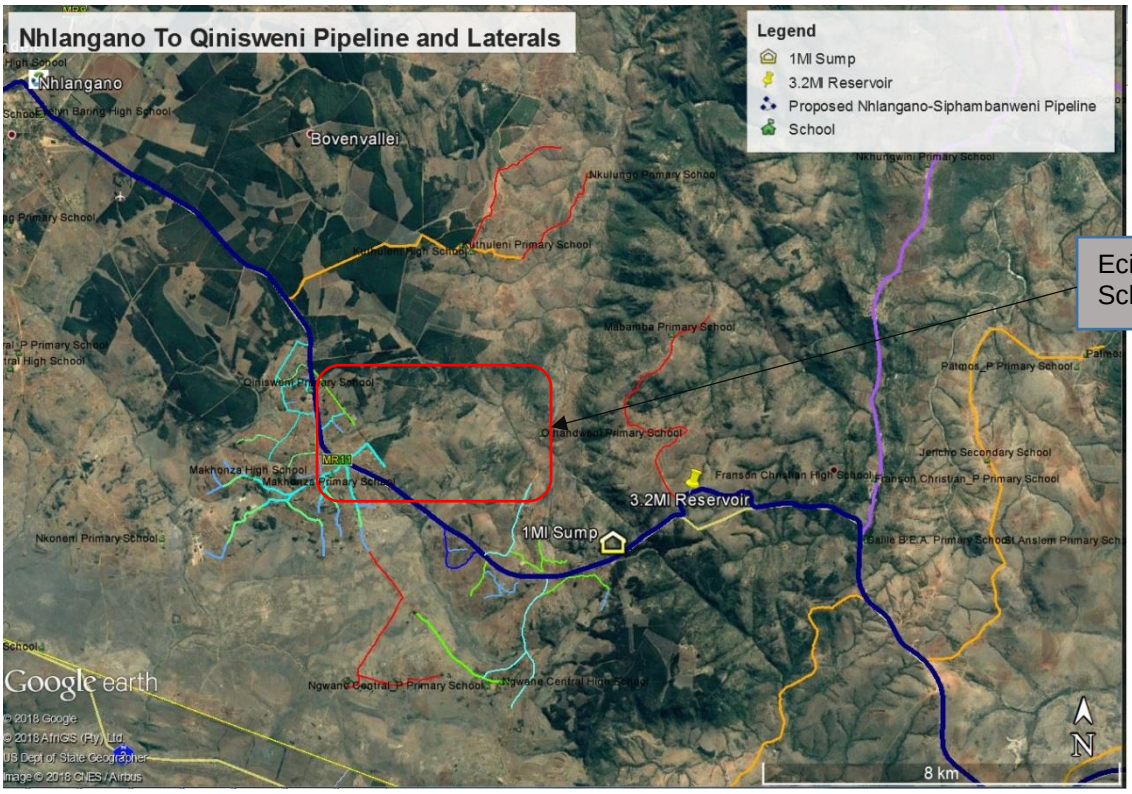


Figure 10: Qinisweni Network with Pipeline to Pump House

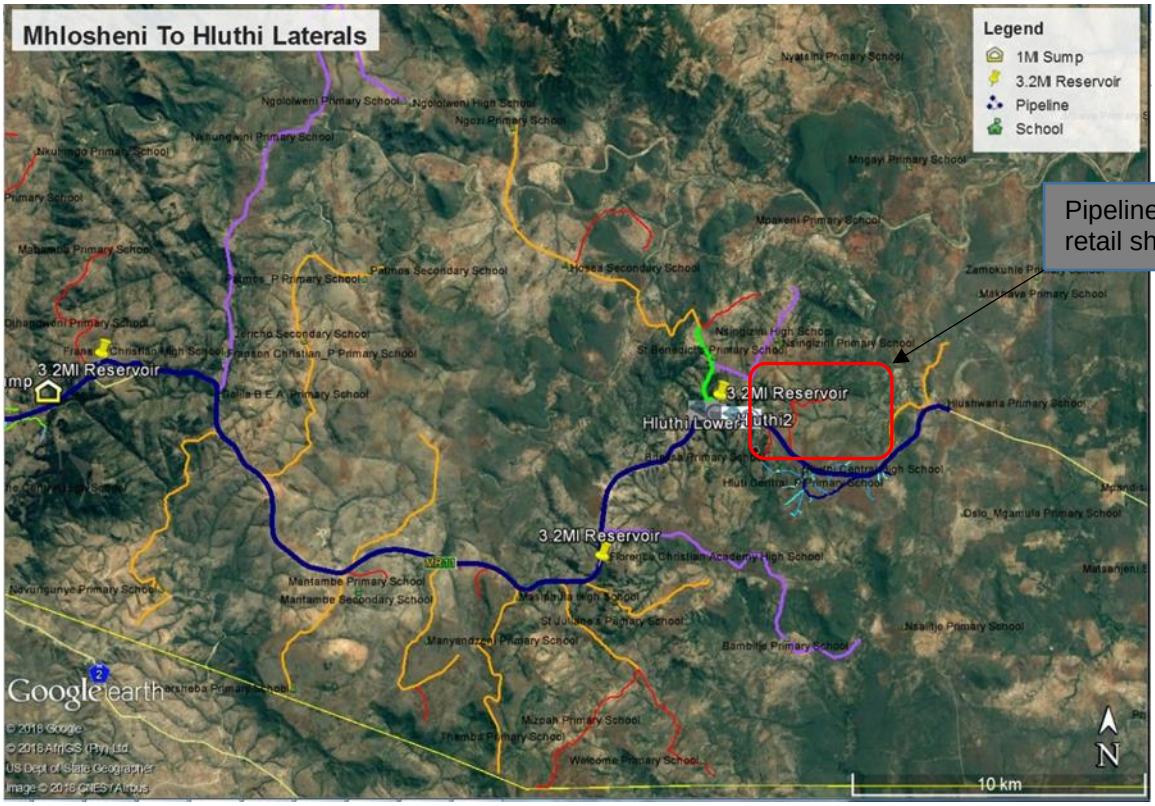


Figure 11: Mhlosheni to Hluthi Connections

4.2.7 Solar Power Supply

There will be 1 pumphouse that will be located next to the 1Ml sump at CH 22+500. The proposed pumps for the pump house require 180kva with an 8 hour pumping operation per day resulting to 6'480kwh/day. The aim is to move towards greener technology hence the solar component will be built in the components of the pump houses to be constructed (Solar panels on roof tops and reservoir tops). The energy capacity will be approximately 300KW since this energy will mostly be used for supplementary needs. Ultimately, the viability of it will be confirmed by the design consultant as it is meant to be an alternative power supply to the booster pump station. Figure 12 shows the location of the proposed solar plant.

Figure 12: Proposed Solar Power Supply Site

Land requirements of the "Solar Power Supply" shall be assessed and where there is/are need(s) for land acquisition, PAPs shall be consulted and be paid compensation and resettlement assistances in line with provisions stated in the entitlement matrix of the RPF.

4.2.7.1 *Energy Requirement for Pumphouse*

Table 12 shows the requirements of the proposed solar plant.

Table 12: Electricity Demands for Pumping Station

Q (m3/hr)	455
H (m)	70
P (kW)	135
kVA	180
Energy Demand Cost (E/kVA)	155.860
Energy Access (E/kVA)	58.060
Facility Charge/Month	5,015.720
Power Consumption/day (kWh)	6,480
Power Consumption/month(kWh)	142,560
Q/day (m3)	72.00
Q/Month (m3)	1,584.00
Energy demand	28,054.80
Access Charge	10,450.80
Facility Charge	5,015.72
Total Costs	79,787.87

4.2.8 Electricity costs for Pumping station

The following table outlines the costs of pumping for peak, standard and off peak hours.

Table 13: Annual Electricity Costs for Pumping Station

	Hours/Week	Hours/Year	Cost/kWh	kWh/year	Cost/Year	Cost/Month
HIGH DEMAND						
PEAK	25	325	4.7141	43,875	206,831.14	
STANDARD	62	806	1.4534	108,810	158,144.45	
OFF - PEAK	81	1053	0.9601	142,155	136,483.02	
LOW DEMAND						
PEAK	25	975	1.6646	131,625	219,102.98	
STANDARD	62	2418	1.1875	326,430	387,635.63	
OFF - PEAK	81	3159	0.9601	426,465	409,449.05	
TOTAL					1,517,646.25	126,470.52
High Demand Weeks	13					
Low Demand Weeks	39					

From the above table, the expected power consumption costs at maximum operation and power for the pump house are expected to be E1.5M for the first year, with expected 10% or more increases each year will result in a five-year energy cost of E9.2M. If this figure can be offset by putting up a renewable energy plant and running it, this gives a solid case for consideration of alternative energy to power the plant and is more cost effective.

4.2.8.1 *Energy yields*

The proposed solar plant is expected to have yields as shown in Figure 13.

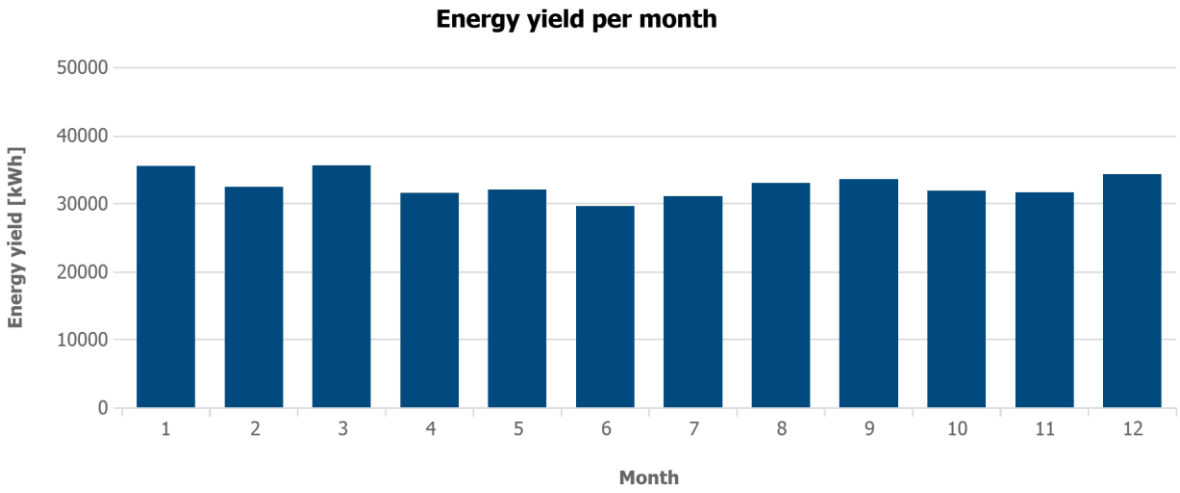


Figure 13: Solar Plant Electricity Yield per Month

4.2.9 Kiosks

At the end of every lateral, a kiosk will be constructed. This is a structure where water is sold to people who may not be connected to the water supply. It helps widen the reach of the water supply so that even those segments of society with no house connections can still have affordable potable water distribution point (public stand pipe). The principle of water kiosks also helps empower community members since each kiosk is run as a business by a local person. In addition, the kiosk operators will be allowed to display and sell other items like fruits and vegetables to maximise their income from this operation. A total of 24 kiosks will be set up.

The location of these kiosks are decided based on proximity to high population of the less privileged, proximity to public structures like schools, clinics. Location of kiosks will be based on ease of accessibility, population coverage and also the need to have individual kiosks service multiple people to sustain the business.

All the planned kiosk will be located in Swazi Nation Land. This means that EWSC will engage with the respective chiefs for each community, under the traditional 'khonta' system. This involves acquiring rights to use land by requesting and getting approval from the chief and paying a cow.

The kiosks operators will be trained by EWSC on the operation of the kiosk. In as much as this is not based on a cost recovery model given the low cost of the water tariffs, it greatly improves the access to potable water as people find it more affordable. These kiosks can be added incrementally depending on water needs in the various areas. The following photoplate shows a water kiosk in operation.

Photoplate 5: Water Kiosk in Operation

4.3 Capacity Requirements and Design Guidelines

As this will be mainly a gravity main with limited pumping, the use of pump and system curves was the main method used. Also, design parameters considered included the areas through which the pipeline will traverse.

4.3.1 Total Daily Water Consumption in Litres

The total daily water consumption is indicated in Table 14.

Table 14: Current Expected Consumption Figures Based on IRC 1980

Item Description	l/day (2007) 17 500	l/day (2017) 18 500	l/day (2047) 24 000
Domestic Consumption Urban (2'500 people)	300 000	360 000	600 000
Domestic Consumption Rural (15'000 people)	750 000	800 000	950 000
Clinics Consumption (4 Clinics)	80 000	100 000	120 000
Schools Consumption (32 schools)	256 000	280 000	320 000
Church Consumption (10 Churches)	5 000	6 000	7 500
Business Consumption	50 000	75 000	100 000
Other Consumption (Police, RDA, 108Nkhundla, kraal)	5 500	7 500	10 000

Total Average Daily Demand	1 515 500	1 628 500	2 107 500
Somtongo –Matsanjeni worst case scenario (l/day)	570 000	750 000	
Total Requirements (l/day)		2 198 500	2 857 500

This means that with the current scenario having a large percentage of the population provided with potable water connections, there is an estimated 2.2Ml required daily to feed areas beyond Nhlangano and beyond the current ongoing extensions by EWSC. This is spare capacity that the Nhlangano plant has and can provide including the requirements of the integration area of Somntongo-Matsanjeni. In 2047 which is 30 years later, there will be an estimated need of 2.9Ml per day, which if development patterns change to increase settlement along the route, then this could be estimated to 3.5Ml per day, which capacity the Nhlangano plant still has available for production and distribution.

4.3.2 Pipeline Design Parameters

The proposed pipeline design parameters are outlined in Table 15.

Table 15: Pipeline Parameters

Pipeline Parameter	Gravity 250mm	Pumping 200mm	Gravity 200mm
Liquid density @ 20deg (kg m^{-3})	998.2	998.2	998.2
Liquid viscosity @ 20deg (Pa s)	0.001005	0.001005	0.001005
Gravity (m s^{-2})	9.81	9.81	9.81
Pipe diameter (m)	0.25	0.20	0.20
Pipe length (m)	20’100	2’700	40’100
Pipe roughness (m)	0.0000015	0.000061	0.0000015
Pipe cross-sectional area (m2)	0.049087385	0.031415927	0.031415927

4.3.3 Other Relevant design considerations

Table 16 outlines other considerations in the designs of the project

Table 16: Other Relevant Parameters

Design Parameter	Value
Percentage of Urban population after pump	40%
Percentage of Rural population after pump	60%
Estimated Daily Consumption after Pump	1 200 000 l/day
Power Operating Period (time of use)	8 hours
Required volume/day without SISOMA (2017)	1 800 000L
Required volume/day without SISOMA (2047)	2 200 000L
Required volume/day with SISOMA (2017)	2 200 000L

Required volume/day with SISOMA (2047)	2 900 000L
Pumping or flow through whole network at	120L/s
120L/s over 8 hours of pumping provides up to	3 456 000L

The above design consideration shall also factor in land requirements of the project. The project design will incorporate design options to avoid and minimize land requirements of the project.

4.4 Equipment and Materials

The heavy equipment that will be used for the construction is shown in Table 17. Picture of typical equipment to be used in the project have been presented in the photo plate below.

Table 17: Inventory of Equipment and materials

Equipment	**Source**
Trucks	Local and international suppliers
Excavators	Local and international suppliers
Compactors	Local and international suppliers
TLB	Local and international suppliers
Reel and tensioner	Local and international suppliers
Lorries	Local and international suppliers
Materials	**Source**
Cement	Local suppliers
Sand	Local suppliers
Concrete	Local suppliers
Aggregate	Local suppliers
Water pipes	Local and international supplies
Reinforcement bars	Local supplies
Solar Panels	Local and international suppliers
Pipes of different sizes and materials (steel pipes, SDPE, uPVC and Concrete)	Local and international suppliers
Pumps	Local and international suppliers
Water	Local suppliers
Sand (Plaster and River)	Local suppliers
Cement	Local suppliers
Reinforcements	Local suppliers
Valves	Local and international suppliers
Water meters	Local and international
Blocks	Local suppliers
Crush stone	Local suppliers
Timber (roofing)	Local suppliers
Roof Sheets	Local suppliers

4.5 Project Activities

4.5.1 Pre-construction Phase

Detailed Study Design: EWSC procured a consulting firm to prepare a detailed design of the proposed project which may vary albeit not significantly from the feasibility study design currently under preparation and will equally update this draft ESIA report to detailed design ESIA.

Comprehensive ESIA Report: This draft ESIA report will be updated to include the specifics as outlined in the detailed design. The ESIA will be submitted to the Eswatini Environment Authority (EAA) for approval as per the regulations of the country and at the same time submitted to the Bank for clearance. This draft ESIA recognizes that there are certain gaps that can only be addressed during the preparation of detailed design report.

Obtaining Necessary Permitting Requirements: A number of environmental and social permitting requirements will be required to be obtained by contractor for this project as per the statutes of the Government of Eswatini before the construction commences. These include among others the Environmental Compliance Certificate issued by the EEA. The other activities to be done during the preconstruction phase are as outlined below:

- High level design of pipeline and components
- Environmental Impact Analysis and Mitigation in place
- Power purchase and generation agreements sourced
- Detailed surveys and design of pipeline
- Detailed design for solar energy plant and power banks for 10’000kWh per day
- Establishment of site offices
- Consultations with potential PAPs
- Finaliztion of resettlement and compensation to PAPs,
- Submission of compensation and resettlement payments report to the Bank and obtain the Bank’s clearance prior to clearing and handing over the impact sites to the contractor
- Obtaining of relevant permits and licences

4.5.2 Construction phase

Key activities during the construction stage including equipment and construction material is presented to the extent known and is subject to change depending on final methodology that will be adopted by the contractor. Activities during the construction will include among others: -

4.5.2.1 *Clearing and excavations*

Once the project receives its final permits and the Bank’s clearance on completion of compensation resettlement assistance payments, construction crews will begin clearing or trimming the transmission route where necessary. This includes clearing trees and brush to provide construction crews and their equipment safe access to the work site. When construction is complete, disturbed areas will be restored. Native shrubs and ground cover are allowed to regrow.

4.5.2.2 *Installation of main water pipes*

The next step is the installation of the water pipes. The workers will set aside the topsoil carefully (which will be reused). After installation of the pipes, the excavations will be covered. There are no trenches which will be left uncovered for more than 48 hours. The main pipeline will be 21km 400mm Ductile Iron gravity, 3km 400mm Ductile pumping and 41km 250mm ductile iron gravity mains with isolation, air, scour valves and are supply tee junctions. These details may change subject to finalisation of the designs.

4.5.2.3 *Construction of planned laterals and water kiosks*

After the main pipe has been constructed, the associated laterals and kiosks will be constructed to facilitate the distribution of water to institutions and homesteads. It is proposed that 244km Lateral networks will be constructed. Twenty-Four (24) water kiosks are proposed in peri-urban and adjacent rural areas. Consideration shall be made to ensure that these water kiosks are all-inclusive and are accessible to/by elderly and disables.

4.5.2.4 *Construction of pump house and solar power supply*

The solar power plant will also be constructed concurrently with the installation of the pipes. This will include site clearing, excavations and the construction of the power plant. An access road will also be constructed for use during operation to enable vehicles to pass through to the solar plant.

4.5.2.5 *Construction of reservoirs*

The reservoir constructions will also run parallel with the construction of the pipeline. Its construction will also involve site clearing, levelling and erection of the reservoir. An access road will also be constructed for use during operation. There will be 3 x 3.2Ml Reservoirs that will be constructed, whose proposed locations have been indicated in earlier sections.

4.5.3 Operational phase

This will involve the following activities

- Regular maintenance of water supply infrastructure
- Support in training and capacity building within EWSC for WB funded projects comprising environmental issues, social issues, procurement, engineering services for design and supervision
- Training for Kiosk operators

4.5.4 Decommissioning

After the 50-year lifespan of the equipment a major overhaul of the system will be done to avoid increased waster loss due to dilapidated infrastructure.

4.6 Land Take and Land Acquisition

The project will require some land take, mostly along the road reserve of the MR 11. Land that may be affected is on both Swazi Nation Land and Title Deed land. There are no resettlements and relocations anticipated in the current alignment of the project. The following table outlines the properties that may be affected. Engagements of these stakeholders have been initiated and are ongoing. A Resettlement Policy Framework has been developed and is attached as Appendix 4. Compensation payments are determined by a set of rules and an entitlement matrix contained in a RAF. The RAP will be prepared as a separate, independent but connected activity to this ESIA. The RAP will be guided by the existing RPF and shall be prepared in accordance with the objective, applicability and requirements of ESS5.

The table below outlines the properties that will be affected based on the preliminary designs. The highlighted properties are those where the proposed reservoirs, pumphouse and solar panels might be located and this will be confirmed during the final design of the project.

Table 18: Information on Land Required for the Project

No	Property	Distance	Min Offset	Max Offset	Comments
1	Lot 853 of Nhlangano Ext 8	141	1.5	50	Public Open Space to avoid structures
2	Portion 8 of Farm 285	435	1.8	4.6	Dependant on road fence position can be avoided if within official road reserve.
3	Portion 7 of Farm 285	438	3	12	Dependant on road fence position can be avoided if within official road reserve.
4	Farm 142	1067	1	124	Dependant on road fence position can be avoided if within official road reserve.
5	Farm 977	839	1	455	Dependant on road fence position can be avoided if within official road reserve.
6	Remainder Farm 972	512	1	135	Dependant on road fence position can be avoided if within official road reserve.
7	Portion 1 of Farm 1091	635	1	281	Dependant on road fence position can be avoided if within official road reserve.
8	Remainder of Farm 1091	479	27	172	Dependant on road fence position can be avoided if within official road reserve.
9	Portion 4 of Farm 975	344	1	122	Dependant on road fence position can be avoided if within official road reserve.
10	Remainder of Farm 975	67	134	139	Dependant on road fence position can be avoided if within official road reserve.
11	C/101A/LC1P	887	1	501	Dependant on road fence position can be avoided if within official road reserve.
12	Farm 1053	592	1	370	Swazi Nation Land, dependant on road fence position can be avoided if within official road reserve.
13	Farm 999	2834	1.5	384	Swazi Nation Land, dependant on road fence position can be avoided if within official road reserve.
14	Portion E of Farm 470	2208	137	827	Dependant on road fence position can be avoided if within official road reserve.
15	Remainder of Portion F of Farm 470	908	322	709	Dependant on road fence position can be avoided if within official road reserve.
16	Portion 2 of Portion F of Farm 470	436	354	20	Dependant on road fence position can be avoided if within official road reserve.
17	Remainder of Farm 470	637	362	417	Dependant on road fence position can be avoided if within official road reserve.

No	Property	Distance	Min Offset	Max Offset	Comments
18	Farm 1054	2318	21	622	Swazi Nation Land, dependant on road fence position can be avoided if within official road reserve.
19	Farm 993	2739	1998	23	Dependant on road fence position can be avoided if within official road reserve.
20	Remainder of Henwoods LC1P	685	40.89	9.5	Dependant on road fence position can be avoided if within official road reserve. Also require 3500m2 for Reservoir
21	Farm 993	89.78	22	4.78	Dependant on road fence position can be avoided if within official road reserve.
22	Portion 2 of Farm 991	3256	581	62.5	Swazi Nation Land, dependant on road fence position can be avoided if within official road reserve.
23	Remainder of Farm 991	1314	2	839	Swazi Nation Land dependant on road fence position can be avoided if within official road reserve.
24	Portion 5 of Portion 101B of LC1P	1121	17	507	Swazi Nation Land, dependant on road fence position can be avoided if within official road reserve.
25	Remainder of Portion 101B of LC1P	1012	1.5	27	Hluthi Town dependant on road fence position can be avoided if within official road reserve.
26	Remainder of Farm 1295				Hluthi Town, portion on road fence position can be avoided if within official road reserve, also required for reservoir.
27	Portion 5 of Farm 1299	2520	32	485	Pipeline servitude plus 3500sqm reservoir site
28	Remainder of Farm 1267				15000sqm for reservoir, pumphouse and solar panels
29	Portion C of Portion 84A of LC1P	890			Swazi Nation Land dependant on road fence position can be avoided if within official road reserve. Also contains existing EWSC water plant and reservoir
30	Remainder of Farm 911	377	24	25.5	Dependant on road fence position can be avoided if within official road reserve.
31	Remainder of Farm 910	976	19.6	47	Dependant on road fence position can be avoided if within official road reserve.
32	Remainder of Portion 84A of LC1P	250	1.5	116	Dependant on road fence position can be avoided if within official road reserve.

No	Property	Distance	Min Offset	Max Offset	Comments
33	Portion B of Portion 79A of LC1P	398	1.5	295	Dependant on road fence position can be avoided if within official road reserve.
34	Portion A of Portion 79A of LC1P	124	1.5	352	Dependant on road fence position can be avoided if within official road reserve.
35	Farm 1053	6200			Swazi Nation Land dependant on road fence position can be avoided if within official road reserve.

4.6.1 Transmission Line and laterals

The main transmission line affects mainly the road reserve along the MR 11 road, which was constructed in the year 2011. Project affected parties were relocated when the road was constructed, however payment of compensation has been pending for a long time and since have been settled by the MoPWT as shown in the letter attached. The main lateral route also goes along feeder roads into the community and high-level engagements have been conducted with the traditional authorities.

4.6.2 Reservoirs and access roads

4.6.2.1 *Mhlosheni 1ML Reservoir*

This component lies on a private farm, and the area required for its construction will be determined once the designs have been completed. About 50m wide access road for use during both construction and operation. The cooperation will engage the farm owner on possible land take and compensation.

4.6.2.2 *Mhlosheni 3.2ML Reservoir*

This reservoir site lies on Swazi Nation Land, under Makhosini Umphakatsi. The land is currently open grassland used for livestock grazing. The area required for its construction will be determined once the designs have been completed. About 50m wide for access and it is notably close to the main road (the length will be determined after designs have been completed).

4.6.2.3 *Florence 3.2ML Reservoir*

This component lies on a private farm. The area required for its construction will be determined once the designs have been completed. About 50m wide for access and it is notably close to the main road (the length will be determined after designs have been completed). The cooperation will engage the farm owner on possible land take and compensation.

4.6.2.4 *Hluthi 3.2ML Reservoir*

This component lies on a private farm. The area required for its construction will be determined once the designs have been completed. About 50m wide for access and it is notably close to the main road (the length will be determined after designs have been completed). The cooperation will engage the farm owner on possible land take.

4.6.3 Pump House and Solar Power Supply

This component lies on a private farm. The area required for its construction will be determined once the designs have been completed. About 50m wide for access and it is notably close to the main road (the length will be determined after designs have been completed). The cooperation will engage the farm owner on possible land take. There will be 1 pumphouse that will be located next to the 1Ml sump at CH 22+500. The proposed pumps for the pump house require 180kva with an 8 hour pumping operation per day resulting to 6’480kwh/day. The aim is to move towards greener technology hence the solar component will be built in the components of the pump houses to be constructed (Solar panels on roof tops and reservoir tops). The energy capacity will be

approximately 300KW since this energy will mostly be used for supplementary needs. Ultimately, the viability of it will be confirmed by the design consultant as it is meant to be an alternative power supply to the booster pump station.

4.7 Project Timelines

The estimated duration of the proposed project is as follows;

Table 19:Project Timelines

	Timing (months)							
Stage 1 - Design and Tendering								
Environmental and Social Studies, EEA Approval	4 months							
Project Financing Approval by World Bank	2 months							
Procurement of design and supervision consultant		4 months						
Engineering studies and final designs			6 months					
Preparation of tender documents				2 months				
Tendering and appointment of Contractor					6 months			
Stage 2 - Construction								
Construction						24 months		
Defect Liability Period							12 months	
Stage 3 - Operation phase								600 months
Stage 4- Upgrade/ decommissioning phase								

4.8 Spoil and Quarry sites

Quarry will be sourced commercially, there is no likelihood for quarry sites, however this will be determined one project deigns have been completed. In case where there is a need for quarry sites, the contactor will draw up C-EMP specific to the site. It is not anticipated that there will be a need for spoiling of material, since the excavated material will be used as cover material. In case where there is excess material, it will be disposed at the Nhlangano landfill to be used as cover material during landfill activities.

4.9 Burrow sites

There are no burrow pits and spoil sites planned for the project. However, if there is a need as the designs are developed further, the contractor will prepare a Contractor Environmental Management Plan (C-EMP).

4.10 Site Access

The pipeline will run along the MR11 Nhlangano Lavumisa Road, and as such can be accessed through this main road. The laterals, reservoir and solar plant can be accessed through the minor roads teeing off the MR11.

4.11 Schedule for Implementation and Workforce

Construction for the project is planned to be implemented over a period of 2 years (24 months).

The construction of the pipeline, laterals, reservoirs and solar power plant generally require human labor/Workforce who will be instrumental in among others: -

- Excavation works associated with construction of gravity mains
- Excavation works associated with construction of laterals
- Excavation works associated with construction of reservoirs, and solar power plant
- Construction of access roads to reservoirs and solar power plant
- Construction of kiosks including commissioning of solar power plant
- Operation and maintenance of solar power plant, reservoirs and kiosks

The number of workers who will be involved in the construction of the project will be approximately 50, but the detailed design phase which will include tender documents complete with number of workers, associated skill sets and whether they will be foreign or local will ascertain the exact workforce required. Impacts associated with workers specifically with respect to ESS2 and ESS 4 will be evaluated in detail.

4.12 Workforce

The construction of the Nhlangano - Siphambanweni Integrated Water Supply Project will need some 70 workers of varying skill levels at the peak of construction. Most of the un-skilled workers will be locally recruited. The 10 highly skilled labour will not be local but will use accommodation facilities in Nhlangano. The project will not use child labour In order to address risks associated with working condition and management of worker relationship, the project in collaboration with ESWC will develop and implement written labour management procedures. The purpose of the labour management procedures is to facilitate planning for the project and help identify the resources necessary to address the labour issues associated with the project.

5 PROJECT ALTERNATIVES

A key component in the ESIA process is the identification and consideration of feasible and reasonable alternatives. The identified feasible alternatives should be evaluated in terms of social, biophysical, economic and technical aspects. Alternatives in relation to the proposed activity or development can be defined as different means of meeting the general purpose and requirements of the activity. These alternatives can include the following:

- The property on which or location where it is proposed to undertake the activity;
- The type of activity to be undertaken;
- The design or layout of the activity;
- The technology to be used in the activity;
- The operational aspects of the activity; and
- The option of not implementing the activity.

5.1 Site selection alternatives

5.1.1 Development of Nhlangano- Siphambanweni Integrated water supply

- Minimizes the risk of raw water shortages and inadequate supply for the current Somntongo – Matsanjeni system as it depends on the Jozini dam through a small holding dam in Eswatini. Due to climate change and recurring droughts, the holding dam is prone to depletion which severely compromises potable water supply. It is expected that linking it to the Nhlangano supply and therefore utilizing Mkhondvo River will provide a backup supply of water for Lavumisa.
- The project will give potable water to communities along the pipeline with a population exceeding **20'000** people.
- The proposed system will further improve water supply at Hluthi town and reduce reliance on groundwater that is depleted in the dry season. The population of the area is expected to rise to almost **30'000** in 2047, this excluding Somtongo –Matsanjeni area.
- It is envisaged that the availability of potable water in the area will also necessitate the need to provide or improve sanitation as well as the promotion of good hygiene practices for the populace in the area. This project will also seek to provide the required sanitation upgrade for on-site waste water treatment systems (VIPs and septic tanks). In addition, the rising costs of water production due to energy costs will be addressed in this project through the possible use of renewable energy (solar PV plant) to mitigate pumping costs.
- Through the construction of water kiosks, the community will have opportunities to earn a living by running the kiosks and supplementary businesses associated with it.

5.1.2 Development of the project in a different area

This would mean the Shiselweni region, which has the lowest percentage access to clean water and sanitation, will continue to lag behind amongst the regions of Eswatini.

5.2 Technology alternatives

5.2.1 Extend Coverage and Allow the System to be able to Transmit Water in both Directions Between the Existing Treatment Plants

An alternative design would be to expand the water supply scheme from Lavumisa. Lavumisa is a low point in the country. This will result in a more expensive project with more pumping to bring water from Lavumisa towards Nhlangano. This will prove to be costly and most likely never be used as the water availability on the Lavumisa side is still uncertain following issues of cross border water permits and agreements as well as frequent down-time of the equipment required to bring water from South Africa to the holding dam in Eswatini. Another critical factor is the capacity of the holding dam and the sharing of the water with agricultural users who have very high abstraction rates.

5.2.2 Use of gravity from Nhlangano to Siphambanweni

Connecting the water supply from Nhlangano to Siphambanweni allows for the project to use gravity all the way because Nhlangano is at a higher altitude than Siphambanweni. It minimizes pumping costs, making the running costs of the project lower.

5.3 Sources of water supply for the project

5.3.1 Ground water

Due to the fact that this region is prone to dry spells, the groundwater resources easily run dry. This would make the water supply very unreliable and it would mean a backup system would need to be in place. A new water treatment plant would need to be constructed.

5.3.2 Rainwater harvesting

Rainfall patterns are not predictable. The region itself is an area that is prone to drought and as such this alternative would not help the communities much. In addition, the treatment of the rainwater would have to be individualized, which may lead to increased costs.

5.3.3 Use of Mkhondvo River

The Mkhondvo River is one of the major rivers and it is a perennial river, making the water supply from more stable. EWSC has a water permit to abstract water which allows for supply of water from Nhlangano to Siphambanweni, leaving capacity so supply more communities. The Nhlangano treatment plant capacity is sufficient to produce for the new demand. This seems to be the most financially and logically viable solution towards water supply coverage and integration.

5.4 Power supply alternatives

5.4.1 Connecting to the EEC grid

This option will not require the installation of the solar plant, therefore eliminate the associated capital costs. However, the running costs would be high.

5.4.2 Establishment of a solar plant

The establishment of a power plant to meet the pumping needs of the project will lower the running costs of the system, even though at the beginning the capital costs may have been high.

5.5 No Project Alternative

There would not be any need to spend money on this water supply project, and investments would be done in other areas. There would be no possible adverse environmental impacts associated with the project, as the environment will be left intact. However, this would leave the population of the proposed project area in the same situation with regards to access to water supply and sanitation. This will mean that no new coverage objective will be realized and that redundancy for the Somtongo –Matsanjeni project will not be achieved. This will further mean that the full capacity of the Nhlangano plant cannot be utilized in the short/medium term.

Implementation of the project in a different location would mean the communities at Hosea, Sishelweni 1 and Zombodze Emuva Tinkhundla will remain with unreliable access to potable water. Existing water schemes in the area have been failed due to unaffordability of communities and poor maintenance of structures. The cost of potable water is currently E100.00 for 10 000L at the corporation, where the purchaser pays for own transport. The actual cost of the water is low bit the total costs would be high due to transport costs. Other rural water schemes in the project are most nonfunctional, due to poor maintenance of infrastructure and lack of subscriptions. Existing water schemes in the area are regulated in terms of access hours (open in limited hours of the day) and the appointed custodian of the key may not be available at times when they need to be open, with a fixed monthly fee per family. This presents a limited access to potable water. Furthermore, water from these schemes is not regularly monitored for quality. This also presents risks of access to poor quality water for drinking. The cooperation has a system in place to ensure proper maintenance of the scheme and related infrastructure. Most of the pipeline is buried, which protects it from vandalism. The corporation has a water loss department that monitors pipe leaks to avoid losses.

5.6 Preferred alternative for water supply system

The extension of the water supply from Nhlangano to Siphambanweni is the preferred alternation because of the socio-economic benefits to the community, sustainability and affordability.

5.7 Alternative Transmissions

Gravity flow of water was considered against pumping systems for the following reasons:

- Gravity flow systems are advantageous in systems where there is sufficient elevation, which is the case for the project area. A typical gravity system has the following advantages: no energy costs, simple operation, low maintenance costs and no sudden pressure changes. This system has the following disadvantages Gravity system is less flexible for future extension.
- Small gradients available for friction losses require large diameters within the whole system.
- Longer pipelines are necessary.
- High pressure for firefighting requires use of motor pumping.

A pumping system requires a constant power supply which is costly. However, Consumers don't have to store water, since it is continuously available at the tap and water always remains available.

5.8 Alternatives for Pipeline Route

The preliminary route proposed for the project passes on the road reserve along the MR 11 road. This route is the preferred one because it minimises land take impacts as there are no settlements along the road reserve. An alternative route would be costly since it would require compensation of PAPs and well as potential disputes and disturbance of green fields.

5.9 Alternatives for Materials

Materials used of the project will include:

- Concrete
- Pipework:
- Major process pipework: pressure pipelines – mild steel (with full corrosion protection), stainless steel, UPVC, HDPE
- Pipelines will normally be buried
- Puddle pipes – Epoxy tar coated mild steel
- Small diameter process pipework
- Galvanized mild steel – above ground
- Gravity lines below ground - concrete, UPVC
- Pressure pipelines below ground – ND-UPVC
- Pressure pipelines below ground – ND-HDPE
- Storm water pipes
- jointed concrete
- jointed concrete with anchor blocks

The above materials are easily accessible locally and mostly a manageable cost:

- PVC is a low carbon plastic, PVC pipes require less energy and fewer resources to manufacture. Moreover, the ultra-smooth surface of PVC pipes reduces pumping costs and energy use, and their leak-free fittings eliminate water loss.

- HDPE pipe is flexible and ductile, not rigid. It has outstanding resistance to fatigue. Unlike other plastic pipes, it is designed and pressure rated to handle the kind of occasional and recurring surge events that are common in water distribution systems.
- Epoxy tar coated mild steel is used for industrial concrete floors because of its extreme durability.
- Galvanized steel does not shrink or crack because it is metallurgically bonded to the steel it protects. It also offers superior resistance to abrasion and water.

Above listed materials were considered over other conventional material like iron is easily rusted contaminating the water supply. The also easily leak from rusting leading to water losses. Asbestos material was not considered due as it represents a carcinogenic health hazard when used to transport water for human consumption. Stainless steel was not considered too costly for the project.

6 DESCRIPTION OF THE BASELINE ENVIRONMENT

This chapter provides a description of the environmental and social baseline of the proposed Nhlangano - Siphambanweni Integrated Water Supply Project area. An understanding of the physical, biological and socioeconomic attributes of the project area and surroundings is critical in an ESIA as it allows for a better understanding of the environment in which the project is being considered. Consideration of the receiving environment is a prerequisite for the identification of potential environmental and social impacts. The baseline information was obtained through site visits by ESIA and a review of available secondary information. Validation of this information was done through the data from secondary sources, satellite imagery study and consultation with project proponent and published literature as well as consultation with local authorities.

6.1 Land Use

The major land uses of the country are crop production and livestock grazing. About 50% of the land is communally grazed, 19% is under commercial ranching. Plantation forestry covers 8% and nature reserves and parks cover 4% of the total land area (Mwendera, 2003).

The proposed Nhlangano - Siphambanweni Integrated Water Supply Project main pipeline is along the MR11 road from Nhlangano to Siphambanweni, a total distance of 64km. In addition, there will be laterals branching off this main pipeline; covering a total of 244 km. The project area is rural, and therefore it mainly consists of settlements. It is sparsely populated, with subsistence crop farming and livestock grazing. In areas from an estimated distance of 10 km from Nhalngano, there is commercial forest called Agro Forestry Development. These plantations have *Acacia mearnsii,* commonly known as black wattle, and pine trees (*Pinus monticola* and some *Aracaria columnaris)*. The area also has *Psidium guajava,* commonly known as guava trees. There are commercial banana plantations around Mhlosheni. Along the MR11 road, there are some vegetables and fruit stalls run by women, especially in the bus stop structures. At the turn-off to Franson Christian High School, at Mhlosheni, there is a number of stalls, about 10 in total.

There is land under title deed that is found in the project area, where not much activity in terms of farming was observed. A few formal business establishments are found in the project area. These include small shops, maize milling operations, butcheries and filling stations. Government establishments found in the area include a police station at Hluthi, Sub-regional Government offices, a number of schools and clinics. The site is near the border with the republic of South Africa, and as such the Lavumisa border gate and Nsalitje border gate are within a 20 km radius of the site.

Photoplate 6: Market Stalls

Photoplate 7:Banana Plantations at Mhlosheni

Photoplate 8: Entrance to Casino Royale

6.1.1 Surrounding Land use

The following are establishments that are neighbouring the project area:

- Bahle Benguni Milling
- United Christian Church
- Agro Forestry Development
- Evangelical Church
- Concrete Block Supplier
- Mgazini Nazarene Clinic
- Muna nwar Investments
- Nhlangano Funeral Parlour
- Sibovini Supermarket
- Siphambanweni Milling
- ESIGAS Filling Station
- Kantombanyana Resturant and Mini Supermarket
- Ka-Lakhumalo
- Swazi Sigwe
- Try Again Supermarket
- Cordan Hardware Store

- Van niekarks Farm
- Lijaha Sisu General Dealer
- Imphilo Butchery
- Gugwane Hardware

6.2 Geology and Soils

The geological map of Eswatini indicates that the geological setting of Nhlangano is made up of 6 groups, the first being dominant in the area is the Nhlangano gneiss a granite gneiss reddish in the Nhlangano area while in Mkhondo Valley are Nhlangano outcrops of gneissoe veined at the margins, homogeneous with a plutonic aspect centrally. A few are folded malic dykes which are upright gneiss domes mantled mainly by Pongola and related rocks. Also characteristic of the area is a few of the Hlatikhulu granite (Htg), Mahamba Gneiss (Mh gn) Mozaan Group (Mz) Mkhondo Valley (MVms) and Dolorite grabbo (do). The Hlatikhulu granite is coarse to medium-grained relicas and xenolithis common in some areas around Hlatikhulu in sheet like form fed from below by dykes and sheets- late pegmelites and mesocralic granite dykes. The Mahamba Gneiss is a semi pelitoc gametilerous gneiss which its correlation is uncertain. The Mozaan group is a basalt about 150m thick. Lastly is the dolorite grabbo and metegrabbo which is mostly dykes of various swarms and ages which a few may be proterozioc or karro.

The arrangement of the soil structure in the project area varies considerably. From Nhlangano to Qinisweni, there are three soil types. It is mostly deep red loam, very acidic soil. Some parts of the soil structure are orange loam, on a soft iron pan. It ranges from ferrisolic to ferralitic. Right after Qinisweni and up to Mantambe, the structure is generally ferralitic; beginning with a Highveld grey on orange which is gravely loam. There are also rock outcrops with stony ground (raw mineral soil) and grey loam on the thick stone line. Moving up to Makhondza area, just before Shiselweni 1, the soil arrangement is deep yellow, loam and very acidic. In some parts, this ferralitic structure is deep pale grey sand on clay. Masiphula area is represented by generally lithosolic rock. It is grey sandy on hard iron pan and shallow grey to sandy loam on hard rock. From Masiphula to Hluthi, the structure of the soil is mostly shallow grey to sandy loam on hard rock, with Highveld grey on orange which is gravely loam and deep red loam, very acidic. Hluthi to Siphambanweni has ferralitic soil which is slightly vertisolic. This gives the soil an acidic dark to deep dark brown clay structure with rock outcrops. It is in some parts marsh, with deep black clay and is calcareous.

The erosion hazard map indicates that soils in Nhlangano area fall between an erosion hazard category 2 and 4 with sub-factors s, r and e. This means the soils in the area are erodible, but at an intermediate rate with contributing factors of slope and rainfall. From Nhlangano town to Galile Primary, the slope is a major contributing factor to erosion. In the area with a steeper slope (such as St Florence Christian High Academy), there is greater erosion power. This area is also susceptible to rainfall erosivity. The flat areas are not susceptible to erosion by slope but during periods of high rainfall in January where most precipitation, the area is likely to experience erosion as a result of rainfall in disturbed areas that have not been rehabilitated. The erosion hazard category ranges from as low as 2 to a medium (3). Galile Primary area has a steep slope too with an erosion hazard category of 4 which is a high medium and soil erodibility due to the nature of the slope. Moving into Hluthi and up to Siphambanweni, the erosion hazard map shows that the soil has an erosion hazard category of 3 with soil erodibility due to slope.

6.3 Climate and Climate Change Patterns

6.3.1 Climate of Eswatini

The climate of Eswatini varies from tropical to near temperate. The rain falls during summer months in the form of thunderstorms. The annual rainfall is the highest in the Highveld towards the westerly direction and ranges from 1000 mm to 2000 mm. However, this varies from year to year. The Lowveld, which is in the easterly direction, receives the lowest rainfall, ranging from 500 mm to 900 mm per annum (World Bank, 2015). The country receives the highest average annual rainfall in December (142 mm) and the lowest rainfall in June (8 mm). Temperatures vary according to the altitude of the regions. The Highveld region temperatures are temperate; whilst the Lowveld has temperatures which reach up to 40^{o}C in summer (World Bank, 2015). Eswatini receives the highest average temperatures in February (24^{o}C) and temperatures are at their lowest in winter months with an average of 16^{o}C in June (World Bank, 2015).

6.3.2 Climate of Nhlangano

The climate is warm and temperate in Nhlangano. In winter, there is much less rainfall than in summer. The wet season is warm and partly cloudy and the dry season is comfortable and mostly clear. Over the course of the year, the temperature typically varies significantly. The average percentage of the sky covered by clouds experiences significant seasonal variation over the course of the year. The clearer part of the year in the area begins around February ending around October. June normally has the clearest day of the year; the sky is clear, mostly clear, or ***partly*** cloudy 88% of the time, and overcast *or* mostly cloudy 12% of the time. The cloudier part of the year begins around October, ending around February. November normally has the cloudiest day of the year; the sky is overcast or mostly cloudy 44% of the time, and clear, mostly clear, or partly cloudy 56% of the time. The wetter season lasts between October and March; with a greater than 27% chance of a given day being a wet day. The chance of a wet day peaks at 50% in December. The drier season is usually from March to October. The smallest chance of a wet day is 3% on July. Over the course of July the length of the day gradually increases***.*** From the start to the end of the month, the length of the day increases by roughly 23 minutes***.*** The graphs below (using data sourced from the Eswatini Meteorological Department) indicate the average temperatures and rainfall measures between year 2015 and 2018. Data used here was collected from the Mbabane weather station.

6.3.3 Average Monthly Rainfall of Nhlangano

Generally, the most rain falls during the 31 days cantered in January and December. But on Figure 14, it is shown that between 2015 and 2018, the highest average rainfall was measured in February (90.5mm). December and March also recorded significantly average rainfall totals of 59.4mm and 75.3mm respectively. The rainless period of the year is between May, June, July and August with average rainfall totals of 21.4mm, 0.4mm, 6.5mm and 9.8mm correspondingly. The least rain falls around June; with an average total accumulation of 0.4mm.

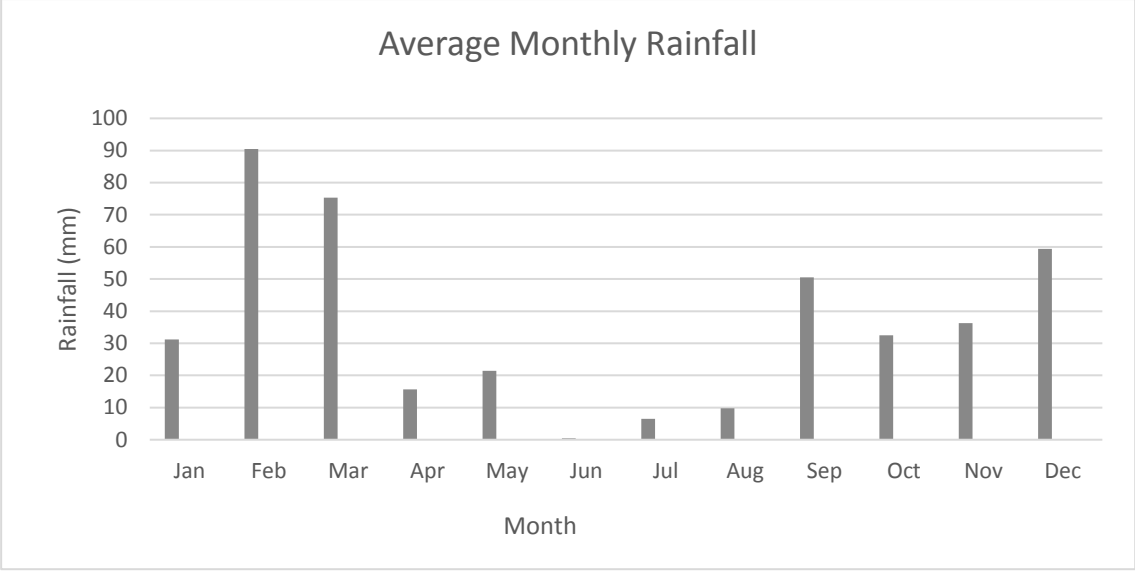


Figure 14: Average Monthly Rainfall Measured Between 2015 Andand 2018 (Sourced From Thefrom the Eswatini Meteorology Department 2018)

6.3.4 Average Annual Rainfall of Nhlangano

Nhlangano experiences extreme seasonal variation in monthly rainfall. The lowest and highest rainfalls at 235 mm and 486 mm respectively. The lowest rainfall was in the 2015 and highest in 2018. This, along with the rainfall totals for 2016 and 2017 is shown in *Figure 15* below.

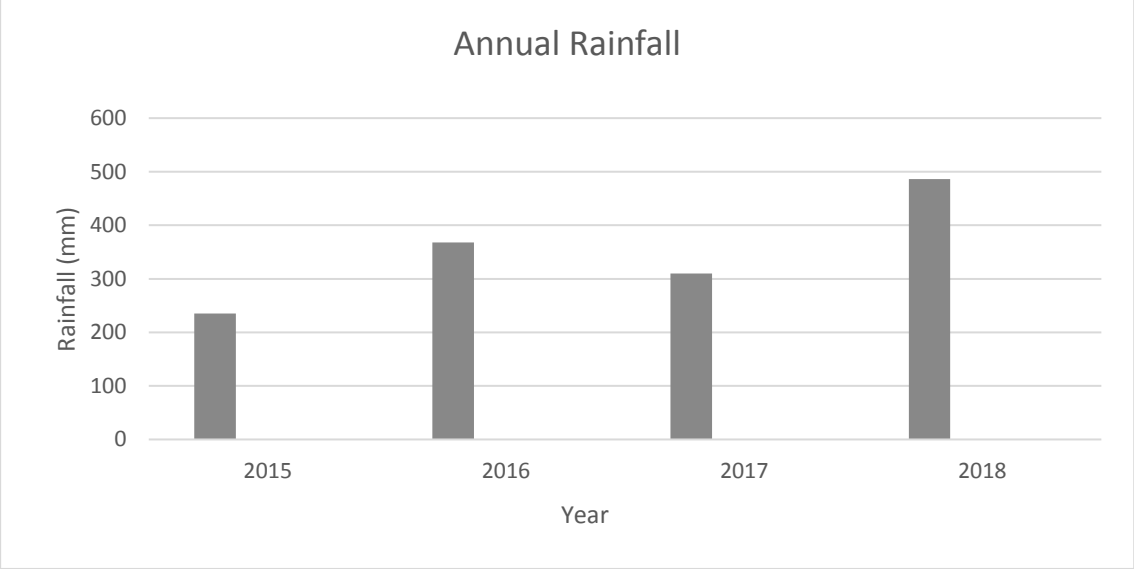


Figure 15: Annual Rainfall Measured 2015-2018 (Sourced from the Eswatini Meteorology Department 2018)

6.3.5 Temperature

The warm season lasts from December to February; with the highest monthly temperatures at 28.6 Degrees Celsius, 27.9 Degrees Celsius and 28.9 Degrees Celsius in December, January and February respectively. The hottest month of the year is February, with an average high of 28.9 Degrees Celsius. The cool season is normally from May to August with average monthly high temperatures of 10.4 Degrees Celsius, 9.9 Degrees Celsius, 8.9 Degrees Celsius and 10.6 Degrees Celsius in May, June, July and August respectively. The coldest month of

the year is July; with an average monthly low of 8.9 Degrees Celsius. *Figure 16* demonstrates the average minimum and maximum monthly temperatures between 2015 and 2018 from January to December.

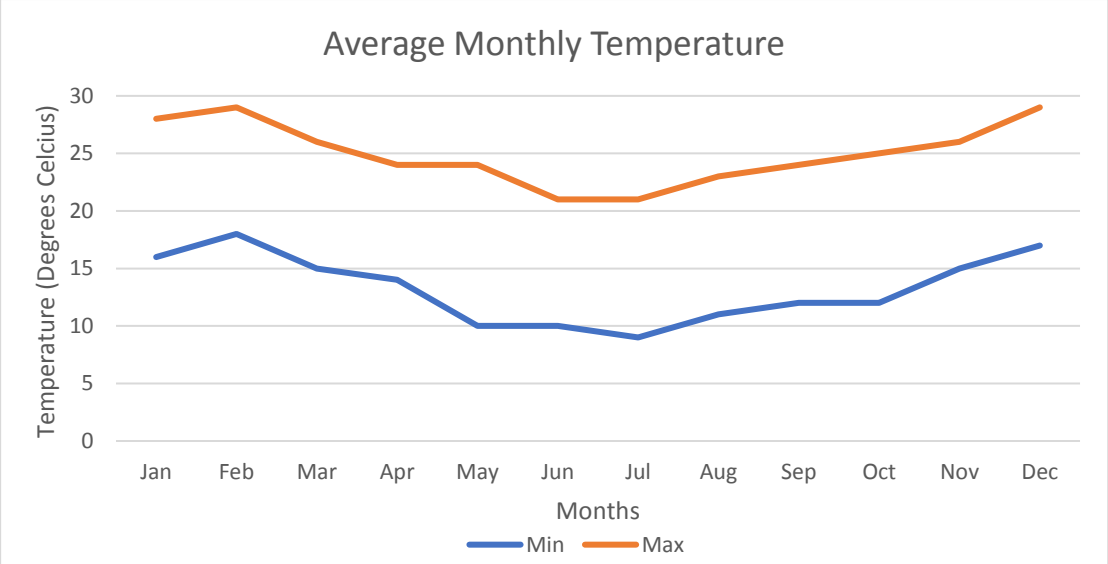


Figure 16: Average Monthly Minimum and Maximum Temperatures Between 2015 and 2018 (Sourced from Eswatini Meteorology Department 2018)

The subsequent figure (*Figure 17*) shows the average annual temperatures from 2015 to 2018. This is to show variation within the years and not just the monthly average totals. The figure shows a drastic decline in the average minimum temperatures; with the lowest temperature recorded in the year 2018. The lowest being 12.1 Degrees Celsius in 2018 while 14.4 Degrees Celsius in 2015. This shows a decrease by 2.3 Degrees Celsius. The maximum temperature dropped marginally to 24 Degrees Celsius in 2017. The temperatures continued to plateau out up to 2018. However, towards the end of 2018, there was a minute increase to 24.1 Degrees Celsius.

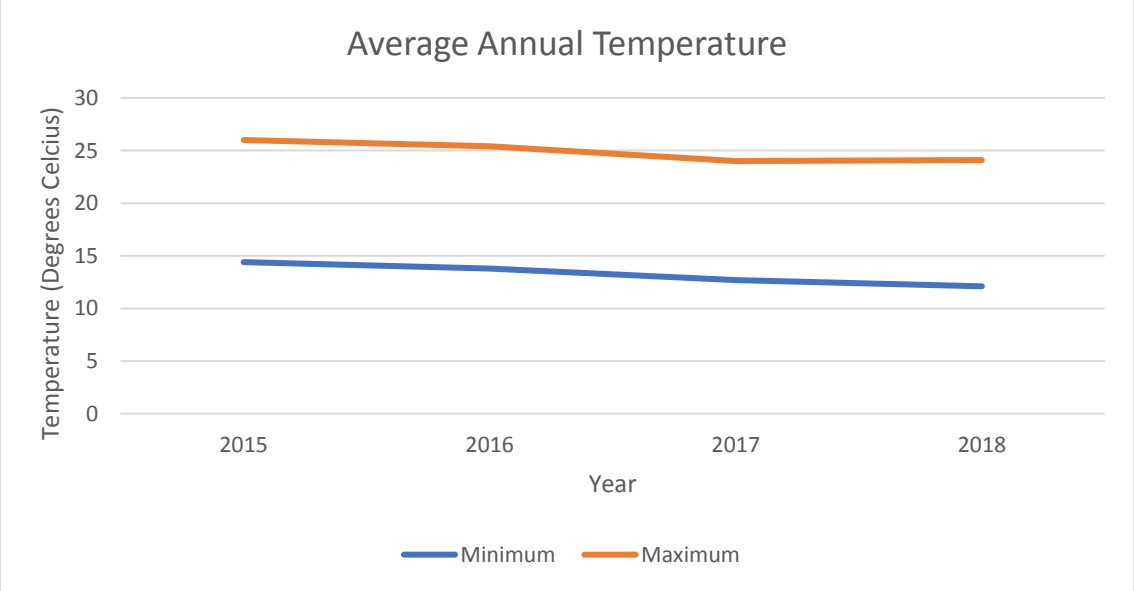


Figure 17: Average Annual Minimum and Maximum Temperatures (Sourced from Eswatini Meteorology Department 2018)

6.4 Topography

Eswatini is oval shaped and bestrides the dissected edge of South African Plateau. The elevation of the country decreases from west to easterly direction. There are four main geographical regions running longitudinal north to south and these are (Microsoft Encarta Encyclopaedia, 2002 and Mwendera, 2003).

- The mountainous westernmost portion, the Highveld, has an average elevation of 900 m to 1400 m and in some places it reaches an altitude of more than 1800 m above sea level;
- The hilly central Middleveld has an elevation of 400-800 m;
- The eastern Lowveld is a rolling area that averages from 120 to 130 m above sea level; and
- The Lubombo Mountains bound the Lowveld on the east.

Significant ridge areas are present in the region of the proposed project.

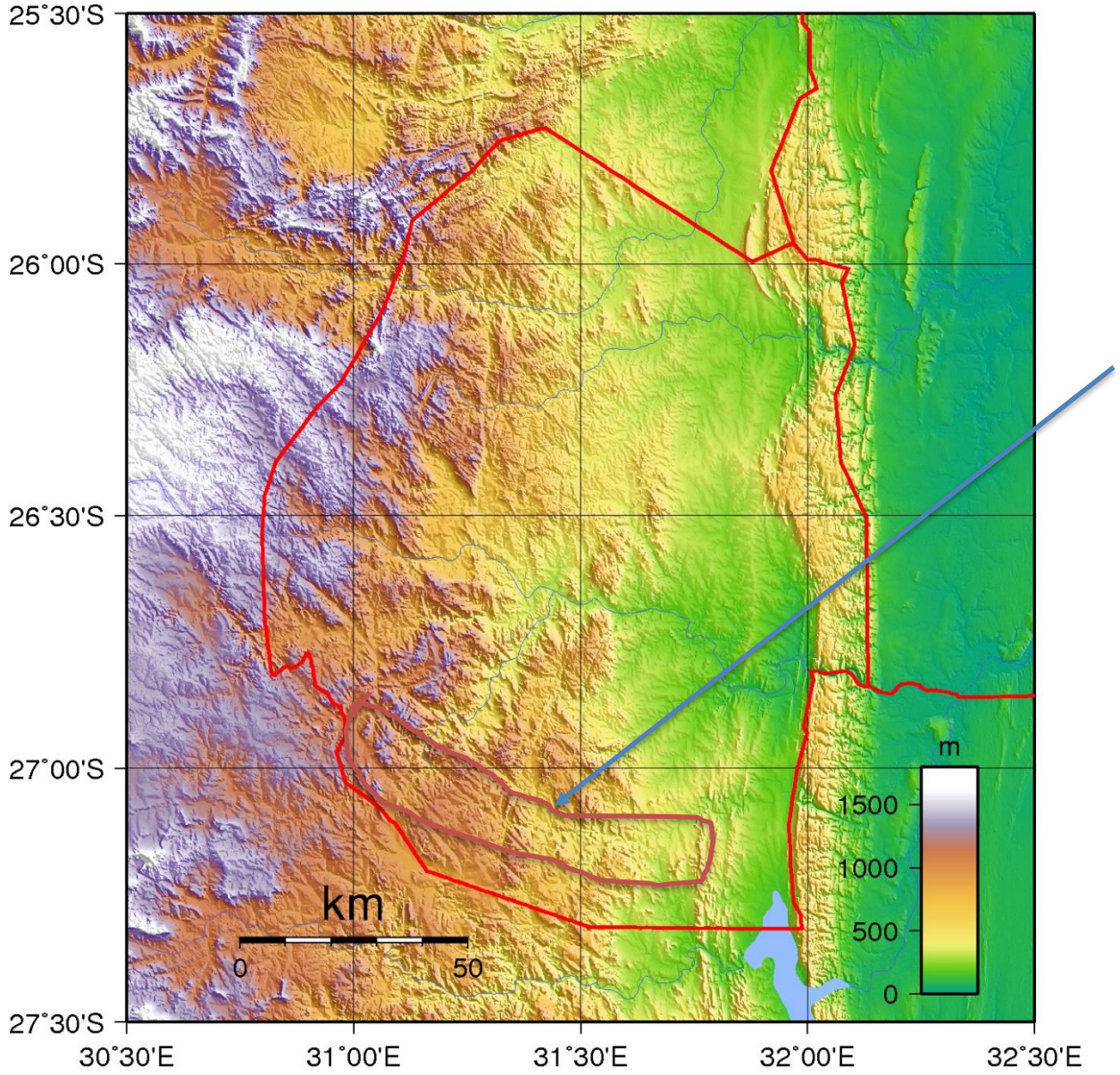


Figure 18: Topography of Eswatini

Source: Wikipedia

6.5 Biodiversity

6.5.1 Flora

1. Biodiversity

The Project is located in significantly modified natural habitats, including extensive rainfed farmland (much of which has been abandoned) and tree plantations, especially close to Nhlangano.

2. Flora

The vegetation of the area crossed by the Project is mainly secondary. It includes a mix of indigenous, alien and exotic plant species. The dominant indigenous trees include *Ficus sp.*, Blue berry trees, *Aloe Malothii*, *Acacia sp,* the marula tree*, Sclerocyrea birrea, Vengueria sp*, as well as grasslands with thorny bushveld tree species. The dominant exotic trees in the project area are: *Acacia mearnsii* (Black Wattle/ umtfolo wesilungu), *Eucalyptus sp*. (umgomu), Jacaranda trees and *Melia azedarach (*Umsilinga*)*. Dominant grass species include; *Digitaria sp, Eragrostis sp, panicum sp and Terminelia sp.alien.* Invasive species such as *Lantana camara* and *Chromolena odorata* are common in the project area and surroundings. The following photoplates and table 20 show some of the flora found in the project area.

Table 20:List of Flora in the Project Area

Scientific name	**Common name**	**Siswati Name**	**Comment**
Syzygium cordatum	Water berry	Umcozi	Indigenous
Psidium guajava	guava	Umgwava	Invasive
Lantana Camara		Emehlo akati	Alien invasive species
Pinus sp.	**Pine Tree**	**Umtfolo**	**Alien invasive species**
Sclerochiton harveyanus	Blue-lips	Mazabuka	Weed
Lannea discolor	Live-long	umnTfokolovu	Indigenous
Ozoroa engleri R. & A.Fern	White Resin Tree	imFuce lemhlophe	Indigenous
Ozoroa sphaerocarpa R. & A.Fern	Currant Resin Tree	imFuce lemnyama	Indigenous
Rhus chirindensis Baker f. R. legatii	Red Currant	inHlangushane lenkhulu	Indigenous
Rhus pentheri Zahlbr. R. cuneata	Crow-berry	inHlangushane, Sitsatsatsa	Indigenous
Sclerocarya birrea	Marula	umGanu	Indigenous
Monanthotaxis caffra (Sond.)	Dwaba-berry	siTitane, maSweleti, maSweti	Indigenous
Carissa bispinosa (L.)	Num-num	umVusankunzi, umBethankunzi	Indigenous
Cussonia spicata	Cabbage Tree	umSenge	Indigenous
Chromolaena odorata (L.)	riffid Weed, Paraffin Weed	Sandanezwe	
Vernonia myriantha	Eared Vernonia, Eared Bitter-tea, Blue Bitter-tea	liNyatselo	Indigenous
Kigelia africana	Sausage Tree	umVongotsi	Indigenous
Eucalyptus spp	Gum tree	Gomu	
Ricinus communis L	Castor Oil Bush	umHlafutfo	Indigenous
Pinus patula var. patula	Pine Tree	Sipheshula	Indigenous
Prunus persica	Peach	uMpetjisi	
Persea americana	Ovacado	uMkotapeni	
Englerophytum magalismontanum		umnumbela	Indigenous
Bidens bipinnata	daisy	Chuchuza	
Alternanthera sessilis	sessile joyweed	Imbuya	Herb
Corchorus argillicola	Jew's mallow	Ligusha	Herb
Pluchea bojeri	sunflower	Nukani, Shashasha	Herb
Vangueria cyanescens	Kalahari wild-medlar	Umntulwa	Indigenous

None of the species observed are protected under the Flora Protection Act, 2001

6.5.2 Fauna

There are 19 vertebrate species on the IUCN (2013) Globally Threatened Species list which are native to Eswatini. Of the 19 globally threatened vertebrate species, 6 are locally extinct in Eswatini. and 11 are found within Gazetted PAs. Of the 40 species of threatened plants recorded for Eswatini 29 occur within National PAs, a further 3 occur in Informal PAs and the balance except for one species (*Ficus sansibarica Warb.* ssp. *Sansibarica*) are found in potential new PAs.

A search of the available literature did not find any animal species on IUCN's Red data list in the area directly affected by the Project. This will be confirmed during preparation of the full ESIA. More generally, wildlife, particularly large mammals, is not abundant in the Project area, being limited according to locals to the occasional monkey and impala, which needs to be confirmed during by the full ESIA. Instead, areas not farmed are open rangeland used by cattle. Table 21 below shows the fauna species that are present in the region.

Table 21: Fauna Species in the Project Area

Species	**Common name**	**SiSwati name**
Chiroptera spp	Bats	Lilulwane
Lepus saxatilis	Scrub hare	Logwaja
Pronolagus crassicaudatus	Natal red rock rabbit	Logwaja
Cercopithecus mitis	Samango monkey	Ingobiyane
Chlorocebus pygerythrus	Vervet monkey	Ingobiyane
Papio ursinus	Chacma baboon	Imfene
Aethomys chrysophilus	Red veld rat	Ligundvwane
Aethomys ineptus	Tete veld rat	Ligundvwane
Aethomys namaquensis	Namaqua rock mouse	Ligundvwane
Sylvicapra grimmia	Common duiker	Impunzi
Poyntonophrynus fenoulheti	Northern Pygmy Toad	Sicoco
Schismaderma carens	Red Toad	sigogodvolo
Sclerophrys capensis	Raucous toad	sigogodvolo

None of the species known to be in the project area is contained in the red data list for protected fauna.

There are no protected areas within the project area and its vicinity.

6.6 Water Resources

6.6.1 Hydrology

The project area falls within the Usuthu River Basin. The main river flowing through Shiselweni is the Mkhondvo river, which is the source of water supply for the project. Its confluence with the Usuthu River is at Sidvokodvo. The figure below shows the main river basins of the country.

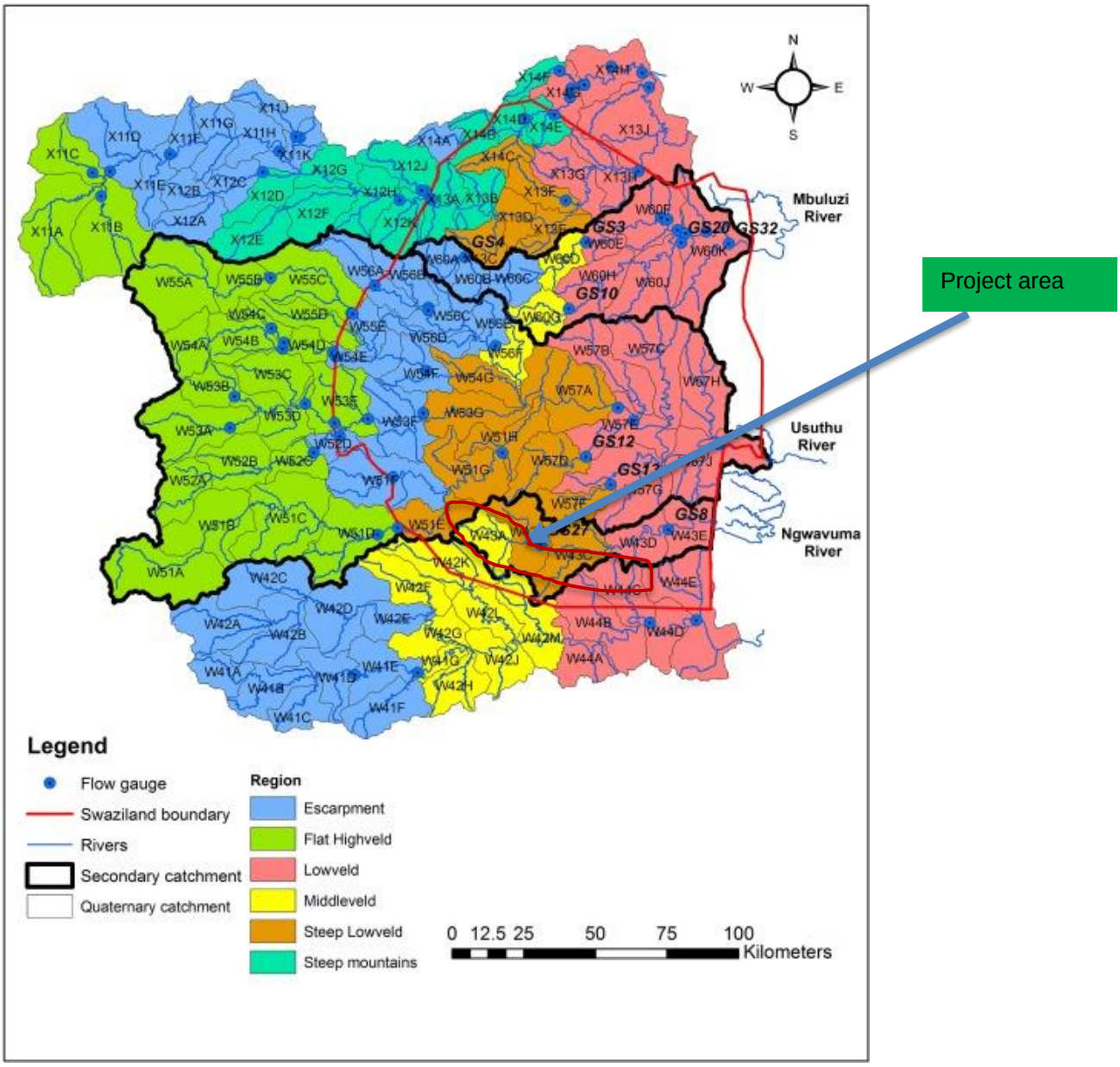


Figure 19:River Basins in Eswatini

6.6.1.1 *Mkhondvo River Flows*

The following table indicates the flow rate for the Mkhondvo River over the last 5 years

Table 22:Monthly Flow Rates for the Mkhondvo River

Year	Oct (m^3/s)	Nov (m^3/s)	Dec (m^3/s)	Jan (m^3/s)	Feb (m^3/s)	Mar (m^3/s)	Apr (m^3/s)	May (m^3/s)	Jun (m^3/s)	Jul (m^3/s)	Aug (m^3/s)	Sep (m^3/s)	Monthly mean	Monthly median
2011/12	2.831	4.052	3.208	19.66	14/47	6.322	-	1.309	1.180	1.061	0.9264	-	5.503	3.020
2012/13	-	-	-	25.40	14.93	15.30	14.09	8.750	3.749	1.659	0.7963	0.4293	9.458	8.750
2013/14	0.736	3.292	15.86	8.861	8.849	36.48	9.058	4.575	2.811	1.809	1.519	1.186	7.925	3.933
2014/15	2.782	4.556	16.00	11.07	5.509	2.527	1.766	1.191	0.7116	0.8102	0.6597	0.6861	4.030	2.147
2015/16	0.7105	0.4951	0.7972	1.827	2.083	6.114	1.134	1.023	0.7921	0.7501	0.7198	0.7080	1.429	0.7946
2016/17	0.9143	3.857	2.147	3.710	3.334	5.520	1.917	1.142	0.4603	0.8403	0.7275	0.06084	2.113	1.530
2017/18	-	-	9.398	6.863	6.310	11.36	7.643	3.054	1.632	1.1213	1.170	-	5.405	6.310
Mean	2.631	4.910	9.763	10.13	9.534	9.002	4.324	2.177	1.410	1.264	0.9497	1.176		
Median	2.275	3.448	6.936	6.664	6.310	6.218	2.236	1.369	1.137	1.048	0.7242	0.7080		
Max	10.13	17.01	62.55	68.04	36.38	36.48	14.17	8.750	4.233	4.401	3.150	5.462		
Min	0.1554	0.4951	0.3867	0.9380	0.6058	0.4691	0.4806	0.3757	0.1801	0.3216	0.2333	0.2215		

Source: Ministry of Natural Resources and Energy, DWA

The lowest flow rate for the river in the past 5 years was experienced in October, which was 0.1554m^3/s which translates to 4,900,694.4m^3 per year. This lowest minimum flow rate (which is the worst-case scenario in 5 years) can accommodate the allocated quota of 1,866,240m^3 per year. It therefore leaves enough water for downstream use and aquatic life.

6.6.2 Water Quality

Along the MR11, there several small, seasonal streams namely; Mahosha, Mthongwane, Mantambe 1 and Mantambe 2. The following table indicates the water quality for Mkhondvo River at the abstraction point and the different streams that are along the MR11.

Table 23: Water Quality of streams in the project area

Parameter	Unit	Mkhondvo**	Mohosha	Mantambe 1	Mantambe 2	Mthongwane	Water Quality Standard*
Turbidity	NTU	34.05					5
Electrical Conductivity	µS/cm	132.1	118	378	470	57	1800
Dissolved Solids	ppm	69.2	59	189	235	29	-
TSS	ppm	178	8	10	20	12	-
DO	ppm	5.87					>4
Total Alkalinity	ppm	37.33	41	202	246	11	
Salinity	ppm	0.08					-
Total Hardness	ppm	33	17	127	160	2	1000
Faecal coliforms	Per 100ml		200	400	710	75	1-10
Total Coliforms	Per 100ml	80.5					1-10
pH	-	7.95	6.6	8.3	8.5	6.5	6.5 - 8.5
Cl	ppm	6.04	12	18	24	4	-
Fe	ppm	0.133	0.971	0.707	1.220	1.234	1
COD	ppm	17.59					10
NO_3	ppm	3.40	0.1	0.3	0.1	0.1	10
PO_4	ppm	0.19					-
NH_4	ppm	0.042	0.01	0.02	0.01	0.03	0.6
Flouride	ppm		0.1	0.8	0.5	0.2	1
Ca	ppm		3.51	24.40	37.44	0.787	0.2
Na	ppm		14.92	36.55	44.01	8.34	-
Mg	ppm		3.97	24.49	27.50	0.775	-
K	ppm		2.75	0.48	1.25	0.95	-
Pb	ppm		0.007	0.00	0.00	0.00	-
Cu	ppm		0.00	0.007	0.00	0.001	-

*Water Pollution Control Regulation, 2010; **Ministry of Natural Resource and Energy data

6.6.2.1 *Water Quality for raw and treated water at Masibini*

Table 24: Raw and Treated Water Quality For Mkhondvo At Abstraction

Parameter	Unit	Raw water	Treated	Drinking Water Standard*
Turbidity	NTU	6.5	0.975	1
pH	pH Units	7.6	7.3	6.0-9.0
EC	µS/cm	118	120	100
Colour		49.75	12.8	15

TSS	ppm	65.75	1.5	25
TA	ppm	49.75	47.8	400
SO4	ppm	8.3	9.05	200
Cl	ppm	15.8	43.79	1.2 - 10
Total Coliforms	Per 100mL	500	25.8	Not detected
E. Coli	Per 100mL	250.3	6	Not detected

*SWSC Drinking Water Standards

The table above indicates that the water treatment system at Masibini does not adequately remove total coliforms and E. Coli. This needs to be addressed for the treatment process to comply with drinking water standards.

6.7 Noise

Along the project route, sensitive receptors are located and include towns and settlements. Sensitive receptors also include schools, hospitals which are likely to be affected by construction noise. A detailed analysis aimed at identification of such sensitive receptors including distance with respect to construction site/route will be undertaken during the detailed design and will definitively identify the noise related impacts of the project on sensitive receptors and in comparison with the WBG noise level guidelines. The Government of Eswatini does not have noise level guidelines.

6.8 Roads

Some of the roads in the region are outlined below

- National Route 11 (MR11) – The road runs from Nhlangano, towards Lavumisa. The associated traffic on the road is classified as low, consisting out of mainly light vehicles (greater portion of mini-taxis) and <5% heavy vehicle make-up of the total traffic amount; and
- Unpaved road (D8) – from turning off the MR11 towards Hlathikhulu at Hluthi, past Hosea Inkhundla, with one of the laterals running along it.
- Unpaved road (MR21) – from turning off the MR11 towards Nsalintje border gate at Siphambanweni
- Tarred road (MR9)- toward Mahamba

6.8.1.1 *Identified Sensitive Receptors*

The table below presents the relevant sensitive areas selected for further analysis. The following table indicates the identified sensitive receptors.

6.8.1.1.1 Schools

Table 25: Schools in the Project Area

School	Distance from MR11
Kuthuleni High School	4.3 km
Othandweni Primary School	2.8 km
Ngwane Central Primary School	2.6 km
Ngwane Central High School	2.4 km
Mabamba Primary School	5.4 km

School	Distance from MR11
Nkoneni Primary School	4.5 km
Mthonjeni Primary School	5 km
Mantambe Primary School	7 km
Manyandzeni Primary School	3.1 km
Themba Primary School	6.1 km
St. Juliana's Primary School	1.8 km
Bhejisa Primary School	1.3 km
Hluthi Central Primary School	39.4 m
Our Lady of Sorrows High School	3 km
St. Benedict's Primary School	1.6 km
St. Maria Primary School	197 m
Hosea Secondary School	8.1 km
Jericho Primary School	5.3 km
Patmos Primary School	10.4 km

The furthest schools from the MR11 road are Patmos Primary School and Hosea Secondary School located 10.4 km and 8.1 km correspondingly. Schools closest to the MR11 road are Hluthi Central Primary School and St. Maria Primary School at 39.4 m and 197 m away respectively.

6.8.1.1.2 Other Establishments

Table 26: Establishments in Surrounding Areas

Name	Type	Distance from MR11
Hluthi Clinic	Clinic	47 m
Mahosha Church of the Nazarene	Church	15.3 km
Makhoza E.C	Church	1.9 km
Emantungwa Restaurant	Commercial establishment	1 m
Benguni Chemist	Commercial establishment	59 m
Nhlangano Casino Royale	Commercial establishment	104m
T's Tools	Commercial establishment	11.4 km
Hluthi Petrol Station	Commercial establishment	1 m
Amitofo Care Centre of Eswatini	Orphanage	3.4 km

Hluthi Police Station	Police station	300m

6.9 Existing Water Supply Schemes

The project area has several water supply schemes that are developed mainly by the Rural Water Supply Branch under the Department of Water Affairs. Hosea Inkhundla has 61 Water Supply schemes (11 Macro and 50 Micro). Shiselweni 1 has 34 (14 Macro and 20 Micro) and Zombodze Emuva has 25 Schemes (13 Macro and 12 micro). The following table outlines number of water schemes that have been developed in the Shiselweni Region. The micro schemes are supplied from three kinds of infrastructure sources which include: either boreholes or hand dug well or protected springs infrastructure. The infrastructure for macro schemes is focused mainly on the standpipes, water storage facilities and pipeline since these are key in the provision of potable water to communities.

Table 27: Distribution of Water Schemes by Inkhundla

Region	***Inkhundla***	**Macro**	**%**	**Micro**	**%**	**Total**
Shiselweni		**214**	36	**377**	**64**	**591**
	Gege	27	60	18	40	45
	Hosea	11	18	50	82	61
	Kubuta	17	68	8	32	25
	Maseyisini	25	51	24	49	49
	Matsanjeni South	16	12	122	88	138
	Shiselweni II	23	64	13	36	36
	Mtsambama	22	79	6	21	28
	Ngudzeni	10	59	7	41	17
	Nkwene	11	85	2	15	13
	Sandleni	8	33	16	67	24
	Shiselweni 1	14	41	20	59	34
	Sigwe	11	18	51	82	62
	Somntongo	6	18	28	82	34
	Zombodze Emuva	13	52	12	48	25

Source: Ministry of Natural Resources and Energy

6.9.1 Functionality and Distribution status of Existing RWSS

Of the existing water schemes, 67% are functional under Hosea Inkhundla, 65% under Shiselweni 1 and 64% under Zombodze Emuva. The table below illustrates the functionality of Water schemes in the Shiselweni Region.

Table 28: Functionality of Water Schemes

Region	*Inkhundla*	Functional	%	Not Functional	%	Partially Functional	%	Total
Shiselweni		**387**	**65**	**177**	**30**	**27**	**5**	**591**
	Gege	36	80	8	18	1	2	45
	Hosea	41	67	18	30	2	3	61
	Kubuta	11	44	12	48	2	8	25
	Maseyisini	31	63	17	35	1	2	49
	Matsanjeni South	93	67	41	30	4	3	138
	Shiselweni II	25	69	11	31	0	0	36
	Mtsambama	22	79	3	11	3	11	28
	Ngudzeni	9	53	5	29	3	18	17
	Nkwene	7	54	3	23	3	23	13
	Sandleni	13	54	11	46		0	24
	Shiselweni 1	22	65	10	29	2	6	34
	Sigwe	41	66	18	29	3	5	62
	Somntongo	20	59	14	41	0	0	34
	Zombodze Emuva	16	64	6	24	3	12	25

Source: Ministry of Natural Resources and Energy

6.9.2 Socio Economic Baseline

6.9.3 Background

Shiselweni Region has one of the highest rates of poverty in the country, with 21.1% of the population living below the extreme poverty line. The main source of livelihood is agriculture, predominantly livestock and rain fed subsistence farming. The region is also characterized by climate variability with recurring droughts and is prone to portable water shortages and inadequate supply from the Jozini dam.

The region comprises 14 Tinkhundlas (administrative subdivisions) and its administrative center is Nhlangano. The population size for the serviced enumeration area is approximately 18,478 (2017 data) of which 65% is rural and 35% urban for purposes of water consumption calculations (based on lifestyle and homesteads). The majority of the communities to be served by the project live in geographically dispersed rural villages along the main road and scattered around the hill-tops and valleys with agriculture being the main economic activity.

Due to severe water shortages in the project area, a significant percentage of rural households obtain their drinking water from boreholes which are also used by livestock. There are a few water kiosks in the area selling 20 litres of water for SZL0.20.

The pipeline traverses through an existing road reserve which is a built up, already disturbed rural area.

The total population of the three target Tinkhundla: Zombodze (14,231), Hosea (14,733) and Shiselweni I (9,269)-total 38,233) will benefit from improved sanitation services.

6.9.4 National level

6.9.4.1 *Population*

The population of Eswatini is 1093238 and the population density is 63 people per square metre. It is largely rural with the population of Eswatini concentrated in the Hhohho and Manzini regions. Fifty three percent (51%) of the Eswatini population are female whilst 49% are male (Central Statistical Office, 2017).

6.9.4.1.1 Source: Swaziland **Population** Projection 2007 -2030

Population	2007	2017	2018	2019	2030
Total Population	1,020,102	1,145,970	1,159,250	1,172,433	1,303,090
Male population	482,209	544,811	551,317	557,760	620,793
Female population	537,893	601,159	607,933	614,673	682,297
Percent 0-4	13.0	13.3	13.2	13.1	11.5
Percent 5-14	25.7	23.1	23.1	23.0	22.6
Percent 15-49	50.8	53.4	53.5	53.6	54.4
Percent 15-59	55.8	58.5	58.6	58.8	60.6
Percent 60+	5.5	**5.1**	**5.1**	**5.1**	5.4

Source: Swaziland Population Projection 2007 -2030

6.9.4.1.2

6.9.4.2 *Poverty levels*

A majority of the population (58.90%) in Eswatini lives below the poverty line, but only 20.1% live below the extreme poverty line. The percentage working poor is 38.90%. More people living below the poverty line live in the rural areas (70.15%) than urban areas (19.55). The national poverty gap is 24.9%. Amongst the 4 regions of Eswatini, Lubombo has the highest percentage, followed by Shiselweni. Manzini has the lowest after Hhohho. The poverty gap and percentage of people living under extreme poverty follows the aforementioned trend.

6.9.4.3 *Household income and consumption per Capita*

The national average household income per capita is SZL1651, and the consumption average per capita is SZL1074. The percentage entrepreneurship rate is 27.69%. A majority of enterprises (66.45%) have a female decision maker. This indicates that women in Eswatini are more empowered than man to run their own businesses.

6.9.4.4 *Education Levels*

The country has a 91% enrolment rate for primary education. At secondary level (form 1 to 5), the enrolment rate drops to 51.25%. This may be attributed to the access to the free primary education, which then makes the literacy for the country to be 94.61%, with males having a higher literacy rate (95.64%) than females (93.77%). The average money spent on education per household is SZL1,114.54 (CSO, 2017).

6.9.4.1 *Health*

The total percentage of the population with impairment is at 18.13%. The healthcare affordability for the country is about 80%. The average distance travelled to a health facility is 11.36 km. The national average health expenditure is SZL649.93 per year per household.

6.9.4.2 *Water Supply and Sanitation*

At a national level 29.9% of the population has functional connection to the EWSC grid and a further 11.76% get water from functional community taps. 75.6% use improved sources of drinking water; 12.8% use unimproved drinking water using appropriate treatment methods and 77.43% are engaged in water harvesting. In terms of sanitation 53.68% have access to safely managed; none shared Sanitation facilities. The Shiselweni region as whole lags behind the three other national regions in terms of improved water and sanitation. The following table indicates the percentage of improved drinking water by region and percentage improved sanitation respectively.

Table 29: Improved Sources of Drinking Water by Region

Region	% to improved sources of drinking water
Hhohho	79%
Manzini	79.5%
Shiselweni	***65.7%***
Lubombo	71.9%

(Source: CSO, 2017)

6.9.5 Regional Level

6.9.5.1 *Population*

6.9.5.1.1 Population by Region and Sex

The following table presents the distribution of the population in each of the regions by sex.

Table 30: Population Distribution by Region and by Sex

Region	Total Population Census: 2017	Male		Female	
		Total	%	Total	%
Hhohho	320, 651	158,229	49	162,422	51
Manzini	355,945	172,470	48	183,475	52
Shiselweni	204,111	96,000	47	108,111	53
Lubombo	212,531	104,412	49	108,119	51
Total	1, 093,238	531,111		562,127	

Source: CSO 2017

Table 30 indicates that all the regions have a higher percentage of females than males. Shiselweni has the lowest male to female ratio (0.89), followed by Manzini (0.92). Hhohho and Lubombo have the highest ratio, both at 0.96.

6.9.5.1.2 Population by Age Group and Sex: Shiselweni

Table 31 shows the breakdown of the population in the Shiselweni region by age.

Table 31: Population Age Group and Sex in the Shiselweni Region

Age group	Total	Male	Female
0-14	79,823	39,687	40,136

15-29	58,409	28,700	29,709
30-44	30,638	13,835	16,803
45-59	18,174	7201	10,971
60-74+	16,334	6179	10,155
All Ages	204,111	96,000	108,111

Source: CSO 2017

Table 27 indicates that the majority (68%) of the population in the Shiselweni Region is below 29 years, and at these ages, the majority is female. The trend observed in the region is consistent at national level. Noteworthy is that the male - female ratio drops significantly in the region at ages above 45 years.

6.9.5.2 *Poverty levels in the Shiselweni Region*

Sixty Seven percent (67%) of the Shiselweni population lives below the poverty line, and a further 21.1% lives under extreme poverty. The poverty for the Shiselweni Region is 28.3%.

6.9.5.3 *Water supply and Sanitation*

Only 56 percent of the population in this region have access to an improved source of drinking water and 19.7 percent have access to improved sanitation. Approximately 35 percent of this target group use piped water, 13 percent use tube well/borehole, 10 percent use an unprotected well (an unimproved source) and most of the remainder use surface water (24 percent). Most of the population (68 percent) does not have access to drinking water on their premises and a total of 31 percent must travel more than 30 minutes to collect water (both improved or unimproved source). A total of 12 percent of the population openly defecate and 17 percent of households were observed as having a place for handwashing.

6.9.6 Targeted Tinkhundla Level

6.9.6.1 *Population by Age group and Sex*

The following table presents the age distribution of the population in the three targeted Tinkhundla.

Table 32: Age and Sex Distribution in Targeted Tinkhundla

Age Group	Target Tinkhundla									% targeted all Tinkhundla	
	Zombodze			Hosea			Shiselweni 1				
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
0- 14	2617	2929	5546	2602	3144	5746	1697	1918	3615	49	51
15-29	1946	2178	4124	1935	2338	4273	1262	1426	2688	46	54
30-44	1007	1127	2134	1001	1209	2210	653	738	1391	46	54
45-59	604	760	1364	600	726	1326	392	443	835	45	55
60-74+	537	601	1138	534	645	1179	348	393	741	46	54
All age	**6710**	**7521**	**14231**	**6671**	**8062**	**14733**	**4351**	**4918**	**9269**	**46**	**54**

Table 32 indicates a higher female population in all three constituencies. Zombodze has the highest male to female ratio (0.89), followed by Shiselweni 1 (0.88). Hosea has the lowest ratio (0.83). The highest population is below 29 years in all constituencies.

6.9.7 Baseline survey on Project Area

A quantitative survey was carried for the proposed project area. The questionnaire used in the survey has been attached as Appendix 12. The survey sample size for the targeted constituencies is 5,761, which is about 15% of the population of the targeted constituencies. This covers 342 households in the targeted constituencies.

6.9.7.1 *Household Composition*

6.9.7.1.1 Household Characteristics

A household rather than a homestead was to be the unit of enumeration because this is the smallest level of resource sharing. The cooking arrangement international definition of a household was used, which is defined as a person or persons who may be related or unrelated, who share at least one meal per day ("Lidladla, noma badla bhodo linye"). Since no list of households was available from Bucopho, homesteads were selected using random sampling, and thereafter all households in selected homesteads were interviewed. The following table presents the household characteristics by sex and age in the constituencies.

Table 33: Household Characteristics

Characteristics	Targeted Tinkhundla				Total	Percentage
	Zombodze	Hosea	Matsanjeni	Shiselweni 1		
Sex of Head of Household:						
Male	92	85	13	55	245	71.6
Female	31	42	6	18	97	28.4
Total	123	127	73	19	342	100
Number of people in the households by age						
Infants (0- 4 years)	615	645	95	365	1,720	29.9
Children (5-14 years)	675	685	100	410	1,870	32.5
Adults (above 15 years)	773	788	140	470	2,171	37.7
All age	2,063	2,118	335	1,245	5,761	100

Table 33 shows that in the 342 households, 71.6% of the households are headed by males while 28.4% of the households are headed by females, mostly widows. The Zombodze Inkhundla has the highest number of male headed households (92), while the Matsanjeni inkhundla has the least number of male headed households. The Hosea Inkhundla on the other hand has the highest number (42) of female headed households.

The above table also presents the number of people by age in the targeted Tinkhundlas. 2,118 people are from Hosea; 2063 people were sampled from Zombodze; 1,245 are from Shiselweni1 and 335 are from Matsanjeni inkhundla. 62.4 % of the sample are infants and children between the ages 0 to less than 15 years. Adults aged above 15 years constitute only 37.7% of the entire sample size. This shows that the area has a higher dependency ratio since children are more than adults.

6.9.7.2 *Sex of Respondents Per Constituency*

In all the constituencies, female respondents were more than the males as shown in the following. The Hosea constituency recorded the highest number of females (90) and 37 males; Zombodze Emuva recorded 76 females and 45 males; in Shiselweni 1, there were 43 females and 33 males. This is illustrated in the following graph.

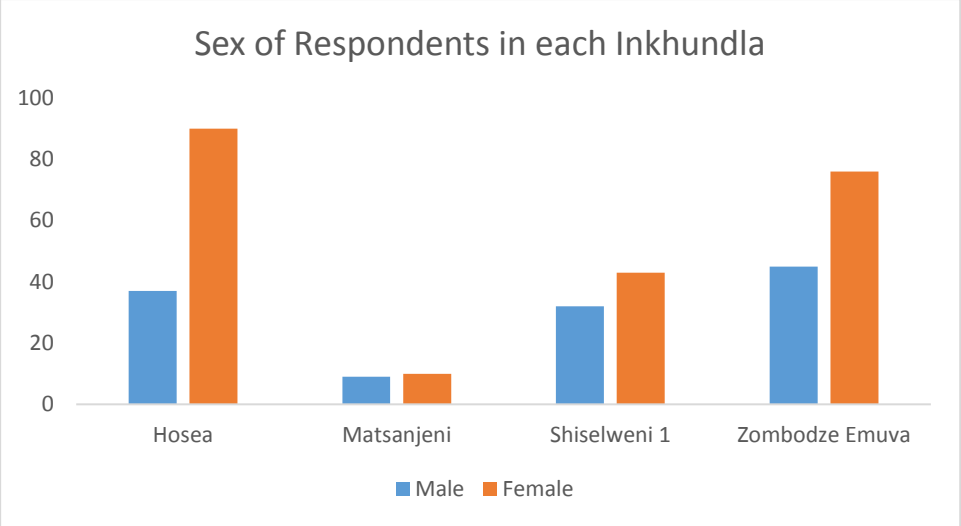


Figure 20:Sex of Respondents by Constituency (Inkhundla)

6.9.7.3 *Economic Status of the Households*

It is very important to investigate the economic status of the households in order to ascertain they will afford to pay for the proposed water supply that will be provided by the Eswatini Water Services Corporation.

6.9.7.3.1.1 Average Monthly income per Household

The following pie chart illustrates the average monthly income per household in the project area.

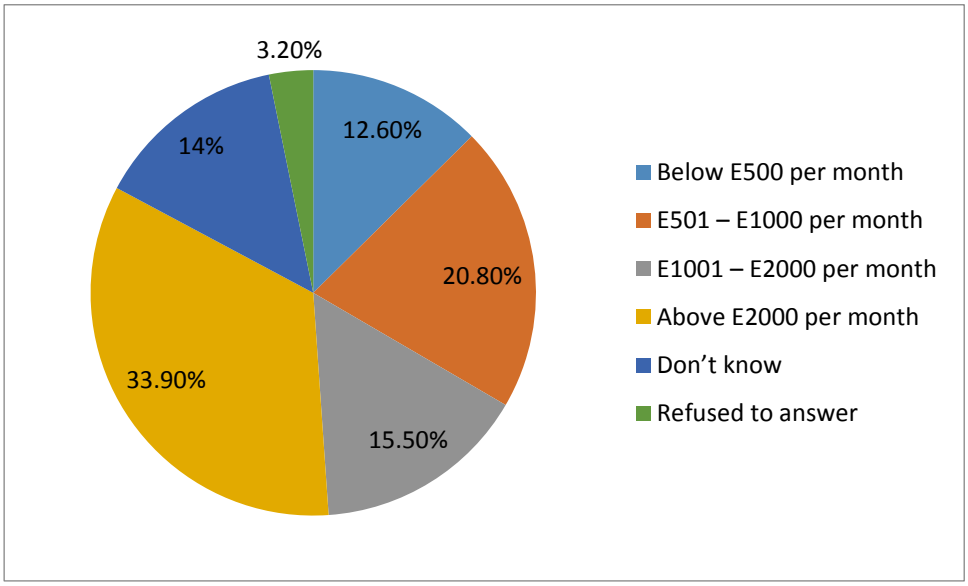


Figure 21: Average Monthly Income per Household

Figure 21 shows that the majority of the households on average have a monthly income above E2000. About 21% of the households have an average monthly income between E1000 and E2000. 45.3% of the households have an average monthly income below E1000, most of these households depend on the elderly grant for income.

6.9.7.3.1.2 Main Sources of Income for the Households

Respondents were asked to list the main sources of income for their households. The results are presented in Figure 22 by constituency:

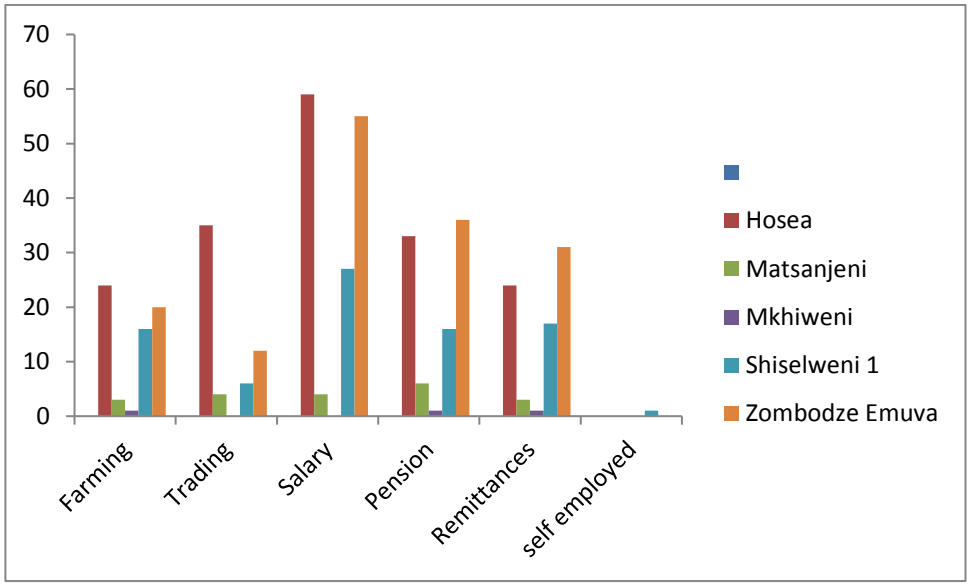


FIGURE 22: MAIN SOURCES OF INCOME BY CONSTITUENCY

Figure 22 shows that in almost all the constituencies the main source of income is the salary. Other sources of income for the respondents include the pension, remittances, trading and farming. It is interesting to note that households in this region are highly dependent of salaried income and only one respondent (0.3%) from the Shiselweni 1 constituency is self-employed.

6.9.7.3.1.3 Highest Expenditure Item in the Household

Expenditure on food (88%) is the most highly ranked item in all the constituencies. This is shown in Table 34 below:

Table 34: Main Expenditure Items for Households

Household Expenditure	Number of Respondents	Percentage
Food	302	88
Electricity	24	7
School Fees	10	3
TV /Radio	6	2
Total	**342**	**100**

Other expenditures include; electricity consumption (7%), school fees (10%) and TVs & radios (2%). This region spends more on consumables than saving or investing their excess income. One respondent out of the 342

respondents is self – employed. The region needs to be oriented on how to start their own businesses so that they can learn to save and invest their proceeds.

6.9.7.4 *Education Levels*

The following table presents the education levels attained in the project area.

Table 35: Education Level Attained by Households in Each Inkhundla

Name of Inkhundla	What is the highest education level attained by the members of your household?							Total
	None	Primary level	Secondary level	High school	College	University	Vocational	
Zombodze Emuva	1	7	36	55	8	14	2	123
Hosea	0	12	41	57	7	9	1	127
Shiselweni 1	0	12	17	34	5	5	0	73
Matsanjeni	0	3	5	11	0	0	0	19
Total	1	34	99	157	20	28	3	342

Table 35 shows that about 46% of the households have completed high school, while 30% of the respondents have completed Secondary school. The tertiary level completion rates are very low. Complete illiteracy is a reality in the area, and this is attributable to them having to acquire work to support their families at the earliest age possible.

6.9.7.5 *Water Supply*

6.9.7.5.1 Access to Safe Water Sources

The following table illustrates the different sources of water supply used in the project area and frequency of use.

Table 36: Sources of Water Supply by the Households in the Constituencies

Sources of Water Supply	**Frequency**	**Percent**
Stream/River/ Pond	97	28.4
Unprotected well without concrete lining or cover	69	20.2
Rainwater collection	30	8.8
Hand dug well with hand pump	1	0.3
Borehole with hand pump	49	14.3
Public taps	30	8.8
Piped into yard	19	5.6
Protected well	15	4.4
Community tank	7	2.0
Dam	1	0.3
Buy the water	6	1.8
Spring	18	5.3

Sources of Water Supply	Frequency	Percent
Total	342	100.0

Table 36 presents the types of water sources where the households fetch water for drinking. The majority of the households (82.3%), drink untreated/unsafe water from the dams, rivers, unprotected wells some of which are hand – dug.

6.9.7.5.2 Responsibility for Collecting Water from the Water Sources and Associated Risks

It is estimated that 59% of women and girls in targeted areas are responsible for collecting water. Carrying the responsibility for collecting water can also be very dangerous for women and girls. They can face conflict at water points and the risk of physical or sexual assault. Many of these dangers also arise when women and girls do not have access to safe and clean water and have no access to private toilet or latrine for urinating, defecating and managing menstruation.

6.9.7.5.3 The Times for Fetching water from the source

The early morning hours (before 9am) are the best times for households to fetch water from the source. The respondents cited reasons including that in the early morning hours, the water is clean compared to the afternoon time where livestock has starred the mud from the source. Additionally, the sun in the morning is not as hot as in the noon and afternoon times. This is illustrated in Figure 23 below.

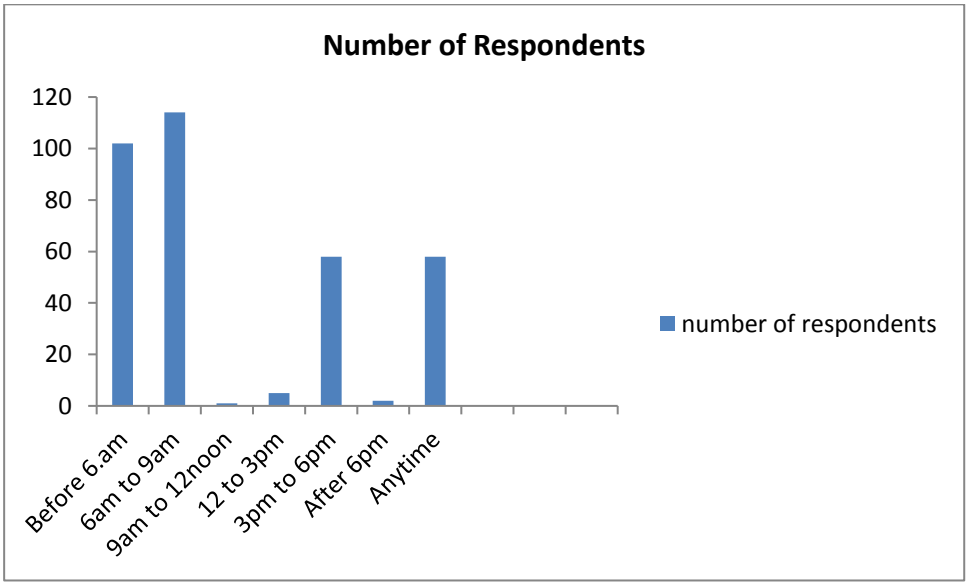


Figure 23: Times for Fetching Water from the Source

6.9.7.5.4 The Time it Takes to Fetch Water from the Source

Respondents were asked to state the time it takes them to fetch water from the source. Their responses are presented in the following bar graph.

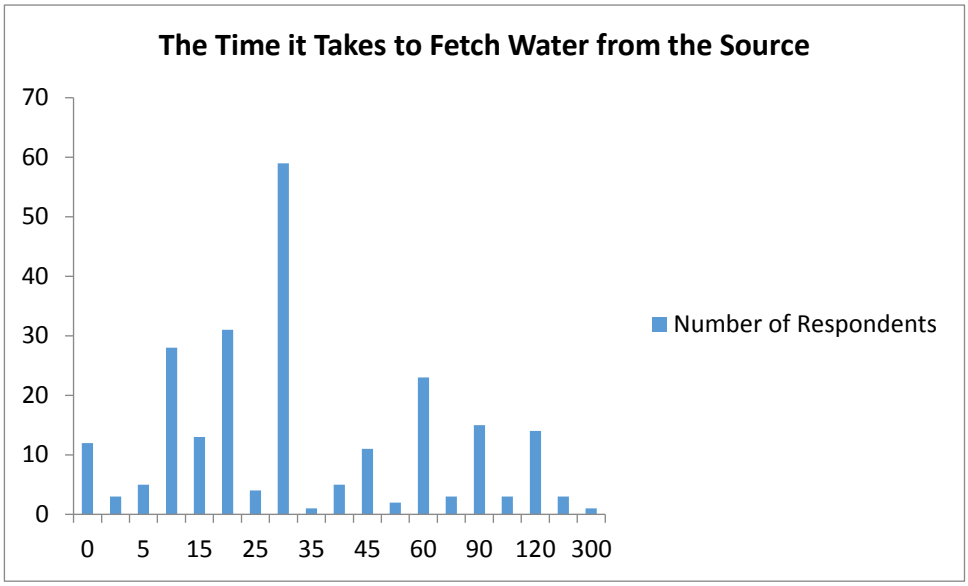


Figure 24: The Time it Takes to Fetch Water from the Water Source

Figure 25 demonstrates that the majority (51%) of the respondents reported that it takes them less than 45 minutes to fetch water from the source. The highest number of respondents (17.3%) reported that it takes them about 30 minutes to fetch water from the source. 49% spend more than an hour to collect water from the source. Any time above 10 minutes indicates that generally most of the respondents walk long distances to get water from the source. There is a great need for clean and accessible water supply in the region.

6.9.7.5.5 Means of Transport to Ferry Water from the Source

Table 37 shows that only 8% of the respondents use transport to ferry water from the source. The remaining 92% carry plastic containers on their heads. The few respondents that use transport to ferry water from the source mostly use wheelbarrows and tractors.

Table 37: Means of Transporting Water from the Source by Tinkhundla

Name of Inkhundla	Means of transporting water from the source by constituency							Total
	car	Donkey	Tractor	Truck	van	water tank	wheelbarrow	
Hosea	1	1	4	0	1	2	2	9
Matsanjeni	0	0	0	0	0	0	0	0
Shiselweni 1	0	0	0	1	0	0	2	1
Zombodze Emuva	0	0	6	1	0	0	8	7
Total	1	1	10	2	1	2	12	17

Figure shows the responsibility for collection of water from the various water sources in the project area.

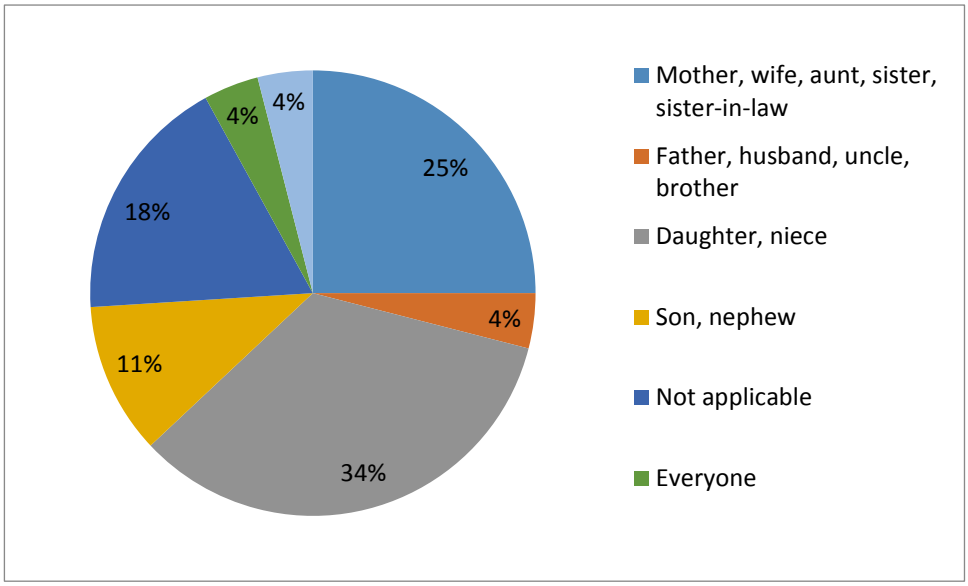


Figure 25: Responsibility for Collecting Water from the Water Sources

It is the responsibility of the females to collect water from the sources. Figure 26 shows that 59% of the female respondents collect water for the households.

6.9.7.5.6 Interruptions in Water Supply

Table 6 below shows that within the past 6 months there were no major breakdowns (72%) in the drinking water supply. This is because most of the water sources that are perennial. The constituencies that have had some breakdown are those communities that use boreholes that had to be closed down so that the community leaders could organise someone to fix the problem. The responses are summarized in the subsequent table.

Table 38: Interruptions/Breakdowns in the Drinking Water Supply From the Main Source in the Past 6 Months

Name of Inkhundla		Did your household experience interruptions/ breakdowns in the drinking water supply from the main source in the past 6 months			Total
		Yes	No	Dont know	
	Hosea	32	90	4	126
	Shiselweni 1	20	51	2	73
	Zombodze Emuva	26	94	1	121
Total		**85**	**247**	**7**	**339**

6.9.7.6 *Sanitation*

Sanitation is the effective use of tools and actions that keep our environment healthy. These include latrines or toilets to manage waste, food preparation, washing stations, effective drainage and other mechanisms. In the immediate environment, exposed faecal matter will be transferred back into people's food and water resources, helping to spread serious diseases such as cholera. Beyond the community, the lack of effective waste disposal or sewerage systems can contaminate ecosystems and contribute to disease pandemics. Also having access to private toilet or latrine for urinating, defecating and managing menstruation can: i) prevent the danger associated with harassing and abusing women and, ii) reduce girls' school dropout rate.

6.9.7.6.1 Types of Toilet Facilities used by Households

Evidence from a baseline study covering Nhlangano to Siphambanweni shows that in all the constituencies over 70% of the households use the improved type of pit latrine. 21% of the households use the traditional type of pit latrine. This is shown in Figure 26 below. An improved pit latrine is the one that has a ventilation pipe from the pit to above the toilet structure, while the basic or traditional pit latrine does not have the ventilation pipe.

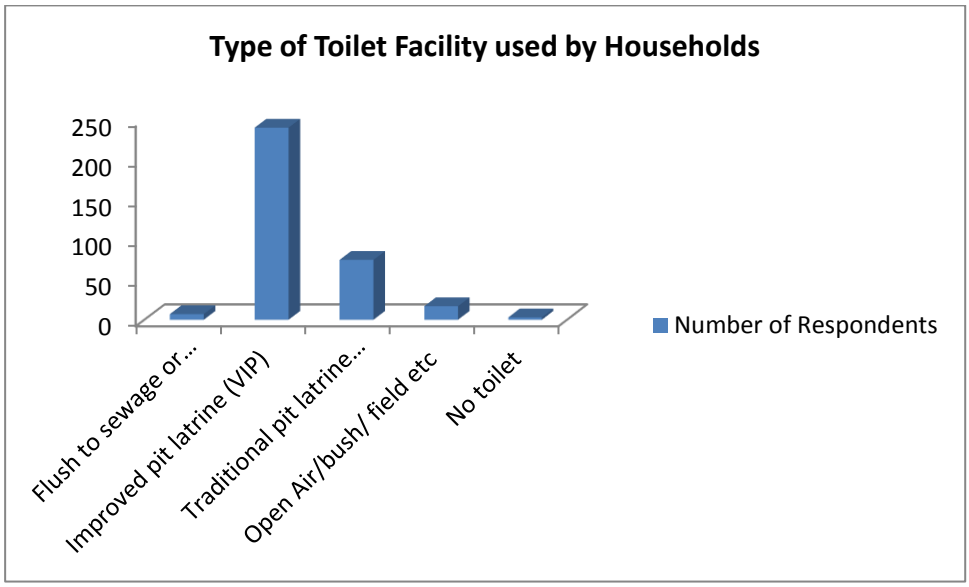


Figure 26: Type of Toilet Facility Used by Households

About 6% of the respondents do not have a toilet facility and they use the bush, open air and fields. The constituencies that reported that they do not have a toilet facility and they use the bush, open air and fields are: Hosea (7 respondents), Shiselweni 1 (6 respondents) and Zombodze Emuva (5 respondents). This is shown in table 39. For women and girls, finding a place to go to the toilet outside, often having to wait until the cover of darkness, can leave them vulnerable to abuse and sexual assault.

Table 39: Type of Toilet Facility used in the Household by Constituency/Inkhundla

		What kind of toilet facility does your household use					
		Flush to sewage or septic tank	Improved pit latrine (VIP)	Traditional pit latrine without slab	Open Air/bush/ field etc	No toilet	Total
Name of Inkhundla	Hosea	0	97	21	7	0	125
	Matsanjeni	0	18	1	0	0	19
	Shiselweni 1	2	54	13	5	1	75
	Zombodze Emuva	5	71	40	3	2	121
Total		7	240	75	15	3	340

6.9.7.6.2 Distance of the Toilet Facility from the Homestead

The majority (81%) of the toilet facilities are located within the compound, while 15% of the respondents reported that the toilet facility is located outside the compound. The few respondents (4%) reported that they do not have the toilet facility at all, they use the bush as a toilet. This is shown in figure 28 below:

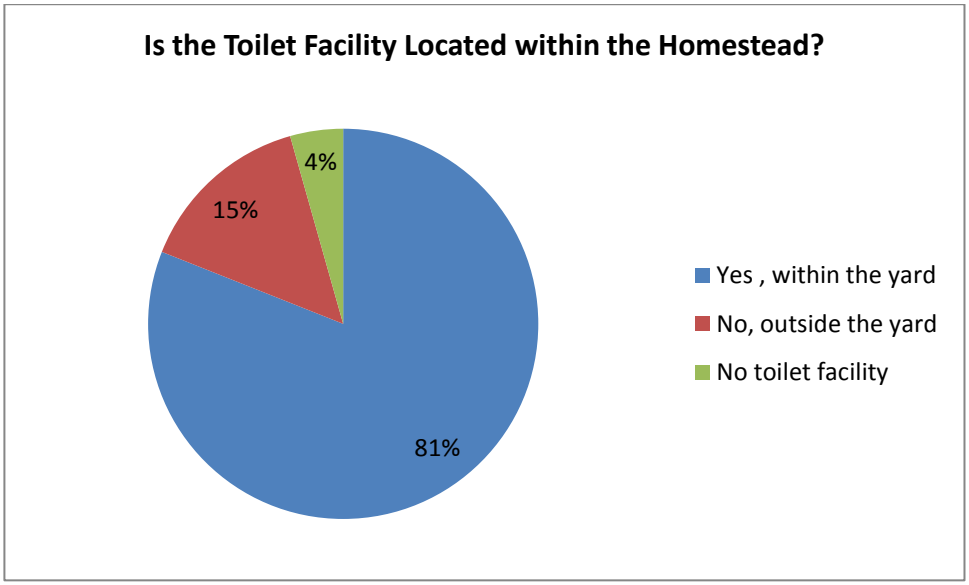


Figure 27: Location of Toilet Facility from the Homestead

6.9.7.6.3 Disposal of Infant stools

Respondents were asked to explain how they dispose the stools of their infants (0 to 3 years), who do not use the toilet facility. The responses are shown in Figure 29:

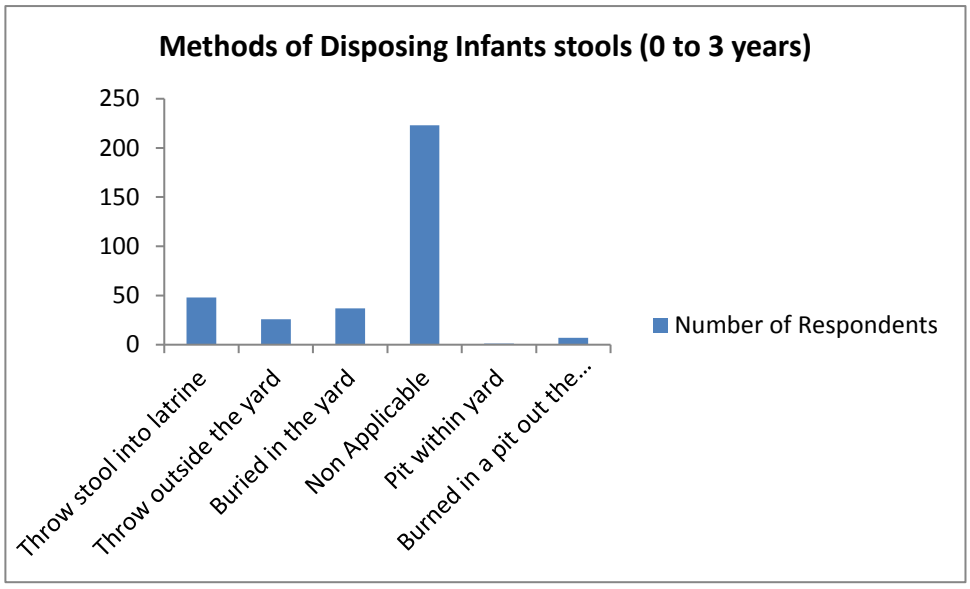


Figure 28: Methods of Disposing Infants Stools (0 To 3 Years)

About 65% of the respondents do not stay with infants. Those that stay with infants reported that they dispose the stools in the latrine (14%); some burry it within the yard (10.89%); others just throw the stools outside the yard (7.6%); others simply burn the disposables in the rubbish pit outside the compound and 0.3% of the respondents throw it in the rubbish pit that is within the compound.

Large portion of the population in the project area just throw stools in the open environment. This practice can have serious implications on human health, including generating: i) water borne disease and, ii) victor borne diseases. The project shall minimize these risks by putting in place and implementing community health and safety measures that will address these challenges in its targeted intervention areas.

6.9.8 Vulnerabilities

6.9.8.1 *HIV/AIDS*

The key factors that underpin Eswatini's social vulnerability are the devastating impact of the Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) pandemic with national HIV prevalence estimated at 39% in 2006, increasing food insecurities due to persistent drought conditions in certain regions of the country, low economic growth levels (below 2% in 2006/7); shrinking agriculture output and rising unemployment. In 2002 the unemployment rate was 34.2%. The impact of HIV and AIDS, unemployment and rising poverty and the corresponding decrease in purchasing power exposes many households to food insecurity (pension-watch knowledge centre).

The Government launched an initiative, called "ALL IN". This initiative is aimed at ensuring that the country attains a National Vision of having an AIDS free generation by 2022. This campaign is also aimed at uniting different sectors in the reduction of AIDS deaths by 65% and reduction in new infection by adolescents by 75% by 2022, and thus set the AIDS movement on track to end the AIDS epidemic among adolescents by 2030.

While contextual risks related with HIV/AIDS are being addressed by the national level initiative, the project related risks shall be mitigated through the project's ESMP within the context of community health and safety requirements of ESS4.

6.10 Heritage

The majority of the proposed routes for the main pipeline and laterals are along the roads (road reserve). The road construction and maintenance that are regularly done may have uncovered surface hidden artefacts/ archaeological object which would have been buried for some time.

The Environmental and Social Assessment will confirm the existence of tangible or intangible cultural heritage at project sites will include guidance regarding how to manage any negative impacts. Since the project will be financing some civil works, some of excavation, movement of earth and impounding can be expected. These types of activities pose the possibility of encountering both known and unknown physical and cultural resources. A "Chance Finds Procedure" will be elaborated in the Environmental and Social Management Plans.

6.10.1 Archaeological interest

There were no archaeological sites, artefacts or anything of archaeological importance observed in the area. In cases where these are discovered during the implementation of the project, the Eswatini National Trust Commission will be notified immediately and involved in the removal and preservation of these items.

6.10.2 Graves

There were no signs of graves within the area affected by the project. During consultations with the communities in the project area, there has not been any indication that there may be graves affected by the project.

6.10.3 Monuments

The Eswatini National Trust Commission Act popularly known as the ENTC Act of 1972 section 25 (1) (a)(i) defines a monument as "any area of land containing old building or any other place or object (whether natural or constructed by man) aesthetic, historical, archaeological, scientific, sacred, or religious value or interest".

Along the proposed route there were no old buildings that qualify for national monument status as per the ENTC Act stipulations. Old buildings identified are not on the proposed route for the project. There were also no waterfalls, caves, rock art sites or anything else found along the proposed route that can stated to be of archaeological value or which deserves monument status.

There were no identified areas or pieces of land along the proposed route that were said to be of historic value or sacred according to the nearby communities.

6.11 Crime

The Shiselweni region records cross border crime since it is bordering South Africa. This suggest that in some cases like stock theft, Robberies, drug smuggling, Human trafficking, Theft, House Breaking and theft, the

criminals are either from the Republic of South Africa or Eswatini or even conspire with each other in committing the crimes. Other nationalities are also involved in cross border crime. However, in comparison to the other regions, the crime rate for Shiselweni is third after Hhohho and Manzini regions, Lubombo having the lowest. Shiselweni Police Region has got six (6) Police Stations which can be ranked according to high crime rate as follows. The project area is under the jurisdiction of Nhlangano and Hluthi Police station. Nhlangano has the highest crime rate in the region, and Hluthi. The following tables indicates the ranking of police stations in the region.

Table 40: Crime Rate Ranking for Shiselweni Police Stations

Police station	Crime rate ranking
Nhlangano	1
Hlatikulu	2
Hluti	3
Lavumisa	4
Gege	5
Phunga	6

Source: Eswatini Royal Police Headquarters

Table 41:Crime Statistics in the Project Area (in Percentages)

Crime Statistics for The Past Five (5) Years 2014-2018					
Offences Against Lawful Authority	**2014**	**2015**	**2016**	**2017**	**2018**
Terrorism	0	0	0	0	0
Public Order	9	8.4	4.5	8.9	13
Perjury	0	0.47	3	3	2.6
Contempt	84	86	78.2	70.4	66.2
Def. The Ends	1.4	0.93	4.5	3	2.6
Escaping	5.6	4.2	9.8	14.9	14.3
Other	0	0	0	0	1.3
Offences Against Public Morality					
Rape	39.7	43.7	34.6	21.4	26.2
Att. Rape	1.9	6	3.4	1.3	1.7
Indecent Ass.	17.9	24.5	26.2	14.7	7.5
Unnatural Off.	36.7	22.5	34.1	0	2.1

Abortion	0	3.3	1.7	0.7	0.3
Other	3.8	0	0	61.9	62.2
Offences Against Person					
Murder	1.3	1.0	9.7	0.99	1.2
Ch	1.1	0.8	8.3	0.85	1.0
Att. Murder	0.4	0.5	0.46	0.35	0.58
Ass. Gbh	37.6	35.8	31.2	34.2	35.5
Ass. Common	47.1	49.2	43.9	48.1	50.9
Abduction	1.4	1.7	1.6	2.3	1.5
Robbery	9.9	10	5.09	10.5	7.7
A/Robbery	0.8	1.0	0.6	2.71	22
Car Hijacking	0	0	0.05	0	0
Extortion	0	0	0	0	0
Other	0.2	0	0	0	0.43
Offences Against Property					
H/B	28.3	26.6	31.3	30.9	31.9
Arson	0.7	0.4	8.7	0.5	0.3
Mip	9.6	9.2	0.9	8.5	7.7
Stock Theft	10.5	9.85	2.2	6.5	6.9
Theft Common	4.7	50.1	48	48.6	48.7
Car Theft	0.5	0.13	0.2	0.06	0.3
Falsitas	2.9	2.4	2.2	2.9	2.9
Fraud	0.8	0.9	0.9	0.6	0.6
Foggery	0.3	0.3	0.3	0.4	0.03
Rec. Stolen Pro.	0	0.03	0	0	0.03
Other	41.7	0.09	5.1	1.0	0.6
Offences Against Statute					
Girls	4.1	4.1	3.0	3.7	2.2
Game Act	0.5	0.8	0.4	0.5	0.5
Offences Against Statute (Cont.)					
Drugs	19.6	19.3	22.7	0	17.6

Liquor Act	14.8	10.4	12.4	13.3	10.5
Grass Burning	0.2	0	0	0.2	0
Gambling	0.1	0	0.1	0.4	0.4
Stock Disease	11.8	9.2	6.1	5.3	7.2
Firearm	1.3	1.2	1.9	1.3	0.9
Income Tax	0.8	0.7	0.4	0.9	1.3
Hum. Traffick.	0.1	0	0.1	0	0
Other	46.8	54.3	52.9	74.4	59.4

Source: Eswatini Royal Police Headquarters

6.12 Facilities

6.12.1 Health

A Clinic located within the project area is at Hluthi. The Matsanjeni Health Centre and Nhlangano Health Centres can be reached with 30 minutes from either side of the project area.

The following tables outline the prevalent diseases/conditions treated in the 3 health facilities in the project area. Hluthi and Matsanjeni health facilities are along the MR11, which makes them easily accessible to all population (women, children and other vulnerable groups). Nhlangano Health centre is located within Nhlangano town, which is also reachable as Nhlangano is the main town in the region. The cost of health care services is heavily subsidized by government, allowing the treatment of all people regardless of their financial status.

6.12.1.1 *Hluti Clinic Top Conditions*

Below are the top conditions recorded in Hluti Clinic in 2018.

Table 42: Annual Hluthi Clinic Data

Condition	Frequency
Abnormal faeces	498
Acute upper respiratory infections of unspecified site	1701
Contact dermatitis and other eczema, unspecified cause	1017
Cough	438
Dental caries, extending into pulp	486
Diarrhea	70
Disorder of bone and cartilage, unspecified	511
Epilepsy, unspecified, without mention of intractable epilepsy	6
Fever, unspecified	51
Headache	323
Hypertension	285
Injury	58
Intestinal helminthiasis, unspecified	28
Intestinal Worms	15
Leukorrhea, not specified as infective	86
Lower Respiratory Infection (severe)	78
Mental Disorders	0
Muscular Skeletal Disease	255
Persistent Diarrhoea	20
Skin Disorders	507
Unspecified functional disorder of intestine	311
Unspecified essential hypertension	658
Unspecified senile psychotic condition	8
Upper respiratory infection	887
Urethral discharge	98
Varicella without mention of complication	9
Venereal disease, unspecified	138
Vomiting alone	44

Source: Regional HMIS (Out Patient Data 2018)

6.12.1.2 *Matsanjeni Health Centre Top Conditions*

Below are the top conditions recorded in Nhlangano Health Centre in 2018.

Table 43: Matsanjeni Health Centre Data

Condition	Frequency
Abnormal faeces	31
Acute tonsillitis	1
Acute upper respiratory infections of unspecified site	129
Contact dermatitis and other eczema, unspecified cause	57
Cough	58
Dental caries, unspecified	4
Diarrhoea	2
Disorder of bone and cartilage, unspecified	160
Epilepsy, unspecified, without mention of intractable epilepsy	6
Epilepsy complicating pregnancy, childbirth, or the puerperium, unspecified as to episode of care or not applicable	2
Family history of diabetes mellitus	9
Fever, unspecified	2
Headache	80
Hypertension	4366
Injury	727
Intestinal helminthiasis, unspecified	1
Intestinal Worms	49
Leukorrhea, not specified as infective	14
Mental Disorders	615
Muscular Skeletal Disease	887
Persistent Diarrhoea	102
Unspecified disorder of urethra and urinary tract	1
Unspecified essential hypertension	246
Unspecified functional disorder of intestine	51
Unspecified senile psychotic condition	24
Urethral discharge	138
Varicella without mention of complication	2
Venereal disease, unspecified	9
Vomiting alone	12

Source: Regional HMIS (Out Patient Data 2018)

6.12.1.3 *Nhlangano Health Centre Top Conditions*

Below are the top conditions recorded in Nhlangano Health Centre in 2018.

Table 44: Annual Nhlangano Health Centre Data

Condition	Frequency
Abnormal faeces	1230
Acute tonsillitis	411
Acute upper respiratory infections of unspecified site	3722
Altered mental status	760
Contact dermatitis and other eczema, unspecified cause	1843
Cough	1571
Dental caries, unspecified	3305
Diarrhea	296
Disorder of bone and cartilage, unspecified	3481
Epilepsy, unspecified, without mention of intractable epilepsy	419
Epilepsy complicating pregnancy, childbirth, or the puerperium, unspecified as to episode of care or not applicable	710
Family history of diabetes mellitus	2765
Fever, unspecified	211
Headache	1502
Intestinal helminthiasis, unspecified	128
Leukorrhea, not specified as infective	451
Unspecified disorder of urethra and urinary tract	431
Unspecified essential hypertension	7201
Unspecified functional disorder of intestine	1279
Unspecified senile psychotic condition	387
Urethral discharge	216
Varicella without mention of complication	111
Venereal disease, unspecified	320
Vomiting alone	222

Source: Regional HMIS (Out Patient Data 2018)

Hypertension is among the top three conditions treated in all three health facilities. The other two in Hluthi are upper respiratory infections and skin diseases. Muscular skeletal disease and injury were the other two conditions in Matsanjeni. In Nhlangano Health Centre, disorder of bone and cartilage and dental caries were the other conditions ranked highest along with the hypertension.

6.12.2 Utilities

There are telephone and power transmission lines that run along the MR11, on the road reserve, and they cover the whole distance of the main pipeline. There is an MTN mast in close proximity to the proposed reservoir site at Hluthi. This will not be disturbed by the proposed reservoir construction.

6.12.3 Emergency services

The nearest fire and emergency services office is at Nhlangano. Police stations in the project area and in close proximity are Hluthi and Nhlangano police stations. The nearest fire and emergency services site is at Nhlangano.

GBV/SEA:

7 OVERVIEW OF THE PUBLIC CONSULTATION PROCESS

This section describes the outcomes of the stakeholder consultation process as part of the ESIA compilation; furthermore, it provides details of the public consultation and participation activities undertaken during compilation of the ESIA for the Nhlangano - Siphambanweni Integrated Water Supply Project. The law states that public participation and provision of access to information are obligatory procedures of the environmental authorisation process and for that reason, these consultations were aimed at being fully inclusive, open and transparent. Stakeholder engagement and participation is of essence in the planning and implementation of the proposed water project as it will provide an opportunity for the implementing agency (EWSC) and other stakeholders to engage extensively with project beneficiaries, identify stakeholder's interests and to collate feedback to assist in project planning and in the refinement of preliminary designs.

The consultation process was carried out in accordance with the requirements of the Eswatini Environment Authority (EEA) and the Environmental and Social Standards (ESSs) of the World Bank (ESS10 – Stakeholder Engagement and Information Disclosure in conjunction with ESS1 – Assessment and Management of Environmental and Social Risks and Impacts). Public consultation, disclosure and stakeholder engagement are key requirements of the World Bank because when done effectively, they can improve the environmental and social sustainability of projects and as well as allow these stakeholders to make significant contribution to successful project design and implementation. It assists also in the management of environmental and social impacts. The requirements for stakeholder engagement in projects require that stakeholder consultation and engagement should start as early as possible in the project cycle; continue throughout the life of the project; be free of external manipulation, interference, coercion, or intimidation; where applicable enable meaningful community participation; and be conducted on the basis of timely, relevant, understandable, and accessible information in a culturally appropriate format.

A number of stakeholders are involved in this project; ranging from the Government Line Ministries, the community and other stakeholders. Noteworthy is that these consultations were carried out at both Regional and Constituency Level. At the Regional level, the following groups of people were inclusive; constituency leadership (Bucopho, Tindvuna), development partners (World Vision, Red Cross), security forces (Police, Correctional, USDF), the youth (ENYC) and Government (CTA, Education, Commerce, Rural Water, Health). For the Constituency Level, these groups of people were consulted; the youth, water committees, WASH community representatives, social workers (Bagcugcuteli), traditional authorities and community police. The public consultation process began in March 14, 2019.

The primary aims of the public participation process are:

- To inform Interested and Affected Parties (IAPs) and key stakeholders of the proposed project and Environmental and Social Impact Assessment
- To initiate meaningful and participation of IAPs;
- To identify issues and concerns of key stakeholders and IAPs with regards to the implementation of the project (i.e. focus on important issues);
- To promote transparency and an understanding of the project and its potential environmental (social and biophysical) impacts (both positive and negative);
- To provide information used for decision-making;
- To provide a structure for liaison and communication with IAPs and key stakeholders;
- To ensure inclusivity (the needs, interests and values of IAPs must be considered in the decision-making process);
- To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be taken into account in project design and environmental and social performance;
- To anticipate and avoid risks and impacts and where possible, minimize or reduce risks to acceptable levels;
- To focus on issues relevant to the project, and issues considered important by IAPs and key stakeholders; and
- To provide responses to IAP queries.

The public participation process for the proposed project was undertaken according to the stages outlined below.

7.1 Scoping phase stakeholder engagements

7.1.1 Initial Stakeholder Consultations

At the inception of the ESIA process, the Development Teams from each benefiting community were engaged. Meetings were also held with the Ministry of health, which is driving the sanitation part of the project. Consultations were conducted at Regional level (Shiselweni Region Development Team) and further condensed to Constituency level (Zombodze Emuva Inkhundla Development Team, Hosea Inkhundla Development Team and Shiselweni 1 Development Team).

All IAP information; including details on who was consulted, consultation dates, what was consulted on and general feedback on consultation process, responses, has been included and acts as a record of the communication/public involvement process. Minutes of these consultations have been attached as Appendix 5 of this report. A detailed Stakeholder Engagement Plan is attached as Appendix 6.

A total of five consultative meetings were held and a total of 234 people have attended these meeting on the dates shown under table 42, the last meeting was the public scoping meeting.

Table 45: Dates of Community Meetings

Meeting	Date	Venue	Number of participants
Shiselweni Regional Development Team	14 March 2019	ESWC Regional office auditorium	50 Attendees: 29 males, 21 males
Zombodze Emuva Constituency	16 March 2019	Zombodze Emuva Constituency Building	35 attendee, 21 males, 14 females
Hosea Constituency	23 March 2019	Hosea Constituency Building	43 Attendees: 29 Males, 14 females
Shiselweni 1 Constituency	30 March 2019	Shiselweni 1 Constituency Building	50 Attendees: 25 males, 25 females
Hluthi Police Station - Conference Room (Scoping Meeting)	04 April 2019	Hluthi Police Station - Conference Room	47 Attendees: 35 males, 12 females

During these consultations, a powerpoint presentation was done by the EWSC's Project Manager; Mr Bongani Mdluli and the Corporation's Public Affairs Manager Ms Nomahlubi Matiwane explained the aim of the meeting which was to;

- Provide background information about the proposed water project (project brief)
- Gather feedback and identify stakeholders interests
- Address social, technical and environmental issues

Meeting attendees were then allowed to voice their comments and seek clarifications.

Photoplate

Photoplate were asked for their perceptions and expectations with respect to the proposed project and in particular the location of kiosks along the project area for ease of accessibility. They were also asked to indicate the main challenges they face as a result of the unavailability of potable water in the area. Issues of sanitation were also discussed as perpetuated by the lack of clean water.

The following photo plates illustrate the discussion.

Photoplate

7.2 Advertising for the Scoping meeting

7.2.1 Site Notices

Site notices were erected at various noticeable locations along the MR11 corridor (Nhlangano - Siphambanweni) to advertise the planned scoping meeting. The purpose of these notices was to raise awareness about the planned scoping meeting, for optimal participation of IAPs. A4 size site notices in both English and Siswati were placed in the site, especially population concentrated areas (Hluthi Police Station, Siphambanweni Water Kiosk, Market Stalls and multiple Bus Stop Shelters along the aforementioned road amongst others), inviting interested and affected members of the public to a scoping meeting as part of the ESIA compilation process.

The photo plates below show some of the notices displayed;

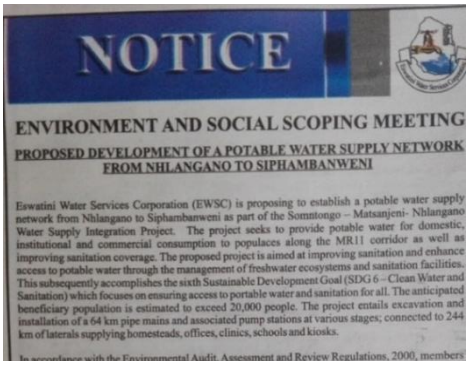
Photoplate 9: Advert displayed at the entrance of a local shop

Photoplate 10:An Advert at Siphambanweni Kiosk

7.2.2 Advertising

To support the project environmental review process, members of the public and IAPs were invited to a scoping meeting with the purpose of collecting public input and allowing the public and IAPs to express their views and concerns about the project. The primary aim of the advert was to ensure that the widest possible group of IAPs were informed of the project, and to elicit comments from the public regarding the proposed project. This interactive process is key in the determination of major issues and impacts that will be vital and need to be addressed in the ESIA. This advert was published in the local newspaper for two consecutive weeks on the following dates; 23rd March 2019, 30th March 2019, 31st March 2019 and 3 April 2019. To reach a wider audience, members of the public and IAPs were also invited to the meeting on various social media platforms including Facebook, through the EWSC's pages.

The following photo plate shows one of the published adverts on the local Newspaper;



NOTICE

ENVIRONMENT AND SOCIAL SCOPING MEETING

PROPOSED DEVELOPMENT OF A POTABLE WATER SUPPLY NETWORK FROM NHLANGANO TO SIPHAMBANWENI

Eswatini Water Services Corporation (EWSC) is proposing to establish a potable water supply network from Nhlangano to Siphambanweni as part of the Somntongo – Matsanjeni- Nhlangano Water Supply Integration Project. The project seeks to provide potable water for domestic, institutional and commercial consumption to populaces along the MR11 corridor as well as improving sanitation coverage. The proposed project is aimed at improving sanitation and enhance access to potable water through the management of freshwater ecosystems and sanitation facilities. This subsequently accomplishes the sixth Sustainable Development Goal (SDG 6 – Clean Water and Sanitation) which focuses on ensuring access to portable water and sanitation for all. The anticipated beneficiary population is estimated to exceed 20,000 people. The project entails excavation and installation of a 64 km pipe mains and associated pump stations at various stages; connected to 244 km of laterals supplying homesteads, offices, clinics, schools and kiosks.

In accordance with the Environmental Audit, Assessment and Review Regulations, 2000, members

PHOTOPLATE 12: ADVERT IN THE LOCAL NEWSPAPER

For more details, the following can be contacted:

Ms. Nomahlubi Matiwane
Public Affairs Manager
Eswatini Water Services Corporation
P. O. Box 20
Mbabane
Tel: 24169000; Fax: 24163616
Email: nomahlubi.matiwane@swsc.co.sz

Ms. Lulu Ndzimandze
Environmentalist
MTK Sustainable Technologies
P. O. Box 4019
Manzini
Tel: 2505 8875; Cell: (+268)78254223
Email: sustainable@mtkinvest.com or
lulu@mtkinvest.com

Emtfonjeni Building, Corner MR 103 and Cultural Village Drive, Ezulwini.
Tel: 2416 9000, Fax: 2416 3616
Visit: www.swsc.co.sz

facebook.com

WATER SUPPLY NETWORK FROM NHLANGANO TO SIPHAMBANWENI

Eswatini Water Services Corporation (EWSC) is proposing to establish a potable water supply network from Nhlangano to Siphambanweni as part of the Somntongo – Matsanjeni- Nhlangano Water Supply Integration Project. The project seeks to provide potable water for domestic, institutional and commercial consumption to populaces along the MR11 corridor as well as improving sanitation coverage. The proposed project is aimed at improving sanitation and enhance access to potable water through the management of freshwater ecosystems and sanitation facilities. This subsequently accomplishes the sixth Sustainable Development Goal (SDG 6 – Clean Water and Sanitation) which focuses on ensuring access to portable water and sanitation for all. The anticipated beneficiary population is estimated to exceed 20,000 people. The project entails excavation and installation of a 64 km pipe mains and associated pump stations at various stages; connected to 244 km of laterals supplying homesteads, offices, clinics, schools and kiosks.

In accordance with the Environmental Audit, Assessment and Review Regulations, 2000, members of the public and interested and affected parties (IAPs) are invited to a scoping meeting. The purpose of the meeting is to allow members of the public and IAPs to express their views and concerns about the project.

The scoping meeting will be held on Thursday, 04 April 2019 at 1000 hours at Hluthi Sub-Regional Offices, Hluthi Business Centre.

For more details, the following can be contacted:

Ms. Nomahlubi Matiwane
Public Affairs Manager
Eswatini Water Services Corporation
P. O. Box 20
Mbabane
Tel: 24169000; Fax: 24163616
Email: nomahlubi.matiwane@swsc.co.sz

Ms. Lulu Ndzimandze
Environmentalist
MTK Sustainable Technologies
P. O. Box 4019
Manzini
Tel: 2505 8875; Cell: (+268)78254223
Email: sustainable@mtkinvest.com or

Nikiwe Nondumiso Hlophe and 9 others
5 Comments 6 Shares
Like Comment Share

PHOTOPLATE 11: ADVERT ON EWSC FACEBOOK PAGE

7.3 Public Scoping Meeting

The primary aim of the public meeting was to:

- Provide IAPs and stakeholders with information regarding the proposed project and associated infrastructure;
- Provide IAPs and stakeholders with information regarding the ESIA process;
- Provide an opportunity for IAPs and stakeholders to seek clarity on the project;
- Record issues and concerns raised; and
- Provide a forum for interaction with the project team.

A scoping report was compiled and submitted to the EEA for review and approval. The scoping report was approved as shown in Appendix 2 of this report.

7.4 Issues Raised during Consultations

The following table provides a summary of the issues raised during these initial stakeholder consultations.

Table 46: Summary of Issues raised during consultations

Category	Question	Response
Project Timelines	1. When will the World Bank approve the project for implementation. 2. How long after approval will implementation commence? 3. After receipt of approval from the Bank, may EWSC work speedily to complete this project?	The World bank will meet to consider the project for funding in July and communicate decision to EWSC soon after that. After approval, there will be an appointment of design consultants to make detailed designs, which will take 6-12 months. The contractor will then be appointed to start the construction. EWSC will ensure that there are no delays after approval of eth project for funding and run processes in parallel where possible.
Resettlement & Compensation	1. Will there be compensation due to movement of water network through privately owned land?	Privately owned land that is affected will be a=compensated after extensive consultations with property owners, using national and international guidelines. Compensation will be done in accordance with national and international guidelines. No civil work shall commence unless compensation and Resettlement Assistances are paid to Project Affected Persons (PAPs)
Employment	1. What benefits will the community receive e.g. job opportunities? 2. Are there any laws that address payment of unskilled labour?	Locals will be given first preference, depending on the availability of their skills. The contractor will be advised to ensure non skilled labour is sourced from the community. Unskilled labour will be sourced from the Tinkhundla in the area. Appointed Community Liaison Officer (CLO) will assist. Companies, contractors included, are expected to comply with labour laws of the country to ensure that salaries paid to workers are above the minimum wage.
Movement of Laterals	1. How will the pipe laterals move from the Left Hand Side (LHS) to the Right Hand Side (RHS)?	To minimise disturbance to traffic, the design will use storm water culverts that cross under the roads.

Water Abstraction	1. Has a water abstraction permit been obtained? 2. How does EWSC plan to continuously provide water in cases where Mkhondvo River levels are significantly low?	The water abstraction permit for the existing Masibini water treatment plant has more water allocation than is currently abstracted. The required volumes from this project will still be within the allocated quota.
ESIA Process	Once Environmental Compliance Certificate (ECC) has been issued out by the EEA, can EEA evoke the Certificate due to concerns from the public?	The EEA does not revoke the EEC before doing extensive consultations and engagements with concerned parties. It is after that exercise has been exhausted that the EEC may be revoked, but also based on valid environmental non compliances.
Socio-economic Issues	1. Can child-headed families who cannot afford meter installation fee be given a discount? 2. Do water charges differ in the rural areas compared to the urban areas?	The project does not give preferential treatment for installation cost to disadvantaged groups. However, the provision of kiosks, which provided water at E0.20 per litre, makes a provision for disadvantaged groups to access water at minimal cost.
Water Kiosks	1. Will multiple Water Kiosks be placed in densely populated areas?	Location of kiosks will be based on ease of accessibility, population coverage and also the need to have individual kiosks service multiple people to sustain the business. areas with a high density of less privileged people will also be considered first. The placement and number of kiosks will be done in consultations with community and will ensure maximum coverage in these communities.
Pipeline Coverage	1. What is the estimated number of people to be provided with potable water in this project? 2. How will the water reach homesteads away from the MR 11 corridor?	The estimated population of 20,000, and up to 50,000 people are expected to benefit from this project. There will be laterals that will be constructed to feed communities that are not in close proximity to the highway, as shown in the project layout drawings presented. EWSC provides 15m coverage from main pipe to homes. Individuals who fall beyond the 15m can acquire a quotation from EWSC to bring meter closer to their homes. Quotation is based on the number of additional metres required by the client. Most of the water will be driven by gravity because the pipeline is from an area of higher latitude to lower altitude. However, because of the different laterals, the pressure will need to be boosted by

	3. Are there any pump stations along the network? 4. Is an individual allowed to buy a similar pipe grade for movement of meter within his/her home instead of those provided by EWSC to avoid high installation costs? 5. Will the network cover Bambitje area? It has been previously left out and is in desperate need for potable water.	pumping. Only one solar powered pump station is proposed, opposite St Florence Christian Academy due to extremely steep slope. The Corporation does not encourage that the public buys their own pipes, because the quality may be substandard. EWSC encourages the use of SABS approved pipes. Water pipes sold in most local hardware shops cannot withstand the velocity at which the water flows and will therefore lead to bursting of the pipes. Bambitje has been included in this project.
Appointment of Contractor	1. Contractor appointed in a similar project in Lavumisa did an exceptional job. Can he be appointed for this project?	The procurement of the contractor will follow standard EWSC procurement procedures, and equal opportunities will be given to contractors
Existing Water Committees and Schemes	1. Will existing multiple water committees and community water schemes be dissolved for the formation of new committees to assist in implementation? 2. Some people have already paid in water schemes, what is the way forward?	For ease of sustainability, water supply from EWSC should not be supplementary to other water supply projects. One member from the various water committees in each Inkhundla can be selected for the formation of a water committee to work with EWSC. The project will give an option for people to access water. It will not compel people to change form their schemes if they prefer to stick with them.
General	1. Request for EWSC to open a branch in Hluthi 2. Who digs and buys the pipes for supply in homes?	The suggestion was noted and would be taken up with the leadership of EWSC EWSC does the installation of the bulk infrastructure up to the water meter. The plumbing from the water meter to the houses is done by plumbers that are engaged by home owners.

The following table outlines the responses to typical questions that have been carried out.

Photoplate 13: A Section of The Regional Development Team Meeting Attendees

15: Interactions with the Shiselweni Regional Team

Photoplate 14: The Project Manager Presenting the Project Outline

Photoplate 16: Zombodze Emuva Consultations

Photoplate 17: Interactions with Zombodze Emuva Attendees

18: Submission of the Environmentalist at Hosea Inkhundla

Photoplate 19: A section of Attendees for Hosea Inkhundla

Photoplate 20: Some of the Attendees of the Consultative Meeting for Shiselweni 1

Photoplate 21: A Presentation by Ms Matiwane during the Meeting

Photoplate 22: Interactions with the Attendees who required Clarification

7.5 Focus Group Discussions

A number of focus group discussions were held to solicit input of various groups in the project area.

7.5.1 Women

Focus group meetings were with women (25 women at Shiselweni 1 Inkhundla, 10 at Lushini and 13 at Mchinsweni communities). Women23: The Focus Group Discussion

Photoplate 24: Ms Matiwane Chairing the Discussion at Shiselweni 1 Inkhundla

7.5.1.1 *Summary of issues raised by women groups*

The following table summarizes comments and issues from women's groups

Table 47: Issues Raised by Women

Category	Comment/Issue
Existing water supply schemes	Existing stand-pipes within their community are unreliable. When this happens, the community has no choice but to return to unsafe sources such as rivers. Although technically they are near to safe water sources these are often shut down. These water schemes were implemented by Rural Water Supply Branch and as is the norm, community members had to put down a joining fee to be part of the scheme as well as provide labour for the installation of pipes. Some schemes are said to be non-functional at least once per month for a couple of days at a time even though community member are paying E10 per month.
Water Availability	Each person is allowed a 20litre container at a time at the borehole pumps. If there are many people at the borehole the process is slowed considerably.
Water quality	The water is drawn from an earth dam that was built so respondents are not sure how clean it is. Water from the boreholes is sometimes muddy.
Affordability	There is concern in the community that some will not be able to afford to pay their bills which in the past has affected neighbours. For this reason, the kiosk is the preferred means of getting safe potable water.
Access to water supply	The elderly find it increasingly difficult to fetch water or use an outdoor toilet. For many the option of indoor plumbing is desirable as even the water kiosk is considered far for some. Those who live with or near sick or elderly people are concerned to ensure they leave enough water for the day. Some respondents claim that they sometimes queue for water from 3am to 7am before they can return home. Those who have transport make use of the EWSC water kiosk at Nsalitje.
Sanitation	VIP toilets had to be built by homesteads in order for them to be eligible for the Rural Water scheme but many of these quickly fell into disrepair because they were done hurriedly to facilitate the project. Some have hand-washing facilities but most do not.

Category	Comment/Issue
Maintenance of water supply infrastructure	Community members are further frustrated because they have to constantly maintain clogged pipes and repair burst pipes or other infrastructure which they provided labour to install in the first instance.
General	As carrying water is cumbersome, most opt to wash the cloths at the river rather than at home. This time-consuming task means other household chores are put on hold. The availability of water closer to the homestead is seen as a timesaving intervention where additional activities such as cooking, and watering livestock can be carried out simultaneously.
Waste management	Disposable nappies are littered all over the community in dongas and even along the side of the road. The preference to disposable nappies is said to be nothing to do with the availability of water but the allure of 'modern' living.

7.5.1.2 *Recommendations from women's groups*

i. The project should use local labour for their ('our') projects and were keen to know if the kiosk would provide more long-term employment.
ii. They are eager to learn more about water conservation with a view to reducing costs.
iii. They are looking forward to having the water project implemented and they wold protect against anyone who stopped a water project.

Photo plate 25: Women's group Lushini

Photo plate 26: Long awaiting plumbing

7.5.2 Rural Health Motivators

Rural Health Motivators are generally regarded as the most knowledgeable community members with regards to water and sanitation having been trained on WASH issues by government and non-governmental organisations over the years. Rural Health Motivators (RHMs) were also consulted to solicit their views on the project. These are community people that work with the Ministry of Health to promote health issues and play a liaison role between the Ministry of health and the community.

7.5.2.1 *Summary of issues raised by RHMs*

The following table provides a summary of issues raised by RHMs in the project area.

Table 48: Issues Raised by RHMs

Category	Issue raised
Need for the project	Expressed gratitude for the project No single home in Bambitje community has a water connection Water kiosk is the first priority so that everyone in the community can have access to clean potable water. The respondents request that ESWC consult them with regards to the site of the proposed kiosk. Then those who can afford to can opt for individual connections.
Existing water schemes	Though there have been boreholes with communal hand-pumps in the area these are not maintained Not reliable
Water availability	Most people collect water from the river which they share with livestock Now even the rivers are drying up so that in many places people have to dig for water.

Category	Issue raised
	There is so little water to spare that one respondent remarked that 'people do not even offer water to travellers if they ask – we pretend not to hear.' Respondents also observed that the availability of water at home or close to home would allow them to be more efficient in their chores.
Water reuse and recycling	The use of 'grey' water for homestead gardens is understood but respondents complain that this water is hardly adequate for viable gardens.
Sanitation	In many areas, percentage of homestead with good, effective VIP toilets in the area has decreased. This is because many of the existing VIPs are old and have become dilapidated or because they are many new homesteads who did not benefit from past interventions. Bambitje community has recently benefitted from an EU funded sanitation programme implemented by World Vision. Every home has a clean toilet with additional waste pits in each. These new VIP toilets also include hand-washing facilities utilising 2 litre plastic bottles attached to the toilet. There has been education on sanitation and hygiene for all the families in the area although it is difficult to estimate who adheres to this.
Education and awareness raising	The Rural Health motivators stated that they try to teach people about purifying drinking water and believe that many are following their advice because the cases of diarrheal diseases in the community have declined over the years.
Waste management – Disposable nappies	A big challenge to waste management are disposable nappies which are said to litter the community. Although burning disposables and sanitary towels is an option many chose to throw in the veld or in the VIP latrines which are already full. This is a source of annoyance for those family members who have to dig new pits, in many instances the men. Recognising that water projects always have a sanitation component; respondents were concerned that some families will not be able to improve their facilities.
Affordability	Respondents stated that many will make the connections even if they may be an initial reluctance to commit. An elderly couple stated that would even be willing to sell their cattle if necessary because they find it increasingly difficult to cope with fetching water and using an outdoor latrine. This is an important commitment considering the traditional attachment to cattle among Emaswati.

7.5.2.2 *Recommendations from RHMs*

The community would be grateful for more information on how to maintain their water connections, how to avoid faults and how to reduce costs.

The following photoplates show interactions with RHMs

Photo plate 27: Rural Health motivators at Bambitje

Photo plate 28: Rural Health motivators at Ondiyaneni

7.5.3 Traditional Authorities

The importance of engaging with traditional authorities cannot be understated. Buy in from the traditional authority in general is key to the success of a project in the country.

7.5.3.1 *Summary of issues from traditional authorities*

The following table summarises the issues raised during the engagements.

Table 49: Summary Issues from Traditional Authorities

Category	Comment/Issue
Consultations	Respondents suggest that previous projects have been stalled or cancelled because the traditional authorities felt that they were not adequately consulted. Following the scoping activities that have been carried out by ESWC, Bandlancane expressed satisfaction with the consultations carried out so far in this project.
Reception of the project	The people of this area look forward to having water not only for drinking but also to plant vegetables. Some even have ambitions to plant sugar cane rather than maize. It is clear from informants that the implementation of a water project will give positive political mileage for all community leaders associated with it. Many are keen that the project be implemented during their term of office

7.5.3.2 *Recommendations from Traditional authorities*

i. Although all traditional authorities including Bandlancane expressed satisfaction with the scoping process carried out, further enhancement of this benefit would be for the Regional Administrator who is responsible for Chiefs within the region to be informed of the project and formally and to liaise with his chiefs for the duration of the project.
ii. Members of Libandla also expressed a hope that there would be further consultations as to where to construct Kiosks so that they are in easy reach of the neediest in the community.

Further Consultations will be carried out as outlined in the environmental and Social commitment plan (ESCP) and the Stakeholder Engagement Plan.

7.6 Disclosure

This stage focuses on disclosing and consulting on the draft results of the ESIA process. Within the overarching ESIA engagement objectives, the specific objectives for the ESIA phase are to:

- Provide feedback to the stakeholders on the draft impact assessment and associated management/mitigation measures
- Gather stakeholder input on the impact assessment and outlined mitigation and enhancement measures

Consultation and public participation are equally an integral part of the EIA process in Eswatini as applied to projects assigned to both medium and high risk under the Environmental Audit, Assessment and Review Regulations.

As required by EAA, this draft Environmental and Social Impact Assessment (ESIA), as well as Resettlement Policy Framework (RPF) and Stakeholder Engagement Plan (SEP) will be disclosed in the EWSC website and an advertisement will be placed in the daily newspaper informing the general public of the need to access and review the documents as part of stakeholder consultations.

8 DESCRIPTION OF POTENTIAL IMPACTS

This chapter describes the potential impacts on the biophysical and socio-economic environments, which may occur due to the proposed activities. Impacts are identified and predicted based on the analysis of the information collected from the following: -

- Project information
- Baseline information
- World Bank Environmental Health Guidelines for Water and Sanitation Projects

8.1 Positive/Beneficial Impacts

8.1.1 Construction Phase

The construction of the pipeline, laterals and pumphouses, reservoirs and kiosks and additional general operational maintenance activities provide employment opportunities (directly and indirectly) to skilled as well as unskilled labour primarily to locals. Routine and periodic maintenance activities during the operation phase would generate direct employment not necessarily to the local communities but to the staff of EWSC.

8.1.1.1 *Education and Health Facilities*

The educational and health facilities in the project areas will be connected to the main pipeline and this will improve the quality of services.

8.1.1.2 *Employment and Acquisition of new skills*

Increased employment opportunities, improved service delivery to enterprises and the population across the water sector in general remains one of the positive benefits that will arise from the project. Project needs include labour force; therefore, semi and unskilled labour will be sourced locally to provide significant employment opportunities. It is anticipated that the project will provide direct employment during the construction phase and another operational stage (through the kiosks). Indirect employment through aspects such as, infrastructure maintenance and markets will be far much greater and over a longer period. The proposed project will provide economic benefits to the communities in Hosea, Shiselweni 1 and Zombodze Emuva Tinkhundlas. These will come in a form of direct and indirect job opportunities to a significant number of the population of the area during the construction phase of the project. This will reduce the unemployment rate in the area and in the process improve the standard of living of the residents. Locals may acquire some sills in construction through training and Skills transfer, training. This will increase in future employment and entrepreneurial opportunities.

8.1.1.3 *Increase in entrepreneurship opportunities*

Commercial activities in the corridor will have their businesses widened by the increased demand for their products. The project will also create markets for goods and services especially construction inputs which include raw materials, construction machinery and labour. Many secondary businesses are also likely to spring up during the construction phase especially those providing foods and beverages to the construction workers.

8.1.2 Operation Phase

8.1.2.1 *Increased Water Supply*

The project entails the bulk supply of water in the project area. Presently, a high percentage of the population in the project area drink untreated water from dams, rivers and unprotected wells; some of which are hand dug. Water from these sources is commonly shared with livestock. In addition, borehole water supply is unreliable and at times muddy. The proposed project will ensure reliable supply good quality water.

8.1.2.2 *Employment/Job Creation*

It is anticipated that the project will provide direct employment in the constituencies during the construction phase and another operational stage (through the operation of the kiosks).

8.1.2.3 *Improved Economic Growth*

Better access to clean water, sanitation services and water management creates tremendous strategy for economic growth as its availability has a potential for various investments and gains across domestic, industry and irrigation. This project will be a catalyst for local development and economic activity and help reduce extreme poverty and promote shared prosperity. Furthermore, the value of time savings is the largest component of economic benefits as a result of the project as the beneficiaries will no longer have to access water from relatively distance sources.

8.1.2.4 *Increased Food Security*

Water scarcity has a huge impact on food production as it is key to food security. Without water, people do not have a means of watering their crops. This is because agriculture requires substantial amounts of water is required for irrigation processes. Currently, most people in the project area (82.3%) drink water from untreated/unsafe water from dams, rivers and unprotected wells; some of which are hand-dug. This water is also shared with livestock including cattle and goats, which presents a health risk as various communicable and zoonotic diseases can be transmitted first from the animals and then spread within the population. Through the provision of potable water to the people located in the project area, water more will be available for crop production and livestock growth. The beneficiary population will be able to water their gardens and provide water to various livestock which are both sources of food.

8.1.2.5 *Business Growth*

Improved reliability and quality of water supply will stimulate business and entrepreneurial activities leading to increased commercial and residential water demand in the Shiselweni region. Moreover, the construction of the pipeline and distribution laterals and power station including operation of the kiosks will require materials and equipment which will be sourced locally and internationally, and will in-effect boost the local business enterprises through supply of locally available materials and equipment. Water is a significant trigger of economic growth and establishment of small and micro-enterprises by the local communities. Businesses are likely to increase due to the presence of improved water hence spur economic growth.

8.1.2.6 *Education and Health Facilities*

The educational and health facilities in the project areas will be connected to potable water and this will improve the quality of services, for example, health centres that have water, which is also contributes to sanitation. Access to clean water will make the schools and health facilities not to be a source of infections themselves.

8.1.2.7 *Gender and Children*

Access to potable water would go a long way towards alleviating the daily household burdens of women, giving them more time, improving their health and enhancing their livelihoods. The burden to collect water for cooking, and other domestic needs falls primarily on women and children (more than 59% in the project area). water will contribute significantly to their safety and productivity as they will have more time to perform other tasks. The social studies undertaken during the preparation of this report revealed 51% of the beneficiary population take less than 45 minutes to collect water, and 49% spend more than an hour. This shows that the water sources are significantly far away from homesteads. This activity can, and often does, take women away from other, more economically profitable, opportunities such as employment or even farming. Children often must miss school or arrive late to collect water. In some cases, children and women must walk long distances to water sources. Besides opportunity costs, many find themselves in danger along the route to and from water sources. The availability of easily accessible potable

8.1.2.8 *Improved Community Health*

Communities in Hosea, Shiselweni 1 and Zombodze Tinkhundla will have access to potable water through the pipeline which alleviates the risk is waterborne diseases. In some places, the water sources are shared with livestock and other possible contamination sources. People living outside the 3 Tinkhundlas will also have access to potable water through 24 water kiosks that will be constructed. This will improve the quality of life school-going children, especially young adolescent girls.

8.1.2.9 *Reduction of Greenhouse Gas Emission*

Most of the electricity used in Eswatini is imported from South Africa and Mozambique, of which most is generated from coal. The use of a solar plant to generate power for the project will contribute to climate change alleviation as this will allow the project not to use power generated from coal.

8.1.2.10 *Improved Service Delivery*

EWSC customers along the Nhlangano Matsanjeni corridor will experience an improvement in quality of water supply service (e.g., distance to water, pressure and daily hours of service). The total population of the three target Tinkundla (Zombodze (14,231), Hosea (14,733) and Shiselweni I (9,269)- total 38,233) will benefit from improved sanitation services (through either: new infrastructure, supply chain enhancement, behaviour change campaign, sanitation marketing campaign, hygiene campaign, private sector enhancement). Baby WASH interventions will target all households with children under 3 year's old living in the household (assuming approximately 8 percent of households). Additionally, there will be improved service delivery to enterprises and the population across the water sector in general remains one of the positive benefits that will arise from the

project. Institutions such as schools, shops and clinics stand to benefit and that will enhance their ability to better deliver their various service to the public.

8.1.2.11 *Security*

Presence of clean water will be of beneficial impact to the local communities in terms of general security as a result of water. This is because the responsibility for fetching water, combined with recurring droughts and floods, results in women facing an increased risk of gender-based violence, as they have to walk farther distances to water sources. Through improved access of water (i.e., located closer to home, adequate volume of supply, better quality of water and regularity of supply) the project will directly improve the situation of women, elderly and youth in the targeted areas of Eswatini.

8.2 Adverse Impacts

8.2.1 Construction Phase

8.2.1.1 *Site office Establishment*

Temporary construction sites are necessary to store construction equipment and materials. It is important to note that the materials will be delivered along the sections of the proposed pipeline to avoid long distance transportation of materials. There will be a need to establish several site offices at different points along the main pipeline and laterals for effective project supervision and management.

8.2.1.2 *Land Acquisition Impacts*

The pipeline will be designed such that it aligns with the existing main road (MR11) along the road reserve, and parts will pass through certain fields and farmland, therefore there will be a need to land acquisition associated with the pipeline will be kept at a minimum. Associated infrastructure, including pump houses and reservoirs will be constructed will require land acquisition.

8.2.1.3 *Land Use Change*

Agricultural production is one of the key activities that is a source of livelihood for the communities especially since most families depend on agricultural produce for their day to day dietary needs. Certain parts of the pipeline will pass through fields, which may not be used temporarily during construction. Furthermore, some land will be lost due to construction of other structures like reservoirs and the pump house.

8.2.1.4 *Increase Invasion by Alien Weeds into Adjoining Areas*

Spread of alien invasive weeds onto adjoining naturally vegetated areas due to re-opening and transportation of stockpiles.

8.2.1.5 *Depletion of water resources*

As part of the planning process, one of the activities to be undertaken in preparation for construction will include seeking approvals to abstract water for construction. The logical choice of water supply for construction and dust suppression will be from surface water bodies close to the project area. Indiscriminate harvesting of water resources without a permit leads to shortage of water supply to downstream communities.

8.2.1.6 *Water pollution*

Disturbances due to the pipeline construction on the water bodies could be in the form of increased pollution load by way of erosion from construction/ vehicle movement activities. The trenching activities may generate trench water, having high suspended solids concentration due to turbidity. Poor management of oils and hazardous material may lead to spillages and subsequent pollution of the surface water bodies

8.2.1.7 *Loss of flora and vegetation cover*

Construction activities like clearing of land to make way for pipeline and associated infrastructure will lead to exposed area that may be more prone to erosion. Although the Flora may be lost through contamination due to improper management of chemicals, empty chemical containers and other wastes.

8.2.1.8 *Soil Erosion and Contamination*

Clearing and compaction activities may lead to soil erosion since the soils on the project site are erodible. If clearing of areas is done and soil is left bare for a considerable amount of time, it may cause washing away of the topsoil. This may lead to sedimentation of nearby water bodies through surface runoff.

The soil may further be contaminated by poor management of waste and other hazardous material. The soils on the project site are erodible. If clearing of areas is done and soil is left bare for a considerable amount of time, this may lead to soil erosion. Leaking machinery and equipment may pollute the soil, posing an adverse effect to the environment.

8.2.1.9 *Community Health and Safety*

8.2.1.9.1 Increase in road accidents

The average traffic flow along the MR11 is 61.8 cars per hour. The introduction of construction vehicles may lead to unexpected disruption. The usability of this road will be compromised by heavy construction vehicles turning on/off the road and mingling with local traffic. During construction there will be heavy duty vehicles that come to the construction site to deliver various construction materials. This will increase traffic volumes as well as disrupt the smooth flow of traffic along these roads. The use of un-roadworthy vehicles, drivers disobeying traffic rules and obstruction of motorists' views will contribute to this potentially negative impact. Drivers on the MR11 road and other feeder roads may also be not be aware of project construction vehicles, exposing them to risks.

8.2.1.9.2 Access Impacts

The blocking and disturbance of accesses from construction activities will impact on accesses to properties due to excavations which may block users to their place of residence or business properties.

8.2.1.9.3 Changes in population dynamics

The introduction of new people in the communities may lead to anti-social elements in this quiet environment, with a negative impact especially on issues of crime, HIV prevalence, and alcoholism and drug abuse especially among the youth, prostitution, women and child abuse, increase in costs of service provision, breakdown in values of locals.

8.2.1.10 *Gender Based violence*

The introduction of new people in the project area may aggravate the current crime statistics related to violence against women and children which is the second highest public morality offense in the Shiselweni Region. Over the last five years, Grievous Bodily Harm (GBH) has been the second highest in offences against women with an average of 34.9%.

8.2.1.11 *Child labour*

Contractors may hire underage persons, which is against international and national legislation and standards.

8.2.1.12 *Security Impacts*

At night, when streetlights may be absent or insufficient, inadequate site security or signage could lead to night-time accidents.

8.2.1.13 *Blasting Impacts*

These impacts include ground vibrations, air blast, and generation of fines, fumes, dust and structural defects.

8.2.1.14 *Pump House Impacts*

The raw materials used for the construction of the pump house may be disposed of improperly leading environmental degradation and aesthetical impacts.

8.2.1.15 *Occupational Health and Safety*

8.2.1.15.1.1 Site Water and Sanitation

Since there is no running water, site workers may not have access to quality drinking water, which may lead to waterborne diseases. Without proper sanitation, site workers may use bushes as toilets, which may lead to soil pollution as well as pollution of water resources from pollutants like coliforms and other pollutants. Project activities may impact water availability in the small streams in the project area. Poor sanitation may also cause pollution to these water bodies.

8.2.1.15.1.2 Atmosphere and Aesthetics

- *Dust*

Construction of the pipeline may temporarily affect the visual aesthetics of the area as well as give rise to dust, noise and visual impacts. During haulage of material, dust will be emitted. The weight of vehicles, their speed of passage and number of wheels in contact with the ground, and the nature and condition of road surfaces or haul routes all contribute to dust emission. If not sheeted, turbulence in the empty bodies of the vehicles may scour out dust. Cleared surfaces may emit dust when vehicles are using them. Dust may also be emitted from stockpiles of soil material. This may be exacerbated in dry and windy days.

- *Emissions*

Machinery and vehicles may emit gases like SOx and NOx and particulate matter, which cause air pollution and respiratory illnesses. This may be exacerbated by unserviced and poorly maintained machinery and vehicles.

- Noise

Construction vehicles may generate a considerable amount of noise during construction activities. Noise during movements include reversing alarms and engine revving. Noise from construction vehicles has a number of different sources including silencer, brakes, poor suspension and body slap. Empty trucks are worse than fully loaded ones; they tend to travel faster and be noisier because they suffer from "body-slap" when going over potholes, bumps, or road humps.

- Aesthetics *Impacts*

Linear projects such as pipeline developments have a propensity to spoil aesthetic environments. This may be due to large tracts of areas being cleared and deep cuts involved. Excavated sites scar the landscape. This impact is high negative if unmitigated.

8.2.1.16 *Waste Management*

Construction waste like cement bags, containers and other waste streams are likely to be generated. Improper management of this waste may lead to environmental pollution.

8.2.1.17 *Loss of cultural and archaeological artefacts*

Although no archaeological finding has been made, the excavations may uncover these. If procedures for discovery are not in place, these can be lost.

8.2.1.18 *Disruption of services*

The digging of trenches may affect lead to disruption of services like electricity in cases where the cables are underground. Pipes for existing water schemes may also be disturbed during the digging and laying of pipes.

8.2.2 Operational Phase

The operation of water supply infrastructure will lead to various bio-physical and socio-economic adverse impacts in the project area. The EHS Guidelines for Water and Sanitation identify the following sector specific impacts.

8.2.2.1 *Water Treatment Plant Management Impacts*

Solid waste residuals generated by water treatment include process residuals, used filtration membranes, spent media and miscellaneous wastes. Process residuals primarily consist of settled suspended solids from source water and chemicals added in the treatment process, such as lime and coagulants. Pre-sedimentation, coagulation (e.g., with aluminum hydroxide [alum]), lime softening, iron and manganese removal, and slow sand and diatomaceous earth filtration all produce sludge. Composition of the sludge depends on the treatment process and the characteristics of the source water, and may include arsenic and other metals, radionuclides,

lime, polymers and other organic compounds, microorganisms, etc. Damaged or exhausted membranes are typically produced from water treatment systems used for desalination. Spent media may include filter media (including sand, coal, or diatomaceous earth from filtration plants), ion exchange resins, granular activated carbon. Water contamination may also be experienced as a result of a non-functional or inefficient water treatment process.

8.2.2.2 *Wastewater Impacts*

Wastewater from water treatment projects include filter backwash, reject streams from membrane filtration processes, and brine streams from ion exchange or demineralization processes. These waste streams may contain suspended solids and organics from the raw water, high levels of dissolved solids, high or low pH, heavy metals.

8.2.2.3 *Chemicals management*

The water treatment process involves the use of chemicals for coagulation, disinfection and water conditioning. These include soda ash, alum (delivered by tanker), polyelectrolyte (liquid in plastic carboy that is directly to the dosing plant).

8.2.2.4 *Air Emissions*

Air emissions from water treatment operations may include gaseous or volatile chemicals used for disinfection processes (e.g chlorine). Measures nee hazardous chemicals discussed above will mitigate risks of chlorine and ammonia releases.

8.2.2.5 *Water System Leaks and Loss of Pressure*

Water system leaks can reduce the pressure of the water system compromising its integrity and ability to protect water quality (by allowing contaminants into the system) and increasing the demands on the source water supply, the quantity of chemicals, and the amount of power used for pumping and treatment. Leaks in the distribution system can result from improper installation or maintenance, inadequate corrosion protection, settlement, stress from traffic and vibrations, overloading, amongst others.

8.2.2.6 *Solid Waste Impacts*

During maintenance of the water supply system, there may be waste generated from servicing and maintenance of pumps, valves, pipeline, laterals and the solar power supply. Waste that may be generated includes oils, non-functional pumps, electronic waste, oil soiled swabs and damaged pipes. Some of this waste is classified as hazardous waste in the Waste Regulations, 2000. Improper management of this waste may lead to environmental degradation.

8.2.2.7 *Water Discharges*

Water lines may be periodically flushed to remove accumulated sediments or other impurities that have accumulated in the pipe. Flushing is performed by isolating sections of the distribution system and opening flushing valves or, more commonly, fire hydrants to cause a large volume of flow to pass through the isolated pipeline and suspend the settled sediment. The major environmental aspect of water pipe flushing is the discharge of flushed water, which may be high in suspended solids, residual chlorine, and other contaminants that can harm surface water bodies.

8.2.2.8 *Storm water management*

Improper rehabilitation of the disturbed areas may lead to erosion, compromising the integrity of storm water drains and causing siltation.

8.2.2.9 *Water Resource Impacts*

The current volume abstracted from the Mkhondvo River will increase on operation of the project to service the additional population along the Nhlangano – Siphambanweni corridor. This may impact water availability for downstream use and aquatic life. This may be more pronounced in unforeseen drought situations.

8.2.2.10 *Atmosphere and Aesthetics*

During maintenance of the water supply system, dust and noise may be generated from maintenance trucks and maintenance activities. Noise may also be generated from the operation of pumps. The addition of structures like reservoirs, pumphouse and other structures will change the visual landscape of the project area.

8.2.2.11 *Community Health and Safety*

Poor maintenance of pipes may cause to their bursting leading to flooding affecting properties, including fields, businesses and grazing land. Leaking of pipes may lead to contamination of water. During the maintenance of the system, open trenches may lead to safety hazards to the community.

8.2.2.12 *Occupational Health and Safety*

Personnel involved in maintenance of equipment may be exposed to injuries from electrocution and occupational hazards like dust and noise.

8.2.2.13 *Increased power usage*

The additional water abstraction will require more pumping from the Mkhondvo river, leading to increased power requirements.

8.2.3 Construction Phase Impact Evaluation

The table below presents the evaluation of impacts for the Construction phase.

Impact		Description	Ext[1]	Dur[2]	Sev[3]	Sig[4]	Pro[5]
Site Office Establishment		Temporary construction sites are necessary to store construction equipment and materials. It is important to note that the materials will be delivered along the sections of the proposed pipeline to avoid long distance transportation of materials. There will be a need to establish several site offices at different points along the main pipeline and laterals for effective project supervision and management.	Site specific	Short	Low	Medium	Definite
Land Acquisition		The pipeline will be designed such that it aligns with the existing main road (MR11) along the road reserve, and parts will pass through certain fields and farmland, therefore there will be a need to land acquisition associated with the pipeline will be kept at a minimum. Associated infrastructure, including pump houses and reservoirs will be constructed will require land acquisition.	Local	Long	Medium	Medium	Definite
Land Use Change		Agricultural production is one of the key activities that is a source of livelihood for the communities especially since most families depend on agricultural produce for their day to day dietary needs. Certain parts of the pipeline will pass through fields, which may not be used temporarily during construction. Furthermore, some land will be lost due to construction of other structures like reservoirs and the pump house.	local	Short	Low	Low	Definite
Increase invasion by alien weeds into adjoining areas		Spread of alien invasive weeds onto adjoining naturally vegetated areas due to re-opening and transportation of stockpiles.	Local	Long	Medium	High	Probable
Depletion of water resources		As part of the planning process, one of the activities to be undertaken in preparation for construction will include seeking approvals to abstract water for construction. The logical choice of water supply for construction and dust suppression will be from surface water bodies close to the project area. Indiscriminate harvesting of water resources without a permit leads to shortage of water supply to downstream communities.	Regional	Short	Medium	High	Probable

[1] Extent of Impact

[2] Duration Of Impact

[3] Severity of Impact

[4] Significance

[5] Probability of Occurrence

Water pollution		Disturbances due to the pipeline construction on the water bodies could be in the form of increased pollution load by way of erosion from construction/ vehicle movement activities. The trenching activities may generate trench water, having high suspended solids concentration due to turbidity. Poor management of oils and hazardous material may lead to spillages and subsequent pollution of the surface water bodies	regional	Construction	Medium	Medium	Probable
Loss of flora and Fauna		Construction activities like clearing of land to make way for pipeline and associated infrastructure will lead to exposed area that may be more prone to erosion. Although the Flora may be lost through contamination due to improper management of chemicals, empty chemical containers and other wastes.	Local		Medium	Medium	Definite
Soil Erosion and Contamination		Clearing and compaction activities may lead to soil erosion since the soils on the project site are erodible. If clearing of areas is done and soil is left bare for a considerable amount of time, it may cause washing away of the topsoil. This may lead to sedimentation of nearby water bodies through surface runoff. The soil may further be contaminated by poor management of waste and other hazardous material. The soils on the project site are erodible. If clearing of areas is done and soil is left bare for a considerable amount of time, this may lead to soil erosion. Leaking machinery and equipment may pollute the soil, posing an adverse effect to the environment.	Local	Long	High	High	Probable
Community Health and Safety							
	Increase in road accidents	The average traffic flow along the MR11 is 61.8 cars per hour. The introduction of construction vehicles may lead to unexpected disruption. The usability of this road will be compromised by heavy construction vehicles turning on/off the road and mingling with local traffic. During construction there will be heavy duty vehicles that come to the construction site to deliver various construction materials. This will increase traffic volumes as well as disrupt the smooth flow of traffic along these roads. The use of un-roadworthy vehicles, drivers disobeying traffic rules and obstruction of motorists' views will contribute to this potentially negative impact. Drivers on the MR11 road and other feeder roads may also be not be aware of project construction vehicles, exposing them to risks.	Local	short	Medium	Low	Probable
	Access Impacts	The Blocking and disturbance of accesses from construction activities will impact on accesses to properties due to excavations which may block users to their place of residence or business properties	Local	Short	Low	Low	Probable

	Changes in Population Dynamics	The introduction of new people in the communities may lead to anti-social elements in this quiet environment, with a negative impact especially on issues of crime, HIV prevalence, and alcoholism and drug abuse especially among the youth, prostitution, women and child abuse, increase in costs of service provision, breakdown in values of locals.	Local	Long	Medium	Medium	Probable
Gender Based Violence		The introduction of new people in the project area may aggravate the current crime statistics related to violence against women and children which is the second highest public morality offense in the Shiselweni Region. Over the last five years, Grievous Bodily Harm (GBH) has been the second highest in offences against women with an average of 34.9%.	Regional	Short	medium	Low	Probable
Child labour		Contractors may hire underage persons, which is against international and national legislation and standards.	Regional	Construction	Low	Low	Unlikely
Security Impacts		At night, when lights may be absent or insufficient, inadequate site security or signage could lead to night-time accidents.	Local	Long	Medium	Medium	Probable
Blasting Impacts		These impacts include ground vibrations, air blast, generation of fines, fumes, dust and structural defects.	Local	Construction	Low	Low	Probable
Pumphouse Impacts		The raw materials used for the construction of the pump house may be disposed of improperly leading environmental degradation and aesthetical impacts.	Local	Construction	Medium	Low	Probable
Occupational Health and Safety							
	Site water and Sanitation	Since there is no running water, site workers may not have access to quality drinking water, which may lead to waterborne diseases. Without proper sanitation, site workers may use bushes as toilets, which may lead to soil pollution as well as pollution of water resources from pollutants like coliforms and other pollutants. Project activities may impact water availability in the small streams in the project area. Poor sanitation may also cause pollution to these water bodies.	Local	Long	Medium	High	Probable
	Dust	Construction of the pipeline may temporarily affect the visual aesthetics of the area as well as give rise to dust, noise and visual impacts. During haulage of material, dust will be emitted. The weight of vehicles, their speed of passage and number of wheels in contact with the ground, and the nature and condition of road surfaces or haul routes all contribute to dust emission. If not sheeted, turbulence in the empty bodies of the	Local	Construction	Medium	Medium	Probable

		vehicles may scour out dust. Cleared surfaces may emit dust when vehicles are using them. Dust may also be emitted from stockpiles of soil material. This may be exacerbated in dry and windy days.					
	Noise	Construction vehicles may generate a considerable amount of noise during construction activities. Noise during movements include reversing alarms and engine revving. Noise from construction vehicles has a number of different sources including silencer, brakes, poor suspension and body slap. Empty trucks are worse than fully loaded ones; they tend to travel faster and be noisier because they suffer from "body-slap" when going over potholes, bumps, or road humps.	Site	Construction	Medium	Low	Definite
Emissions		Machinery and vehicles may emit gases like SOx and NOx and particulate matter, which cause air pollution and respiratory illnesses. This may be exacerbated by unserviced and poorly maintained machinery and vehicles.	Local	Construction	Medium	Low	Probable
Aesthetic Impacts		Linear projects such as pipeline developments have a propensity to spoil aesthetic environments. This may be due to large tracts of areas being cleared and deep cuts involved. Excavated sites scar the landscape. This impact is high negative if unmitigated.	Local	Short	Medium	Low	Definite
Waste Management		Construction waste like cement bags, containers and other waste streams are likely to be generated. Improper management of this waste may lead to environmental pollution.	Local	Construction	Medium	Low	Probable
Loss of archaeological artefacts		Although no archaeological finding has been made, the excavations may uncover these. If procedures for discovery are not in place, these can be lost.	Local	Long	Medium	Medium	Probable

8.2.4 Operational Phase Impact Evaluation

The following table presents the evaluation of adverse impacts for the operational phase

Table 50: Operational Phase Impact Evaluation

Impact	Description	**Ext[6]**	**Dur[7]**	**Sev[8]**	**Sig[9]**	**Pro[10]**
Water Treatment Plant Management Impact	Solid waste residuals generated by water treatment include process residuals, used filtration membranes, spent media and miscellaneous wastes. Process residuals primarily consist of settled suspended solids from source water and chemicals added in the treatment process, such as lime and coagulants. Pre-sedimentation, coagulation (e.g., with aluminum hydroxide [alum]), lime softening, iron and manganese removal, and slow sand and diatomaceous earth filtration all produce sludge. Composition of the sludge depends on the treatment process and the characteristics of the source water, and may include arsenic and other metals, radionuclides, lime, polymers and other organic compounds, microorganisms, etc. Damaged or exhausted membranes are typically produced from water treatment systems used for desalination. Spent media may include filter media (including sand, coal, or diatomaceous earth from filtration plants), ion exchange resins, granular activated carbon. Water contamination may also be experienced as a result of a non-functional or inefficient water treatment process.	Regional	Long	Medium	High	Probable
Wastewater Impacts	Wastewater from water treatment projects include filter backwash, reject streams from membrane filtration processes, and brine streams from ion exchange or demineralization processes. These waste streams may contain suspended solids and organics from the raw water, high levels of dissolved solids, high or low pH, heavy metals.	Regional	Long	High	High	Probable
Chemicals Management	The water treatment process involves the use of chemicals for coagulation, disinfection and water conditioning. These include soda ash, alum (delivered by tanker), polyelectrolyte (liquid in plastic carboy that is directly to the dosing plant).	Local	Medium	Medium	Medium	Probable

[6] Extent of Impact

[7] Duration Of Impact

[8] Severity of Impact

[9] Significance

[10] Probability of Occurrence

Impact	Description	Ext[6]	Dur[7]	Sev[8]	Sig[9]	Pro[10]
Air Emissions	Air emissions from water treatment operations may include gaseous or volatile chemicals used for disinfection processes (e.g chlorine). Measures for hazardous chemicals management to be outlined will mitigate risks of chlorine and ammonia releases.	Local	Medium	Medium	Medium	Probable
Water system leaks and loss of pressure	Water system leaks can reduce the pressure of the water system compromising its integrity and ability to protect water quality (by allowing contaminants into the system) and increasing the demands on the source water supply, the quantity of chemicals, and the amount of power used for pumping and treatment. Leaks in the distribution system can result from improper installation or maintenance, inadequate corrosion protection, settlement, stress from traffic and vibrations, overloading, amongst others.	Regional	Long	Long	High	Probable
Solid Water Management	During maintenance of the water supply system, there may be waste generated from servicing and maintenance of pumps, valves, pipeline, laterals and the solar power supply. Waste that may be generated includes oils, non-functional pumps, electronic waste, oil soiled swabs and damaged pipes. Some of this waste is classified as hazardous waste in the Waste Regulations, 2000. Improper management of this waste may lead to environmental degradation.	Local	Medium	Medium	Medium	Probable
Water Discharges	Water lines may be periodically flushed to remove accumulated sediments or other impurities that have accumulated in the pipe. Flushing is performed by isolating sections of the distribution system and opening flushing valves or, more commonly, fire hydrants to cause a large volume of flow to pass through the isolated pipeline and suspend the settled sediment. The major environmental aspect of water pipe flushing is the discharge of flushed water, which may be high in suspended solids, residual chlorine, and other contaminants that can harm surface water bodies.	Local	Low	Medium	Low	Probable
Storm water Management	Improper rehabilitation of the disturbed areas may lead to erosion, compromising the integrity of storm water drains and causing siltation.	Local	Long	Medium	Medium	Probable
Water Resource Impacts	The current volume abstracted from the Mkhondvo River will increase on operation of the project to service the additional population along the Nhlangano – Siphambanweni corridor. This may impact water availability for downstream use and aquatic life. This may be more pronounced in unforeseen drought situations.	Local	Medium	Medium	Medium	Probable
Atmosphere and Aesthetics	During maintenance of the water supply system, dust and noise may be generated from maintenance trucks and maintenance activities. Noise may also be generated from the operation of pumps. The addition of structures like reservoirs, pumphouse and other structures will change the visual landscape of the project area.	Local	Long	Medium	Medium	Probable
Community health and safety	Poor maintenance of pipes may cause to their bursting leading to flooding affecting properties, including fields, businesses and grazing land. Leaking of pipes may lead to contamination of water. During the maintenance of the system, open trenches may lead to safety hazards to the community.	Local	Medium	Medium	Medium	Probable

Impact	Description	**Ext[6]**	**Dur[7]**	**Sev[8]**	**Sig[9]**	**Pro[10]**
Occupational Health and Safety	Personnel involved in maintenance of equipment may be exposed to injuries from electrocution and occupational hazards like dust and noise.	Local	Medium	Medium	Medium	Probable
Increased power usage	The additional water abstraction will require more pumping from the Mkhondvo river, leading to increased power requirements.	Local	Long	High	High	Definite

9 IMPACT MANAGEMENT

9.1 Construction Phase Mitigations

9.1.1 Site Establishment Mitigations

a. In identification of site offices, areas which are already disturbed will be considered as first priority to minimise disturbance of virgin land.
b. The contractor shall restrict all activities to the designated areas on the construction layout plan.
c. Establishment of site offices, material storage areas will be done in a manner that avoids environmentally sensitive areas like wetlands and streams.
d. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses.
e. All waste generated in the project, including builder's rubble will be disposed in an approved waste disposal facility, in accordance with the Waste Regulations, 2000.
f. Cleared surfaces will be regularly sprayed with water to minimize dust. Exposed areas will be rehabilitated and grassed as soon as work has been finished in those areas.
g. Locals will be given first preference in hiring of skills that are available in the community.
h. The contractor will be required to recognize his responsibility towards the social issues of his workforce. An HIV/AIDS awareness campaign will be done for the workers.

9.1.2 Land acquisition impacts mitigations

a. The proponent undertakes to compensate all property owners fully. There shall be no gender bias.
b. The cooperation will draw up and implement a Resettlement Action Plan (RAP) to mitigate project related displacement impacts in addition to the existing Resettlement Framework Policy (RFP)
c. Land affected by the project will be compensated after consultations and negotiations conducted in good faith by both parties (affected and proponent) before construction commences according to the land values given by the Valuator. In case of disagreements the issues must be referred to an Independent Arbitrator.
d. Consultations will be undertaken especially with all affected landowners, and household members on the, valuation processes, negotiations and, awards
e. The proponent and property owners will agree on compensation terms by signing letters of acceptance.
f. Compensation will be effected prior to project implementation.
g. Community Liaison Officers (CLOs) will be designated by the Traditional authorities to facilitate communication in cases where rights to cross fields and other community properties are required.

9.1.3 Land use change

a. Construction of the pipeline will be managed such that sections falling on farming areas are completed in the shortest possible time
b. PAPs using agricultural land will be engaged, and compensation will be paid for time when production cannot take place.
c. The cooperation will draw up and implement a Resettlement Action Plan (RAP) to mitigate project related displacement impacts in addition to the existing Resettlement Framework Policy (RFP)

9.1.4 Increased invasion by alien weeds

a. Progressive rehabilitation will be done to avoid the establishment of alien invasive species in cleared areas.

b. Removal of invasive plant species, whenever possible, cultivating native plant species
c. Once the establishment of an alien invasive species has been detected, the contractor will steps such as eradication, containment and control, to mitigate the adverse effects.

9.1.5 Depletion of water resources

a. There will be logical choice of water supply for construction and dust suppression will be from surface water bodies close to the project area.

b. Indiscriminate harvesting of water resources without a permit will not be done

c. This lowest minimum flow rate (which is the worst-case scenario in 5 years) can accommodate the allocated quota of 1,866,240m^3 per year. It therefore leaves enough water for downstream use and aquatic life.
d. The corporation shall ensure that abstracted volume are within the allocated quoter

9.1.6 Water Pollution

a. The design of the pipeline will be such that at places where it crosses water bodies it will be suspended (attached to bridges) to avoid pollution.
b. Digging will only done when pipes are ready to be laid, open trenches will be covered within 24hrs to minimise erosion of soil material
c. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses
d. Stockpiled material will be kept away from water bodies to prevent sedimentation of water bodies
e. The contractor will draw up and implement a chemicals management plans, display signs, control access to chemicals and handle chemicals in accordance with their MSDSs. Only trained personnel will handle hazardous material, procedures for handling spillages will also be in place.
f. All topsoil removed during construction will be stockpiled close to the site for rehabilitation purposes.
g. The Contractor will ensure that stockpiles will be placed in areas where run-off will be a problem even during the dry season as this will cause water erosion and that they are arranged such that they are not exposed to the wind.
h. Areas for storage of stockpiles will be graded to a uniform surface. It shall be free of all vegetation and other debris, and free from stones. Moreover, the stockpiles will be sprinkled with water regularly, thus abating dust emission.
i. Topsoil that will be stripped and stored with as little compaction as possible, and only on non-wet days. All stockpiles will be stored without exceeding 1m height and those which are three months older will be re-seeded. Furthermore, the contractor will rehabilitate natural slopes to reduce environmental impact and erosion, using the stockpile of overburden material.

9.1.7 Loss of Flora and vegetation cover

a. The contractor will zone out working areas to reduce ecological destruction,
b. Restore disturbed natural sites through environmental rehabilitation; restoring top soils and (re-)introduce genetic species similar to those destroyed in order to re-establish the natural local ecology.
c. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses

d. EWSC will ensure that there will be no indiscriminate site clearances, and that workers will be educated on the Plant Protection Act so as to be able to identify all legally protected ones.

9.1.8 Soil Erosion and Contamination

a. Clearing will only be done when equipment and personnel are ready to start work on that area.
b. Topsoil and subsoil will be stripped and stockpiled for rehabilitation after completion.
c. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses.
d. Vehicles and machinery will be regularly serviced. There will be no servicing done on site. This will ensure that the vehicles do not leak fuel into the soil. However, if there are any spills, the contaminated soil will be scooped and stored in hazardous waste marked bins which will then be treated using bioremediation on site.
e. During construction, care will be taken that substances used in construction that may pollute nearby water bodies are properly stored and residues do not find their way into the river but are properly disposed of.

9.1.9 Community Health and Safety

a. The contractor will implement training of Project Workers designed to heighten awareness of risks and to mitigate impacts on local communities
b. The contactor will develop and implement measures and action to assess and manage specific risks and impacts to the community arising from Project activities
c. There is potential hazard risk from open trenches in the vicinity of populated areas during the construction phase that should be mitigated by appropriate warnings and fencing.
d. The contractor will prepare an Occupational Health and Safety Plan for minimizing occupational and community health and safety impacts.

9.1.10 Access Impacts

a. The contractor will ensure that access roads leading to business/residential are kept open at all times for easier accessibility and that these provide safe and convenient passage. Where this cannot be avoided, the contractor will ensure that periods of closure are keep minimum.
b. Access roads will be maintained during the construction period

9.1.11 Changes in Population Dynamics

a. Local people will be prioritised for employment and no construction camps for accommodation will be established
b. The contactor will have draw up recruitment policy that ensures screening of potential employees
c. The local police will be engaged to assist in awareness raising on anti-social behaviours

9.1.12 Gender Based Violence

a. The contractor will enforce legislation and act against employees found to have committed acts of gender-based violence

b. The contactor will draw up recruitment policy that ensures screening of potential employees
c. The local police will be engaged to assist in awareness raising on anti-social behaviours

9.1.13 Child labour

The contractor will draw up and implement are recruitment policy that is in-line with national and international laws and against child labour.

9.1.14 Security Impacts

a. Security will be maintained 24hrs a day on site
b. There will be signs restricting a day on site
c. There will be access control and maintenance of entrance register in to the site

9.1.15 Blasting Impacts

It is not anticipated that there will be blasting in the project, in the event that it is needed, the contactor will draw up and implement a blasting management plan

9.1.16 Pump house Impacts

The contractor will draw up and implement a waste management plan in line with the Waste Regulations, 2000.

9.1.17 Occupational Health and Safety

a. Site Water and Sanitation
b. Adequate drinking water and proper sanitation facilities will be provided (for each sex where conditions warrant).
c. Temporary chemical toilets will be put on site to ensure proper sanitation and avoid pollution of groundwater and surface water resources.

9.1.18 Atmosphere and Aesthetics

Dust

a. Cleared surfaces will be watered to supress dust, including spraying with water.
b. The vehicles working on this project will be required to observe a speed limit of 40 km/h to minimise the emission of dust.
c. The Contractor will ensure that stockpiles are not will not be placed in areas where run-off will be a problem even during the dry season as this will cause water erosion and that they are arranged such that they are not exposed to the wind.
d. Areas for storage of stockpiles will be graded to a uniform surface. It shall be free of all vegetation and other debris, and free from stones. Moreover, the stockpiles will be sprinkled with water regularly, thus abating dust emission.
e. Top soil that will be stripped and stored with as little compaction as possible, and only on non-wet days. All stockpiles will be stored without exceeding 1m height and those which are three month older will be re-seeded. Furthermore, the contractor will rehabilitate natural slopes to reduce environmental impact and erosion, using the stockpile of overburden material.

9.1.19 Emissions

All vehicles will be serviced regularly and monitored for emissions

9.1.20 Noise

a. Construction activities will be confined to daytime and noise and the noise levels will only affect the nearby areas for a relatively short time.

b. A buying policy that includes consideration of noise for all new items of plant will be adopted.

c. It will be ensured that plant and vehicles are properly maintained.

d. Enclosures will be used for noisy plant such as pumps or generators.

e. Rubber linings will be used in chutes and dumpers to reduce impact noise.

9.1.21 Loss of archaeological and heritage Impacts

a. In cases where a discovery is made, the ENTC will be notified immediately.
b. The contractor will draw a chance find procedure for unexpected discovery.

9.1.22 Aesthetics Impacts

a. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses
b. Design will take into consideration surrounding environment and made to blend with it as much as possible.

9.1.23 Waste Impacts

a. Bins will be provided in all site offices for disposal of general waste.
b. All employees will be sensitized on proper waste management.
c. Special waste like tonners, cartridges and florescent tubes will be placed in separate, marked bins and will be stored in containers for environmentally sound disposal in accordance with the Waste Regulations, 2000.
d. Disposing of rubble and other waste will be done appropriately and on a regular basis during the construction phase of the proposed project.

9.1.24 Disruption of Services

a. The utility companies will be engaged prior to project implementation to be made aware of the project timelines.
b. Incidences will be promptly reported to the relevant stakeholders for them to fix the problem.
c. In cases where the pipeline crosses the road, the storm water drainage structures beneath the road will be used as a passage for the pipeline.
d. Leaking pipes will be fixed immediately to avoid disruption of water supply to the community.

9.2 Operational Phase Mitigations

9.2.1 *Water Treatment Plant Management Impacts*

- The quantity of solids generated by the water treatment process is minimised through optimizing coagulation processes;
- Use of ferric and alum sludges will be balanced to bind phosphorous (e.g., from manure application at livestock operations) without causing aluminium phytotoxicity. Land application after testing for levels of heavy metals will be done before this is used for land application.
- Sludges may require special disposal if the source water contains elevated levels of toxic metals, such as arsenic, radionuclides, etc.;
- Regenerate activated carbon will be returned to the supplier.
- Residual waste that cannot be recycled will be stored in designated containers and disposed of in Compliance with the Waste Regulations, 2000.

9.2.1.2 *Wastewater Impacts*

- Land application of wastes with high dissolved solids concentrations is generally preferred over discharge to surface water subject to an evaluation of potential impact on soil, groundwater, and surface water resulting from such application;
- Filter backwash is recycled into the process.
- Reject streams, including brine, is treated tested for quality before being returned to the river, in compliance with the Environmental Management Act, 2002 and the Water Act, 2003. Disposal

9.2.1.3 *Chemicals management*

- Alarm and safety systems, including automatic shutoff valves, that are automatically activated when a chlorine release is detected are installed in the Water Treatment plant
- Containment and scrubber systems are in place to capture and neutralize chlorine should a leak occur
- Corrosion-resistant piping, valves, metering equipment, and any other equipment coming in contact
- with gaseous or liquid chlorine are used, and kept free from contaminants, including oil and grease
- Chlorine is stored away from all sources of organic chemicals, and protect from sunlight, moisture, and high temperatures
- Sodium hypochlorite is stored in cool, dry, and dark conditions for no more than one month, and used with equipment constructed of corrosion-resistant materials;
- Calcium hypochlorite is stored away from any organic materials and protect from moisture; fully empty or re-seal shipping containers to exclude moisture. Calcium hypochlorite is stored for up to one year;

- The amount of chlorination chemicals stored on site is minimised while maintaining a sufficient inventory to cover intermittent disruptions in supply;
- A prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures has been developed and implemented.
- A plan for responding to accidental releases has been developed and implemented .
- A material safety Data Sheet (MSDS) is in place to ensure a sound chemicals management approach

9.2.1.4 *Water System Leaks and Loss of Pressure*

- It will be ensured that construction meets applicable standards and industry practices;
- Conduct regular inspection and maintenance;
- Implement a leak detection and repair program (including records of past leaks and unaccounted-for water to identify potential problem areas);
- Consider replacing mains with a history of leaks of with a greater potential for leaks because of their location, pressure stresses, and other risk factors.

9.2.1.5 *Solid Waste Impacts*

- Waste will be recycled as far as practically possible by identifying and giving waste to licenced recyclers.
- All employees will be sensitized on proper waste management.
- Special waste like ewaste, old pumps, waste oils will be given to licenced recyclers
- Oil swabs and other hazardous waste (like expired and used chemicals) will be placed in separate, marked bins and will be stored in containers for environmentally sound disposal in accordance with the Waste Regulations, 2000.
- Disposing of waste will be done appropriately and on a regular basis in an approved Waste disposal site.

9.2.1.6 *Water Discharges*

- The flush water will be discharged into a separate storm sewer system with storm water management measures such as a detention pond, where solids can settle, and residual chlorine consumed before the water is discharged;
- Erosion during flushing will be minimised by avoiding discharge areas that are susceptible to erosion and spreading the flow to reduce flow velocities.

9.2.1.7 *Storm water management*

- A storm water management plan will be drawn up to ensure that rainwater is channelled to existing drainage lines with minimal contamination.

9.2.1.8 *Water Resource Impacts*

- It shall be ensured that water abstracted from the river is within the allocated quota.
- In cases where the water levels are unusually low, EWSC will engage with the Department of Water Affairs to adjust abstraction flow rates until the situation normalises
- Community will be educated on water conservation and encouraged to report leakages in the water supply infrastructure.

9.2.1.9 *Atmosphere and Aesthetics*

- Cleared surfaces will be watered to supress dust.
- The vehicles working on this project will be required to observe a speed limit of 40 km/h to minimise the emission of dust.
- There will be regularly spraying of untarred road surfaces
- Machinery to be used during project implementation will be properly serviced to ensure that unnecessary noise is not emitted while the machines are at work.
- Baffle mounds or noise fences will be used to provide screening since the area is a noise sensitive environment.

9.2.1.10 *Community Health and Safety*

a. A maintenance plan will be developed and implemented to ensure regular maintenance of water supply infrastructure. This will include proactive testing of pipes and other infrastructure.
b. The materials chosen for the water supply system will durable with easily obtainable spare parts.
c. Community will be sensitized if there are anticipated disruption to service and fixing water supply issues
d. All leaks will be addressed in the shortest time possible.

9.2.1.11 *Occupational Health and Safety*

a. There will be regular OHS training of personnel involved in maintenance and operation of the water supply infrastructure

b. EWSC has an OHS policy and plan, which new employees will be inducted on

c. Relevant personnel Protective Equipment will be provided for all employees and employees will be encouraged to use it

d. Access to high risk areas will be limited to highly trained personnel

e. There will be proper warning signs for areas that are of high risk.

f. First aid representatives will be part of every maintenance crew and every area/section of work.

g. First aid fits will always be available and accessible

h. Fire fighting equipment will be put in place and properly serviced.

i. Fire drills will be dome for workers and fire assembly points demarcated.

9.2.1.12 *Increased power usage*

a. Power conservation measures will be put in place

b. Pumping will only be done when it is necessary, and equipment not in use will ne switched off

c. Works will be sensitised of energy conservation

An Environmental and Social Commitment Plan has been developed and attached as Appendix 7.

9.3 Summary of Mitigation Measures

The following table presents proposed mitigation measures for minimising adverse impacts.

Adverse Impact	Impact Description	Mitigation Measure
Site Establishment	Temporary construction sites are necessary to store construction equipment and materials. It is important to note that the materials will be delivered along the sections of the proposed pipeline to avoid long distance transportation of materials. There will be a need to establish several site offices at different points along the main pipeline and laterals for effective project supervision and management.	In identification of site offices, areas which are already disturbed will be considered as first priority to minimise disturbance of virgin land. The contractor shall restrict all activities to the designated areas on the construction layout plan. Establishment will be done in a manner that avoids environmentally sensitive areas like wetlands and streams. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses. All waste generated in the project, including builder's rubble will be disposed in an approved waste disposal facility, in accordance with the Waste Regulations, 2000. Cleared surfaces will be regularly sprayed with water to minimize dust. Exposed areas will be rehabilitated and grassed as soon as work has been finished in those areas. Locals will be given first preference in hiring of skills that are available in the community. The contractor will be required to recognize his responsibility towards the social issues of his workforce.
Land Acquisition Impacts	The pipeline will be designed such that it aligns with the existing main road (MR11) along the road reserve, and parts will pass through certain fields and farmland, therefore there will be a need to land acquisition associated with the pipeline will be kept at a minimum. Associated infrastructure, including pump houses and reservoirs will be constructed will require land acquisition.	The proponent undertakes to compensate all property owners fully. There shall be no gender bias. The cooperation will draw up and implement a Resettlement Action Plan (RAP) to mitigate project related displacement impacts in addition to the existing Resettlement Framework Policy (RFP). Land affected by the project will be compensated after consultations and negotiations conducted in good faith by both parties (affected and proponent) before construction commences according to the land values given by the Valuator. In case of disagreements the issues must be referred to an Independent Arbitrator. Consultations will be undertaken especially with all affected landowners, and household members on the, valuation processes, negotiations and, awards. The proponent and property owners will agree on compensation terms by signing letters of acceptance. Compensation will be effected prior to project implementation. Community Liaison Officers (CLOs) will be designated by the Traditional authorities to facilitate communication in cases where rights to cross fields and other community properties are required.

Land Use Change	Agricultural production is one of the key activities that is a source of livelihood for the communities especially since most families depend on agricultural produce for their day to day dietary needs. Certain parts of the pipeline will pass through fields, which may not be used temporarily during construction. Furthermore, some land will be lost due to construction of other structures like reservoirs and the pump house.	Construction of the pipeline will be managed such that sections falling on farming areas are completed in the shortest possible time. PAPs using agricultural land will be engaged, and compensation will be paid for time when production cannot take place. The cooperation will draw up and implement a Resettlement Action Plan (RAP) to mitigate project related displacement impacts in addition to the existing Resettlement Framework Policy (RFP).
Increase Invasion by alien weeds into adjoining areas	Spread of alien invasive weeds onto adjoining naturally vegetated areas due to re-opening and transportation of stockpiles.	Progressive rehabilitation will be done to avoid the establishment of alien invasive species in cleared areas. Removal of invasive plant species, whenever possible, cultivating native plant species. Once the establishment of an alien invasive species has been detected, the contractor will take steps such as eradication, containment and control, to mitigate the adverse effects.
Depletion of Water Resources	As part of the planning process, one of the activities to be undertaken in preparation for construction will include seeking approvals to abstract water for construction. The logical choice of water supply for construction and dust suppression will be from surface water bodies close to the project area. Indiscriminate harvesting of water resources without a permit leads to shortage of water supply to downstream communities.	There will be logical choice of water supply for construction and dust suppression will be from surface water bodies close to the project area. Indiscriminate harvesting of water resources without a permit will not be done. This lowest minimum flow rate (which is the worst-case scenario in 5 years) can accommodate the allocated quota of 1,866,240m^3 per year. It therefore leaves enough water for downstream use and aquatic life. The corporation shall ensure that abstracted volume is within the allocated quota.
Water Pollution	Disturbances due to the pipeline construction on the water bodies could be in the form of increased pollution load by way of erosion from construction/ vehicle movement activities. The trenching activities may generate trench water, having high suspended solids concentration due to turbidity. Poor management of oils and hazardous material may lead to spillages and subsequent pollution of the surface water bodies	The design of the pipeline will be such that at places where it crosses water bodies it will be suspended (attached to bridges) to avoid pollution. Digging will only done when pipes are ready to be laid, open trenches will be covered within 24hrs to minimise erosion of soil material. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses. Stockpiled material will be kept away from water bodies to prevent sedimentation of water bodies. The contractor will draw up and implement a chemicals management plans, display signs, control access to chemicals and handle chemicals in accordance with their MSDSs. Only trained personnel will handle hazardous material, procedures for handling spillages will also be in place. All topsoil removed during construction will be stockpiled close to the site for rehabilitation purposes. The Contractor will ensure that stockpiles are not be placed in areas where run-off will be a problem even during the dry season as this will cause

		water erosion and that they are arranged such that they are not exposed to the wind. Areas for storage of stockpiles will be graded to a uniform surface. It shall be free of all vegetation and other debris, and free from stones. Moreover, the stockpiles will be sprinkled with water regularly, thus abating dust emission. Topsoil that will be stripped and stored with as little compaction as possible, and only on non-wet days. All stockpiles will be stored without exceeding 1m height and those which are three months older will be re-seeded. Furthermore, the contractor will rehabilitate natural slopes to reduce environmental impact and erosion, using the stockpile of overburden material.
Loss of flora and vegetation cover	Construction activities like clearing of land to make way for pipeline and associated infrastructure will lead to exposed area that may be more prone to erosion. Although the Flora may be lost through contamination due to improper management of chemicals, empty chemical containers and other wastes.	The contractor will zone out working areas to reduce ecological destruction. Restore disturbed natural sites through environmental rehabilitation; restoring topsoils and (re-)introduce genetic species similar to those destroyed in order to re-establish the natural local ecology. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses EWSC will ensure that there will be no indiscriminate site clearances, and that workers will be educated on the Plant Protection Act so as to be able to identify all legally protected ones.
Soil Erosion and Contamination	Clearing and compaction activities may lead to soil erosion since the soils on the project site are erodible. If clearing of areas is done and soil is left bare for a considerable amount of time, it may cause washing away of the topsoil. This may lead to sedimentation of nearby water bodies through surface runoff. The soil may further be contaminated by poor management of waste and other hazardous material. The soils on the project site are erodible. If clearing of areas is done and soil is left bare for a considerable amount of time, this may lead to soil erosion. Leaking machinery and equipment may pollute the soil, posing an adverse effect to the environment.	Clearing will only be done when equipment and personnel are ready to start work on that area. Topsoil and subsoil will be stripped and stockpiled for rehabilitation after completion. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses. Vehicles and machinery will be regularly serviced. There will be no servicing done on site. This will ensure that the vehicles do not leak fuel into the soil. However, if there are any spills, the contaminated soil will be scooped and stored in hazardous waste marked bins which will then be treated using bioremediation on site. During construction, care will be taken that substances used in construction that may pollute nearby water bodies are properly stored and residues do not find their way into the river but are properly disposed of.
Waste Management	Construction waste like cement bags, containers and other waste streams are likely to be generated. Improper management of this waste may lead to environmental pollution.	The contractor prepares a waste management plan and provide labelled waste receptacles during the construction period. Employees will also be taught on the importance of proper waste management during toolbox talks to ensure that they are adequately sensitized about waste management. The contractor will additionally ensure segregation of all wastes from source. Special waste like tonners, cartridges and florescent tubes will be placed in separate, marked bins

		and will be stored in containers for environmentally sound disposal in accordance with the Waste Regulations, 2000. Disposing of rubble and other waste will be done appropriately and on a regular basis during the construction phase of the proposed project.
Loss of cultural and archaeological artefacts	Although no archaeological finding has been made, the excavations may uncover these. If procedures for discovery are not in place, these can be lost.	In cases where a discovery is made, the ENTC will be notified immediately.
Blasting Impacts	These impacts include ground vibrations, air blast, generation of fines, fumes, dust and structural defects.	It is not anticipated that there will be blasting in the project, in the event that it is needed, the contactor will draw up and implement a blasting management plan
Pump House Impacts	The raw materials used for the construction of the pump house may be disposed of improperly leading environmental degradation and aesthetical impacts.	The contactor will draw up and implement a waste management plan in line with the Waste Regulations of 2000.
Community Health and Safety		
Increase in Road Accidents	The average traffic flow along the MR11 is 61.8 cars per hour. The introduction of construction vehicles may lead to unexpected disruption. The usability of this road will be compromised by heavy construction vehicles turning on/off the road and mingling with local traffic. During construction there will be heavy duty vehicles that come to the construction site to deliver various construction materials. This will increase traffic volumes as well as disrupt the smooth flow of traffic along these roads. The use of un-roadworthy vehicles, drivers disobeying traffic rules and obstruction of motorists' views will contribute to this potentially negative impact. Drivers on the MR11 road and other feeder roads may also be not be aware of project construction vehicles, exposing them to risks.	The contractor will ensure that flaggers and all traffic control signage is put up to control traffic. A traffic study will also be done by the contractor. No work will be done during the peak hours when traffic flows are high. Traffic warning signs will be erected indicating possible construction vehicles driving in and out of site. Drivers and operators of heavy machinery will be properly trained.
Access Impacts	The blocking and disturbance of accesses from construction activities will impact on accesses to properties due to excavations which may block users to their place of residence or business properties.	The contractor will ensure that access roads leading to business/residential are kept open at all times for easier accessibility and that these provide safe and convenient passage. Where this cannot be avoided, the contractor will ensure

		that periods of closure are keep minimum. Access roads will be maintained during the construction period.
Changes in Population Dynamics	The introduction of new people in the communities may lead to anti-social elements in this quiet environment, with a negative impact especially on issues of crime, HIV prevalence, and alcoholism and drug abuse especially among the youth, prostitution, women and child abuse, increase in costs of service provision, breakdown in values of locals.	Local people will be prioritized for employment and no construction camps for accommodation will be established. The contactor will draw up recruitment policy that ensures screening of potential employees. The local police will be engaged to assist in awareness raising on anti-social behaviors
Gender Based Violence	The introduction of new people in the project area may aggravate the current crime statistics related to violence against women and children which is the second highest public morality offense in the Shiselweni Region. Over the last five years, Grievous Bodily Harm (GBH) has been the second highest in offences against women with an average of 34.9%.	The contractor will enforce legislation and act against employees found to have committed acts of gender-based violence. The contactor will draw up recruitment policy that ensures screening of potential employees. The local police will be engaged to assist in awareness raising on anti-social behaviors.
Child Labour	Contractors may hire underage persons, which is against international and national legislation and standards.	The contractor will draw up and implement are recruitment policy that is in-line with national and international laws and against child labour
Security Impacts	At night, when streetlights may be absent or insufficient, inadequate site security or signage could lead to night-time accidents.	Security will be maintained 24hrs a day on site. There will be signs restricting a day on site. There will be access control and maintenance of entrance register in to the site
Occupational Health and Safety		
Site Water and Sanitation	Since there is no running water, site workers may not have access to quality drinking water, which may lead to waterborne diseases. Without proper sanitation, site workers may use bushes as toilets, which may lead to soil pollution as well as pollution of water resources from pollutants like coliforms and other pollutants. Project activities may impact water availability in the small streams in the project area. Poor sanitation may also cause pollution to these water bodies.	Adequate drinking water and proper sanitation facilities will be provided (for each sex where conditions warrant). Temporary chemical toilets will be put on site to ensure proper sanitation and avoid pollution of groundwater and surface water resources.
Atmosphere and Aesthetics		

Dust	Construction of the pipeline may temporarily affect the visual aesthetics of the area as well as give rise to dust, noise and visual impacts. During haulage of material, dust will be emitted. The weight of vehicles, their speed of passage and number of wheels in contact with the ground, and the nature and condition of road surfaces or haul routes all contribute to dust emission. If not sheeted, turbulence in the empty bodies of the vehicles may scour out dust. Cleared surfaces may emit dust when vehicles are using them. Dust may also be emitted from stockpiles of soil material. This may be exacerbated in dry and windy days.	Cleared surfaces will be watered to suppress dust, including spraying with water. The vehicles working on this project will be required to observe a speed limit of 40 km/h to minimise the emission of dust. The Contractor will ensure that stockpiles are not will not be placed in areas where run-off will be a problem even during the dry season as this will cause water erosion and that they are arranged such that they are not exposed to the wind. Areas for storage of stockpiles will be graded to a uniform surface. It shall be free of all vegetation and other debris, and free from stones. Moreover, the stockpiles will be sprinkled with water regularly, thus abating dust emission. Topsoil that will be stripped and stored with as little compaction as possible, and only on non-wet days. All stockpiles will be stored without exceeding 1m height and those which are three months older will be re-seeded. Furthermore, the contractor will rehabilitate natural slopes to reduce environmental impact and erosion, using the stockpile of overburden material.
Emissions	Machinery and vehicles may emit gases like SOx and NOx and particulate matter, which cause air pollution and respiratory illnesses. This may be exacerbated by unserviced and poorly maintained machinery and vehicles.	All vehicles will be serviced regularly and monitored for emissions
Aesthetics Impacts	Linear projects such as pipeline developments have a propensity to spoil aesthetic environments. This may be due to large tracts of areas being cleared and deep cuts involved. Excavated sites scar the landscape. This impact is high negative if unmitigated.	Clearing will only be done when equipment and personnel are ready to start work on that area
Noise	Construction vehicles may generate a considerable amount of noise during construction activities. Noise during movements include reversing alarms and engine revving. Noise from construction vehicles has a number of different sources including silencer, brakes, poor suspension and body slap. Empty trucks are worse than fully loaded ones; they tend to travel faster and be noisier because they suffer from "body-slap" when going over potholes, bumps, or road humps.	Construction activities will be confined to daytime and noise and the noise levels will only affect the nearby areas for a relatively short time. A buying policy that includes consideration of noise for all new items of plant will be adopted. It will be ensured that plant and vehicles are properly maintained. Enclosures will be used for noisy plant such as pumps or generators. Rubber linings will be used in chutes and dumpers to reduce impact noise.
Increase in HIV/AIDS Prevalence	Influx of workforce in the project area may potentially aggravate the prevalence of HIV/AIDS.	An HIV/AIDS awareness campaign will be done for the workers. The contractor will also ensure the provision of condoms for both male and female employees in the ablution facilities.

Storm water Management	Improper rehabilitation of the disturbed areas may lead to erosion, compromising the integrity of storm water drains and causing siltation.	
Water Resource Impacts	The current volume abstracted from the Mkhondvo River will increase on operation of the project to service the additional population along the Nhlangano – Siphambanweni corridor. This may impact water availability for downstream use and aquatic life. This may be more pronounced in unforeseen drought situations.	The proponent will ensure that abstraction volume do not exceed the allowable limit in the permit granted by the Ministry of Natural Resources and Energy.
Atmosphere and Aesthetics	During maintenance of the water supply system, dust and noise may be generated from maintenance trucks and maintenance activities. Noise may also be generated from the operation of pumps. The addition of structures like reservoirs, pump house and other structures will change the visual landscape of the project area.	Cleared surfaces will be watered to supress dust. The vehicles working on this project will be required to observe a speed limit of 40 km/h to minimise the emission of dust. There will be regularly spraying of untarred road surfaces Machinery to be used during project implementation will be properly serviced to ensure that unnecessary noise is not emitted while the machines are at work. Baffle mounds or noise fences will be used to provide screening since the area is a noise sensitive environment.
Community Health and Safety	Poor maintenance of pipes may cause to their bursting leading to flooding affecting properties, including fields, businesses and grazing land. Leaking of pipes may lead to contamination of water. During the maintenance of the system, open trenches may lead to safety hazards to the community.	A maintenance plan will be developed and implemented to ensure regular maintenance of water supply infrastructure. This will include proactive testing of pipes and other infrastructure. The materials chosen for the water supply system will durable with easily obtainable spare parts. Community will be sensitized if there are anticipated disruption to service and fixing water supply issues. All leaks will be addressed in the shortest time possible.
Occupational Health and Safety	Personnel involved in maintenance of equipment may be exposed to injuries from electrocution and occupational hazards like dust and noise.	There will be regular OHS training of personnel involved in maintenance and operation of the water supply infrastructure EWSC has an OHS policy and plan, which new employees will be inducted on. Relevant personnel Protective Equipment will be provided for all employees and employees will be encouraged to use it. Access to high risk areas will be limited to highly trained personnel. There will be proper warning signs for areas that are of high risk. First aid representatives will be part of every maintenance crew and every area/section of work. First aid fits will always be available and accessible. Fire fighting equipment will be put in place and properly serviced. Fire drills will be dome for workers and fire assembly points demarcated.

Increase in Power Usage	The additional water abstraction will require more pumping from the Mkhondvo river, leading to increased power requirements.	Power conservation measures will be put in place. Pumping will only be done when it is necessary, and equipment not in use will be switched off. Works will be sensitised of energy conservation
Wastage of Water		Communities will be trained on water billing, water conservation and management.
Mismanagement of Kiosks		The proponent will train kiosks operators and monitor their operations to ensure that they don't experience challenges that may lead to closure.
Water Treatment Plant		
Treatment Plan	Solid waste residuals generated by water treatment include process residuals, used filtration membranes, spent media and miscellaneous wastes. Process residuals primarily consist of settled suspended solids from source water and chemicals added in the treatment process, such as lime and coagulants. Damaged or exhausted membranes are typically produced from water treatment systems used for desalination. Spent media may include filter media (including sand, coal, or diatomaceous earth from filtration plants), ion exchange resins, granular activated carbon. Water contamination may also be experienced as a result of a non-functional or inefficient water treatment process.	The quantity of solids generated by the water treatment process is minimised through optimizing coagulation processes; Use of ferric and alum sludge will be balanced to bind phosphorous (e.g., from manure application at livestock operations) without causing aluminum phytotoxicity. Land application after testing for levels of heavy metals will be done before this is used for land application. Sludge may require special disposal if the source water contains elevated levels of toxic metals, such as arsenic, radionuclides, etc.; Regenerate activated carbon will be returned to the supplier. Residual waste that cannot be recycled will be stored in designated containers and disposed of in Compliance with the Waste Regulations, 2000.
Waste water Impacts	Wastewater from water treatment projects include filter backwash, reject streams from membrane filtration processes, and brine streams from ion exchange or demineralization processes. These waste streams may contain suspended solids and organics from the raw water, high levels of dissolved solids, high or low pH, and heavy metals.	Land application of wastes with high dissolved solids concentrations is generally preferred over discharge to surface water subject to an evaluation of potential impact on soil, groundwater, and surface water resulting from such application; Filter backwash is recycled into the process. Reject streams, including brine, is treated tested for quality before being returned to the river, in compliance with the Environmental Management Act, 2002 and the Water Act, 2003.
Chemicals management	The water treatment process involves the use of chemicals for coagulation, disinfection and water conditioning. These include soda ash, alum (delivered by tanker), polyelectrolyte (liquid in plastic carboy that is directly to the dosing plant).	Alarm and safety systems, including automatic shutoff valves that are automatically activated when a chlorine release is detected are installed in the Water Treatment plant. Containment and scrubber systems are in place to capture and neutralize chlorine should a leak occur. Corrosion-resistant piping, valves, metering equipment, and any other equipment coming in contact with gaseous or liquid chlorine are used, and kept free from contaminants, including oil and grease. Chlorine is stored away from all sources of organic chemicals,

		and protect from sunlight, moisture, and high temperatures. Sodium hypochlorite is stored in cool, dry, and dark conditions for no more than one month, and used with equipment constructed of corrosion-resistant materials; Calcium hypochlorite will be stored away from any organic materials and protect from moisture; fully empty or re-seal shipping containers to exclude moisture. Calcium hypochlorite will be stored for up to one year; The amount of chlorination chemicals stored on site is minimised while maintaining a sufficient inventory to cover intermittent disruptions in supply; A prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures has been developed and will be implemented. A plan for responding to accidental releases has been developed and implemented. A material safety Data Sheet (MSDS) is in place to ensure a sound chemicals management approach.
Air Emissions	Air emissions from water treatment operations may include gaseous or volatile chemicals used for disinfection processes (e.g chlorine). Measures nee hazardous chemicals discussed above will mitigate risks of chlorine and ammonia releases.	Air monitoring will be conducted periodically to assess the air emissions level at the treatment plant. The employees at the water treatment plant will be provided with appropriate PPE to prevent the inhalation of volatile chemicals.
Water System Leaks and Loss of Pressure	Water system leaks can reduce the pressure of the water system compromising its integrity and ability to protect water quality (by allowing contaminants into the system) and increasing the demands on the source water supply, the quantity of chemicals, and the amount of power used for pumping and treatment. Leaks in the distribution system can result from improper installation or maintenance, inadequate corrosion protection, settlement, stress from traffic and vibrations, overloading, amongst others.	It will be ensured that construction meets applicable standards and industry practices such as conducting regular inspection and maintenance; implementing a leak detection and repair program (including records of past leaks and unaccounted-for water to identify potential problem areas) and replacing mains with a history of leaks of with a greater potential for leaks because of their location, pressure stresses, and other risk factors.
Solid Waste Impacts	During maintenance of the water supply system, there may be waste generated from servicing and maintenance of pumps, valves, pipeline, laterals and the solar power supply. Waste that may be generated includes oils, non-functional pumps, electronic waste, oil soiled swabs and damaged pipes. Some of this waste is classified as hazardous waste in the Waste Regulations, soli. Improper management of this waste may lead to environmental degradation.	Waste will be recycled as far as practically possible by identifying and giving waste to licenced recyclers. All employees will be sensitized on proper waste management. Special waste like E-waste, old pumps, waste oils will be given to licenced recyclers. Oil swabs, spent ad expired chemicals and other hazardous waste will be placed in separate, marked bins and will be stored in containers for environmentally sound disposal in accordance with the Waste Regulations, 2000. Disposing of waste will be done appropriately and on a regular basis in an approved Waste disposal site.

Water Discharges	Water lines may be periodically flushed to remove accumulated sediments or other impurities that have accumulated in the pipe. Flushing is performed by isolating sections of the distribution system and opening flushing valves or, more commonly, fire hydrants to cause a large volume of flow to pass through the isolated pipeline and suspend the settled sediment. The major environmental aspect of water pipe flushing is the discharge of flushed water, which may be high in suspended solids, residual chlorine, and other contaminants that can harm surface water bodies.	The flush water will be discharged into a separate storm sewer system with storm water management measures such as a detention pond, where solids can settle and residual chlorine consumed before the water is discharged; Erosion during flushing will be minimised by avoiding discharge areas that are susceptible to erosion and spreading the flow to reduce flow velocities.
Aging infrastructure	Each pipeline has its own unique age. Aging pipes can pose a risk for pipeline rapture due to factors such as material used and how the pipeline is maintained.	The proponent will counterbalance the impact of aging infrastructure and construction materials by properly managing the integrity of the pipe line and all associate infrastructure. This will include; the use of durable construction materials and regular maintenance of the pipeline and all its associated infrastructure. Easily degrading materials will not be sourced for this project.
Excavation damage	The integrity of the pipeline, its laterals, the pump house and reservoirs may be damaged through natural force damage or damage by persons.	Security personnel will be placed at locations such as the reservoirs and pump house to ensure that none of the infrastructure is damaged. Communities will also be sensitized on the importance of protecting the pipeline and its laterals for the guaranteed provision of potable water. All offenders will be punished by the local Police Department.

10 ESMP

Adverse Impact	Impact Description	Mitigation Measure	Phase Impact	Responsibility
Site Establishment	Temporary construction sites are necessary to store construction equipment and materials. It is important to note that the materials will be delivered along the sections of the proposed pipeline to avoid long distance transportation of materials. There will be a need to establish several site offices at different points along the main pipeline and laterals for effective project supervision and management.	In identification of site offices, areas which are already disturbed will be considered as first priority to minimise disturbance of virgin land. The contractor shall restrict all activities to the designated areas on the construction layout plan. Establishment will be done in a manner that avoids environmentally sensitive areas like wetlands and streams. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses. All waste generated in the project, including builder's rubble will be disposed in an approved waste disposal facility, in accordance with the Waste Regulations, 2000. Cleared surfaces will be regularly sprayed with water to minimize dust. Exposed areas will be rehabilitated and grassed as soon as work has been finished in those areas. Locals will be given first preference in hiring of skills that are available in the community. The contractor will be required to recognize his responsibility towards the social issues of his workforce.	Construction	Contractor
Land Acquisition Impacts	The pipeline will be designed such that it aligns with the existing main road (MR11) along the road reserve, and parts will pass through certain fields and farmland, therefore there will be a need to land acquisition associated with the pipeline will be kept at a minimum. Associated infrastructure, including pump houses and reservoirs will be constructed will require land acquisition.	The proponent undertakes to compensate all property owners fully. There shall be no gender bias. The cooperation will draw up and implement a Resettlement Action Plan (RAP) to mitigate project related displacement impacts in addition to the existing Resettlement Framework Policy (RFP). Land affected by the project will be compensated after consultations and negotiations conducted in good faith by both parties (affected and proponent) before construction commences according to the land values given by the Valuator. In case of disagreements the issues must be referred to an Independent Arbitrator. Consultations will be undertaken especially with all affected landowners, and household members on the, valuation processes, negotiations and, awards. The proponent and property owners will agree on compensation terms by signing letters of acceptance. Compensation will be effected prior to project	Construction	Contractor

		implementation. Community Liaison Officers (CLOs) will be designated by the Traditional authorities to facilitate communication in cases where rights to cross fields and other community properties are required.		
Land Use Change	Agricultural production is one of the key activities that is a source of livelihood for the communities especially since most families depend on agricultural produce for their day to day dietary needs. Certain parts of the pipeline will pass through fields, which may not be used temporarily during construction. Furthermore, some land will be lost due to construction of other structures like reservoirs and the pump house.	Construction of the pipeline will be managed such that sections falling on farming areas are completed in the shortest possible time. PAPs using agricultural land will be engaged, and compensation will be paid for time when production cannot take place. The cooperation will draw up and implement a Resettlement Action Plan (RAP) to mitigate project related displacement impacts in addition to the existing Resettlement Framework Policy (RFP).	Construction	Contractor
Increase Invasion by alien weeds into adjoining areas	Spread of alien invasive weeds onto adjoining naturally vegetated areas due to re-opening and transportation of stockpiles.	Progressive rehabilitation will be done to avoid the establishment of alien invasive species in cleared areas. Removal of invasive plant species, whenever possible, cultivating native plant species. Once the establishment of an alien invasive species has been detected, the contractor will take steps such as eradication, containment and control, to mitigate the adverse effects.	Construction	Contractor
Depletion of Water Resources	As part of the planning process, one of the activities to be undertaken in preparation for construction will include seeking approvals to abstract water for construction. The logical choice of water supply for construction and dust suppression will be from surface water bodies close to the project area. Indiscriminate harvesting of water resources without a permit leads to shortage of water supply to downstream communities.	There will be logical choice of water supply for construction and dust suppression will be from surface water bodies close to the project area. Indiscriminate harvesting of water resources without a permit will not be done. This lowest minimum flow rate (which is the worst-case scenario in 5 years) can accommodate the allocated quota of 1,866,240m^3 per year. It therefore leaves enough water for downstream use and aquatic life. The corporation shall ensure that abstracted volume are within the allocated quota.	Construction	Contractor
Water Pollution	Disturbances due to the pipeline construction on the water bodies could be in the form of increased pollution	The design of the pipeline will be such that at places where it crosses water bodies it will be suspended (attached to bridges) to avoid pollution. Digging will only done when pipes	Construction	Contractor

	load by way of erosion from construction/ vehicle movement activities. The trenching activities may generate trench water, having high suspended solids concentration due to turbidity. Poor management of oils and hazardous material may lead to spillages and subsequent pollution of the surface water bodies	are ready to be laid, open trenches will be covered within 24hrs to minimise erosion of soil material. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses. Stockpiled material will be kept away from water bodies to prevent sedimentation of water bodies. The contractor will draw up and implement a chemicals management plans, display signs, control access to chemicals and handle chemicals in accordance with their MSDSs. Only trained personnel will handle hazardous material, procedures for handling spillages will also be in place. All topsoil removed during construction will be stockpiled close to the site for rehabilitation purposes. The Contractor will ensure that stockpiles are not will not be placed in areas where run-off will be a problem even during the dry season as this will cause water erosion and that they are arranged such that they are not exposed to the wind. Areas for storage of stockpiles will be graded to a uniform surface. It shall be free of all vegetation and other debris, and free from stones. Moreover, the stockpiles will be sprinkled with water regularly, thus abating dust emission. Top soil that will be stripped and stored with as little compaction as possible, and only on non-wet days. All stockpiles will be stored without exceeding 1m height and those which are three months older will be re-seeded. Furthermore, the contractor will rehabilitate natural slopes to reduce environmental impact and erosion, using the stockpile of overburden material.		
Loss of flora and vegetation cover	Construction activities like clearing of land to make way for pipeline and associated infrastructure will lead to exposed area that may be more prone to erosion. Although the Flora may be lost through contamination due to improper management of chemicals, empty chemical containers and other wastes.	The contractor will zone out working areas to reduce ecological destruction. Restore disturbed natural sites through environmental rehabilitation; restoring top soils and (re-)introduce genetic species similar to those destroyed in order to re-establish the natural local ecology. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses EWSC will ensure that there will be no indiscriminate site clearances, and that workers will be educated on the Plant Protection Act so as to be able to identify all legally protected ones.	Construction	Contractor

Soil Erosion and Contamination	Clearing and compaction activities may lead to soil erosion since the soils on the project site are erodible. If clearing of areas is done and soil is left bare for a considerable amount of time, it may cause washing away of the topsoil. This may lead to sedimentation of nearby water bodies through surface runoff. The soil may further be contaminated by poor management of waste and other hazardous material. The soils on the project site are erodible. If clearing of areas is done and soil is left bare for a considerable amount of time, this may lead to soil erosion. Leaking machinery and equipment may pollute the soil, posing an adverse effect to the environment.	Clearing will only be done when equipment and personnel are ready to start work on that area. Topsoil and subsoil will be stripped and stockpiled for rehabilitation after completion. Progressive rehabilitation will be done so that cleared areas are rehabilitated as work progresses. Vehicles and machinery will be regularly serviced. There will be no servicing done on site. This will ensure that the vehicles do not leak fuel into the soil. However, if there are any spills, the contaminated soil will be scooped and stored in hazardous waste marked bins which will then be treated using bioremediation on site. During construction, care will be taken that substances used in construction that may pollute nearby water bodies are properly stored and residues do not find their way into the river but are properly disposed of.	Construction	Contractor
Waste Management	Construction waste like cement bags, containers and other waste streams are likely to be generated. Improper management of this waste may lead to environmental pollution.	The contractor will prepare a waste management plan and provide labelled waste receptacles during the construction period. Employees will also be taught on the importance of proper waste management during toolbox talks to ensure that they are adequately sensitized about waste management. The contractor will additionally ensure segregation of all wastes from source. Special waste like tonners, cartridges and florescent tubes will be placed in separate, marked bins and will be stored in containers for environmentally sound disposal in accordance with the Waste Regulations, 2000. Disposing of rubble and other waste will be done appropriately and on a regular basis during the construction phase of the proposed project.	Construction	Contractor
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Blasting Impacts	These impacts include ground vibrations, air blast, generation of fines, fumes, dust and structural defects.	It is not anticipated that there will be blasting in the project, in the event that it is needed, the contactor will draw up and implement a blasting management plan	Construction	Contractor
Pump House Impacts	The raw materials used for the construction of the pump house may be disposed of improperly leading environmental degradation and aesthetical impacts.	The contactor will draw up and implement a waste management plan in line with the Waste Regulations of 2000.	Construction	Contractor
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Access Impacts	The blocking and disturbance of accesses from construction activities will impact on accesses to properties due to excavations which may block users to their place of residence or business properties.	The contractor will ensure that access roads leading to business/residential are kept open at all times for easier accessibility and that these provide safe and convenient passage. Where this cannot be avoided, the contractor will ensure that periods of closure are keep minimum. Access roads will be maintained during the construction period.	Construction	Contractor

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Child Labour	Contractors may hire underage persons, which is against international and national legislation and standards.	The contractor will draw up and implement are recruitment policy that is in-line with national and international laws and against child labour	Construction	Contractor
Security Impacts	At night, when streetlights may be absent or insufficient, inadequate site security or signage could lead to night-time accidents.	Security will be maintained 24hrs a day on site. There will be signs restricting a day on site. There will be access control and maintenance of entrance register in to the site	Construction	Contractor
Occupational Health and Safety				
Site Water and Sanitation	Since there is no running water, site workers may not have access to quality drinking water, which may lead to waterborne diseases. Without proper sanitation, site workers may use bushes as toilets, which may lead to soil pollution as well as pollution of water resources from pollutants like coliforms	Adequate drinking water and proper sanitation facilities will be provided (for each sex where conditions warrant). Temporary chemical toilets will be put on site to ensure proper sanitation and avoid pollution of groundwater and surface water resources.	Construction	Contractor

	and other pollutants. Project activities may impact water availability in the small streams in the project area. Poor sanitation may also cause pollution to these water bodies.			
Atmosphere and Aesthetics				
Dust	Construction of the pipeline may temporarily affect the visual aesthetics of the area as well as give rise to dust, noise and visual impacts. During haulage of material, dust will be emitted. The weight of vehicles, their speed of passage and number of wheels in contact with the ground, and the nature and condition of road surfaces or haul routes all contribute to dust emission. If not sheeted, turbulence in the empty bodies of the vehicles may scour out dust. Cleared surfaces may emit dust when vehicles are using them. Dust may also be emitted from stockpiles of soil material. This may be exacerbated in dry and windy days.	Cleared surfaces will be watered to suppress dust, including spraying with water. The vehicles working on this project will be required to observe a speed limit of 40 km/h to minimise the emission of dust. The Contractor will ensure that stockpiles are not will not be placed in areas where run-off will be a problem even during the dry season as this will cause water erosion and that they are arranged such that they are not exposed to the wind. Areas for storage of stockpiles will be graded to a uniform surface. It shall be free of all vegetation and other debris, and free from stones. Moreover, the stockpiles will be sprinkled with water regularly, thus abating dust emission. Top soil that will be stripped and stored with as little compaction as possible, and only on non-wet days. All stockpiles will be stored without exceeding 1m height and those which are three month older will be re-seeded. Furthermore, the contractor will rehabilitate natural slopes to reduce environmental impact and erosion, using the stockpile of overburden material.	Construction	Contractor
Emissions	Machinery and vehicles may emit gases like SOx and NOx and particulate matter, which cause air pollution and respiratory illnesses. This may be exacerbated by unserviced and poorly maintained machinery and vehicles.	All vehicles will be serviced regularly and monitored for emissions	Construction	Contractor
Aesthetics Impacts	Linear projects such as pipeline developments have a propensity to spoil aesthetic environments. This may be due to large tracts of areas being cleared and deep cuts involved. Excavated sites scar the landscape.	Clearing will only be done when equipment and personnel are ready to start work on that area	Construction	Contractor

	This impact is high negative if unmitigated.			
Noise	Construction vehicles may generate a considerable amount of noise during construction activities. Noise during movements include reversing alarms and engine revving. Noise from construction vehicles has a number of different sources including silencer, brakes, poor suspension and body slap. Empty trucks are worse than fully loaded ones; they tend to travel faster and be noisier because they suffer from "body-slap" when going over potholes, bumps, or road humps.	Construction activities will be confined to daytime and noise and the noise levels will only affect the nearby areas for a relatively short time. A buying policy that includes consideration of noise for all new items of plant will be adopted. It will be ensured that plant and vehicles are properly maintained. Enclosures will be used for noisy plant such as pumps or generators. Rubber linings will be used in chutes and dumpers to reduce impact noise.	Construction	Contractor
Increase in HIV/AIDS Prevalence	Influx of workforce in the project area may potentially aggravate the prevalence of HIV/AIDS.	An HIV/AIDS awareness campaign will be done for the workers. The contractor will also ensure the provision of condoms for both male and female employees in the ablution facilities.	Construction	Contractor
Storm water Management	Improper rehabilitation of the disturbed areas may lead to erosion, compromising the integrity of storm water drains and causing siltation.		Construction/Operation	Contractor
Water Resource Impacts	The current volume abstracted from the Mkhondvo River will increase on operation of the project to service the additional population along the Nhlangano – Siphambanweni corridor. This may impact water availability for downstream use and aquatic life. This may be more pronounced in unforeseen drought situations.	The proponent will ensure that abstraction volume do not exceed the allowable limit in the permit granted by the Ministry of Natural Resources and Energy.	Operation	Proponent
Atmosphere and Aesthetics	During maintenance of the water supply system, dust and noise may be generated from maintenance trucks and maintenance activities. Noise may also	Cleared surfaces will be watered to supress dust. The vehicles working on this project will be required to observe a	Operation	Proponent

	be generated from the operation of pumps. The addition of structures like reservoirs, pump house and other structures will change the visual landscape of the project area.	speed limit of 40 km/h to minimise the emission of dust. There will be regularly spraying of untarred road surfaces Machinery to be used during project implementation will be properly serviced to ensure that unnecessary noise is not emitted while the machines are at work. Baffle mounds or noise fences will be used to provide screening since the area is a noise sensitive environment.		
Community Health and Safety	Poor maintenance of pipes may cause to their bursting leading to flooding affecting properties, including fields, businesses and grazing land. Leaking of pipes may lead to contamination of water. During the maintenance of the system, open trenches may lead to safety hazards to the community.	A maintenance plan will be developed and implemented to ensure regular maintenance of water supply infrastructure. This will include proactive testing of pipes and other infrastructure. The materials chosen for the water supply system will durable with easily obtainable spare parts. Community will be sensitized if there are anticipated disruption to service and fixing water supply issues. All leaks will be addressed in the shortest time possible.	Operation	Proponent
Occupational Health and Safety	Personnel involved in maintenance of equipment may be exposed to injuries from electrocution and occupational hazards like dust and noise.	There will be regular OHS training of personnel involved in maintenance and operation of the water supply infrastructure EWSC has an OHS policy and plan, which new employees will be inducted on. Relevant personnel Protective Equipment will be provided for all employees and employees will be encouraged to use it. Access to high risk areas will be limited to highly trained personnel. There will be proper warning signs for areas that are of high risk. First aid representatives will be part of every maintenance crew and every area/section of work. First aid fits will always be available and accessible. Fire fighting equipment will be put in place and properly serviced. Fire drills will be dome for workers and fire assembly points demarcated.	Operation	Proponent
Increase in Power Usage	The additional water abstraction will require more pumping from the Mkhondvo river, leading to increased power requirements.	Power conservation measures will be put in place. Pumping will only be done when it is necessary, and equipment not in use will be switched off. Works will be sensitised of energy conservation	Operation	Proponent
Wastage of Water		Communities will be trained on water billing, water conservation and management.	Operation	Proponent

Mismanagement of Kiosks		The proponent will train kiosks operators and monitor their operations to ensure that they don't experience challenges that may lead to closure.	Operation	Proponent
Water Treatment Plant				
Treatment Plan	Solid waste residuals generated by water treatment include process residuals, used filtration membranes, spent media and miscellaneous wastes. Process residuals primarily consist of settled suspended solids from source water and chemicals added in the treatment process, such as lime and coagulants. Damaged or exhausted membranes are typically produced from water treatment systems used for desalination. Spent media may include filter media (including sand, coal, or diatomaceous earth from filtration plants), ion exchange resins, granular activated carbon. Water contamination may also be experienced as a result of a non-functional or inefficient water treatment process.	The quantity of solids generated by the water treatment process is minimised through optimizing coagulation processes; Use of ferric and alum sludge will be balanced to bind phosphorous (e.g., from manure application at livestock operations) without causing aluminum phytotoxicity. Land application after testing for levels of heavy metals will be done before this is used for land application. Sludge may require special disposal if the source water contains elevated levels of toxic metals, such as arsenic, radionuclides, etc.; Regenerate activated carbon will be returned to the supplier. Residual waste that cannot be recycled will be stored in designated containers and disposed of in Compliance with the Waste Regulations, 2000.	Operation	Proponent
Waste water Impacts	Wastewater from water treatment projects include filter backwash, reject streams from membrane filtration processes, and brine streams from ion exchange or demineralization processes. These waste streams may contain suspended solids and organics from the raw water, high levels of dissolved solids, high or low pH, and heavy metals.	Land application of wastes with high dissolved solids concentrations is generally preferred over discharge to surface water subject to an evaluation of potential impact on soil, groundwater, and surface water resulting from such application; Filter backwash is recycled into the process. Reject streams, including brine, is treated tested for quality before being returned to the river, in compliance with the Environmental Management Act, 2002 and the Water Act, 2003.	Operation	Proponent
Chemicals management	The water treatment process involves the use of chemicals for coagulation, disinfection and water conditioning. These include soda ash, alum	Alarm and safety systems, including automatic shutoff valves that are automatically activated when a chlorine release is detected are installed in the Water Treatment plant. Containment and scrubber systems are in place to capture	Operation	Proponent

	(delivered by tanker), polyelectrolyte (liquid in plastic carboy that is directly to the dosing plant).	and neutralize chlorine should a leak occur. Corrosion-resistant piping, valves, metering equipment, and any other equipment coming in contact with gaseous or liquid chlorine are used, and kept free from contaminants, including oil and grease. Chlorine is stored away from all sources of organic chemicals, and protect from sunlight, moisture, and high temperatures. Sodium hypochlorite is stored in cool, dry, and dark conditions for no more than one month, and used with equipment constructed of corrosion-resistant materials; Calcium hypochlorite will be stored away from any organic materials and protect from moisture; fully empty or re-seal shipping containers to exclude moisture. Calcium hypochlorite will be stored for up to one year; The amount of chlorination chemicals stored on site is minimised while maintaining a sufficient inventory to cover intermittent disruptions in supply; A prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures has been developed and will be implemented. A plan for responding to accidental releases has been developed and implemented. A material safety Data Sheet (MSDS) is in place to ensure a sound chemicals management approach.		
Air Emissions	Air emissions from water treatment operations may include gaseous or volatile chemicals used for disinfection processes (e.g chlorine). Measures nee hazardous chemicals discussed above will mitigate risks of chlorine and ammonia releases.	Air monitoring will be conducted periodically to assess the air emissions level at the treatment plant. The employees at the water treatment plant will be provided with appropriate PPE to prevent the inhalation of volatile chemicals.	Operation	Proponent
Water System Leaks and Loss of Pressure	Water system leaks can reduce the pressure of the water system compromising its integrity and ability to protect water quality (by allowing contaminants into the system) and increasing the demands on the source water supply, the quantity of chemicals, and the amount of power used for pumping and treatment. Leaks in the	It will be ensured that construction meets applicable standards and industry practices such as conducting regular inspection and maintenance; implementing a leak detection and repair program (including records of past leaks and unaccounted-for water to identify potential problem areas) and replacing mains with a history of leaks of with a greater potential for leaks because of their location, pressure stresses, and other risk factors.	Operation	Proponent

	distribution system can result from improper installation or maintenance, inadequate corrosion protection, settlement, stress from traffic and vibrations, overloading, amongst others.			
Solid Waste Impacts	During maintenance of the water supply system, there may be waste generated from servicing and maintenance of pumps, valves, pipeline, laterals and the solar power supply. Waste that may be generated includes oils, non-functional pumps, electronic waste, oil soiled swabs and damaged pipes. Some of this waste is classified as hazardous waste in the Waste Regulations, soli. Improper management of this waste may lead to environmental degradation.	Waste will be recycled as far as practically possible by identifying and giving waste to licenced recyclers. All employees will be sensitized on proper waste management. Special waste like E-waste, old pumps, waste oils will be given to licenced recyclers. Oil swabs, spent ad expired chemicals and other hazardous waste will be placed in separate, marked bins and will be stored in containers for environmentally sound disposal in accordance with the Waste Regulations, 2000. Disposing of waste will be done appropriately and on a regular basis in an approved Waste disposal site.	Operation	Proponent
Water Discharges	Water lines may be periodically flushed to remove accumulated sediments or other impurities that have accumulated in the pipe. Flushing is performed by isolating sections of the distribution system and opening flushing valves or, more commonly, fire hydrants to cause a large volume of flow to pass through the isolated pipeline and suspend the settled sediment. The major environmental aspect of water pipe flushing is the discharge of flushed water, which may be high in suspended solids, residual chlorine, and other contaminants that can harm surface water bodies.	The flush water will be discharged into a separate storm sewer system with storm water management measures such as a detention pond, where solids can settle and residual chlorine consumed before the water is discharged; Erosion during flushing will be minimised by avoiding discharge areas that are susceptible to erosion and spreading the flow to reduce flow velocities.	Operation	Proponent
Aging infrastructure	Each pipeline has its own unique age. Aging pipes can pose a risk for pipeline rapture due to factors such as material	The proponent will counterbalance the impact of aging infrastructure and construction materials by properly managing the integrity of the pipe line and all associate	Operation	Proponent

	used and how the pipeline is maintained.	infrastructure. This will include; the use of durable construction materials and regular maintenance of the pipeline and all its associated infrastructure. Easily degrading materials will not be sourced for this project.		
Excavation damage	The integrity of the pipeline, its laterals, the pump house and reservoirs may be damaged through natural force damage or damage by persons.	Security personnel will be placed at locations such as the reservoirs and pump house to ensure that none of the infrastructure is damaged. Communities will also be sensitized on the importance of protecting the pipeline and its laterals for the guaranteed provision of potable water. All offenders will be punished by the local Police Department.	Construction	Contractor

10.1 ESMP Monitoring Plan

The following table summarizes the ESMP monitoring plan for the proposed project.

Table 51:ESMP Monitoring Plan

Project Activity/Aspect	**Parameter**	**Indicator**		**Institutional Responsibility**		**Project Phase**	**Monitoring Cost Estimates USD**
			Implementation Route/Plan	**Monitoring Responsibility**	**Frequency**		
Impact of Flora	Visual Inspection	Bare soil Soil Erosion	ESMP	Contractor Project Manager/Supervising Engineer	Monthly	Construction and operation	To be finalized once detailed designs are completed
Air emissions and quality of dust	Dust fallout	Bad Odour Use of PPE	ESMP	Contractor	Monthly	Construction and operation	To be finalized once detailed

Project Activity/Aspect	Parameter	Indicator	Implementation Route/Plan	Institutional Responsibility Monitoring Responsibility	Frequency	Project Phase	Monitoring Cost Estimates USD
		Health and Safety Plan in use Record of induction for workers Active dust suppression		Supervising Engineer			designs are completed
Safeguarding community health and safety	Visual Inspection Incident and accident records	Induction training records Safety working procedure Maintenance of complaints log and resolution process; and Evidence of effective Grievance Mechanism Photographs of appropriate fencing; and signage around site perimeter and	SEP Project performance Grievance Mechanism	Contractor Supervising Engineer	Daily	Prior to and during Construction and operation	To be finalized once detailed designs are completed

Project Activity/Aspect	Parameter	Indicator	Implementation Route/Plan	Institutional Responsibility Monitoring Responsibility	Frequency	Project Phase	Monitoring Cost Estimates USD
		where identified through risk assessment process.					
Safeguarding Worker Occupation Health and Safety	Health and safety records Visual inspection Active and passive monitoring	audits of PPE use, maintenance of disciplinary records, etc. Records of inductions, trainings & toolbox talks Good “housekeeping” on site Worker Grievance Records & resolution	OHS Management system	Contractor Supervising Engineer	Daily	Construction and operation	To be finalized once detailed designs are completed
Labor Influx	Verification of records Consultations	Number of community complaints Frequency of consultations conducted	ESMP/LMP/CoC	Contractor Supervising Engineer	Daily	Construction and operation	To be finalized once detailed designs are completed

Project Activity/Aspect	Parameter	Indicator	Implementation Route/Plan	Institutional Responsibility Monitoring Responsibility	Frequency	Project Phase	Monitoring Cost Estimates USD
		Number of awareness campaigns conducted					
Storage of hazardous materials and chemicals	Spillages Visual inspection	MSDS for all store Chemicals Functioning storage containers Chemical usage records	Waste Management Plan	Contractor Supervising Engineer	Monthly Audit Review	Construction	To be finalized once detailed designs are completed
Traffic concerns	Visual inspection	Records of accidents involving project vehicles Banks men shall be used to direct vehicle traffic around construction sites and hazards during working hours (Health and Safety Plan).	Traffic Management Plan	Contractor Supervising Engineer	Daily	Construction and operation	To be finalized once detailed designs are completed

Project Activity/Aspect	Parameter	Indicator	Implementation Route/Plan	Institutional Responsibility Monitoring Responsibility	Frequency	Project Phase	Monitoring Cost Estimates USD
		Plan approved by project manager barriers and signage					
Public Awareness and Community perceptions	Community Consultations	Grievance management records & resolution process Evidence of Occurrence-Event report	Stakeholder Engagement Plan Grievance Mechanism	Contractor Supervising Engineer	Monthly	Construction and operation	To be finalized once detailed designs are completed
Noise	dB(A)	Measure included in design and procurement plans Hearing protection and PPE in use Record of equipment maintenance	ESMP	Contractor Supervising Engineer	Monthly	Construction and operation	To be finalized once detailed designs are completed
Soil Erosion	Visual inspection	Bare soil	ESMP	Contractor	Weekly	Construction and operation	To be finalized once

Project Activity/Aspect	Parameter	Indicator	Implementation Route/Plan	Institutional Responsibility Monitoring Responsibility	Frequency	Project Phase	Monitoring Cost Estimates USD
		Soil pillars		Supervising Engineer			detailed designs are completed
Solid waste management	Domestic refuse, metallic scraps,	Documented Approvals for placement of wastes,	Comprehensive waste management plan	Contractor Supervising Engineer	Daily	Construction and operation	To be finalized once detailed designs are completed
Land Acquisition, displacement and restrictions on land use	Consultations Site Visits	Records of compensation completion & completion rate Progress on RAP/LRP implementation Compliance with RPF/RAP and national legislation	RPF RAP/LRP	ECC	Daily	Prior to and during Construction	To be finalized once detailed designs are completed
Cultural Heritage	Visual inspection	Records of Chance Find Procedures activated	ESMP (Chance Finds Procedures)	Contractor Supervising Engineer	Daily	Prior to and during Construction	To be finalized once detailed designs are completed

Project Activity/Aspect	Parameter	Indicator		Institutional Responsibility		Project Phase	Monitoring Cost Estimates USD
			Implementation Route/Plan	Monitoring Responsibility	Frequency		
Supply Chain	Reporting	Bidding documents and Contracts Supply chain performance on ESS2 compliance	ESMP Bidding documents	Contractor Supervising Engineer	Weekly	Construction and Operation	To be finalized once detailed designs are completed

In addition to mitigation measures and monitoring arrangements indicated in the ESMP tables, the EWSC in collaboration with the PIU and the contractor shall pay close attentions to the followings risks and impacts mitigation measures throughout the project life span:

Labour Influx: The construction of the pipeline, laterals, reservoirs and solar power plant will require skilled and unskilled labor. The estimated number of workers who will be involved in the construction of the project is 355 of which 289 are male and 66 are female. In order to mitigate social risks and impacts associated with workers or potential labour influx, a Labour Management Procedures (LMP) was developed by Eswatini Water Services Corporation (EWSC. The LMP sets out the Project's approach to meeting national requirements as well as the objectives of the World Bank's Environmental and Social Framework, specifically objectives of Environmental and Socials Standard 2: Labour and Working Conditions (ESS2) and Standard 4: Community Health and Safety (ESS4). The LMP is cleared by the Bank and is applicable to all Project workers whether full-time, part-time, temporary, seasonal or migrant workers.

Community Health and Safety: The main community health and safety risks associated with the project are: i) risks and impacts of the project on the health and safety of the affected communities and, ii) risks and impacts associated with the project's security personnel. While preparing and implementing the project activities, the EWSC/PIU is required to assess health and safety risks and impacts on communities, and security personnel associated risks and impacts to those within and outside the project. On the basis of the assessment outcomes, the EWSC/PIU is required to propose and implement mitigation measures in the project's ESMP and the CESMP.

Participation: In line with Bank's ESS-10, the EWSC/PIU has prepared the project Stakeholder Engagement Plan (SEP) and the plan is cleared by the Bank. The plan is geared toward providing opportunity for all-inclusive approach in project preparation, planning, implementation and monitoring processes. The SEP identified relevant interested parties and Project Affected Persons (PAPs). It provides the process for all parties' dispute resolution mechanism and has embedded variety of stakeholder engagements and consultations strategies. The underlying principle of stakeholder engagement for the project is that engagement shall be: a) free of manipulation, b) free of interference, coercion, and intimidation, and conducted based on timely, relevant, understandable and accessible information, in a culturally appropriate format. It shall involve interactions between project's stakeholders and shall provide stakeholders with an opportunity to raise their concerns and opinions and shall ensures that this information is taken into consideration when designing the project and making decisions.

GBV/SEA: An initial GBV risks assessment, using Bank's GBV risk screening tool, indicates the project GBV risk is moderate. As required, for moderate risk projects, by the Bank's "Good Practice Note" for addressing gender base violence, the project shall prepare a "GBV Actions Plan" and; the basis of the GBV Action plan shall constitute part of the project's ESMP and the contractor C-ESMP. The GBV Acton Plan shall include arrangements for: i) GBV risks awareness raising targeting workers and communities, ii) mapping GBV service providers and referral services, and iii) GBV allegation procedures.

Gender: The project is also planning to undertake gender analysis to identify project relevant gaps between and female in light of country gaps identified by SCD and CPF. On the basis of the gap analysis, the project will put specific actions to address project level gender gaps and to improve women and men's empowerment. The project will also include indicators in the result framework to monitor outcomes from actions identified in specific actions to address gender gaps. It is estimated that 79% of adult female collects drinking water when the source

is not on premises; this is usually the case in about 50 percent of the rural households in Eswatini. It is expected that the project will reduce the burden of female collecting drinking water thereby allowing enough time for schooling and at the same time reducing the risk associated with female insecurity.

Exclusion/Inclusion: The project aims at addressing lack of adequate sanitation facilities for girls in schools through Menstrual Hygiene Management Approach. This measure is hoped to reduce or eliminate higher school dropout rates among female students coincided with menstruation and will also afford girls equitable access to sanitation facilities. Enhanced information about menstruation and the availability of adequate sanitation facilities is expected to reduce or eliminate challenges faced by girls at schools and young women. The project will promote inclusive design standards that take into account menstrual hygiene management needs and good practice such as: separate cabins for boys and girls, safe locks, lighting, presence of disposal bins, and handwashing stations.

Disability: The project area is reported to have disabled and vulnerable groups who encountered access to portable water and to disability friendly sanitation facilities. These groups include the elderly, persons with disabilities, orphans and vulnerable children. In line with the National Development Strategy of the Kingdom of Eswatini on disability, and in fulfilment of the Bank's ESF requirement to give differentiated treatment to vulnerable people, the project will follow universal project design principles and will make portable water and sanitation infrastructures accessible to vulnerable groups and for persons with disabilities; including, allowing disadvantaged groups to participate in project planning and implementation.

11 CONCLUSION AND RECOMMENDATIONS

The preliminary ESIA process for the proposed Nhlangano - Siphambanweni Integrated Water Supply Project has been undertaken in accordance with the Environmental Audit Assessment and Review Regulations 2000 published in terms of the Environmental Management Act (Act No 5 of 2000) and World Bank environmental and social standards. The essence of the ESIA process is aimed at ensuring informed decision making and environmental accountability and to assist in achieving environmentally sound and sustainable development. In assessing the environmental feasibility of the proposed project, the requirements of all international and national relevant legislation have been considered as described in Chapter 3. The preliminary ESIA will also inform the development of project design. This relevant legislation has informed the identification and development of appropriate management and mitigation measures that should be implemented in order to minimise potentially significant impacts associated with the project.

11.1 Evaluation of the Proposed Project

The preceding chapters of this report provided a detailed assessment of the predicted environmental impacts on specific components of the social and biophysical environment as a result of the proposed project. This chapter concludes the preliminary ESIA report by providing a holistic evaluation of the most important environmental impacts identified through the process. In so doing, it draws on the information gathered as part of the ESIA Process and the knowledge gained by the environmental consultants during the course of the ESIA and presents an informed opinion about the proposed project.

The ESIA Study also investigated alternative options for the proposed project for;

- Site selection, and technologies for the water supply
- Technology options for the sanitation, and
- No Project Alternative.

The preferred alternative was the implementation of the integrated Water supply project as proposed, as well as the sanitation component. The major environmental impacts associated with the proposed project as discussed in the ESIA include:

- Potential impacts on Water Resources;
- Potential impact on Noise and air quality; and
- Potential Social Social Impacts and
- Potential health and Safety Impacts
- Potential Impacts on Soils

11.2 Recommendations

The proposed Nhlangano - Siphambanweni Integrated Water Supply Project project clearly offers compelling strategic, economic and social advantages to Eswatini, whilst also positively impacting climate change.

Environmental impacts that will result from the execution of the Nhlangano - Siphambanweni Integrated Water Supply Project have been identified and it is recommended that the following aspects be considered by the EWSC prior to implementation:

- The mitigation measures recommended for the proposed project are outlined in the preceding chapters of this report particularly chapter 8 and are also contained within the Environmental and Social Mitigation Plan (ESMP) compiled for the project. The ESMP is a detailed plan of action prepared to ensure that recommendations for enhancing positive impacts and preventing negative environmental impacts are implemented during the lifecyclelife-cycle of a project.
- The ESMP is compiled to provide recommendations and guidelines according to which compliance monitoring can be done during the construction phase as well as to ensure that all relevant factors are considered to ensure for environmentally responsible development. The ESMP should also form part of the contract for the Contractor who will be responsible for the construction of the proposed project.

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