ENVIRONMENTAL IMPACT ASSESSMENT

PROPOSED KATIMA MULILO WASTE WATER TREATMENT PLANT UPGRADE ON PORTION 197 OF FARM KM No.1328 KATIMA MULILO

JUNE 2025

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List of Abbreviations

EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMA	Environmental Management Act
EMS	Environmental Management System
ESA	Environmental Scoping Assessment
I&Aps	Interested and Affected Parties
PPPPs	Projects, Plans, Programmes and Policies

PROJECT DETAILS

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REPORT STATUS:	**FINAL**

1. BACKGROUND AND INTRODUCTION

Katima Mulilo Town Council is proposing to develop to upgrade the existing sewerage ponds to a Waste Water Treatment Plant on Portion 197 of Farm KM No.1328, Katima Mulilo, Zambezi region. The proposed development is aimed at providing a solution to bulk sewer treatment. The plan is part of the bigger vision for the town council to eradicate the informal settlement mushrooming in the Katima Mulilo townlands and accommodating the beneficiaries in formal housing. Bulk Services and infrastructure that will be installed include provision of bulk sewage , water, electricity, stormwater management and roads to enable the operation of this waste water treatment plant.

Ace Projects Consultants, an independent consultant, has been appointed by Katima Mulilo Town Council and its project managers to undertake an Environmental Impact Assessment (EIA) on the proposed waste wate treatment plant.

An assessment will be undertaken to determine the potential impact of the development on the environment and to determine all safety, health and social impacts associated with the proposed development activities. The project location is indicated on the map.

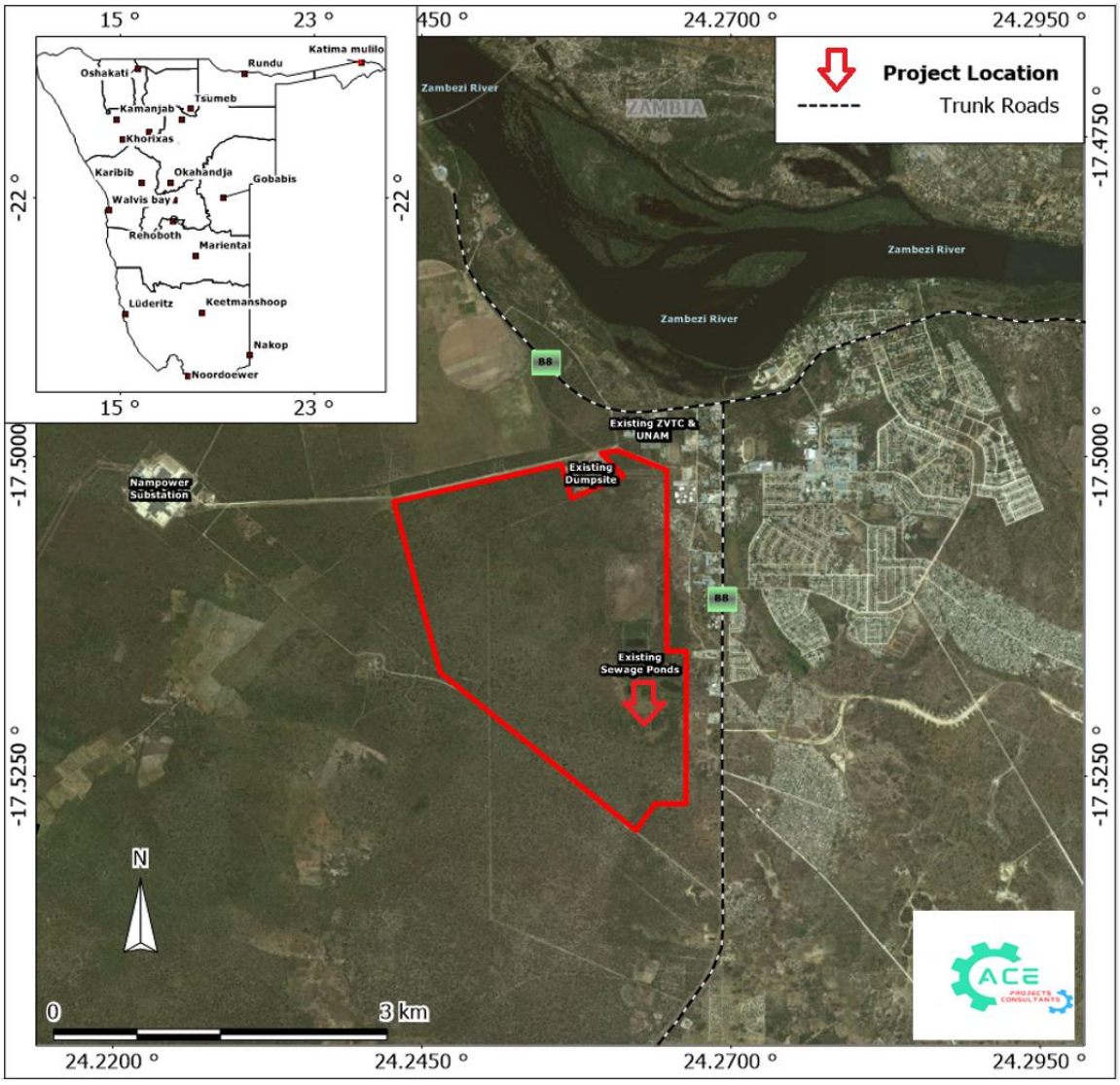


Figure 1. Location Map (Katima WWTP)

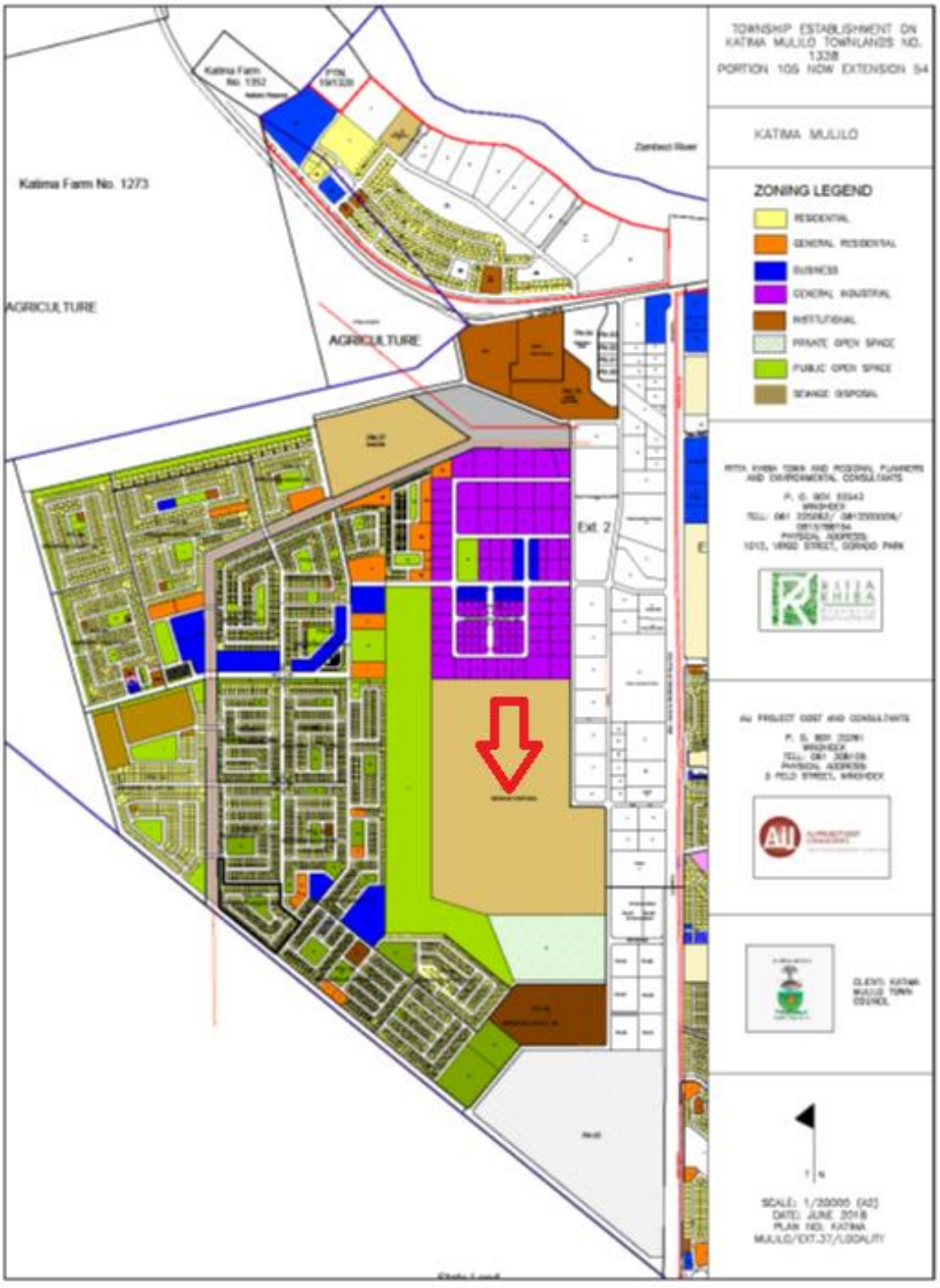


Figure 2: Location and zoning Map (KWWTP)

The environmental assessment will be conducted as per Namibia's Environmental Assessment Policy and the Environmental Management Act No.7 of 2007 and its regulations of 2012 .

The proposed Katima Waste Water Treatment Plant erven is currently zoned "Sewage Disposal" in Katima Mulilo structure plan and Katima Mulilo Town Council wishes to upgrade the existing oxidation ponds on the same erven to a convectional activated sludge waste water treatment plant , at the same time maintaining sensitive the environmental setting of the area e.g vegetation, groundwater etc.

This project was registered with the Ministry of Environment and Tourism (MET), as per Environmental Management Act No 7 of 2007 requirements.

2. TERMS OF REFERENCE

Katima Mulilo Town Council has commissioned an Environmental Impact Assessment (**EIA**) for the proposed Katima Mulilo Waste Water Treatment Plant. The proposed project is one of the development mechanism projects that Katima Mulilo Town Council has engaged to address land scarcity or availability of serviced plots in Katima Mulilo.

Ace Projects Consultants was appointed to undertake the Environmental Impact Assessment of the proposed Katima Mulilo Waste Water Treatment Plant. This study will enable decision makers to make an informed decision regarding the development and make sure it does not have significant impacts and that they are mitigated. The environmental impact assessment was conducted to comply with the Environmental Assessment Policy (1995) and the Environmental Management Act (2007).

3. PROJECT INFORMATION

3.1 Project Rationale

Katima Mulilo Town Council is currently experiencing a scarcity of developable land for residential areas and therefore decided to develop (service) Macaravan East (Portion A-G), and this waste water treatment plant will serve this area.

The need for the project relate to the strategic plans of Katima Mulilo Town Council to eradicate or minimize all informal settlements in its area of jurisdiction. The aim is to integrate the residents into housing in a sustainable manner.

The Katima Mulilo Town Council forms part of the Zambezi Regional Council and Ministry of Rural and Urban Development that aligns to the National Agenda set out by the Government in the NDP5 and the Harambee Property Plan II (2021-2025). KMTC forms part of HPPII under the social progression and infrastructure development by upgrading the town by setting up 84 Townships that will cater for housing and basic services.

To achieve the goals of the Harambe Prosperity Plan, the Katima Mulilo Town Council and Fullbright Investments entered into a Public-Private Partnership (PPP) in 2020 to deliver 2000 housing units.

The existing wastewater infrastructure is inadequate for Katima Mulilo's current and growing population. Severely under-capacitated, the system was originally designed for 5,000 residents but now serves over 47,000, leading to overflows. Furthermore, the pump stations' central location poses a significant health risk. The infrastructure is also under-maintained and in poor condition. As the town has expanded, the current sewer infrastructure is now too close to urban areas. Consequently, any new infrastructure must be located away from future urban growth. To address these issues and support the town's present and future expansion, an upgrade of the Wastewater Treatment Plant is required.

Other associated land uses of Macaravan East (Portion A-G) Township are residential development such as commercial facilities, social services (shops, churches, schools, community halls, sport fields, libraries etc) and provision of bulk services. The development will therefore not only benefit the future residents but also the surrounding areas by providing necessary facilities and social services that are not currently in place.

The proposed development will also create employment, both during the construction and operational phase. The project will ensure the provision of bulk sewerage treatment.

Other Potential spin-offs from the development of Katima WWTP:

- Potential revenue generation from the sale of Ervens by the Katima Mulilo Town Council once the area gets serviced.
- Reduced land scarcity in Katima Mulilo.
- Creation of job opportunities, training and skills development during construction and operational phase. It is estimated that the new jobs will improve the livelihoods of the workers and their families. Given that the unemployment rate of 43.7% in the region, this in itself is regarded as a significant benefit to the socio-economic situation in the region (2023 Population and Housing Census, NSA).
- Provision of housing and community facilities.
- Impact on health and safety of Macaravan East (Portion A-G) and Choto (Portion 55 & 56) in Katima Mulilo residents by providing proper housing and sanitation.
- Change the sense of the place of the area from undeveloped townland to a formal housing development.

- ❖ Increase in economic opportunities in the area.
- ❖ General enhancement of the quality of life in the Zambezi region and the surrounding area, should the project be economically viable.

Current state of site

4. Katima Mulilo Waste Water Treatment Plant Activities.

4.1 Current land-use

The propose site is partially developed with the current oxidation pond. The site could not be regarded natural, as the large area of the proposed site is previously disturbed, with visible invader plants on some parts of the portions and signs previous disturbance. The proposed site is relatively flat and undeveloped, with only the neighbouring areas that are partially developed by informal settlements illegally. The area is dominated by bushes and scattered big trees. The matured trees will be made part of the development where possible and will not be cleared.

4.2 Proposed land-use

The proposed Katima Waste Water Treatment is planned to be developed within the existing dedicated sewage disposal erven in Katima Mulilo townlands. The proposed development is aimed at providing a solution the bulk waste treatment in town and consequently eradicating house scarcity and availability of serviced erven in Katima Mulilo.

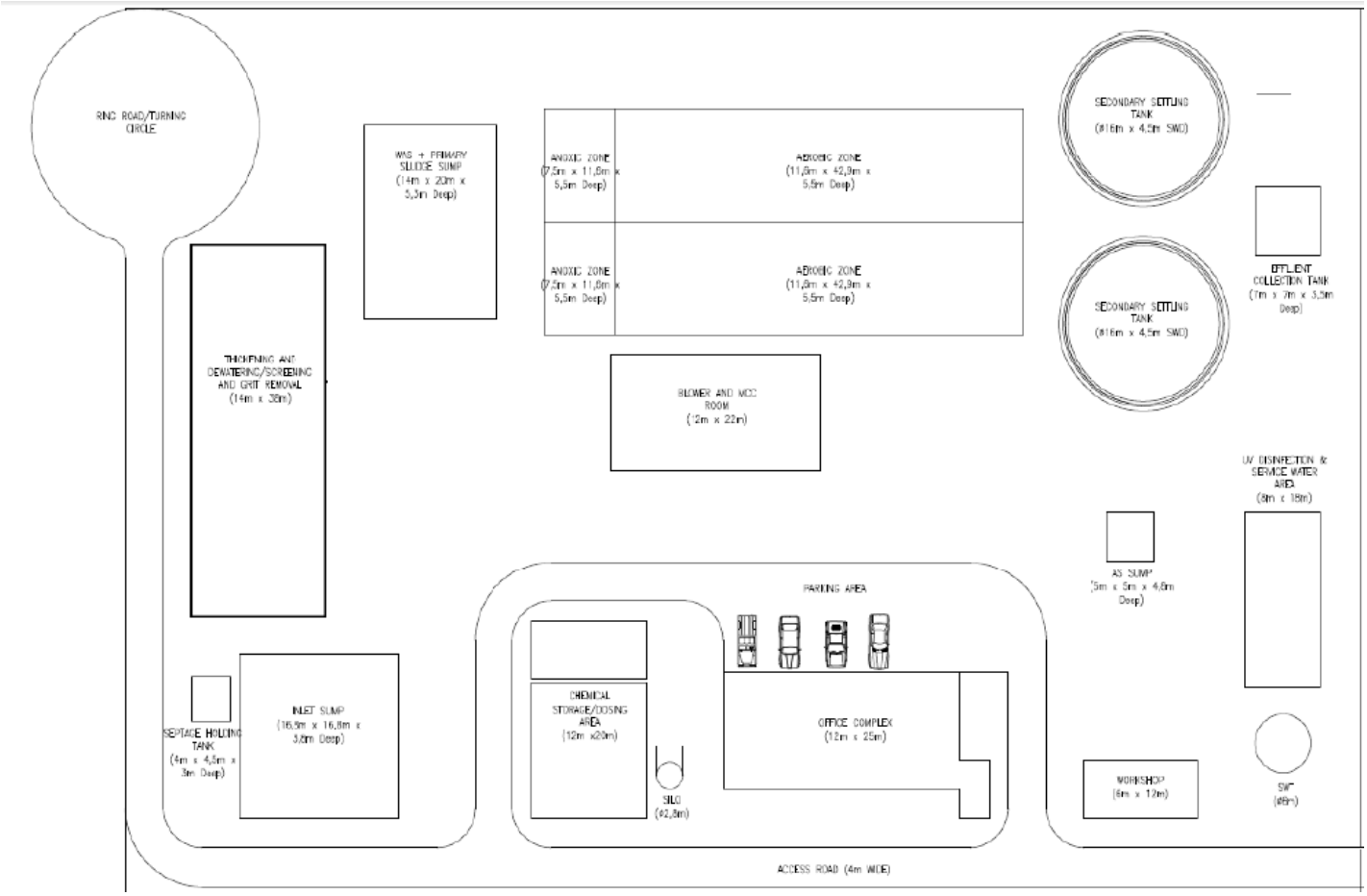
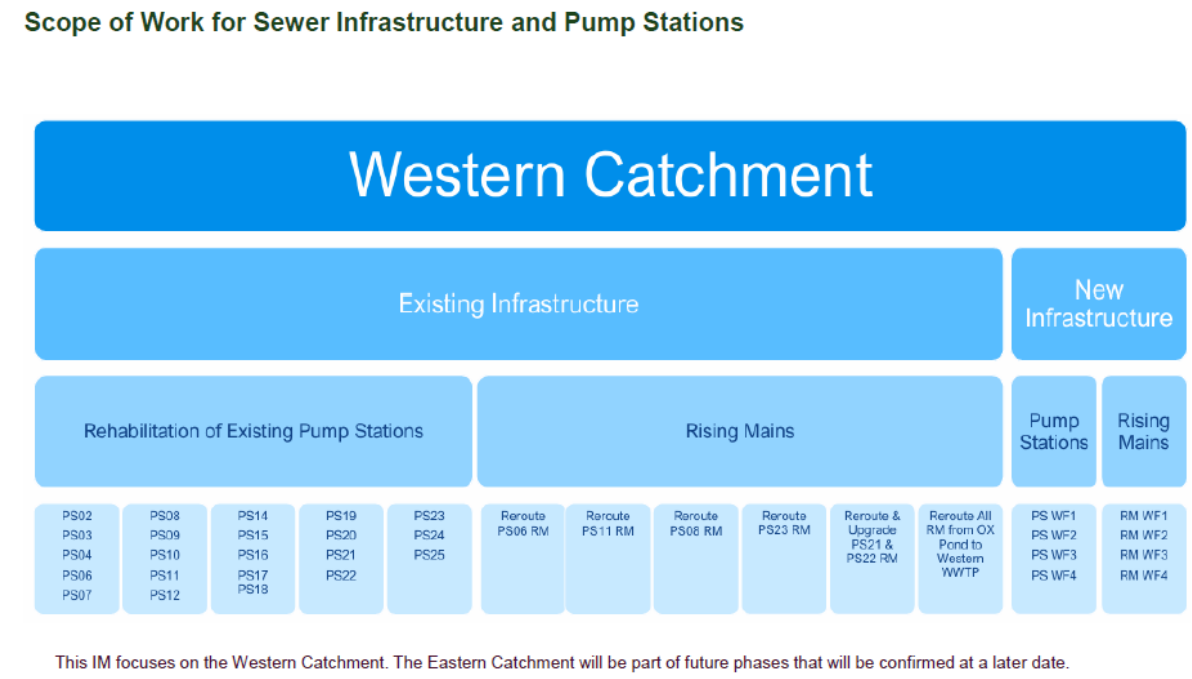


Figure 3: Proposed land-use for Katima Mulilo WWTP



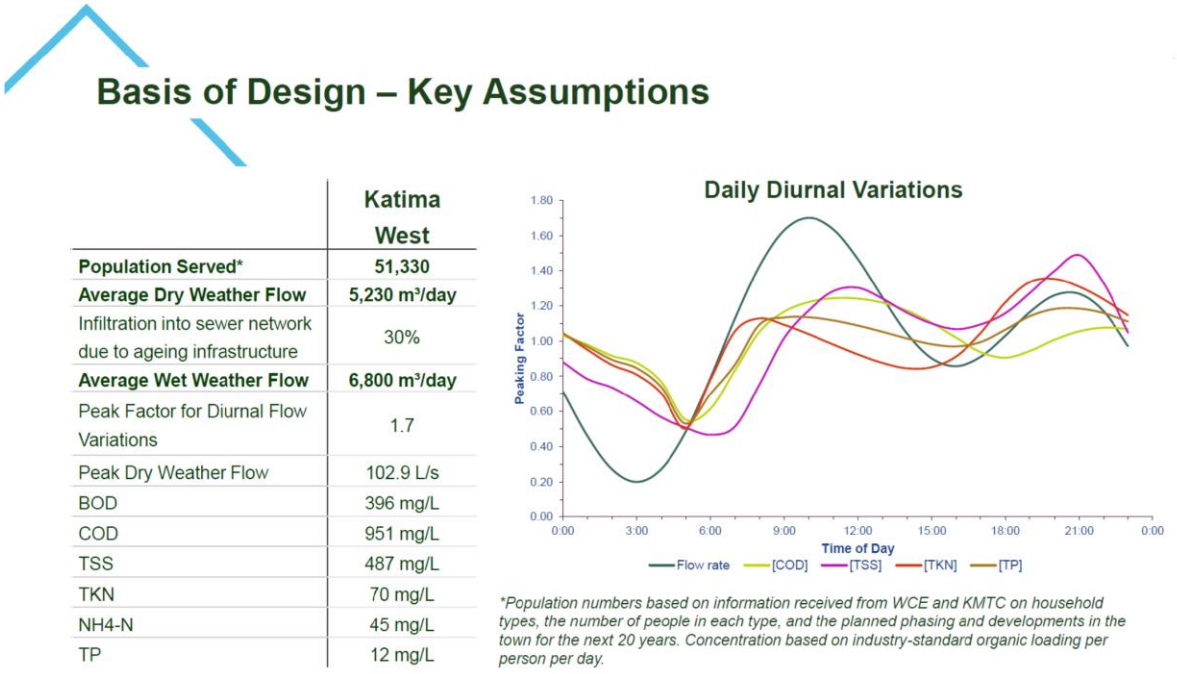


Figure 4: Proposed scope of work for sewer infrastructure and pump stations

5. ENVIRONMENTAL STUDY REQUIREMENTS

According to the Environmental Management Act no. 7 of 2007 the proponent requires an environmental clearance certificate from the Ministry of Environment and Tourism (Department of Environmental Affairs) to undertake the development of Katima Mulilo Waste Water Treatment Plant on Portion 197 of Farm KM No.1328, in Katima Mulilo, Zambezi region. Waste Water Treatment is a *'listed activity'* as per the *List of Activities requiring Environmental Clearance* (Government Notice 29 of 6 February 2012) and accordingly requires an Environmental Impact Assessment (EIA) to be conducted.

The environmental clearance certificate means that the Ministry of Environment and Tourism is satisfied that the activity in question will not have an unduly negative impact on the environment. It may set conditions for the activity to prevent or to minimise harmful impacts on the environment.

6. DESCRIPTION OF ALTERNATIVES

6.1 No-Go Alternative

The no-development alternative is the option of not going ahead with the development of Katima Mulilo Waste Water Treatment Plant on Portion 197 of Farm KM No.1328, Katima Mulilo. The no-go alternative will keep the site in its current state. This alternative is undesirable in terms of the current bulk sewer status quo, that is stored at the dilapidated oxidation pond. The site is vacant, with visible sign of disturbances. The Katima Mulilo informal settlements are growing rapidly. Should the site remain in this state, the possibility and threat of illegal land invasions and squatters settling on the site will persist.

Should the proposed WWTP activity not take place, the region could be deprived of serviced ervens, and an opportunity to ultimately reduce the housing demand in Katima Mulilo. The proposed activity could yield positive results that could provide an alternative serviced land to Katima Mulilo's new and potential inhabitants. The No-go option will not be a viable alternative at this stage, as it will maintain continual sewer pollution to the environment.

6.2 Site Alternative

The existing Portion 197 of Farm KM No.1328 is zoned as municipal with the sole purpose of sewage disposal. The site already house the existing oxidation pond belongs to the Katima Mulilo Town Council. The council wants to provide serviced land to the people of Katima Mulilo to address the scarcity of land in

Katima Mulilo. Katima Mulilo Town Council townlands does not really have enough land available to accommodate this type of development with its buffer zones, thus the site is ideally suited for this type of development.

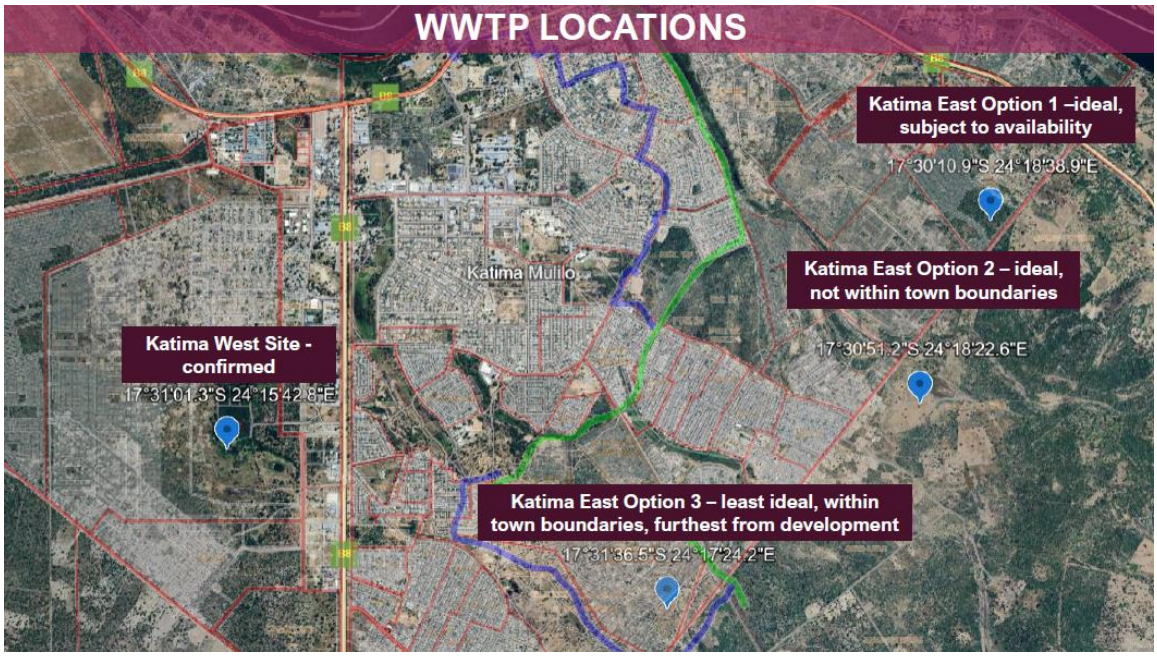


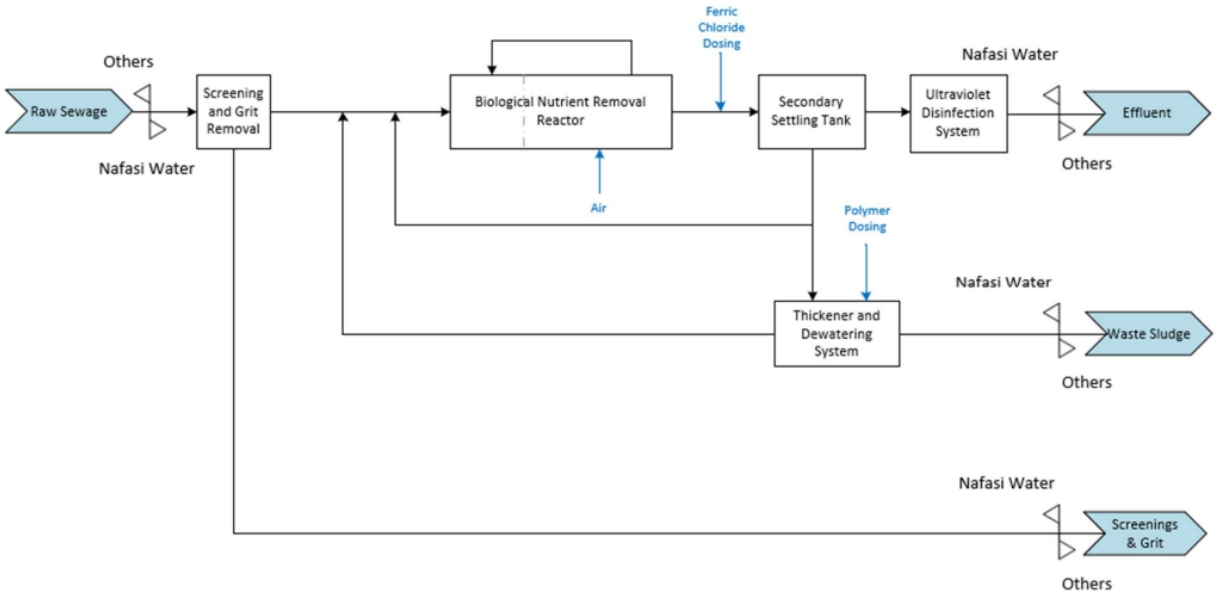
Figure 5: Site alternatives for Katima Mulilo WWTP

The area holds less ecological and conservation values, and the best option chosen is to develop Katima Mulilo Waste Water Treatment Plant with strict consideration of environmental aspects. Mitigation measures on impacts likely to be caused by the activity are incorporated in the planning and execution of the activity. The development of will have minimal impact on the environment. The environmental footprint of this activity is expected to be minimal and restricted to Portion 197 of Farm KM No.1328.

6.3 Waste Water Treatment Technology Alternatives

Conventional Activated Sludge (CAS) Wastewater Treatment Process: An Academic Overview

The Conventional Activated Sludge (CAS) process represents a highly engineered and widely adopted biological wastewater treatment technology. Its primary function is the degradation of dissolved and colloidal organic matter present in municipal and industrial wastewaters, thereby reducing the biochemical oxygen demand (BOD) and suspended solids (SS) prior to discharge. This process leverages a controlled aerobic microbial ecosystem to achieve its treatment objectives.



Process Stages:

The CAS system typically comprises a sequential series of physical and biological unit operations:

a) **Preliminary Treatment:** Raw wastewater initially undergoes preliminary treatment to remove large, settleable, and floatable inert materials that could impede subsequent treatment processes or damage equipment. This stage typically involves:
   - **Screening:** Mechanical removal of gross solids (e.g., rags, plastics, debris) using bar screens or fine screens.
   - **Grit Removal:** Separation of inorganic particulate matter (e.g., sand, gravel, coffee grounds) through velocity-controlled channels or aerated grit chambers, based on differences in specific gravity.

b) **Primary Sedimentation:** Following preliminary treatment, wastewater flows into primary clarifiers (sedimentation tanks). In these quiescent basins, heavier organic and inorganic suspended solids settle by gravity to form primary sludge, while lighter materials (e.g., oils, greases) float to the surface as scum. This physical separation significantly reduces the organic load (typically 25-40% BOD reduction and 50-70% SS reduction) on the downstream biological treatment stage.

c) **Aeration Tank (Biological Treatment):** This constitutes the core of the CAS process, functioning as an aerobic bioreactor. Primary effluent is introduced into a large, agitated tank, where it is continuously mixed with a suspension of metabolically active microorganisms, collectively termed "activated sludge." Atmospheric air or pure oxygen is vigorously diffused or mechanically introduced into the tank to maintain a dissolved oxygen (DO) concentration suitable for obligate aerobes. Within this aerobic environment, the heterotrophic bacteria comprising the activated sludge rapidly assimilate and metabolize dissolved and colloidal organic pollutants (substrates) present in the wastewater. This metabolic activity results in the conversion of organic matter into carbon dioxide (CO_2), water (H_2O), and new microbial biomass (cells).

d) **Secondary Clarification:** The mixed liquor, a suspension of treated wastewater and activated sludge flocs, then flows from the aeration tank into secondary clarifiers. These tanks are designed for gravity-driven solid-liquid separation. The microbial flocs, due to their agglomerated nature and higher density, settle efficiently, separating from the clarified supernatant, which is the treated effluent.

e) **Sludge Management:** Effective management of the activated sludge is critical for process stability and efficiency:
   - **Return Activated Sludge (RAS):** A controlled portion of the settled activated sludge from the secondary clarifier is continuously recycled back to the aeration tank. This recycling ensures the maintenance of a high concentration of active, viable microorganisms (measured as Mixed Liquor Suspended Solids, MLSS) necessary for efficient substrate utilization and stable process performance.
   - **Waste Activated Sludge (WAS):** As microorganisms reproduce, excess biomass is generated. This surplus activated sludge is

continuously or intermittently withdrawn from the system (typically from the RAS line) to maintain a desired F/M (Food-to-Microorganism) ratio and Mean Cell Residence Time (MCRT or sludge age). WAS typically undergoes further stabilization (e.g., thickening, dewatering, anaerobic digestion) before ultimate disposal or beneficial reuse.

f) **Disinfection / Tertiary Treatment (Optional):** The clarified effluent from the secondary clarifier may undergo further treatment depending on discharge standards and environmental regulations. Common tertiary treatment steps include:
   - **Disinfection:** To eliminate residual pathogenic microorganisms, commonly achieved through chlorination, ultraviolet (UV) irradiation, or ozonation.
   - **Tertiary Filtration:** For enhanced removal of residual suspended solids and turbidity, employing media filters (e.g., sand, granular activated carbon).
   - **Nutrient Removal:** Advanced CAS configurations (e.g., Modified Ludzack-Ettinger, Bardenpho) can be employed for biological nitrogen and phosphorus removal through specific anoxic and anaerobic zones integrated into the process.

CAS systems are highly adaptable and form the foundation for numerous enhanced biological treatment processes, offering robust and efficient organic matter removal capabilities.

Advantages of Conventional Activated Sludge (CAS) over Oxidation Ponds:

CAS plants generally offer several significant advantages over oxidation ponds, particularly for larger populations and stricter effluent quality standards:

i. **Higher Treatment Efficiency:** CAS plants provide a much higher degree of treatment and consistently produce a higher quality effluent with significantly lower levels of Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and Total Suspended Solids (TSS). They can achieve 85-95% reduction in BOD and TSS.

ii. **Smaller Land Footprint:** CAS plants are compact and require significantly less land area compared to oxidation ponds, which need vast expanses of land due to their long retention times and reliance on natural processes. This is a major advantage in urban or densely populated areas where land is expensive and scarce.

iii. **Better Control and Reliability:** CAS systems are highly engineered and allow for greater control over the treatment process. Operators can adjust parameters like aeration rates, sludge return rates, and nutrient levels to optimize performance and respond to variations in influent flow and composition. This leads to more consistent and reliable effluent quality.

iv. **Nutrient Removal Capabilities:** CAS plants can be designed with specific configurations (e.g., anoxic and anaerobic zones) to achieve significant removal of nutrients like nitrogen and phosphorus, which are major contributors to eutrophication in receiving water bodies. Oxidation ponds

are less effective at consistent nutrient removal and may even release nutrients in their effluent.

v. **Less Dependent on Climate:** CAS plants are less affected by climatic conditions (temperature, sunlight, wind) compared to oxidation ponds, whose efficiency can fluctuate significantly with weather changes. This makes them suitable for a wider range of geographical locations.

vi. **Reduced Odor and Vector Problems:** Due to their enclosed nature and controlled aeration, CAS plants generally produce less odour and are less prone to mosquito breeding and other vector problems that can be associated with open oxidation ponds.

vii. **Faster Treatment Time:** The hydraulic retention time (HRT) in CAS plants is much shorter (hours to days) compared to oxidation ponds (days to weeks), allowing for a more rapid treatment of wastewater.

viii. **Scalability:** CAS technology is highly scalable and can be designed to treat wastewater from small communities to very large urban areas.

7. SCOPE OF THE EIA

The scope of the EIA aims at identifying and evaluating potential environmental impacts emanating from the proposed development of Katima Mulilo Waste Water Treatment Plant. Relevant data have been compiled by making use of secondary sources and from project site visits. Potential environmental impacts and associated social impacts are identified and addressed in this report.

The environmental impact assessment report aims to address the following:

a) Identification of potential positive and negative environmental impacts.
b) Provide sufficient information to determine if the proposed project will result in significant adverse impacts.
c) Identification of “hotspots” which should be avoided where possible due to the significance of impacts.
d) Evaluation of the nature and extent of potential environmental impacts.
e) Identify a range of management actions which could mitigate the potential adverse impacts to required levels.
f) Provide sufficient information to the Ministry of Environment, Forestry and Tourism to make an informed decision regarding the proposed project.
g) Present and incorporate comments made by stakeholders.

8. METHODOLOGY

The following methods were used to investigate the potential impacts on the social and natural environment that could arise from the development of Katima Mulilo Waste Water Treatment Plant:

a) Information about the site and its surroundings was obtained from existing secondary information and site visits.

b) Neighbours, interested and affected Parties (I&APs) were consulted and their views, comments and opinions are presented in this report.

9. STATUTORY REQUIREMENTS

9.1 National Legislative Requirements

The EIA process is undertaken in terms of Namibia's Environmental Management act no. 7 of 2007 and the Environmental Assessment Policy of 1995, which stipulates activities that may have significant impacts on the environment. Listed activities require the authorisation from the Ministry of Environment and Tourism (DEA). Section 32 of the Environmental Management Act requires that an application for an environmental clearance certificate be made for the listed activities. The following environmental legislations are relevant to this project:

- ***The Namibian Constitution***

The Namibian Constitution has a section on principles of state policy. These principles cannot be enforced by the courts in the same way as other sections of the Constitution. But they are intended to guide the Government in making laws which can be enforced.

The Constitution clearly indicates that the state shall actively promote and maintain the welfare of the people by adopting policies aimed at management of ecosystems, essential ecological processes and biological diversity of Namibia for the benefit of all Namibians, both present and future.

- ***Environmental Management Act No.7 of 2007***

This Act provides a list of projects requiring an Environmental Assessment. It aims to promote the sustainable management of the environment and the use of natural resources and to provide for a process of assessment and control of activities which may have significant effects on the environment; and to provide for incidental matters.

The Act defines the term "*environment*" as an interconnected system of natural and human-made elements such as land, water and air; all living organisms and matter arising from nature, cultural, historical, artistic, economic and social heritage and values.

The Environmental Management Act has three main purposes:

(a) to make sure that people consider the impact of activities on the environment carefully and in good time.

(b) to make sure that all interested or affected people have a chance to participate in environmental assessments

(c) to make sure that the findings of environmental assessments are considered before any decisions are made about activities which might affect the environment

The rezoning of land from open space to any other land use is a *'listed activity'* as per the *List of Activities requiring Environmental Clearance* (Government Notice 29 of 6 February 2012) and accordingly requires an Environmental Impact Assessment (EIA) to be conducted.

Line Ministry: Ministry of Environment, Forestry and Tourism

- ***Atmosphere Pollution Prevention Ordinance (1976)***

This Ordinance generally provides for the prevention of the pollution of the atmosphere. Part IV of this ordinance deals with dust control. The Ordinance is clear in requiring that any person carrying out an industrial process which is liable to cause a nuisance to persons residing in the vicinity or to cause dust pollution to the atmosphere, shall take the prescribed steps or, where no steps have been prescribed, to adopt the best practicable means for preventing such dust from becoming dispersed and causing a nuisance.

Line Ministry: Ministry of Environment, Forestry and Tourism

- ***Water Resources Management Act of Namibia (2004)***

This act repealed the existing South African Water Act No.54 of 1956 which was used by Namibia. This Act ensures that Namibia's water resources are managed, developed, protected, conserved and used in ways which are consistent with fundamental principles depicted in section 3 of this Act. Part IX regulates the control and protection of groundwater resources. Part XI, titled Water Pollution Control, regulates discharge of effluent by permit. Thus developers are required to efficiently plan for sewage disposal.

Line Ministry: Ministry of Environment, Forestry and Tourism

- ***The Draft Wetland Policy (1993)***

Requires that any wetlands and its associated hydrological functions form a part, to be managed in such a way that their biodiversity, vital ecological functions and life support systems are protected for the benefit of present and future generations.

Line Ministry: Ministry of Environment, Forestry and Tourism

- ***Environmental Assessment Policy of Namibia (1995)***

Environmental Assessments (EA's) seek to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process, and that the term ENVIRONMENT (in the context of IEM and EA's) is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.

All listed policies, programmes and projects, whether initiated by the government or the private sector, should be subjected to the established EA procedure as set out in Figure 2.

Line Ministry: Ministry of Environment, Forestry and Tourism

- ***Forestry Act (No.12 of 2001)***

This Act makes provision for the protection various plant species. Harvesting permits are required from the Directorate of Forestry to clear certain protected vegetation species from the site.

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry

- ***Townships and Division of Land Amendment Act (No.28 of 1992***

Article (l) of this Act stipulates that "Whenever any area of land constitutes, by reason of its situation, a portion of an approved township, or adjoins an approved township, the Executive Committee may, by proclamation notice in the Gazette and after consultation with the Board, extend the boundaries of the township to include such an area". Thus the new township needs to be approved by the Namibia Planning Advisory Board and the Townships Board.

Line Ministry: Ministry of Urban and Rural Development

- ***Sewerage and Drainage Regulations(amendments)Local authorities act, section 23 (1992).***

The regulations makes provision for proper construction of pipelines in drainage lines. The regulations also stipulate the prevention of pollution and environmental damage caused by improper construction of sewerage and water pipelines in drainage lines.

Line Ministry: Ministry of Urban and Rural Development

- ***Soil Conservation Act (No.76 of 1969).***

The Act advocates for the Prevention and combating of soil erosion, conservation, improvement and manner of use of soil and vegetation, and protection of water resources.

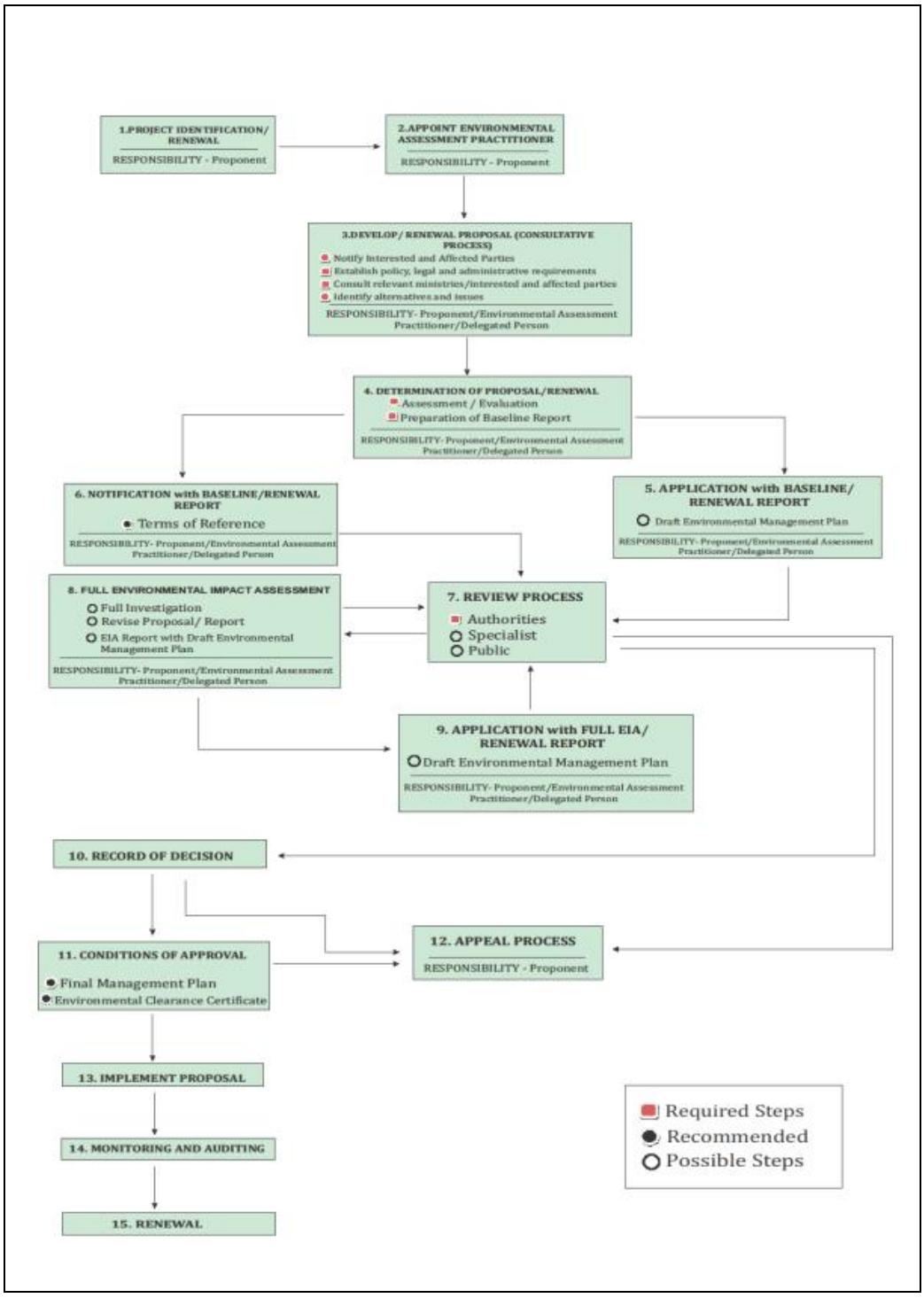


Figure 6. Environmental Assessment Procedure of Namibia *(Adapted from the Environmental Assessment Policy of 1995)*

- ***Draft Pollution Control and Waste Management Bill***

The proposed project of Katima Mulilo WWTP Development, only applies to Parts 2 and 7 of the Bill.

Part 2 stipulates that no person shall discharge or cause to be discharged any pollutant to the air from a process except under and in accordance with the

provisions of an air pollution licence issued under section 23. It further provides for procedures to be followed in licence application, fees to be paid and required terms of conditions for air pollution licences.

Part 7 states that any person who sells, stores, transports or uses any hazardous substances or products containing hazardous substances shall notify the competent authority, in accordance with sub-section (2), of the presence and quantity of those substances.

- ***Hazardous Substances Ordinance No. 14 of 1974***

The Ordinance applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export and is administered by the Minister of Health and Social Welfare. Its primary purpose is to prevent hazardous substances from causing injury, ill-health or the death of human beings.

Line Ministry: Ministry of Health and Social Services

- ***Public Health Act 36 of 1919 and Subsequent Amendments***

The Act, with emphasis to Section 119 prohibits the presence of nuisance on any land occupied. The term nuisance for the purpose of this EIA is specifically relevant specified, where relevant in Section 122 as follows:

- ✓ any dwelling or premises which is or are of such construction as to be injurious or dangerous to health or which is or are liable to favour the spread of any infectious disease;
- ✓ any area of land kept or permitted to remain in such a state as to be offensive, or liable to cause any infectious, communicable or preventable disease or injury or danger to health; or
- ✓ any other condition whatever which is offensive, injurious or dangerous to health.

Potential impacts associated with the development of Katima Mulilo WWTP project are expected to include dust, air quality impacts, noise nuisance and smoke emissions.

Line Ministry: Ministry of Health and Social Services

- ***National Heritage Act (No.76 of 1969).***

The Act calls for the protection and conservation of heritage resources and artefacts. Should any archaeological material, e.g. old weapons, coins, bones found during the construction, work should stop immediately and the National Heritage Council of Namibia must informed as soon as possible. The

Heritage Council will then decide to clear the area or decide to conserve the site or material.

9.2 International Conventions and Regulations

Article 144 of the Namibian Constitution states that "the general rules of public international law and international agreements binding upon Namibia form part of the law of Namibia." This means that all the international agreements that Namibia signed become part of the law of our country. These laws and/or agreements are:

- ✓ Convention on Biological Diversity, 1992;
- ✓ United Nations Framework Convention on Climate Change, 1992;
- ✓ Kyoto Protocol on the Framework Convention on Climate Change, 1998;
- ✓ Stockholm Convention of Persistent Organic Pollutants, 2001.

10. GENERAL ENVIRONMENT OF THE STUDY AREA

This section lists the most important environmental characteristics of the study area and provides a statement on the potential environmental impacts on each.

10.1 Location and Land Use

The proposed Katima Waste Water Treatment Plant is located on Portion 197 of Farm KM No.1328 , Katima Mulilo Townlands.

The site is located within an undeveloped townlands zoned as sewage disposal, as per local municipal regulations, which is surrounded by undeveloped townlands (See Fig 1).

10.2 Topography and Surface Water

The area is generally flat, and mostly undeveloped. The site under study has a gentle slope towards the Zambezi River. The landscape is classified as being in the Sandveld Dunes region, which is characterized with paleo dunes and pans. The site is located within the catchment of the Zambezi River, a perennial river draining in an eastern direction. The river is located less than 1km north of the site.

In general, local drainage in the area is well developed and takes place towards the Zambezi River. Proper drainage systems (e.g. erection of culverts) should be developed at the site to control the flow of surface water to avoid flooding. Storm water management systems should form part of the engineering designs.

10.3 Climate *(Mandelsohn et al)*

Table 1. Climate Data

Classification of climate:	Semi-arid area
Average rainfall:	Rainfall in the area is averaged to be less than 500 mm-550 mm per year.
Variation in rainfall:	Variation in rainfall is averaged to be 30-40 % per year.
Average evaporation:	Evaporation in the area is averaged to be between 1960-2100 mm per year.
Precipitation:	The highest summer rains are experienced in January.
Water Deficit:	Water deficit in the area is averaged to be between 1500-1700mm per year.
Temperatures:	Temperatures in the area are averaged to be between 20- 22 °C per year.
Wind direction:	Wind directions in the area are predominantly easterly winds.

10.4 Geology and Hydrogeology of the Area

The area has generally a relatively thick natural soil cover. Surface geology consists of formations of the Kalahari Sequence, which have a thickness of up to 30m in the area.

Within the Kalahari Sequence generally the following six lithological classifications are recognized: Duricrusts, Kalahari sand, Alluvium and lacustrine deposits, Sandstone, Marl, Basal conglomerate and gravel.

Coarse pebbly gravels are known to occur within the upper 30m in the area between Katima Mulilo and Ngoma, but probably represent fluvial, paleo-Zambezi deposits of Pleistocene age.

Surficial Kalahari sand covers almost the entire land surface here. These lithologies comprise fine-medium-coarse grained, sub angular-rounded glassy quartz sand, off-white in colour and typically clay-free in the upper 5m. These aeolian sands represent reworked Kalahari sediments. Though red sands occur, much of the surface sand in the area is leached of any iron staining.

The transition from the so-called Kalahari sand to the older, underlying sandstone is often not clear, but seems to be gradational.

Below the truly surficial horizon, similar sands are found, but often with varying clay content that may reach significant (>10%) proportions. These sands may contain a small percentage of coarse glassy material, up to 4mm in diameter, which is mostly angular to sub-angular. Within these sands, thin gravel horizons, usually <0,5m thick, are not uncommon. These gravels are comprised of well-rounded, mainly chalcedonic grains and may represent transported amygdales of decomposed Karoo lavas.

The Kalkrand Formation of the Karoo Sequence is expected to underlie the Kalahari Sequence at Katima Mulilo. Groundwater flow would be mostly through primary porosity but flow along fractures, faults and other geological structures present within the formations might take place where consolidated layers are present.

According to the DWA database, as well as the APC in-house database, subsurface water in the area is utilized with approximately 10 known boreholes present in a 2km radius (See Figure 8). Water levels are generally near the surface, close to the river and become deeper as one moves away from the river towards the southeast. Considering the water level above sea level, it becomes evident that groundwater flow takes place from the river, into a southeasterly direction. This can be expected, as the river is a source of groundwater recharge. This can however be reversed during the rainy season when the area receives rain. Water quality in the area is general very good.

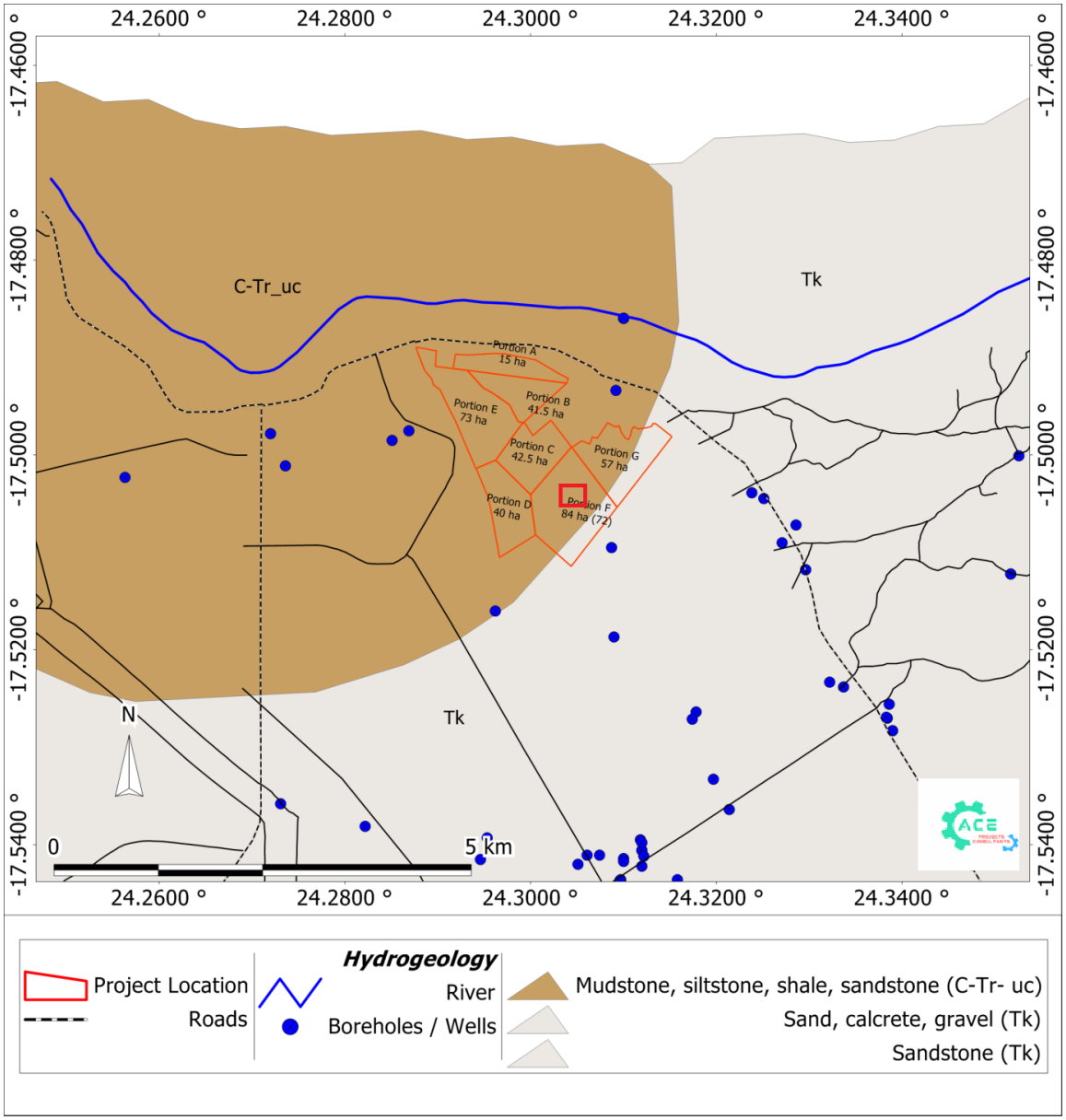


Figure 7: Geological and Hydrogeological map

10.5 General Ecology

The site falls within the Tree and Shrub savannah biome, which is characterised by woodland vegetation structure type with extremely high green vegetation biomass. The vegetation at the site itself consists of grass, weedy species and some small thorny bush. The larger vegetations (trees) are located mainly along the northern property boundaries of the site. No endangered species were identified on site, other than Camelthorn Trees. The following photo illustrates the vegetation at site.

Vegetation on site

The surrounding vegetation on site consists mainly of riparian vegetation and woodland vegetation characterised by Zambezi teak, Afrikan teak, Kalahari podberry, False Mopane and Burkea africana. The department of forestry should be involved in any clearance of any protected or vulnerable species.

Deducing from the Atlas of Namibia, the proposed site is within the area that is known to have more than 300-399 plant species (Mandelsohn et al, 2003).

With regards to fauna, it is estimated that at least 81 to 85 reptile diversity, 28 to 35 amphibians, 106 to 120 mammal and more than 230 bird species (breeding residents) are known to or are expected to occur in the project area of which various proportions are endemics.

11. SOCIO-ECONOMIC ASPECTS

This section provides an overview of socio-economic characteristics of the study area. It provides regional and local information on the, economic activities, population dynamics, vulnerability, and social services currently available in the area.

11.1 Regional Information

The proposed Poultry project will be situated in the Zambezi region of Namibia. The total current population is estimated to be 142 373 (69997 males and 72376 females) (NSA, 2023). Eighty-Three percent of the population of the Zambezi region over 15 years of age are literate (NSA, 2023). The estimated unemployment rate in Zambezi region is 43.7% (NSA, 2023). The population density in Zambezi region is relatively high at 9.7 persons per km^2, compared to the national average of 3.7 persons per km^2.

The life expectancy in Zambezi region is 42years having 43 years in females and 41 years in males (NPC, 2011). The Multi-Dimensional Poverty Index (MPI) in Zambezi region is 26%, compared to the national MPI of 19%.

11.2 Katima Mulilo

Katima Mulilo is a small town which primarily functions as regional capital of Zambezi region of central Namibia. It lies in a pleasant wooded and fertile plain.

11.2.1 Economic Activities

Katima Mulilo, the major town of the Zambezi Region, is the hub for all economic activities. The town is linked to Namibia's air and road network, making it well situated to service Zambia, Zimbabwe, Botswana, Southern Angola and subsequently South Africa.

As a result, new developments are taking place in Katima Mulilo and the surrounding areas. The livelihoods of the local community are likely to be positively impacted by the new fuel retail facility.

11.2.2. Employment (Job Opportunities)

Unemployment still hampers most of the developing world and the Caprivi region is not an exception. The proposed township development is likely to increase the job opportunities in the region. The Construction phase of the project will provide job opportunities, of which 80% are expected to be unskilled and semi-skilled people and can be sourced from the unemployed labour force of Katima Mulilo and the surrounding area.

The proposed project may require construction services which involve engineers, construction firms, equipment vendors, and utilities. All of this cost is spent locally for piping, construction, and operational personnel, contractors, providing additional economic benefits to the community through increased employment. Some of the services in the operational phase will be outsourced e.g. maintenance of security services, waste removal etc. The outsourcing of these services will strengthen existing businesses operating in the area and provide employment to people.

11.2.3 Livelihoods

In general, in the Zambezi region most males own and control valuable resources such as crop fields, donkey carts, farm tools and implements, livestock, vehicles, bicycles, houses, employment, forest and grazing land. Females mainly have ownership over petty resources such as gardens, chickens, cutlery, furniture, wild fruit, seeds, fire wood and food. By Implication, males and male headed households (51%) equally dominate the main livelihood resources making them 'better-off' , then female headed households (49%) which are either 'very poor' or 'poor'. The livelihoods of the local community are likely to be positively impacted therefore predicted to be better than before the development of the project in the area.

11. 2.4 Tourism

Katima Mulilo hold much attraction for tourists due to a few nature reserves such Bwabwata National Park and the Zambezi River. Katima Mulilo act as a toursit stop-over place for tourists travelling to Victoria falls.

Protea Zambezi River Lodge, Zambezi Waterfront, Caprivi River Lodge etc are some of the major tourism attractions in the region. In addition private lodges and conservancies offer protection to wildlife, which in turn becomes attractive to tourists and trophy hunters altogether

Excessive waste, dust, noise, vibrations and appalling air quality can have negative impacts on the tourism industry in the area, as it can become a nuisance to tourists.

11. 2.5 In - Migration

Due to enhanced employment opportunities that could be created by the envisaged project, some in-migration of job seekers to Katima Mulilo can be expected. Depending on the amount of in-migration, local areas may start experiencing overcrowdings, over use of infrastructure, local conflicts, increase of goods prices due to increased demand etc.

11. 2.6 HIV & Prostitution

Namibia has a high incidence of HIV/AIDS, which has a strong and adverse socio-economic impact on livelihoods of people in the region. The HIV prevalence rate for the age group 15 to 49 is estimated at 23.7% for Namibia (NAMPHIA, 2018).

The spending powers of locals working on this project are likely to increase, and this might be a perfect opportunity for sex workers to explore. Migrant labourers from other regions and expatriates are normally vulnerable and may use the services rendered by the sex workers.

Should the HIV prevalence increase, the following consequential issues could arise:

- ✓ Reduced workforce in the Zambezi region.
- ✓ Diversion of income expenditure to medical care.
- ✓ Increase in orphans and household headed by children.
- ✓ Increase in pregnancy related mortality.
- ✓ The current rate of 12 454 people per doctor could increase.

11. 2.7 Infrastructure & Increased Traffic

The traffic in the area would be expected to increase slightly and it might contribute to heavy traffic during peak hours and a higher number of car accidents along the B8 road. Infrastructure like roads will be affected due to increased traffic and heavy-duty cargo trucks.

11.2.8 Regional Education Status

According to EMIS (2023), there are a total number of 120 schools of which 109 are state owned and 11 privately owned in the Zambezi region. 40, 441 learners in the Zambezi Region are enrolled in public schools while the remaining 1428 attend private schools. Only 55 of all 1, 911 teachers in the Zambezi region are without training. The percentage literacy for persons older than 15 years is 83.3% which lower compared with 87% of Namibia. The Zambezi region yields good results when it comes to academic ratings

in the country, although most schools offer quality education to the young ones as from primary to high schools.

11.2.9 Poverty status

Zambezi region's Multidimensional Poverty Index of 26% percent is above the national average of 19. The majority of the communities agree that unemployment, lack of assets and the inability to meet basic needs are characteristics of the 'very poor' or 'poor'. Further on 'poor' people do not have access to agricultural land ,do not own livestock, have never been employed, and thus are unable to pay for their children's education, buy them food, clothes, shoes and provide proper shelter for them. Therefore, a good quality of life in the Zambezi region is represented by the total opposite factors mentioned above, which includes formal employment, owning land, livestock and transport (cars).

12. STAKEHOLDER PARTICIPATION

Consultation with the public forms an integral component of an EIA investigation and enables I&APs e.g. neighbouring landowners, local authorities, environmental groups, civic associations and communities, to comment on the potential environmental impacts associated with the proposed development and to identify additional issues which they feel should be addressed in the EIA. The primary aims of public participation were:

- ❖ To initiate participation of Interested and affected parties (I&APs), e.g. local authorities and communities.
- ❖ To inform I&APs and key stakeholders about the proposed development.
- ❖ To identify issues and concerns of key stakeholders and I&Aps with regards to the proposed development.
- ❖ To provide information to enable informed decision making
- ❖ To develop a communication structure with stakeholder and I&APs
- ❖ To promote transparency of the project
- ❖ To ensure the public and stakeholders comments are considered for the development.
- ❖ To provide answers to I&APs queries
- ❖ To encourage shared responsibility and sense of ownership.

Decision-making authorities were consulted throughout from the outset of the study, and have been engaged throughout the project process. Consultation with the department of Environmental Affairs (MET) included the environmental assessment procedure and application procedure.

Public participation notices were advertised in local newspapers on two different occasions, namely; (See Appendix E)

- ✓ The Namibian Newspaper, 11 May and 17 April 2025
- ✓ New Era Newspaper, 11 May and 17 April 2025

In the adverts an e-mail address was provided to the general public to register as interested and affected parties; and to request a background information document for the project. Posters were place at strategic locations to invite interested and affected parties to the meeting, e.g at Katima Mulilo Town Council offices, Shopping Complex, Katima Mulilo Police Station and at the meeting venue. Flyer invitation to the meeting were handed out in the streets and were also available at the Town Council office.

A public open day was held at Ngweze Community Hall, , Katima Mulilo from 11H00 to 13h00, on the 25th of April 2025. An environmental assessment and process presentation was presented at the meeting. See appendix C for the minutes).

The public participation meeting did not attract a lot of people. The open day session went on from 10:00 to 13:00, and no objections to project were recorded by the few attendees and those that enquired via email. However, involuntary resettlement concerns were raised as to what location will the people in Portion A be located to. The general concerns were not environmental related at all, most of them were about socio-economic issues, especially scarcity of land in Katima Mulilo, preferential options to buy erven in the surrounding areas, procedure on how the land will be sold, and making sure the Katima Mulilo Town Council first take care of first-time buyers when selling the erven. The participants who attended applauded Katima Mulilo Town Council for taking this initiative. A background information document was available to all interested and affected parties 14 days before and after the meeting (see appendix B for the BID).

Katima Mulilo Town Council was also consulted and Mr. Raphael Liswaniso, CEO of Katima Mulilo, indicated no obvious environmental concerns regarding the proposed project area.

Two Focus Group Meetings were held with Water Affairs, as pert of the consultations for the EIA process of the proposed Katima Mulilo WWWTP. The Focus Group came to understanding on the way forward, waste water disposal regulations and discharge permits application procedures.

Below is the list all Interested and Affected Parties.

Table 2. Interviewed Stakeholders/I&APS

NAME	ORGANISATION/ERF	OWNER/POSITION
Mr. R. Liswaniso	Katima Mulilo Town Council	CEO
Mr. Kabende	Private	I & APs
Mr S. Mafwila	Private	I & APs
Ms. N. Ausiku	Private	I & APs
Mr. G. Sitali	Private	I & APs
Mr. R. Milinga	Private	I & APs
Mr. V. Petersen	Project Lead	Fullbright Investment
Mr. S. Richards	Project Manager	PCG
Mr. J Swiegers"	Civil Engineers	WCE
Mr. M. Deelie	Design Engineer	NAFASI
Ms. E. Mbandeka	MAWFLR	
Ms. T. Kandjinga	MAWFLR	Senior Hydrologist

13. ENVIRONMENTAL IMPACT EVALUATION

The Environmental Impact Assessment sets out potential positive and negative environmental impacts associated with the proposed Katima Mulilo WWTP Development. The following assessment methodology will be used to examine each impact identified, see Table 6:

Table 3. Impact Evaluation Criterion *(DEAT 2006)*

Criteria	**Rating (Severity)**	
Impact Type	**+VE**	Positive
	0	No Impact
	-VE	Negative
Significance of impact being either	**L**	Low (Little or no impact)
	M	Medium (Manageable impacts).
	H	High (Adverse impact).

Probability:	**Duration:**
5 - Definite/don't know	5 - Permanent
4 - Highly probable	4 - Long-term (impact ceases
3 - Medium probability	3 - Medium-term (5-15 years)
2 - Low probability	2 - Short-term (0-5 years)
1 – Improbable	1 - Immediate
0 – None	
Scale:	**Magnitude:**
5 – International	10 - Very high/don't know
4 – National	8 - High
3 – Regional	6 - Moderate
2 – Local	4 - Low
1 - Site only	2 - Minor
	0 - None

13.1 Construction Activities of the proposed Katima Mulilo WWTP.

13.1.1 Dust Pollution and Air Quality

Dust will be generated during the construction and installation of sewer bulk services and the new waste water treatment plant, and problems thereof are expected to be site specific. Dust is expected to be worse during the winter months when strong winds occur. Release of various particulates from the site during the construction phase and exhaust fumes from vehicles and machinery related to the construction of bulk services are also expected to take place. Dust is regarded as a nuisance as it reduces visibility, affects the human health and retards plant growth.

It is recommended that regular dust suppression be included in the construction activities, when dust becomes an issue. No unnecessary revving of engines or operation of vehicles is allowed. In general, the servicing of these extensions is envisaged to have minimal impacts on the surrounding air quality.

Impact Evaluation:

Aspect	**Impact Type**	**Scale**	**Duration**	**Magnitude**	**Probability**	**Significance**	
						Unmitigated	**Mitigated**
Dust & Air Quality	-VE	2	1	2	1	M	L

13.1.2 Noise Impact

An increase of ambient noise levels at proposed site is expected due to the construction activities. Noise pollution due to heavy-duty equipment and machinery will be generated.

It is not expected that the noise generated during construction will greatly impact any third parties. Ensure all mufflers on vehicles are in full operational order; and any audio equipment should not be played at levels considered intrusive by others. The construction staff should be equipped with ear protection equipment.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Noise	-VE	1	1	4	4	M	L

13.1.3 Safety and Security

Safety issues could arise from the earthmoving equipment and tools that will be used on site during the construction phase. This increases the possibility of injuries and the contractor must ensure that all staff members are made aware of the potential risks of injuries on site. The presence of equipment lying around on site may also encourage criminal activities (theft).

Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles or machinery not being used. The contractor is advised to ensure that the team is equipped with first aid kits and that they are available on site, at all times. Workers should be equipped with adequate personal protective gear and properly trained in first aid and safety awareness.

No open flames, smoking or any potential sources of ignition should be allowed at the project location. Signs such as 'NO SMOKING' must be prominently displayed in parts where inflammable materials are stored on the premises. Proper barricading and/or fencing around the work sites should be erected to avoid entrance of animals and/or unauthorized persons. Safety regulatory signs should be placed at strategic locations to ensure awareness. Adequate lighting within and around the construction locations should be erected, when visibility becomes an issue.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Safety & Security	-VE	1	1	4	2	M	L

13.1.4 Contamination of Groundwater

Groundwater quality could be impacted through oil leakages, lubricants and grease from the equipment and machinery utilised during the bulk servicing of these extensions. Possibility of contamination from surface sources exist in the proximity of fault zones.

Care must be taken to avoid contamination of soil and groundwater. Use drip trays when doing maintenance on machinery. Maintenance should be done on

dedicated areas with linings or concrete floor. The risk can be lowered further through proper training of staff.

All spills must be cleaned up immediately. Excavations should be backfilled and sealed with appropriate material, if it is not to be used further.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Groundwater	-VE	2	2	2	2	M	L

13.1.5 Contamination of Surface Water

Contamination of surface water might occur might occur through oil leakages, lubricants and grease from the equipment and machinery during the installation and maintenance of bulk services at the proposed site. Oil spills may form a film on water surfaces in the nearby streams causing physical damage to water-borne organisms.

Machinery should not be serviced at the construction site to avoid spills. All spills should be cleaned up as soon as possible. Hydrocarbon contaminated clothing or equipments should not be washed within 25m of any surface water body e.g Zambezi River and its tributaries.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Surface water	-VE	2	2	2	3	M	L

13.1.6 Generation of Waste

This can be in a form of rubble, cement bags, pipe and electrical wire cuttings. Contaminated soil due to oil leakages, lubricants and grease from the construction equipment and machinery may also be generated during the construction phase.

The oil leakages, lubricants and grease must be addressed. Contaminated soil must be removed and disposed off at the hazardous waste landfill. The contractor must provide containers on-site, to store any hazardous waste produced. Regular inspection and housekeeping procedure monitoring should be maintained by the contractor.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Waste	-VE	1	1	4	4	M	L

13.1.7 Traffic

The servicing activities are expected to have a minor impact on the movement of traffic along B8 road. No diversion of traffic or closure of roads is expected.

Speed limit warning signs must be erected to minimise accidents. Heavy-duty vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Traffic	-VE	2	1	4	3	M	L

13.1.8 Fires and Explosions

There should be sufficient water available for fire fighting purposes. Ensure that all fire-fighting devices are in good working order and they are serviced. All personnel have to be trained about responsible fire protection measures and good housekeeping such as the removal of flammable materials on site. Regular inspections should be carried out to inspect and test fire fighting equipment by the contractor.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Fires and Explosions	-VE	1	1	4	2	M	L

13.1.9 Nuisance Pollution

Aesthetics and inconvenience caused to persons using B8 road and surrounding areas. The construction activities of some extensions would be visible from B8 road , thus the supervisor should maintain tidiness on site at all times. Take cognition when parking vehicles and placing equipment.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Nuisance Pollution	-VE	1	1	2	2	L	L

13.1.10 Erosion and Sedimentation

Vegetation clearance and creation of impermeable surfaces could result in erosion in areas across the proposed area. The clearance of vegetation will further reduce the capacity of the land surface to slow down the flow of surface water, thus decreasing infiltration, and increasing both the quantity and velocity of surface water runoff. The particles in suspension will be transported towards the north and could increase the sedimentation in the in the southern direction.

The proposed development will increase the amount of impermeable surfaces and therefore decrease the amount of groundwater infiltration. As a result, the amount of stormwater during rainfall events could increase. If proper stormwater management measures are not implemented this will impact negatively on the water courses close to the site..

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Erosion and Sedimentation	-VE	1	1	4	2	M	L

13.1.10 Ecological Impacts

The proposed Katima Mulilo WWTP area is an already disturbed area, few conservation worthy vegetation. This area was previously disturbed with visible evidence of invader plants. Land will be cleared, leaving the big trees to maintain the vegetation within Katima Mulilo. Medicinal/fruit trees clearance must be avoided at all times, and permit must be obtained before cutting down protected species. Impacts on fauna and flora are expected to be minimal. Disturbance of areas outside the designated working zone is not allowed.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Ecology	-VE	1	1	4	2	L	L

Summary of all potential impacts expected during the construction of the Katima Mulilo WWTP and its associated infrastructure:

In general, impacts are expected to be low to medium, mostly short lived and site specific. Mitigation options recommended in the Environmental Management Plan (EMP) will guide and ensure that the impacts during the construction activities are minimised.

The contractor on site should be made aware of the content and environmental requirements of this report through proper induction training.

13.2 Operational Activities of proposed Katima Mulilo WWTP.

13.2.1 Dust Pollution and Air Quality

Vehicles that will be accessing proposed Katima Mulilo WWTP will contribute to the release of hydrocarbon vapours, carbon monoxide and sulphur oxides into the air. Possible release of sewer odour, due to sewer system failure or maintenance might also occur. All maintenance of Katima Mulilo WWTP and its associated bulk services procedures have to be designed to enable environmental protection .

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Dust & Air Quality	-VE	2	1	2	1	M	L

13.2.2 Noise Impact

Noise pollution already exists around the site in the form of noise generated from vehicles frequenting the existing B8 road. Noise pollution due to this project in the operational phase is expected to be mainly from generators or pumps, road maintenance machinery during maintenance.

Ensure that generator engines are fitted with mufflers. Operators working in close proximity to the generators should be equipped with ear protection equipment, when noise becomes an issue. Observation of on-site noise levels by the Manager or Supervisor of Bulk Services Maintenance Department of Katima Mulilo Town Council.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Noise	-VE	1	3	4	4	M	L

13.2.3 Contamination of Groundwater

Spillages might also occur during maintenance of the sewer system. This could have impacts on groundwater especially in cases of large sewer spills.

Potential health impact on groundwater users do exist. Potential impact on the natural environment from possible polluted groundwater also exits. The area is subjected to north-northwest structures, which might act as preferential pathways for any contaminants entering the saturated zone. Proper containment should be used in cases of sewerage system maintenance. to avoid any possible leakages.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Groundwater contamination	-VE	2	2	2	2	L	L

13.2.5 Generation of Waste

Waste in the form of bio-solid waste from Katima Mulilo WWTP will be generated. General Waste will be removed and disposed off at Katima Mulilo Landfill by Katima Mulilo Town Council or its Waste Removal Contractors e.g. Rent-a-Drum, Kleen Tek etc.

Katima Mulilo Town Council will have waste skips around proposed Katima Mulilo WWTP like the rest of the suburbs in Katima Mulilo.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Waste Generation	-VE	1	1	2	4	M	L

13.2.6 Failure of Reticulation Pipelines

Potential release of sewage, storm-water, water, into the environment environment due to pipeline/system failure. As a result, the spillage could be released into the environment and could potentially be a health hazard to surface and groundwater.

Proper reticulation pipelines and drainage systems should be installed. Regular bulk services infrastructure and system inspection should be conducted.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Failure of Reticulation Pipelines	-VE	1	1	4	2	M	L

13.2.7 Ecological Impacts

No major impacts are expected as the Katima Mulilo WWTP project in the operational phase. Vegetation in open spaces should not be disturbed or removed during the operational phase. Minimise the area of disturbance by restricting movement to the designated working areas during Maintenance.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Ecology Impacts	-VE	1	1	4	2	L	L

13.2.8 Traffic

Traffic around the proposed Katima Mulilo WWTP should be monitored, to avoid traffic congestion in the area. Speed limits and road signs as set out by Katima Mulilo Town Traffic Deparment should be adhered to in order to minimise accidents.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Traffic	-VE	1	3	4	4	M	L

13.2.9 Safety and Security

A number of health and safety threats exist during operational activities of proposed Katima Mulilo WWTP. Individuals in the community can suffer from noise from maintenance activities around proposed Katima Mulilo WWTP. Accidents on roads as a result of increased traffic and deteriorated.

The contractors is advised to ensure that proper personal protective gear and first aid kits are available, at all times. Workers should also be properly trained in first aid and safety awareness.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Safety and Security	-VE	1	3	6	3	M	L

Summary of all potential impacts expected during the operations of the proposed Katima Mulilo WWTP*:*

In general, impacts are expected to be low, short lived and site to local specific. An Environmental Management Plan (EMP) will ensure that the impacts during the operational activities are minimised and includes measures to reduce all impacts identified.

The contractor should be made aware of the content and environmental requirements of this report through proper induction training.

14. CUMULATIVE IMPACTS

These are impacts on the environment, which results from the incremental impacts of the proposed Katima Mulilo WWTP project when added to other past, present, and reasonably foreseeable future actions regardless of what person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. In relation to an activity, it means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts resulting from similar or diverse activities or undertakings in the area.

Possible cumulative impacts associated with the development of proposed Katima Mulilo WWTP includes, noise emissions, sewer damages/maintenance, land disturbance, traffic and possible accidents involving vehicles frequenting the area. This impacts could become significant especially that other nearby facilities/bulk services are also being maintained at the same time. This could collectively impact on the environmental conditions in the area. Cumulative impacts could occur in both the operational and the construction phase.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Cumulative impacts	-VE	1	3	4	3	L	L

15. ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (**EMP**) provides management options to ensure impacts of the proposed servicing of proposed Katima Mulilo WWTP and its associated infrastructure are minimised. An EMP is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the township projects are prevented, and the positive benefits of the projects are enhanced.

The objectives of the EMP are:

- ✓ to include all components of the Katima Mulilo WWTP project;
- ✓ to prescribe the best practicable control methods to lessen the environmental impacts associated with the Katima Mulilo WWTP project;
- ✓ to monitor and audit the performance of the project personnel in applying such controls; and
- ✓ to ensure that appropriate environmental training is provided to responsible project personnel.

The EMP acts as a stand-alone document, which can be used during the various phases of the proposed project. All contractors taking part in the bulk services construction activities should be made aware of the contents of the EMP. An EMP

for the construction and operational phases of township project is attached as Appendix A.

16. CONCLUSIONS

All known environmental and social risks can be minimised and managed through implementing preventative measures and sound management systems. It is recommended that environmental performance be monitored regularly to ensure compliance and that corrective measures be taken if necessary. It is also recommended that this information be made available to the surrounding communities on a regular basis.

In general, the Katima Mulilo WWTP project in Katima Mulilo would pose limited environmental risks, provided the EMP for the activity is used properly during planning, construction and operational phase. The Environmental Management Plan should be used as an on-site tool during all phases of the Katima Mulilo WWTP project. Parties responsible for non-conformances of the EMP will be held responsible for any rehabilitation that may need to be undertaken.

Should the Katima Mulilo WWTP project be modified or extended to a different area, it is recommended that a different EIA be done for the probable new location.

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17. REFERENCES

DEAT (2006) Guideline 4: Public Participation in support of the Environmental Impact Assessment Regulations, 2006. Integrated Environmental Management Guideline Series, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

DEAT (2006) Guideline 5: Assessment of Alternatives and Impacts in support of the Environmental Impact Assessment Regulations, 2006. Integrated Environmental Management Guideline Series, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

Department of Environmental Affairs and Tourism (DEAT), (2006): EIA Regulations.

Digital Atlas of Namibia, Ministry of Environment & Tourism.

Environmental Management Act guideline of Namibia.

NSA : 2023 Population and Housing Census.

NSA: 2023 Population and Housing Census (Labour Survey)

NAMPHIA (2018)

Mandelsohn J., Jarvis A., Roberts C. And Robertson T. (2003), Atlas of Namibia, Ministry of Environment and Tourism, David Phillip Publishers, South Africa.

Meteorological Services Department; Climate Data.

Regional Poverty Profile: Zambezi region, NPC (2004)

The Southern African Institute for Environmental Assessment, (2006) Authors (Brownlie S., Walmsley B. and P. Tarr): Guidance document on Biodiversity, Impact Assessment and Decision Making in Southern Africa. CBBIA – IAIA.