UPDATED ENVIRONMENTAL MANAGEMENT PLAN (EMP) FOR THE EXISTING TOWNSHIP MIXED-LAND USE DEVELOPMENT ON RE/ KATIMA MULILO TOWNLANDS NO.1328

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Assessed for:
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May 2024

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1. INTRODUCTION

The project proponent is, a close corporation company in Namibia registered under the companies act through the Ministry of Trade & Industry. The proponent established a township development on seventy-six hectares of land (76 Hectares) equivalent to 760 000m². The Township comprises of approximately 600 single residential houses, 60-80 bed private hospital, 2 Service Stations, 1 Private School and one (1) Shopping Centre. The Township have left at least five (5) erven for institutional development, 7 erven for business development, 19 erven for General Residential, a Retail Centre comprising of 5,192 square meters on first floor. The over-ground car parking accommodates at most three hundred (300) vehicles with out-door seating and an institution (office) block with eight (8) offices per floor across the four (4) floors with a total area of 14,266 square meters.

Electricity for the Low-density mixed-use project is generated from the national power grid. Namwater connection to bulk water of Katima Mulilo System is providing the Centre with domestic water. At first there were no sewer line in the area hence the proponent to installed a sewage treatment plant on the site which is disposing liquid effluent from the residential flats, offices, shops and other commercial buildings on the site.

The development has made use of materials that are environmentally sustainable in an effort to have a township that have a low carbon footprint as well as encouraging recycling and prudent waste management.

Kayunyi Investment Cc has been appointed by Nyepez Consultant cc to apply for the review of the Clearance Certificate which has expired. The Environmental Impact Assessment (EIA) was conducted under the requisites of the Environmental Management Act (EMA) (Act 7 of 2007) and its Regulations (2012).

1.2 MAIN OBJECTIVE

- To apply for the renewal of the Environmental Clearance Certificate (ECC) for an existing Township, Mixed-Land Use Development on Remainder/ Katima Mulilo Townlands NO.1328 which was obtained in September 2017 (the initial certificate was acquired by Nyepez Consultancy cc on behalf of Kayunyi Investment cc.
- To provide a brief background of the existing project and its proponents;
- Explain the amendments of the projects cope and the need for this project;

- **To provide for the updated Environmental Management Plan (EMP) of the project activities**
- Explain the need for this project; The enforcement and Compliance of the EMP during the operational course and decommissioning of the project;
- To explain the processes that was followed during the Environmental Scoping & EIA Study;
- The monitoring and evaluation of the project in line with the environmental health protocols outlined in the EMP

1.3 PURPOSE AND NEED OF THE TOWNSHIP

Lack of decent housing was and is identified as one of the most contentious issues in Namibia and thus government through its National Development Goals such as NDP 4-5 and Harambee Prosperity Plan (HPP) identified provision for housing as a key priority issue. According to National Household Income and Expenditure survey of 2009/10, (NHIES) Zambezi is the most affected region, thus the need to prioritize land servicing, housing development and sanitation. HPP, proposed several strategies to ensure service delivery, such as the subsidization of local authorities, mass housing initiatives, housing for civil servants, industry contribution, pre-allocation of subserviced land and Private Public Partnership (PPP).

It was through these strategies that Kayunyi Investment and Katima Mulilo town council entered into a (PPP) for the planning, designing and construction of infrastructures within the township of Katima Mulilo (Greenwell Reminder of the Katima Mulilo Townlands No.1328) measuring 76 Hectares.

The undertaking of the development of this nature required that the developer must be well resourceful, with the knowledge of the regulatory framework, experience in the development of large property projects, access to technical, environmental, engineering, architectural, town planning, land surveying and legal aspects.

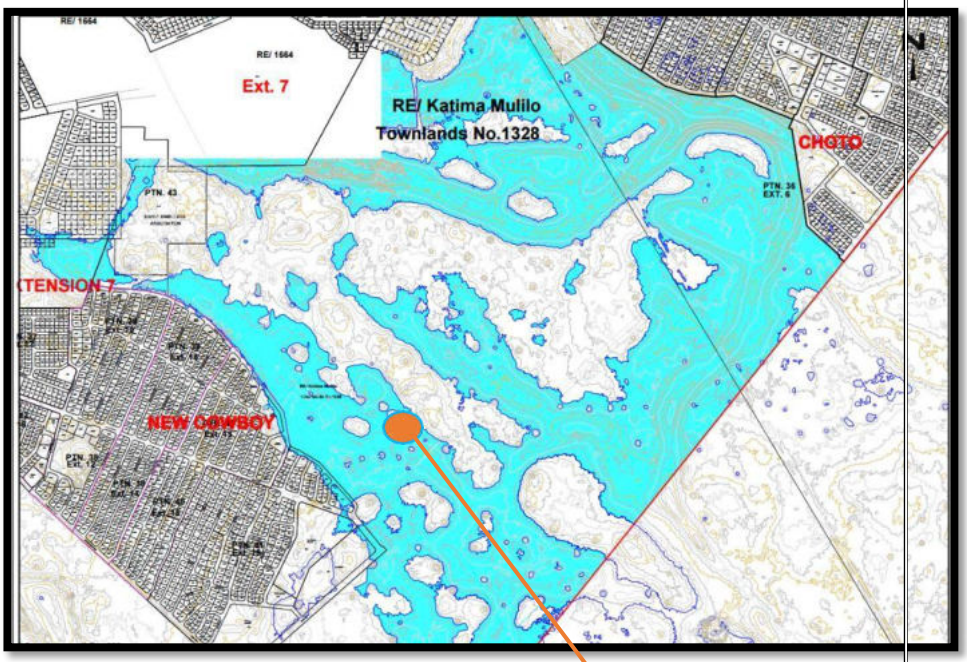
Knowledge of these issues mostly ensured that procedures were followed, and that all matters pertaining to the development were done in a proper and orderly manner. This also ensured that all stakeholders were engaged in meaningful consultations.

1.4 AIMS OF THIS STUDY

- Comply with Namibia's Environmental Assessment Policy, Environmental Management Act (2007) and its February 2012 EIA Regulations;
- Compile an Environmental Management Plan in line with the 2012 EIA Regulations of the Environmental Management Act (2007) and terms of reference.

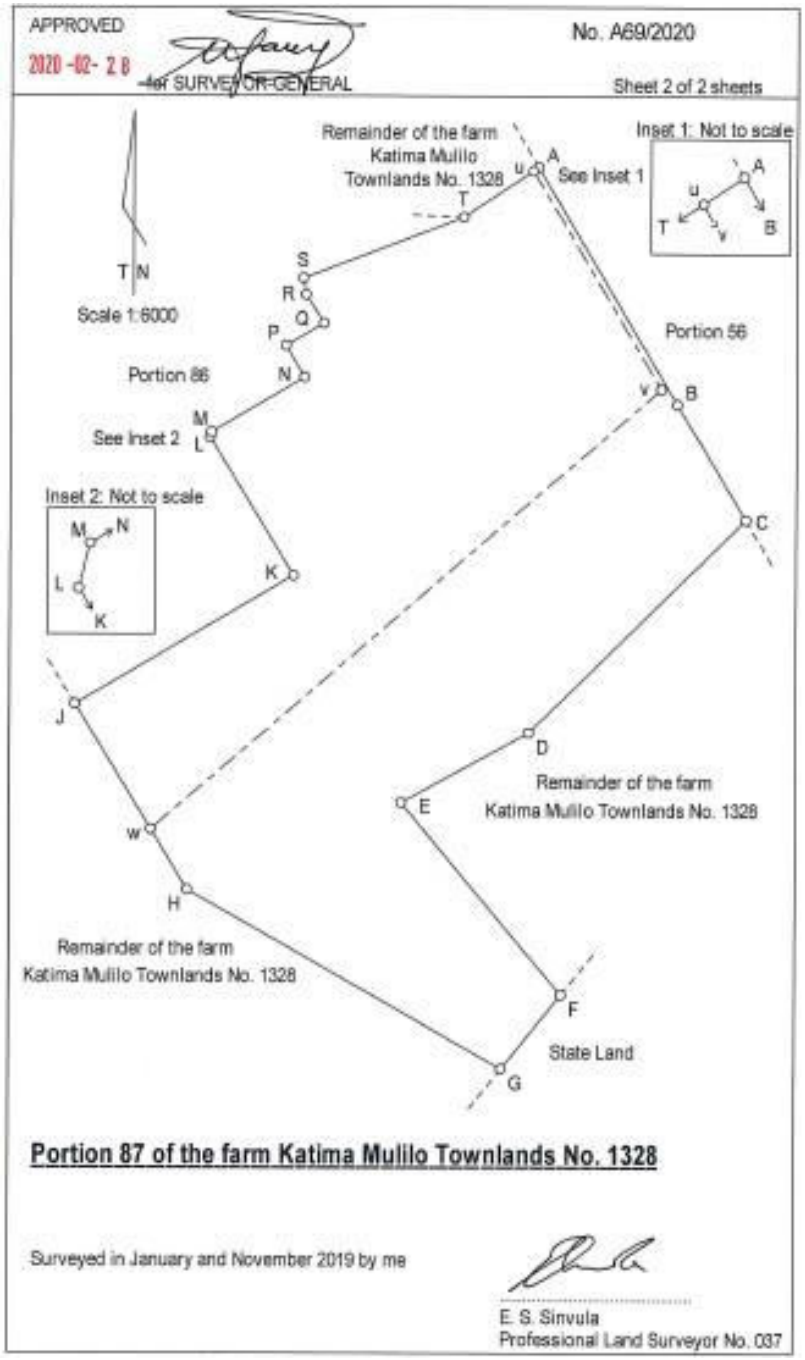
1.5 LOCALITY

As per the indicative map below, the township development was established on the townland of Katima Mulilo (Greenwell Reminder of the Katima Mulilo Townlands No.1328) measuring 76 Hectares.



Project site area, Re/Katima Mulilo Townland No. 1328_Existing Township, Mixed land Use 76 hectares.

Figure 1: Locality for Township Project area



Description of Beacons
A,B,C,D,E,F,G,H,J,L,M,N,Q,R,S,T,u,v,w : 12mm Round Iron Peg
K,P : Not beaconed

Servitude note:
The line u v w represents the centre line of a 15 metre wide pipeline servitude.

The figure A B C D E F G H J K L M N P Q R S T represents 42.7208 hectares of land being

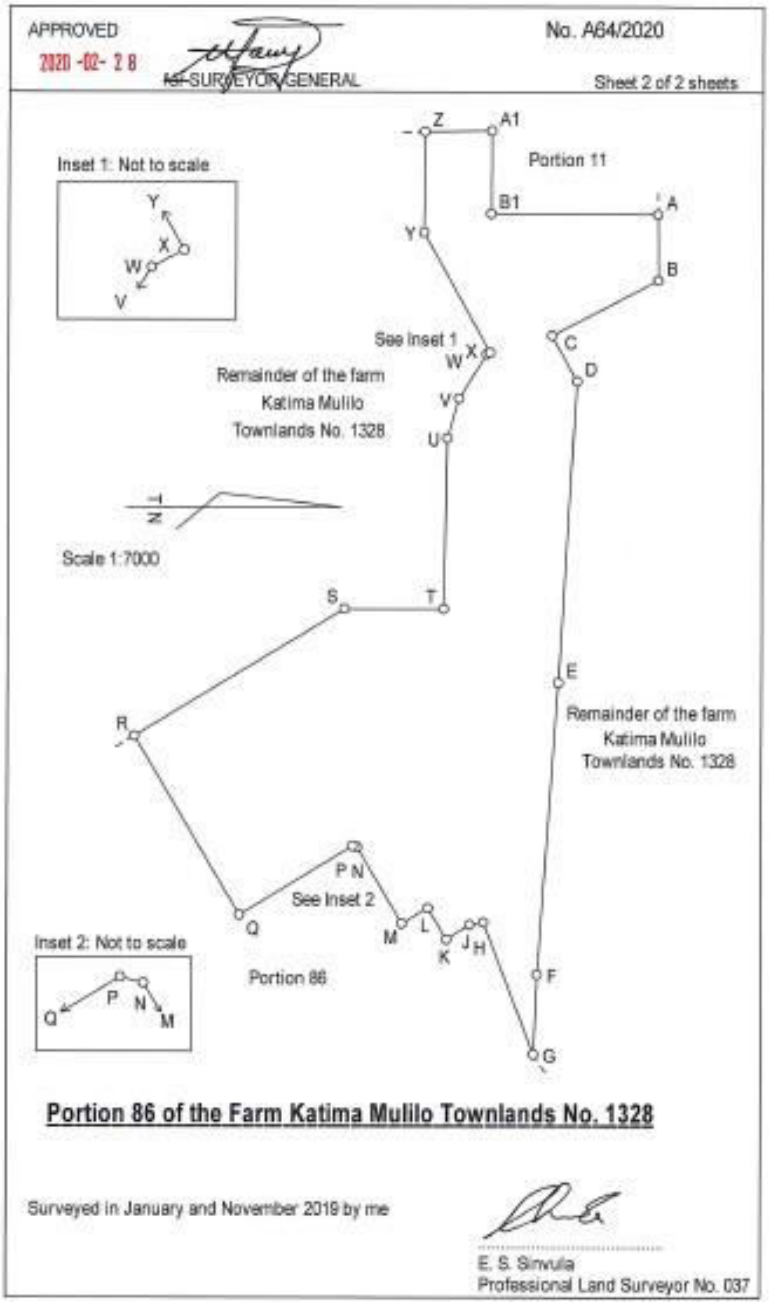
Portion 87 of the farm Katima Mulilo Townlands No. 1328

Situate in the Town Area of Katima Mulilo
Registration Division B
Zambezi Region, Republic of Namibia

Surveyed in January and November 2019 by me

E. S. Sinvula
Professional Land Surveyor No. 037

Figure 2: Kayunyi Investment cc township approved subdivision General plan_42.7 hectares



The figure A B C D E F G H J K L M N P Q R S T U V W X Y Z A1 B1
represents 36.0461 hectares of land being

Portion 86 of the Farm Katima Mulilo Townlands No. 1328

Situate in the Town Area of Katima Mulilo
Registration Division B
Zambezi Region, Republic of Namibia

Surveyed in January and November 2019 by me

E. S. Sinvula
Professional Land Surveyor No. 037

Figure 3: Kayunyi Investment cc township approved subdivision General plan_36.04 hectares

1.5.1 Initial Process Project Scoping

The scoping processes was carried-out during the initial stages in 2016 when the project was proposed. The process was an initiative and legal procedure to identify significant concerns, reasonable and feasible project alternatives such that available resources would be channelled on the assessment of those issues and alternatives. The first step was to identify all interested parties relevant to the project. The second step was to gazette necessary information on the resource to be affected, potential concerns and proposed alternatives. The scoping process involved discussions with the proponent, verbal interviews with the neighbourhood and on-site surveillance. The main objective was to carry out an Environmental Impact Assessment (EIA) of the township development project in order to ensure that the developments took into consideration appropriate measures to mitigate any adverse impacts to the environment.

The initial project assessment carried in 2016 identified existing and potential environmental impacts and possible concerns that affected parties had on the proposed development, as well as prevention and mitigation measures for the negative impacts. It stipulated in the Environmental Management Plan (EMP), the National Housing Policy for Namibia of 2003 that, "improvement of housing for the Namibian population was a major concern to the Government. This concern had been influenced by the fact that the improvement in housing stock was strategically important social and economic investment.

In addition, well-planned housing and infrastructure of acceptable standards and affordable cost when combined with essential services affords dignity, security and privacy to the individual, the family and the community as a whole. Adequate shelter also prevents social unrest occasioned by depravity and frustrations of people living in slums and informal settlements. Besides this social function, housing is also an investment good contributing both directly and indirectly towards poverty reduction by employment generation, raising of incomes, improved health and increased productivity of the labor force (GoK 2004)."

1.5.2 Potential impacts, mitigation measures & Current status /Results

Potential impact	Mitigation measure	Current status /results
Construction phase		
Dust	• Sprinkling water on the ground	• Mitigation measures implemented

	• Regular water addition to unpaved roads to be used by trucks • Controlling the speed and movement of construction vehicles	
Noise	• Restrict construction activities to day time hours • Machines should be serviced to reduce noise	• Mitigation measures implemented
Destruction of the physical environment	• Landscaping and replanting that will blend with the environment • Levelling of soils at the end of earth works. • Proper disposal of the excavated soils	• Mitigation measures implemented
Health and safety Hazards	• Document an emergency response procedure • Use of suitable personal protective equipment (PPEs) • Use of approved and tested stable ladders and climbing support structures. • Training of construction workers on safety measures • Fencing/covering of risky areas such as deep pits • Putting safety signs before the project commencement.	• Mitigation measures implemented
Contamination of Water Resources by sewage	• Provision of sanitary facilities for the construction staff • Installation of adequate water supply	• Mitigation measures implemented
Increase in traffic flow	• Put up adequate road traffic signage • Temporary access from the Northern bypass	• Mitigation measures implemented
Fire hazards and accidents	• Installing of firefighting facilities during the construction and operation phases. • Sensitize workers on fire safety during all project phases • First aid box to be kept on site as well as training on its use • Conduct fire drills to test preparedness of staff	• Mitigation measures implemented
Operation phase		
Destruction of the physical environment	• Site landscaping and planting of tree belts to prevent soil erosion and to reduce wind velocity	• Mitigation measures implemented

Haphazard disposal of solid waste	• Provision of adequate number of solid waste containers • Contract a licensed solid waste transporter	• Mitigation measures implemented
Disposal of liquid waste	• Connecting to the sewerage system	• Mitigation measures implemented
Increase in traffic flow	• Put up adequate road traffic signage	• Mitigation measures implemented
Storm water	• In consultation with other developers to provide adequate measures to channel storm waters to storm water drains	• Mitigation measures implemented

2. LEGAL AND REGULATORY REQUIREMENTS

The Namibian Environmental Management Act (Act No. 7 of 2007) promotes the sustainable management of the environment and the use of natural resources by establishing principles for decision making on matters affecting the environment. With regard to managing ambient air quality in a sustainable way and limiting impacts, health-based ambient standards, emission standards, and ambient monitoring are considered the most appropriate approaches. Below are some Legal Frameworks relevant to safeguard the development's environmental principles and operation of the project.

LEGISLATION/GUIDELINE/POLICY	**APPLICABLE CLAUSE/POLICY**	**COMMENTS**
Namibia 's Environmental Assessment policy (1995)	List of activities that require EA.	Tourism facilities need to be assessed in terms of the impact on the natural and social environmental and resources.
Communal Land Reform Act	List of activities that may not be undertaken without a clearance certificate: 6.tourism development activities	Conduct an EA in terms of the tourism development and submit to MET in order for a clearance certificate to be issued.
Environmental Management Act No. 7 of 2007	Section 2 outlines the objectives of the Act and means to achieve that. Section 3 details the principles of environmental management	The development should be informed by the EMA

EIA regulations GN 28,29 and 30 of EMA (2012)	GR 29 identifies and lists certain activities that cannot be undertaken without the environmental clearance certificate GR 30 provides the regulations governing the environmental assessment (EA) process	**Activity 10.1 (a)** The construction of oil, water, gas and petrochemicals and other bulk supply pipelines **Activity 10.1 (b)** the construction of public roads **Activity 10.2 (a)** the route determination of roads and design of associated physical infrastructures where it is a public road
Convention on biological diversity (1992)	Article 1 lists the conservation of biological diversity amongst the objectives of the convention	The project should consider the impact it will have on the biodiversity of the area
Draft procedures and Guidelines for conducting EIAs and compiling EMPs (2008)	Part 1, stage 8 of the guidelines states that if a proposal is likely to affect people, certain guidelines should be considered by the proponent in the scoping process.	The EA process should incorporate the aspects outlined in the guidelines
Namibia Vision 2030	Vision 2030 states that the solitude, silence and natural beauty that many areas in Namibia provide are becoming sought after commodities and must be regarded as valuable natural assets	Care should be taken that the development does not lead to the degradation of the natural beauty of the area
Water act no. 54 of 1956	Section 23 (1) deals with the prohibition of pollution of underground and surface water bodies	The pollution of water resources should be avoided during construction and operation of the development
Township and Division of Land Ordinance 11 of 1963	The township and division of land ordinance regulates subdivisions of portions of land falling within a proclaimed Local Authority area	In terms of section 19 such applications are to be submitted to the township board
Local Authorities Act No. 23 of 1992	The Local Authorities Act prescribes the manner in which a town or municipality should be managed by the town or municipal council Section 34-47 makes provision for the aspects of water and sewerage	The development has to comply with the provisions of the Local Authority Act

Labour Act no. 11 of 2007	Chapter 2 details the fundamental rights and protection. Chapter 3 deals with the basic conditions of employment	Given the employment opportunities presented by the government, compliance with the labour law is essential
Public Health Act no 36 of 1919	Section 119 prohibits persons from causing nuisance	Contractors and residents of the proposed township are to comply with these legal requirements
Nature conservation ordinance no 4 of 1975	Chapter 6 provides for legislation regarding the protection of indigenous plants	Indigenous and protected plants have to be managed within the legal confines
Atmospheric pollution prevention ordinance no 11 of 1976	The ordinance objective is to provide for the prevention of the pollution of the atmosphere and for matters incidental therefore	All activities on the site will have to take due consideration of the provisions of this legislation
Roads ordinance 17 of 1972	This ordinance consolidates the laws relating to roads	The provisions of this legislation have to be taken into consideration in as far as access to the development site is concerned
Roads Authorities Act, 1999	Section 16 (5) of this act places a duty on the road authority to ensure a safe road system	Some functions of the roads ordinance 17 of 1972 have been assigned to the roads authority

3. INITIAL ENVIORNMNETAL POTENTIAL IMPACT

Various potential environmental impacts (positive and negative) associated with the project and their relative significance were identified. These impacts considered included:

- **Primary impacts:** - a primary impact is direct and occurs at the same time and place of action.
- **Secondary impacts:** - Secondary impact occurs later in time, or at a different place from the initial action
- **Cumulative impacts:** - cumulative impacts result from incremental impact of any proposed action on common resources when added to the past, present and foreseeable future
- **Project legal and regulatory compliance:** this refers to demonstrated compliance with national and local environmental regulations and standards.

3.1 Possible conflicts:

Effort were made to account for impacts during the initial site preparation, Construction stage and the operation stages of project development.

3.2 Determination of Significance of Impacts:

Significance of impacts were determined in terms of context and intensity of an action. Context refers to the geographical scale-local, national or global. Intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the effect, violation of legal compliance and the overall likelihood of occurrence. Pollutant generation, transport and fate can affect the air, water, soil and the biodiversity in proximity to the proposed site. Pollutants and gases are typically transported by air but some maybe deposited on waters and soils. Liquid pollutants (e.g. fuels & Solvents) can evaporate into the air or be transported through soils, sediments, or aquatic media, such as ground water or surface streams.

3.3 Potential Environmental Impacts (Significant Impacts Only)

Activity	**Environmental Aspect**	**Potential Environmental Impact**
Potential Impacts on Air Resources:		
Site excavation and grading; and offloading of construction materials at the site	Dust	• Adverse Human health • Impaired visibility • Nuisance to neighbours
Site excavation and grading; and offloading of construction materials at the site	Noise	• Adverse Human health • Nuisance to neighbours
Site excavation and grading; and offloading of construction materials at the site	Emissions from construction equipment such as bulldozers, graders and compactors including: Particulates Carbon dioxide Carbon monoxide Sulphur oxides and Nitrogen oxides	• Adverse Human health • Greenhouse effect (global warming) • Acid rain • Smog

Potential Impacts on Water Resources:		
Site excavation and grading; and offloading of construction materials at the site	Spills of oil and other hazardous chemicals from construction equipment during construction	Ground water contamination through leaching
Washing Activities during construction & operation phases	Waste water	Contamination of surface water
Potential Impacts on Geological Resources:		
Site excavation and grading; and offloading of construction materials at the site	Oil, chemical and material spills	Soil contamination
Washing Activities during construction & operation phase	Waste water	Soil contamination
Potential Impacts on Biological Resources (Biodiversity):		
Excavation for laying of foundations for Mixed use development	Habitat for fauna	Loss of habitat
Potential Socio-Economic Impacts: **Land use:**		
Construction	Non- compliance with regulatory and legal requirements	Change of land use pattern
Economic Activity:		
General construction work	Hire of Casual labour	Employment creation to the local People
Use of sand	Sand harvesting by people in Katima mulilo town	Employment creation to people in Katima mulilo town. Depletion of natural resource
Use of cement	Manufacture of cement	• Improved business activity for cement manufacturers • Job creation • Depletion of natural resources\ harm to the environment
General operations	Hire of permanent and casual employees	Employment creation to the local people
Provision of Housing	The Namibian County meet its economic targets with increased housing demand that	Promotion of business opportunities in service sector

	are currently insufficient for all residents	
Transportation		
Construction activities	Delivery of building materials	• Job creation to drivers and turn boys • Emission of pollutant gases to atmosphere • Damage to access roads to the especially the feeder roads in Katima Mulilo
Community Services		
On-site construction	Demand for water	Increase in demand for water from existing water supply network
Upon Completion	Demand for water	Increase in demand for water from existing water supply network
Ditto	Demand for Electricity	Increased supply of electricity
General Category		
Construction of the houses	Visual change (aesthetics)	With good design should be beautiful to look at
Upon Completion	General solid waste	Adverse human health
Health and Safety: **1. Construction Phase:**		
Waste management	Site accumulation of waste e.g. of metal off-cuts and construction debris	• Injury to workers
Storage and handling of hazardous materials	Spills	• Adverse human health
Storage and handling of hazardous materials	Gaseous Emissions	• Adverse human health
Construction process	Noise	• Adverse human health
Hazardous material handling	Direct contact	• Adverse human health
Operating at high levels	Fall hazard	Loss of life
Construction process	Falling objects	Injury or loss of life
Solid waste management	Disposal of solid waste	Adverse human health
2. Operation phase		

Ditto	Fire	Loss of life and property
Ditto	Solid waste	• Adverse human health • Pollution of the environment
Ditto	Sewage	• Adverse human health • Pollution of the environment
Ditto	Waste water	• Adverse human health • Pollution of the environment
3. Decommissioning Phase		
Decommissioning	Same as for construction phase	Same as for construction phase

Note as follows:

Population and Housing:

Generally, Population changes have three key components viz:

- Primary population impacts - as a result of relocation of project workers and their families
- Secondary population impacts - as a result of relocation of workers and their dependants associated with project related expenditures in the region
- Natural increases (births minus deaths) and non-project related migration.

The construction phase of the project engaged and is engaging builders, technicians and unskilled workers, some of whom the main contractor and the subcontractors are required to pick and drop at the site.

Community Services:

The issues generally considered under this heading include:

- Projected changes in public school enrolment and the effect to student/teacher ratios and school capacity
- Expected changes in the demand for healthcare services
- Estimated changes in demand for utilities and effect on current capacity. An account of the potential impacts on the utilities has been provided above

3.4 Ongoing Operational Mitigation Measures (for Significant Negative Impacts Only):

3.4.1 Air Resources:

Activity	Environmental Aspect	Potential Environmental Impact	Mitigating Measures	Time Frame & Responsibility	Monitored Indicators
Site excavation, grading; and offloading of construction materials at the site	Dust	• Adverse Human health • Impaired visibility • Legal non-compliance • Nuisance to neighbours	Water the ground before excavation (if Any)	Before excavation by main contractor for civil works	• Complaints from neighbours • Visual observation
Site excavation, grading; and offloading of construction materials at the site	Emissions from construction equipment such as bulldozers, graders, concrete mixers and compactors including: • Particulates • Carbon dioxide •Carbon monoxide SOX and NOX	• Legal non - compliance • Adverse Human health • Greenhouse effect (global warming) • Acid rain • Smog	• Use of respirators by workers • Recondition engine exhaust systems • Engine tune-up to minimize emissions • Establish inspection program for equipment	Before excavation by main contractor for civil works	• Complaints from neighbours • Visual observation

Site excavation, grading; and offloading of construction materials at the site	Noise	• Adverse human health • Nuisance to neighbours	• Use of ear protectors by workers • engine tune up for machines • Establish inspection programme for equipment	Before excavation by main contractor for civil works	Complaints from the Neighbours • Records of machine inspection and reconditioning • Visual observation
3.4.2 Water Resources:					
Activity	**Environmental Aspect**	**Potential Environmental Impact**	**Mitigating Measures**	**Time Frame & Responsibility**	**Monitored Indicators**
Site excavation, grading; and offloading of construction materials at the site	Dust	Nuisance to neighbourhood	Water the ground	Main contractor before excavation	• Visual observation • Complaints from neighbours
Ditto	Spills of oil and other hazardous chemicals from construction equipment	• Ground water contamination through leaching • Legal non -compliance	• Spill prevention Procedures response plan • Water proofing of Concrete floor • Spill control kits • Training of staff	Main contractor— prior to construction	• A record of incidents • Visual observation • Records of staff training
Upon Completion	• Sewage disposal / overflow	Ground water contamination	• Sewage & waste water to be discharged to	• Site management	• Complaints from neighbours

	• Waste water disposal		waste water treatment plant		• Visual inspections • Blockage incidents
Ditto	Solid waste disposal	• Ground water contamination through leaching	• Provide suitable solid waste containers • Contract a licensed solid waste transporter	• Site management	• Complaints from neighbours • Waste tracking documents • A record of Incidents • Visual observations
3.4.3 Geological Resources:					
Activity	**Environmental Aspect**	**Potential Environmental Impact**	**Mitigating Measures**	**Time Frame & Responsibility**	**Monitored Indicators**
Site excavation, grading; and offloading of construction materials at the site	Oil, chemical and material spills	Soil contamination	• Spill control procedures • Training • Spill control kit	• Main contractor • During construction	• Spillage incidents • Training records • Visual observation
3.4.4 Biological Resources (Biodiversity):					
Activity	**Environmental Aspect**	**Potential Environmental**	**Mitigating Measures**	**Time Frame & Responsibility**	**Monitored Indicators**

		Impact			
Excavation	Removal of soil and vegetation when laying foundations	Loss of vegetation and habitat to some animals (fauna)	Landscaping incorporating -Grass cover -Plants -Flowers -trees	Main contractor during construction	Visual observation
3.4.5 Socio-economic Activities **3.4.5.1 Land use:**					
Activity	**Environmental Aspect**	**Potential Environmental Impact**	**Mitigating Measures**	**Time Frame & Responsibility**	**Monitored Indicators**
Construction of the low density mixed use development	Non –compliance with regulatory and Legal requirements	Change of land use pattern	Comply with regulatory and legal requirements	• proponent • Main contractor • Structural Engineer	Approvals for development
3.4.5.2 Economic Activity: All the significant impacts are positive. No mitigation measures are necessary.					
3.4.5.3 Community Services:					
Activity	**Environmental Aspect**	**Potential Environmental Impact**	**Mitigating Measures**	**Time Frame & Responsibility**	**Monitored Indicators**
Construction process	Water usage	Increased demand for water from the Nairobi water and sewerage Company	• Apply to Ministry of water and irrigation for permit for abstraction	Main Contractor and proponent prior to & during construction	• A record of Water consumption • Visual observation

			• Apply for temporary abstraction during construction • Implement Appropriate water conservation measures		
Upon completion	Water usage	Demand for water from the Katima Nam Water and Sewerage Company	Ensure water conservation measures are implemented	Site management Upon completion and hand over	• A record of Water consumption • Visual observation
Construction process	Electricity usage	No Increased demand for electricity from the utility company is envisaged	• Apply to Regional Nored for connection • Implement appropriate energy conservation measures	Main contractor–during construction	A record of electricity bills • Visual observations
Upon Completion	Electricity usage	Increase Demand for Electricity for the hotel and commercial buildings	• Apply to Nored to connect to Katima Mulilo Town grid • Appropriate energy conservation measures • Conduct annual energy audits	Site management during operation	A record of electricity bills • Visual observations

			• Leadership in Energy and Environmental Design certification		
3.4.5.4 Transportation:					
Activity	**Environmental Aspect**	**Potential Environmental Impact**	**Mitigating Measures**	**Time Frame & Responsibility**	**Monitored Indicators**
Construction activities	Transportation of construction materials to the site	Damage to roads	Grant access to the site from the Mafuta road All vehicles delivering Bulk materials to the site not to exceed recommended weight limit and comply with traffic rules	• Use of signage to control flow of traffic • During construction time • Main contractor is responsible	• Complaints from neighbours • Visual inspection
Upon Completion	Transportation of workers to work	Damage to roads	Grant access to the site from the Mafuta gravel road All vehicles delivering Bulk materials to the site not to exceed recommended weight limit and	Local authority should ensure regular maintenance of road	• Complaints from neighbours • Visual inspection

			comply with traffic rules		
3.4.5.5 General Category:					
Activity	**Environmental Aspect**	**Potential Environmental Impact**	**Mitigating Measures**	**Time Frame & Responsibility**	**Monitored Indicators**
Construction at the site	Visual change	Aesthetic impact	Landscaping incorporating • Grass cover • Plants • Flowers	Main contractor during construction	Visual observation
3.4.5.6 Health & Safety:					
Activity	**Environmental Aspect**	**Potential Environmental Impact**	**Mitigating Measures**	**Time Frame & Responsibility**	**Monitored Indicators**
1. Construction Phase:					
Excavation, grading and concrete mixing	Dust	Adverse human health	• Legal compliance • Safety procedures • Personal protective equipment • Use of water sprays	Main contractor Prior to and during construction	Staff complaints Visual observations
Excavation, grading and concrete mixing	Noise	Adverse human health	• Personal protective Equipment • Ear protectors.	Main contractor Prior to and during construction	Staff complaints Visual observations
Storage and handling of hazardous	Spills	• Adverse human health • Fire	Legal compliance • Safety procedures • Personal protective equipment • Fire prevention plan	Main contractor Prior to and during construction	Records of service & inspection • A record of incidents

materials (if any)			• Emergency response plan • Fire equipment • Fire training		• Training records • Visual observations
Storage and handling of hazardous materials (if any)	Direct contact	Adverse human health	Personal protective equipment e.g. gloves, boots & overalls	Main contractor Prior to and during construction	A record of incidents • Staff sickness records • Visual observation
Storage and handling of hazardous materials (if any)	Emissions	Adverse human health	• Legal compliance • Safety procedures • Personal protective equipment e.g. Respirators • Containment of hazardous materials	• Main contractor • Prior to and during construction	• Staff complaints • Visual observation
2. Operation Phase					
Upon completion of construction	Fire	Loss of life and property	• Fire prevention equipment to be provided • Equipment inspection & service program • Training of staff on fire management • Provide fire escapes • Label fire	Site management	• Inspection & service records • Visual observation • A record of incidents • Training records
Upon completion of construction	Storm Water	Damage to roads and flooding of compounds in the area	• Liaise with Engineers to find a solution to storm water	Site Management Proponent	Visual observation

Upon completion of construction	Sewage disposal / overflow	• Waste water disposal • Ground water Contamination • Surface water contamination	Sewage & waste water to be channelled to Waste water management treatment plant	Monitor sewage lines to ensure there are no blockages or leaks	• Complaints from neighbours • Visual observation and inspections • Blockage incidents
Upon completion of construction	Solid waste disposal	• Ground water contamination through leaching	• Provide suitable solid waste Containers and Contract a licensed solid waste transporter • Encourage reuse and recycling of waste	Site management	• Implement a waste management plan tracking document • Visual observations

3.5 Monitoring Plan

3.5.1 During Construction

Monitoring Issue	Parameter	Monitoring Method	Indicator	Frequency of Measurement	Responsibility
Air Emissions/ Ambient Air quality	Dust	Visual Inspection	Airborne particles	Continuous	Main contractor
	Engine exhaust smoke	Visual Inspection	Colour of exhaust smoke	Continuous	Main Contractor
Noise	Noise Level	Time averaged measurements in dB(A) at the site	Complaints and keep records of measurements	Continuous	Main
Waste Management	Amount of Solid waste produced	Tracking the volume of solid waste generated and establishing the storage, transport and disposal methods	Waste streams and volumes generated on site	Continuous	Contractor
	Hazardous	Tracking all	Generated	Continuous	Main

	Waste (if any)	hazardous waste and establishing storage, handling and disposal methods	quantities of: • Used oil • Waste paints		
Health and Safety Occupational	Health and Safety monitoring	Reporting of accident and incidents, safety breaches and damage to equipment	Statistical records and safety reports	Continuous	Contractor
3.5.2 After Construction					
Monitoring Issue	**Parameter**	**Monitoring Method**	**Indicator**	**Frequency of Measurement**	**Responsibility**
Fire protection	Inspection of fire equipment	Review of Inspection records	Status of records	Semi annually	Site management
Waste Management	Solid waste	Tracking the volume of solid waste generated and establishing the treatment, storage, transport and	Waste streams and volumes generated	Continuous	Site management

		disposal methods			
Health and Safety	Occupational Health and Safety monitoring	Reporting of accident and incidents, safety breaches and damage to equipment	Statistical records and safety reports	Continuous	Site management
	Efficient use of resources	Consumption records of water, electricity and other resources	Financial savings in subsequent bills	Monthly	Site management
	Noise	Noise level measurements	Records of measurements & incidents of loss of hearing ability	Annually	Site management
	Dust	Dust level measurements	Records of measurements	Semi-annually	Site management

4. PROJECT DEVELOPMENT FRAMEWORK (EMP)

Project Phase	Aspect	Action	Timeframe /Responsibility	Estimated Cost (N$)	Remarks
Construction phase	Fall Hazard during operation at high level	Provide safety harnesses and scaffolding	• Before and during construction By main contractor for civil works	30,000	Demonstrations should be carried out on safe use of resources and personal protective equipment
Construction phase	Falling objects from high level	Provide helmets	• Before and during construction By main contractor for civil works	20,000	Ditto
Construction phase	Dust	Water the ground before and during excavation	Before excavation by main contractor for civil works Contractor to deliver water to site	20,000	Ditto
Construction phase	Noise	• Use of ear protectors by workers • Recondition engine exhaust systems • Engine tune-up • Establish inspection program for equipment	• Main contractor to provide the protective gear to the workers • Before excavation by main contractor for civil works	15,000	Ear plugs or mufflers may be used
Construction phase	Emissions	• Use of respirators by workers • Recondition engine exhaust systems	Ditto	15,000	The respirators should be Suitable for the type of Emission on site.

		• Engine tune-up • Establish inspection program for equipment			
Construction phase	Sanitation	Provide temporary sanitary facilities	• Main contractor to provide the sanitary facilities to the workers • Before excavation by main contractor for civil works	2,000	Toilet facility to be away from the river to avoid contamination of the river water
Construction phase	Wastewater & sewage discharge	Discharge to sewer	site management	nil	
Construction phase	Traffic that may lead to damage to roads by Heavy Commercial Vehicles	Provide access from the Mafuta gravel road	Contractor and Proponent and Roads Authority		
Construction phase	Storage and handling of Hazardous materials (if any)	• Obtain material safety data sheets for all hazardous materials and products handled at the site • Obtain personal protective equipment for the workers responsible for handling hazardous materials • Train the workers on safe handling procedures	Main contractor • During construction	15,000 per annum	Only applicable if there is any hazardous materials brought to site. It is envisaged that this should be limited to paints

Construction phase	Accumulation of waste oil	Provide labelled on trainers for waste oil	Main contractor • During construction	3000 per annum	Ensure proper storage of accumulated oil & minimize oil spills especially in view of the proximity of the river
Construction phase	Disposal of waste oil	• Identify a licensed contractor to recycle oil • Appoint a licensed contractor to collect waste oil • Adhere to spill control procedures when handling waste oil	Main contractor • During construction	2,000 per month	Main contractor to confirm with EMA a list of licensed waste oil recyclers
Construction phase	Spill control	• Obtain spill control kit • Train staff on spill control	Before excavation • By main contractor	20,000 for spill kit and training	May need services of a consultant to train staff.
Construction and operational phases	Emergency response	(i) Keep a record of the public emergency service telephone numbers including: • Police • Fire brigade • Ambulance services (ii) Document an emergency response procedure (iii) Train staff on emergency response	Main contractor and site management • During construction and operation phases	10,000 per group of trainees	May need services of a consultant to train staff.
Construction and operational phases	Compliance with legal and Regulatory requirements	Refer to relevant policy, legal and administrative framework and comply	Ditto	450,000	Check the EMA website once every month

Construction and operational phases	Environmental Audits	To be carried out against the Environmental Management Plan and the mitigation plan in this report	site management	60,000 per annum	Once a year. To be carried out once a year or as advised by EMA
Occupancy (Operation) Phase)	Fire protection	Ensure fire fighting equipment is inspected semi annually	Site management • During operation phase	10,000 per visit	Fire equipment suppliers
Operation Phase	Traffic flow as a result of development	Conduct a traffic survey to compare the traffic flows before and after development	Proponent	250,000	Engage expert to carry out survey
Operation Phase	Disposal of solid waste	Appoint a licensed Waste transporter	Site management Prior and during operation phase	5,000 per month	Site management to confirm with EMA licensed waste transporters
Operation Phase	Use of equipment subject to statutory inspection	Statutory Inspection		50,000 per annum	Ditto
Operation Phase	Noise	Noise level measurements	Ditto	5,000 per annum	Engage consultant
Operation Phase	Erosion	Site landscaping and planting of tree belts to prevent soil erosion and to reduce wind velocity		100,000	

This environmental management plan may not be exhaustive. However, the project proponent is at liberty to make any improvements that may result in mitigating the identified environmental impacts.

5. CONCLUSION

This revised and/or reviewed, Updated Environmental Management Plan (EMP)has addressed the key issues as identified in in the initial scoping report and this EMP report and no significant impacts or changes thereof has been identified to have been taken place on the project area's initial scope of development as submitted in 2017.

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