# ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN DOCUMENT

***PROJECT TITLE: Proposed construction and operation of Petra Flamingo Getaway lodge at Liselo Area-Katima Mulilo***


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| Project: | ENVIRONMENTAL IMPACT ASSESSMENT FOR<br>THE PROPOSED CONSTRUCTION AND OPERATION OF PETRA FLAMINGO GETAWAY LODGE AT LISELO AREA- KATIMA MULILO |
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|---|---|
| BID | Background Information Document |
| EAP | Environmental Assessment Practitioners |
| ECC | Environmental Clearance Certificate |
| ECO | Environmental Control Officer |
| EIA | Environmental Impact Assessment |
| ESIA | Environmental and Social Impact Assessment |
| EMP | Environmental Management Plan |
| GHG | Greenhouse Gasses |
| ISO | International Organization for Standardization |
| I&APs | Interested and Affected Parties |
| MET: DEA | Ministry of Environment and Tourism's Directorate of Environmental Affairs |
| NHC | National Heritage Council |
| EMA | Environmental Management Act |
| ToR | Terms of Reference |
| UNFCCC | United Nations Framework Convention on Climate Change |

# 1 CHAPTER ONE: BACKGROUND

## 1.1 INTRODUCTION

This report presents an Environmental Impact Assessment (EIA) for the proposed Petra Flamingo Getaway Lodge (PFGL) on a plot in Liselo area of Katima Mulilo by Petra Flamingo Getaway Lodge cc a wholly indigenous and Namibian owned company. The project is set to promote development in Katima Mulilo Town.

The project proponent (Petra Flamingo Getaway Lodge cc) intends to construct lodge accommodation facilities and supporting infrastructure on a 1.6 ha. Plot which is set for development in the area.
The area is to be provided with relevant services (water, electricity, sewer, roads (paths) and entertainment). The project is set to create employment and improve the economic activities in this peri-urban region within proximity to Katima Mulilo town.

For this development the proponent is required to obtain an Environmental Clearance Certificate prior the development as set in the Environmental Management Act No.7 of 2007 and the Environmental Impact Assessment Regulations (GN 30 in GG 4878 of 6 February 2012. Therefore this EIA is carried out for the proponent by Plan Africa Consulting cc to obtain the certificate and to comply with the laws and to make sure that all environmental impacts associated with the development have been addressed to ensure proper mitigation measures.

## 1.2 PROJECT LOCATION

The proposed project will be established on a selected site in Katima Mulilo, Liselo area of Zambezi Region in the Republic of Namibia. The land facet is under the administration of Mafwe Royal Establishment and currently the leasehold for land rights from Ministry of Lands has been obtained. The site is located approximately 4km South of Katima Mulilo CBD along the B8 national highway. The proposed site runs parallel to the B8 highway making it easily accessible to travellers, with the nearest residential establishment 1.34km further North of the site.The exact project site coordinates are as follows:

**Table 1: Site Coordinates**

| | |
|---|---|
| a) 17°32'35.10"S/ 24°16'22.03"E | b) 17°32'34.68"S/ 24°16'27.34"E |
| c) 17°32'38.34"S/ 24°16'21.95"E | d) 17°32'37.93"S/ 24°16'27.38"E |

The map below (Fig 1) gives an Arial view of the project site

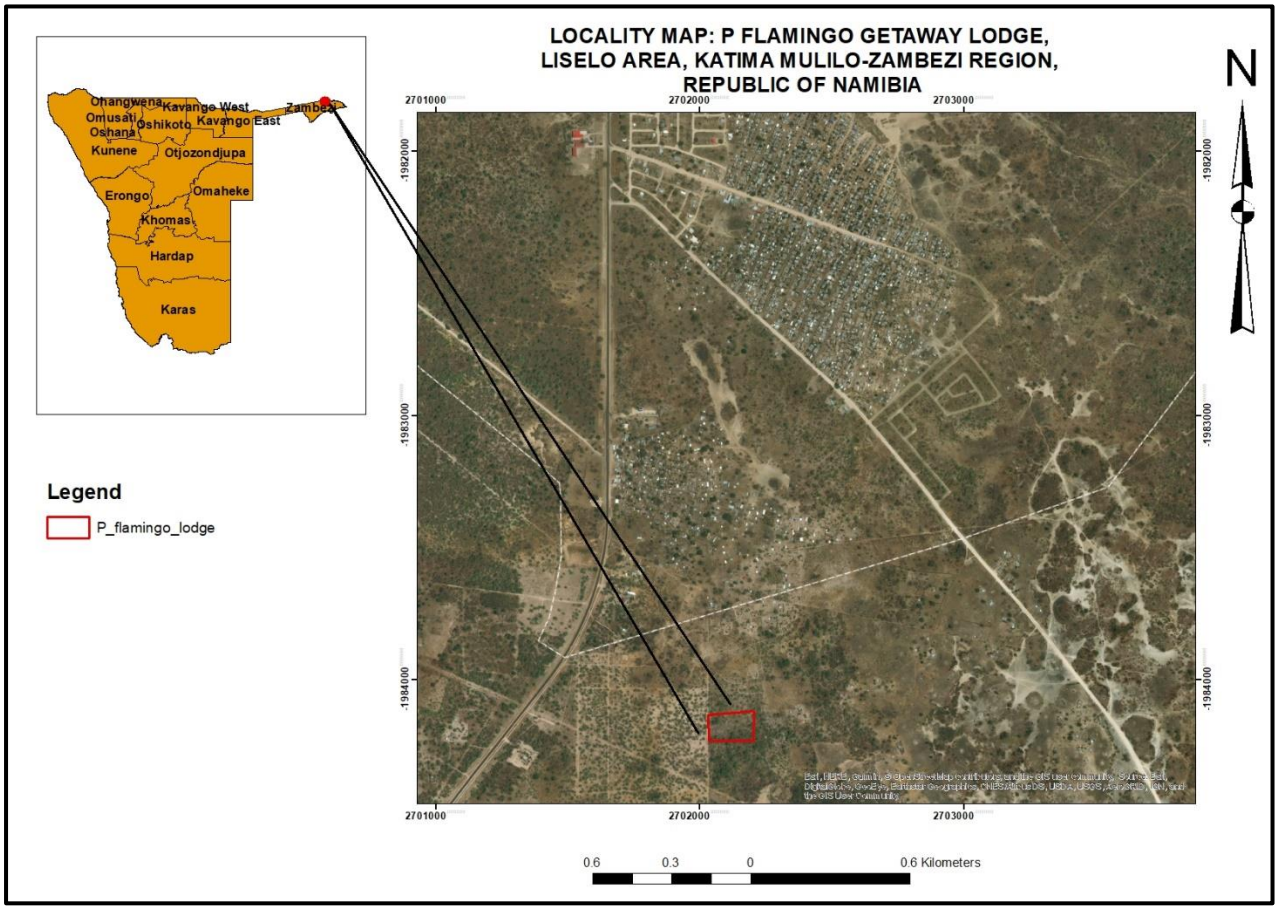


**Figure 1: Locality Map: Petra Flamingo Getaway Lodge**

## 1.3 PROJECT DESCRIPTION

The project proponent is proposing to develop a site that has already been disturbed by human encroachment due to infrastructure development within the project environs. Through the project, the proponent intends to promote Katima Mulilo's tourism sector and at the same time spearheading conservation and land reclamation programmes within the community. The project proponent intends to also construct the following infrastructure on site:

- Conference facility
- Sauna and Gym area
- Swimming pool
- A caravan park
- Staff Accommodation
- Restaurant and bar
- Luxury Chalets x 6
- Accommodation units x 20

### 1.3.1 THE SERVICING OF THE AREA WILL INVOLVE THE FOLLOWING:

- **Access roads** – The site is easily accessed from the B8 Rundu-Katima Highway and the proponent will use an existing exit from the highway to access the proposed facility.
- **Electricity** - There is electricity line adjacent to the site, and the proponent will upgrade it to suit the energy requirements of the new facilities.

- **Clean water** - A clean water reticulation system shall be provided for by Katima Mulilo Municipality.
- **Sewerage** – The proponent will use conservancy tanks and a recommended biorock system for effective effluent handling.
- **Solid waste** -Solid waste can be disposed of at the nearby Katima Mulilo Municipality dumpsite.
- **The Layout Plan**- The proposed layout plan for the proposed lodge's facility is attached in the Appendix C.

### 1.4 CURRENT LAND USE

The project site is lying fallow and has been lying idle for the past years, thus the proposed development is favorable because with it, comes conservation and economic development.

### 1.5 PROJECT RATIONALE

Katima Mulilo town is fast growing and this has seen an increase in institutions, government departments, large companies as well as a boom in tourism in the area. Given the rate of visitors in the Zambezi Region and Katima Mulilo being the focal town, there is great need to initiate new developments for accommodation in the area to handle volumes of visitors trickling into the town.

### 1.6 ASSESSMENT OF ALTERNATIVES

#### a. NO-GO OPTION

The "no-go" option means maintaining the status quo. This option will be explored to assess the implications of not implementing the project.

#### b. SITES

Sites within the project area that pose minimal impact on the environment will be chosen for development. Similarly access routes will be assessed and those with minimal environmental impacts chosen. The same will be done with the fencing of the project area.

#### c. STRATEGIC ALTERNATIVES

Strategic alternatives will be explored to see the best way to construct the facilities and ensure smooth operation of the project overtime i.e. sustainable and indigenous construction methods alternative and ecotourism alternative.

#### d. TECHNOLOGICAL ALTERNATIVES

There are different technologies to be considered in terms of alternative energy needs, natural resource usage and conservation. The various options will be explored and appropriate recommendations made for sustainability.

### 1.7 OBJECTIVES OF THIS STUDY

This Environmental Impact Assessment is being undertaken in compliance with the Environmental Management Act No.7 of 2007 and the Environmental Impacts Assessments Regulations (GN 30 in GG 4878 of 6 February 2012). It is a prerequisite by the law to have an Environmental Impact Assessment carried out before the implementation of the prescribed projects as elaborated in the Environmental Impacts Regulations (GN 30 in GG 4878 of 6 February 2012). The main objectives of this study are as follows:

- To identify and provide mitigation measures of the expected impacts of the proposed land development project in order to protect the environment;

- To brief the Project Proponent of the legal and policy framework govern the proposed activity;
- To identify the possible changes in bio-diversity index that might be as a result of Project implementation in the area;
- To reflect on the various public concerns which will help the National Environmental Action Planners, economist and concerned stakeholders to make decisions;
- To come up with preventive and precautionary measures for the expected physical and biological environmental negative impacts associated with the proposed activities;
- To structure an effective environmental management plan for the sub division and servicing of the land facet to minimise and prevent negative impacts and maximise the positive impacts.

### 1.8 ASSUMPTIONS AND LIMITATIONS

All information received from sources contributing to this project is considered as reasonably acceptable. All intended activities on the project will be assumed to bring up fruits of a sustainable development approach. However there will be an Environmental Management Plan (EMP) to the proposed project will be developed for the receiving environment not to be adversely affected from the initial stages of the project up to the implementation of the proposed land development and servicing project.

# 2 METHODOLOGY AND APPROACH TO THE STUDY

## 2.1 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The process followed in preparing this report is illustrated in Figure 2 below. This process was used in order to meet the mandatory requirement of the Environmental Management Act No. 7 of 2007 and the associated Regulation.

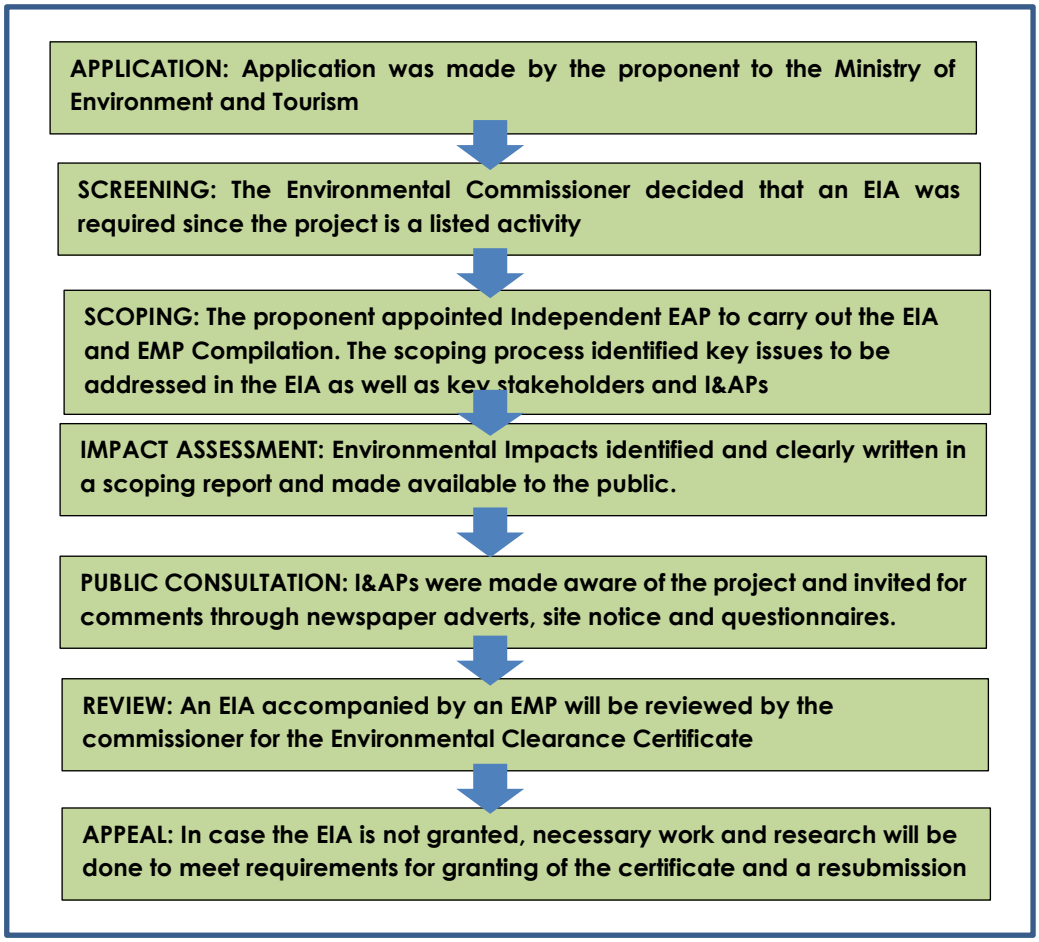


**Figure 2: EIA Process**

## 2.2 METHODOLOGY AND APPROACH TO THE STUDY

In compliance with the Environmental Management Act No.7 of 2007and the Environmental Impact Assessment Regulations (GN 30 in GG 4878 of 6 February 2012), Petra Flamingo Getaway Lodge cc will be required to carry out and prepare an EIA and EMPs to address environmental, social and economic issues and concerns. This process was governed by the Namibian Environmental legislation as well as the EIA World Bank Standards (2010)

The EIA is undertaken in a holistic approach encompassing all different aspects of the EIA process. The process included mostly the highlighted phases below and other available processes for best practices.

### 2.2.1 SCOPING

This was undertaken during the proposed project's EIA process; the main purpose of scoping was to identify key issues to be given attention during the EIA study. Main activities done during the scoping included.

- Identification of key environmental studies to be done that were associated with the development.
- Identify Interested and Affected Parties (I&APs);
- Announcing the EIA process / registration of I&APs;
- Distribution of the BID;

### 2.2.2 PUBLIC PARTICIPATION

The public was notified of the EIA activities through various platforms and the local communities have been consulted for their opinions on issues relating to the potential ecological and socio-economic impacts of the project activities. This provided an opportunity for the public to engage in the process and to make comments or expressed their concerns regarding the proposed project activities. The public and stakeholder consultation was facilitated through the different media of communication and public and focal meetings.

### 2.2.3SCOPING REPORT

A scoping report was prepared considering all the issues that have been raised by the public and issues that were identified during the scoping period. Impact assessment and evaluation formed the part of the draft scoping report. The report was made available to the public for comments. The assessment of all associated and potential impacts of the project activities were carried out using checklist method. Impacts evaluation was carried out using ISO 14001 approach. The assessment reviewed all environmental, social and economic aspects in relation to applicable policies and regulations.

### 2.2.4 ASSESSMENT OF IMPACTS

- Use an Impact Assessment matrix to establish the environmental risks of the overall project, its alternatives and various components;
- Establish mitigation protocols;

### 2.2.5 FINAL SCOPING REPORT AND EMP

The final report was prepared together with EMP after incorporating the public comments, and submitted to the MET. Therefore this report presents the final EIA report and EMP for the proposed Petra Flamingo Getaway Lodge establishment project.

# 3 CHAPTER THREE: POLICY, LEGAL & ADMINISTRATIVE FRAMEWORK

## 3.1 INTRODUCTION

An important part of the EIA is identifying and reviewing the administrative, policy and legislative situation concerning the proposed activity, so as to inform the proponent about the requirements to be fulfilled in undertaking the construction activities. This section looks at the legislative framework within which Petra Flamingo Getaway Lodge cc will operate under, in order to fulfil the requirements regarding environmental management. The focus is on the compliance with the legislation during the planning, and operational phases together with environmental management as a whole. Applying policies, legislative requirements and other requirements will help the proponent to implement the project in conformity to legal obligations for sustainable project implementation.

The Environmental Management Act 7 of 2007 is the primary custodian of the environment with the aim to:

***promote the sustainable management of the environment and the use of natural resources by establishing principles for decision making on matters affecting the environment; to establish the Sustainable Development Advisory Council; to provide for the appointment of the Environmental Commissioner and environmental officers; 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.***

Under section 56 of the Environmental Management Act, 2007 (Act No.7 of 2007), the Minister has made the regulations for Environmental Impact Assessment as set out in the Schedule of Government Notice No. 30 (2012).

These regulations require that all projects that have a detrimental effect on the environment must be accompanied by an EIA Under section 27 of the Environmental Management Act, 2007 (Act No. 7 of 2007), and after following the consultative process referred to in section 44 of that Act, the Minister lists in the Annexure to the above mentioned Schedule, activities that may not be undertaken without an environmental clearance certificate. In both the Environmental management act and its regulation activities that may not be undertaken without an environmental clearance are listed.

The pursuit of sustainability is guided by a sound legislative framework. In this section relevant legal instruments as well as their relevant provisions have been surveyed. An explanation is provided regarding how these provisions apply to this project in particular.

**Table 2 Applying Policies, legal and Administrative regulations.**

| LEGISLATION/POLICY/GUIDING DOCUMENT | PROVISION | PROJECT IMPLICATION |
|---|---|---|
| | **NATIONAL LEGISLATION** | |
| **The Constitution of the Republic of Namibia (1990)** | The articles 91(c) and 95(i) commits the state to actively promote and sustain environmental welfare of the nation by formulating and institutionalising policies to accomplish the Sustainable objectives which include:<br><br>• Guarding against overutilization of biological natural resources,<br>• Limiting over-exploitation of non-renewable resources,<br>• Ensuring ecosystem functionality,<br>• Maintain biological diversity.<br><br>The constitution further states that the State shall actively promote and maintain the welfare of the people by adopting policies that are aimed at maintaining ecosystems, essential ecological processes and the biological diversity of Namibia. | Through implementation of the environmental management plan Petra Flamingo Getaway Lodge establishment will be in conformant to the constitution in terms of environmental management and sustainability.<br><br>Ecological sustainability should inform and guide this Lodge Establishment project. |
| **Vision 2030 and National Development Plans** | Namibia's overall Development ambitions are articulated in the Nations Vision 2030. At the operational level, five-yearly national development plans (NDP's) are prepared in extensive consultations led by the National Planning | The proposed project will Improve availability of lodging facilities in and around Katima Mulilo town as well as offer space for events hosting by the government, private companies and individuals, |

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| | Commission in the Office of the President. Currently the Government has so far launched a 4th NDP which pursues three overarching goals for the Namibian nation: high and sustained economic growth; increased income equality; and employment creation. | adding on the project is set to create employment which will be in fulfilment to the NDP and Vision 2030. |
| **Environmental Assessment Policy of Namibia 1994** | The Environmental Assessment Policy of Namibia states Schedule 1: Screening list of policies/ plans/ programmes/ projects subject to environment must be accompanied by an EIA. "The subdivision, construction and provision of related services for housing development" is among the list. The responsible Authority enforcing the law is the Ministry of Environment and Tourism (MET) Directorate of Environment.<br>The policy provides a definition to the term "Environment" broadly interpreted to include biophysical, social, economic, cultural, historical and political components and provides reference to the inclusion of alternatives in all projects, policies, programmes and plans. In this respect the project will have considerable impact on elements of the environment as defined above, thus it requires an EIA in accordance with the policy. | Site preparation and construction activities will be done after obtaining an environmental clearance certificate, through following the requirements of the Environmental Assessment Policy of Namibia. The EIA and EMP will cater for the sustainable management of bio-physical environment.<br><br>Also considered will be all environmental aspects during the impact assessment and test different options of environmental impact reduction. |
| **Environmental Management Act (No. 07 of 2007)** | Requires that projects with significant environmental impact are subject to an environmental assessment process (Section 27).<br>The Act aims at | This document is compiled in a nature that project implementation is in line with the objectives of the EMA Act. Guiding procedures were also drawn from the act to facilitate for the carrying out of the EIA and drafting the EMP for the proposed development. |

| | | |
|---|---|---|
| | ✓ Promoting the sustainable management of the environment and the use of natural resources by establishing principles for decision-making on matters affecting the environment;<br>✓ To provide for a process of assessment and control of projects which may have significant effects on the environment;<br>✓ To provide for incidental matters.<br><br>Requires for adequate public participation during the environmental assessment process for interested and affected parties to voice their opinions about a project (Section 2(b-c)). | This Act and its regulations should inform and guide this EIA process.<br><br>All formal requirements as per the act will be duly identified and adhered to. The Project will follow this act accordingly and consider all aspects inclusive of the assessment process and acquire environmental clearance. |
| **Townships and Division of Land Amendment Act, 1992 (Act 28 of 1992)** | "(I) 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 that township to include such area". (Minister of Regional and Local Government) | Through conducting this EIA and preparation of EMP the project proponent is doing it as part of the requirements by the township board and the Ministry of Environment and Tourism.<br><br>The proposed layout and land uses need to be informed by environmental factors such as water supply, sanitation and ecological footprint. |
| **Public Health Act (No. 36 of 1919)** | Under this act, in section 119:<br>"No person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health." | The proponent will ensure that all legal requirements of the project in relation to protection of the health of their employees and surrounding residents is protected. |

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| | | -Personal protective equipment shall be provided for employees in construction.<br>-The development shall follow requirements and specification in relation to water supply and sewerage handling so as not to threaten public health of future residents on this piece of land.<br><br>Potential nuisances (whether dust during construction) should be considered during planning and construction phases and avoided. |
| **Soil Conservation Act 76 of 1969** | The objectives of this Act are to:<br>✓ Make provisions for the combating and prevention of soil erosion,<br>✓ Promote the conservation, protection and improvement of the soil, vegetation, sources and resources of the Republic. | The project will have a rather localized impact on soils and on the soil through construction and access roads construction hence soil protection measures will be employed and preservation of trees as much as possible.<br>Adequate storm water drains of the area to be designed and constructed and must form part of the planning phases. |
| **Road Ordinance 1972 (Ordinance 17 0f 1972)** | • Width of proclaimed roads and road reserve boundaries (S3.1)<br>• Rails, tracks, bridges, wires, cables, subways or culverts across or under proclaimed roads (S36.1)<br>• Infringements and obstructions on and interference with proclaimed roads. (S37.1) | The limitations applicable on RA proclaimed roads should inform the proposed layout and zonings where applicable. |

| | | |
|---|---|---|
| | • Distance from proclaimed roads at which fences are erected(S38) | |
| **Water Act 54 of 1956** | The Water Resources Management Act 24 of 2004 is presently without regulations; therefore the Water Act No 54 of 1956 is still in force:<br>• A permit application in terms of Sections 21(1) and 21(2) of the Water Act is required for the disposal of industrial or domestic waste water and effluent.<br>• Prohibits the pollution of underground and surface water bodies (S23 (1)).<br>• Liability of cleanup costs after closure/ abandonment of an activity (S23 (2)).<br>• Protection from surface and underground water pollution | Domestic and Industrial waste is to be managed by Katima Mulilo Municipality, thus there is no major foreseeable impacts within the project environment. |
| **National Biodiversity Strategy and Action Plan (NBSAP2)** | The action plan was operationalised in a bid to make aware the critical importance of biodiversity conservation in Namibia putting together management of matters to do with ecosystems protection, biosafety, biosystematics protection on both terrestrial and aquatic systems. | The project proponent has been advised by the EIA team and recognises the need for ecosystems protection to manage the changing climatic environment.<br>Through this project there will be reforestation and fostering of green projects, which will be promoting the protection and conservation of the bio-physical environment, and with this EIA it will be ensure that almost 70% of grown acacia tree species on site will not be removed but rather will be part of the development, to promote Green development. |

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| **National Policy on Climate Change for Namibia, 2010** | In harmony with the findings of the IPCC over time and the Earth Summits being held annually the policy seeks to outline a coherent, transparent and inclusive framework on climate risk management in accordance with Namibia's national development agenda, legal framework, and in recognition of environmental constraints and vulnerability. Furthermore, the policy pursues the strengthening of national capacities to reduce climate change risk and build resilience for any climate change shocks. | The proposed project will ensure that there will be limited release of greenhouse gasses such as methane, carbon dioxide, nitrous oxides. Methods such as wet surface operations to reduce dust emissions will be utilised to remove aerosols emitted into the near-surface atmosphere. |
| **Wetland Policy, 2004** | The policy provides a platform for the conservation and wise use of wetlands, thus promoting inter-generational equity regarding wetland resource utilization. Furthermore, it facilitates the Nation's efforts to meet its commitments as a signatory to the International Convention on Wetlands (Ramsar) and other Multinational Environmental Agreements (MEA's). | In compliance to this policy the development of the proposed lodge will ensure a standard environmental planning such that it does not affect any nearby wetlands through recognition of these wetlands to promote the conservation and wise utilization of wetlands resources. |
| **Labour Act (No 11 of 2007)** | 135 (f): "the steps to be taken by the owners of premises used or intended for use as factories or places where machinery is used, or by occupiers of such premises or by users of machinery in connection with the structure of such buildings of otherwise in order to prevent or extinguish fires, and to ensure the safety in the event of fire, of persons in such building;" (Ministry of Labour and Social Welfare). | The Act specifies the measures to be taken to secure the safety and the preservation of the health and welfare of employees at work. This will be taken into consideration during the construction stage of the project as well as during operations to ensure safety to both employees and lodge patrons. |

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| **National Heritage Act 27 of 2004** | Heritage resources to be conserved in development. (National Heritage | During the project implementation as soon as objects of cultural and heritage interests are observed such as graves, artefacts and any other object believed to be order than 50 years, all measures will be taken protect these objects until the National Heritage Council of Namibia have been informed, and approval to proceed with the operations granted accordingly by the Council. |
| **Hazardous Substance 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. | The project proponent will make it a priority to get relevant licensing for the use or handling of hazardous substances on site. Possibly substances in the "flammable "cluster will be used by the contracted developer during construction stage and all safe storage procedures will be followed. |
| | **INTERNATIONAL CONVENTIONS.** | |
| **Convection on Biological Diversity (CBD)** | Namibia is a signatory of the Convention on Biological Diversity and thus is obliged to conserve its biodiversity. | Project should refrain from causing any damage to the country's biodiversity. |
| **United Nations Convection to combat Desertification** | Namibia is bound to prevent excessive land degradation that may threaten livelihoods. | It will be the responsibility of the poroponent to preserve vegetation on and around the area, to avoid encroachment of the desert environs in the area. This can only be achieved by reforestation and preservation of vegetative species during construction. |

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| **United Nations Framework Convention on Climate Change. (UNFCCC)** | Namibia was the first Developing Country to submit a report to UNFCCC, this also spelled Namibia's actions to implement the Convention, including actions taken to mitigate climate change, as well as their effects. It also includes information on greenhouse gas emissions. Namibia's strategy aims at promoting financial, technological and capacity-building to support and adapt to Climate change. Needs and support received. | The proponent will commit to conserve tree species on site to act as carbon sinks and promoting the planting of vegetative plants instead of vegetation removal and deforestation. |
| **Agenda 21.** | Namibia's Constitution addresses issues of biodiversity (Article 95) and claims (Article 100) sovereign ownership of all natural resources. Namibia is a signatory to the Rio Declaration of 1992 and has adopted Agenda 21 as the basis for sustainable development in the country. | In compliance to all related environmental management legislation of Namibia the project is adhering to important elements of the Agenda 21 applying in Namibia since MET is guided by the guidelines of the Agenda 21. |

# 4 CHAPTER FOUR: CURRENT ENVIRONMENTAL AND SOCIAL SET UP

## 4.1 INTRODUCTION

In this chapter the findings of the EIA Team on baseline surveys, public consultation and desk reviews undertaken will be discussed in respect to the ecology, society, economy and geo-political set up of the proposed project area. The geological make up and meteorology of the project site will also be discussed in this chapter to give an in-depth understanding of the project area in question.

## 4.2 PROJECT SITING OVERVIEW

Katima Mulilo is a town situated in the Caprivi Strip and is the capital of the Zambezi Region, Namibia's far northeast extension into central Southern Africa. The site is located in Katima Mulilo Urban constituency. Katima Mulilo had 28,362 inhabitants in 2010, and it is conveniently located to the rest of Namibia by the B8 road on the banks of the Zambezi River in lush riverine vegetation. The nearest Namibian town to Katima Mulilo is Rundu, about 500 km away. About 40 km east of Katima Mulilo lies the village of Bukalo, where the road to Ngoma branches off that joins Namibia to Botswana.

Katima Mulilo is inhabited by members of the Masubia and Mafwe tribes speaking mostly the Silozi language.

## 4.3 PHYSICAL ENVIRONMENT

### 4.3.1 CLIMATE

**Classification of climate**: The climate in Katima Mulilo is referred to as a local steppe climate. In Katima Mulilo, there is little rainfall throughout the year. The climate here is classified as BSh by the Köppen-Geiger system. in Katima Mulilo..Semi-arid highland savannah (0.2 0.5 p/pet). Climate is classified as subtropical stepper (low latitude dry) with a subtropical thorn woodland biozane.

**Precipitation:** About 684 mm of precipitation falls annually

**Temperature:** The average annual temperature is 21.3 °C

**Humidity:** The relative humidity during the least humid months of the year (i.e. September and October) is around 10-20% and the most humid month is March with 70-80% humidity. Namibia has a low humidity in general, and the lack of moisture in the air has a major impact on its climate by reducing cloud cover and rain and increases the rate of evaporation.

**Wind direction:** Predominantly Westerly winds. The area experience strong winds during August/Sep with an average wind of 5-12mph.

## 4.4 BIOLOGICAL ENVIRONMENT

### 4.4.1 FLORA

Areas near the Okavango River there prevails a high to very high vegetation density of considerable diversity. However, because of grazing it has been reduced considerably. The further inland is more densely vegetated and is prone to bush fires.

Plant species in the area form part of the extensive Kalahari sand basin which is characterized by grassland and encompassing plant species such as Vossia Cuspidata, Cynodon Dactylon and Setaria Sphacelata (Burke, 2002 – see figure 2 hereunder). Surrounding the site there are species such as kiaat, mopane, mangetti, blue sourplum, bird plum, baobabs, jackal berry and monkey oranges as summarised in the table 2 below. Amongst these species, four are amongst the main protected species namely *Digitaria eriantha*, *Acacia Erioloba*, *Colophospermum mopane and Peltophorum africanum.* The plant species found in this area bear significant economic value with false kiaat, mopane and ushsivi used for timber and the mangetti used to produce kashipembe liquor, (Mendelsohn & el Obeid, 2006).

During previous occupancy at the proposed site, trees were planted, ranging from African wattle (Acacia mearnssi), Knobthorn (Senegalia nigrescens), Jackalberry (Diospyros mespiliformis) and Camelthorn (Vachellia erioloba) and now form part of the prevalent vegetation.

**Table 3: Common Plant Species occurring on the project area**

| Specie | Status |
|---|---|
| ***Anthephora pubescens,*** | |
| ***Brachiaria nigropedata,*** | |
| ***Digitaria eriantha*** | Protected |
| ***Acacia Erioloba*** | Protected |
| ***Hyphaene petersiana*** | |
| ***Colophospermum mopane*** | Protected |
| ***Terminalia prunioides*** | |
| ***Peltophorum africanum*** | Protected |
| ***Combretum imberbe*** | |
| ***Terminalia sericea*** | |
| ***Bauhinia petersiana*** | |

**Figure 3: Some of the vegetation at the proposed site-**The site has mopane trees around, however due to human activities and illegal tree cutting, most of the vegetation around has been affected. Notable are also tufted grass on the southern end of the project site.

### 4.5 FAUNA

The wildlife around the site comprises birds, reptiles and amphibians with a limited number of mammals. Reduced vegetation around the project site and surrounding environs has resulted in habitat loss for most mammals that used to habit the area. Human wildlife conflict (over utilization and habit destruction) has also contributed to forced animal movement to the nearby pristine and protected Bwabata National Park which is located 130km Southeast of the proposed site as well as other pristine environments along the Okavango river banks where there are limited number human developments and activities going on . The region however hosts a vast diversity of birds, which are a key tourist attraction of the Kavango east region (Mendelsohn 2009). Approximately are 116 mammals, 430 bird, 25 amphibian (15 of which are largely dependent on riverine habitats), 67 reptile and 79 fresh water fish species inhabit the area (MET 2008).

It is vital to note that the development is being done on an area that has already been susceptible to human encroachment, thus there are homesteads within the 1km radius vicinity of the proposed lodge. This means that impacts on animals will be minimal because the environment is already disturbed and the lodge will posed a possible opportunity to improve wildlife conservation in the community. The wildlife corridor that habits more animals other than aquatic species is more than 130km East from the site since most of the areas surrounding the lodge are irrigation schemes, villages along the Kavango river and lodges established within the river.

#### 4.5.1 MAMMALS

The following list of occupant mammals in the area was derived from existing literature and personal observation. The list of mammals in the table below was then recognised as occurring in the area (MET, 2008).

**Table 3: List of mammals occurring in and endemic to the region**

| Species | Conservation Status |
|---|---|
| **African Buffalo** | |
| **Hippopotamus** | Endangered |
| **Tsessebe** | |
| ***Blue Wildebeest*** | |
| ***Sitatunga*** | |
| ***Common Reedbuck*** | |
| ***Elephant*** | Endangered |
| ***Giraffe*** | |
| ***Spotted Hyena*** | Endangered |
| ***Kudu*** | |
| ***Sable Antelope*** | |
| ***Roan Antelope*** | |
| ***Red Lechwe*** | |
| ***Chapman`s Zebra*** | Endangered |
| ***African Leopard*** | Endangered |
| ***South African Cheetah*** | Endangered |

### 4.6 BIRDS

The Katima Mulilo environs near the Okavango River in western Bwabwata are listed as an internationally recognized bird's area hosting bird species that are threatened at global level and range as avian diversity hotspots.

### 4.7 List of bird species occurring in the area

| Specie | Common Name | Conservation Status |
|---|---|---|
| ***Rhynchope Flavirostris*** | African Skimmer | Endangered |
| ***Glareola nordmanni*** | Black-winged Pratincole | |
| ***Egretta vinaceigula*** | Slaty Egret | Endangered |
| ***Bugeranus carunculatus*** | Wattled Crane | |
| ***Nettapus auritus*** | African Pygmy Goose | |
| ***Centropus cupreicaudus*** | Coppery-tailed coucal | Endangered |
| ***Gorsachius leuconotus*** | White Banked Night Heron | Endangered |
| ***Ardeola rufiventris*** | Rufous-bellied Heron | |
| ***Porphyrio alleni*** | Allen`s Gallinule | |
| ***Falco dickisoni*** | Dicksino`s Kestrel | Endangered |
| ***Turdoides melanops*** | Black-faced Babbler | Endangered |
| ***Laniarius bicolor*** | Swamp Boubou | Endangered |
| ***Cichladusa arquata*** | Collared Palm Thrush | Endangered |
| ***Lamprotornis mevesii*** | Meves`s Glossy Starling | Endangered |
| ***Burcorvus leadbeateri*** | Southern Ground Hornbill | |
| ***Glaucidium cuculoides*** | Asian Barred Owlet | |
| ***Campethera bennettii*** | Bennett`s Woodpecker | |
| ***Phylloscopus sibilatrix*** | Wood Warbler | |
| ***Phyllocuspus bonelli*** | Leaf Warbler | |
| ***Cisticolidae juncidis*** | Cisticola | |

### 4.8 AMPHIBIANS, REPTILES AND INVERTEBRATES

The area has a high occurrence of reptiles, snakes. This includes cobras, puff adders (inhabit grasslands and bush ecosystems) and the black and green mamba (inhabiting the riverine ecosystems). The area is a habitat of a wide number of lizard species and tortoises. The baseline study further revealed existence of snails, centipedes, spiders and scorpions.

### 4.9 TOPOGRAPHY AND ELEVATION

The area around the proposed project has an overall flat topography. It is characterized by undulating plains dipping towards the east at an elevation of between 1000 and 1200 m above sea level. The depth of the sand cover is estimated at between 20 and 40 m, and the overall Kalahari sequence of the area is up to 150 m deep.

### 4.10 GEOLOGY AND SOIL

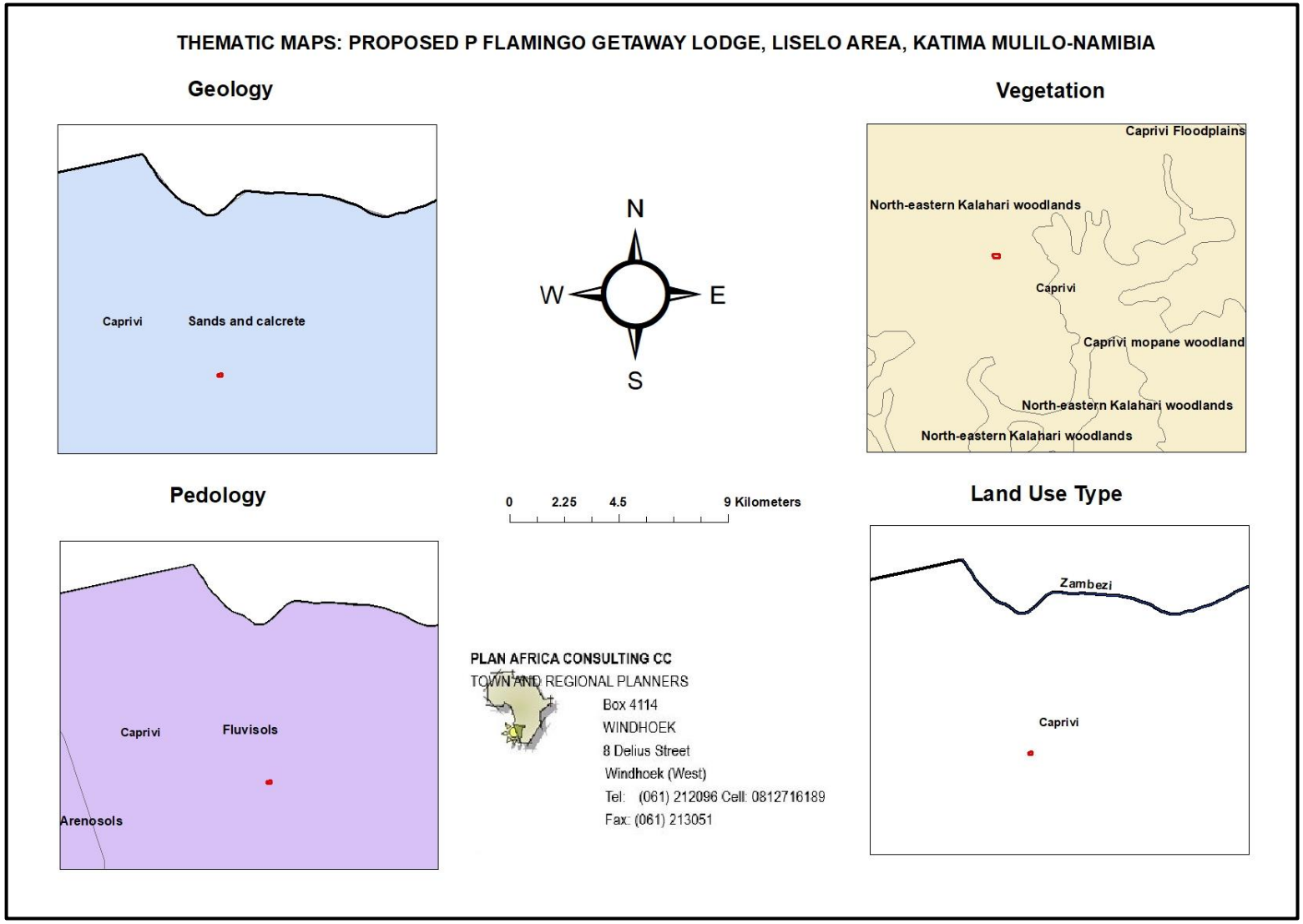
The area is underlain by the Kalahari and Namib sands, which are dominated by cambic arenosols, fluvisols and caprivi sands (Mendelsohn & el Obeid, 2003). According to the Agro-Ecological Zoning Programme (AEZ) of the Ministry of Agriculture, Water and Forestry and the World Reference Base for Soil Resources (FAO, 1998), the arenosols contain sandy soil with poor retained nutrient capacity. The sand further is slightly acidic which also results in nutrient deficiency. Generally, soils are deep and purely sandy with average soil fertility. Heavier textured soils have formed in the so-called omuramba (wide, flat watercourses with-out visible gradient). A number of these omuramba cross the area are in eastern direction from the project area. The omuramba, because of nutrient-richer soils, are sought-after for fields of agricultural vegetation by the local population.

### 4.11 HYDROLOGY (SURFACE & GROUND WATER)

The ground around the site carries productive porous ground water aquifers. Secondly, there is access to potable surface water from the perennial Okavango River. The River Basin engulfs an area of rounded 190,000 square kilometres accross Angola, Namibia and Botswana (Mendelsohn and el Obeid 2003). Its water originates from Angola and ends its flow in the Okavango delta in Botswana. Approximately half of its flow comes down the Cuito, with the remaining 50% originating from Cubango as it enters Kavango at Katwitwi. Flows along the Cuito are comparatively stable, whilst those of the Cubango are more susceptible to the varying seasons. Nevertheless, the strongest flows result from good summer rain falls in the upper catchment of the Cubango. Neither Namibian nor Botswana rains effectively contribute to its water levels. However, Tyeye village forms part of the Okavango river catchment area.

The proposed project has not posed any threat to hydrological water resources in the Okavango n delta because the, purpose of this facility is accommodation and all its waste will be managed by the Katima Mulilo Municipality before disposal. This includes solid waste to be generated from the facility.

**Figure 4: Thematic maps, (Hydrology, geology, soil, vegetation)**



# 5 CHAPTER FIVE: PUBLIC PARTICIPATION

## 5.1 INTRODUCTION

The required public participation process was conducted in accordance with regulations 21 to 24 (EMA 2007, Regulations 2012). It was initiated by way of personal notification given to all potential interested and affected parties (I&Aps), as well as newspaper advertisement in the Newspapers. The Background Information Document (BID) containing all relevant facts in respect of the project was made available to the I&Aps potential interested and affected parties registered or who attended the public meeting.

## 5.2 PUBLIC PARTICIPATION PROCESS NOTIFICATION

### 5.2.1 PROJECT INITIATION

The site visit took place in March 2018 and the proponent introduced the EIA team to the village headman and the Municipality. During the visit, the proponent explained the intended activities clearly mapping out the locality of the proposed project. The EIA conducted a Baseline survey establishing the current environmental status to determine its status in terms of vegetation, biodiversity, social aspects and wildlife.

## 5.3 CONSULTATION WITH I&APS

A public meeting was held with the local headman and Chief at Mafwe Royal establishment, were local people from the village and the nearby town residents attended on 15 April 2018. A call for interested and affected parties' comments was placed in the newspapers (attached).

This consultation process also provided stakeholders opportunity to express their views and concerns about the project which assisted in determining the scope of work for the EIA. Therefore, this process enabled all stakeholders to provide crucial information regarding environmental, social and economic impacts and identified instrumental mitigation measures for the minimising adverse impacts.

## 5.4 CONCERNS, COMMENTS AND OTHER ISSUES

Overall the project idea was well received by the village headman and as well as the community. Their comments were mainly related to employment opportunities:

**Site Boundary and accessibility-** The proponent was encouraged to respect the community decisions through the village headman or the traditional authority, furthermore the community also edged the proponent to respect people's property such as stray cattle, goats and sheep into his boundary because they will be grazing and they are a source of survival for the villagers hence there is no need for poisoning or shooting stray animals.

**Employment-** The community urged that where possible and necessary the proponent should employ locals particularly for manual work and prioritize qualified locals for skilled jobs too. Gender equals employability was also encouraged by the women in attendance.

**Culture and conflict resolution-** The headman reiterated the importance culture, that respect of village elders and village leadership is crucial in Tyeye Village. Therefore, he stressed that the proponent should consult the leadership whenever he encounters challenges. Also, if any conflict arises between him and the villagers, both parties should dialogue to manage and solve the conflict.

**Project implementation and support-**Finally, the community supports the project and recommend that the project should carry on because the community embrace the project as it opens new opportunities for business and tourism in the area.

# 6 CHAPTER SIX: ENVIRONMENTAL IMPACTS ASSESSMENT

## 6.1 INTRODUCTION

The proponent has committed to limiting the impacts on the environment associated with the expected operations in Liselo area. In line with the Namibian Environmental Management legislation and International best practices, the proponent will implement an Environmental Management Plan (EMP) to prevent, minimise and mitigate negative impacts. This chapter will cover and identify potential environmental and socio-economic impacts associated with the lodge which may interfere with environment and social setup of the village. Positive economic impacts at local level and nationwide at large will also be assessed.

## 6.2 IMPACT ASSESSMENT METHODOLOGY

Each of the potential impacts identified is screened according to the set of indicators set during the impact screening process as illustrated below. The scoping process was used addressed all possible impacts and an analysis was made to investigate its relevancy to the project. Furthermore, impacts screening process was used to determine the level of significance and degree of each impact as shown on the impact assessment criteria below.

**Table 4: Impact Screening Criteria**

| Aspect | Description |
|---|---|
| **Nature** | Reviews the type of effect that the proposed activity will have on the relevant component of the environment and includes "what will be affected and how?" |
| **Extent** | Geographic area coverage indicating whether the impact will be within a limited area (on site where construction is to take place); local (limited to within 15km of the area); regional (limited to ~100km radius); national (extending beyond Namibia's boarders). |
| **Duration** | Whether the impact will be temporary (during construction only), short term (1-5 years), medium term (5-10 years), long term (longer than 10 years, but will cease after operation) or permanent. |
| **Intensity** | Establishes whether the magnitude of the impact is destructive or innocuous and whether it exceeds set standards, and is described as none (no impact); low (where natural/ social environmental functions and processes are negligibly affected); medium (where the environment continues to function but in a noticeably modified manner); or high (where environmental functions and processes are altered such that they temporarily or permanently cease and/or exceed legal standards/requirements). |
| **Probability** | Considers the likelihood of the impact occurring and is described as uncertain, improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of prevention measures). |

| | |
|---|---|
| **Significance** | Significance is given before and after mitigation. Low if the impact will not have an influence on the decision or require to be significantly accommodated in the project design, Medium if the impact could have an influence on the environment which will require modification of the project design or alternative mitigation (the route can be used, but with deviations or mitigation) High where it could have a "no-go" implication regardless of any possible mitigation (an alternative route should be used). |
| **Status of the impact** | A statement of whether the impact is positive (a benefit), negative (a cost), or neutral. Indicate in each case who is likely to benefit and who is likely to bear the costs of each impact. |

The application of the above criteria is to determine the significance of potential impacts by the propose lodge establishment uses a balanced combination of duration, extent, and intensity/magnitude, modified by probability. Significance is established by extend, duration, intensity and probability. The Impact assessment matrix further gives significance of impact before mitigation and after mitigation as described below

**Table 5: Impact Rating Criteria**

| Significance Rating | Criteria |
|---|---|
| Low | Where the impact will have a negligible influence on the environment and no modifications or mitigations are necessary for the given development description. This would be allocated to impacts of any severity/ magnitude, if at a local scale/ extent and of temporary duration/time. |
| Medium | Where the impact could have an influence on the environment, which will require modification of the development design and/or alternative mitigation. This would be allocated to impacts of moderate severity/magnitude, locally to regionally, and in the short term. |
| High | Where the impact could have a significant influence on the environment and, in the event of a negative impact the activity(ies) causing it, should not be permitted (i.e. there could be a 'no-go' implication for the development, regardless of any possible mitigation). This would be allocated to impacts of high magnitude, locally for longer than a month, and/or of high magnitude regionally and beyond. |

### 6.3 Impact Assessment

**Table 6: Environmental impact assessment matrix**

| Impact | Status/nature | Extent | Duration | Intensity | Probability | Significance | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Before Mitigation | Mitigation applied | Post Mitigation |
| Construction Phase | | | | | | | | |
| Physical disturbance of the soil during transport and construction activities | -Erosion of top soil<br>-Proliferation of tracks | Local | Short | Medium | Probable | Medium | -Restrict construction activities to defined areas.<br>-Use surface anchored foundations were possible with very limited rock breaking.<br>-Ensure that only site where structures are to be set are only affected. | Low |
| Removal of vegetation during construction land clearing. | -May result in removal and destruction of protected and endemic tree species | Local | Short term | Medium | Definite | High | -Limit construction activities and limit movement to designated areas only.<br>- Implement and monitor the vegetation management plan<br>-Vegetation removal should be done in consultation with and consent from Department of Forestry | Medium |
| Loss of local wildlife such as reptiles, fish etc | -The project site has little/no major wildlife because of human disturbance s in the area, | Local | Short | Low | probable | Medium | -Remove special reptile species encountered<br>-Forbid hunting of animals within the project site. | Low |

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| | however some small animals such as reptiles, squirrels and bird that are locality bound are likely to be affected due to loss of habitat and noise nuisance | | | | | | | |
| Noise pollution from movement of vehicles and construction activities. | -negatively effect on local animals, birds and constructors | Regional | Temporary | Medium | Highly probable | High | -Incorporating recommended no-go zone into final design of site plan and construction areas, where activity is restricted to the project boundary only.<br>-During construction phase, there is need to provide authorized employees with earplugs | Medium |
| Habitat loss, including foraging, roosting | Negative impact on local habitats and vegetative species | Local | Permanent | High | Definite | High | -Incorporating recommended no-go zone into final design of the site infrastructure and camp sites. | Medium |
| Upgrading of existing access road | Negative effects of road upgrade operations by heavy machinery | Local | Short term | Medium | Definite | Medium | -Ensuring Access road construction does not affect vegetation and animals not within the road marked area. | Low |

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| | | | | | | | -Stagger road upgrades may be done once/twice a year only to avoid continuous nuisances | |
| Archaeological Landscape | Visual degradation | Local | Short Term | Medium | Improbable | Medium | -Demarcate, protect and avoid development near sites. If removal is inevitable, apply at Heritage Council via an archaeologist | Low |
| Intrusion in a visual sensitive landscape | Visual pollution and loss of sense of place | Local | Long term | Medium | Definite | Medium | -Break the spatial dominance of the lodge's buildings and camping equipment's by using various shades of a low tone colour such as grey in bands on the structure to break the visual texture. This will also lower the relative size perceived, the visibility distance, and the scale contrast.<br>-Limit the night lighting around the lodge's compound. | Low |
| Disturbance of land with potential for wild animals and livestock grazing. | Loss of sense of ownership of place and community intrusion | Local | Long term | High | Definite | Medium | -Ensure strict implementation of the EMP and not to affect surrounding areas around the lodge boundary by removing vegetation and grazing lands. | Medium |
| Change in landscape character (New land use) | New structures such as buildings and roads in the environment | Local | Long term | Medium | Probable | High | -Ensure that new structures blend in with the environment and there is rehabilitation of disturbed area to leave the area in almost the same level as it was before if not better. | Low |
| Contamination of soils by hydrocarbon | Heavy equipment oils | Local | Short term | Medium | Probable | Medium | -Ensure there is a spillage management plan in place and | Low |

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| pollutants (grease, oils, fuel spills and leakages from machinery and fugitive wastes. | and fuel storage tanks on site | | | | | | licensing of any oils or fuel stored on site | |
| Air Pollutants such as dust releases | Dust releases can be a nuisance to the local residences as well as help contributing into local atmospheric particulate matter content | Regional | Short term | Medium | Probable | Medium | -There is need to wet the areas before working on them especially roads upgrading and foundation digging | Low |
| Noise and vibrations from heavy equipment and vehicle movement frequency | Noise and vibrations causes public nuisance as well as driving away local animals such as hippos nearby | Local | Short term | High | Definite | High | -There is need to use noise suppression equipment of engines<br>-Operations should only be done during the day were noise propagation levels are limited as compared to during the night | Medium |
| Solid Waste from construction (rubbles, cement bags, paint containers, broken equipment etc.) | -Waste from construction activities can result in pollution in the environment, | Local | Long term | High | Definite | High | -An effective waste management system to be implemented by the Lodge management team, separating waste before disposal. | Low |

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| | especially material that is not bio-degradable. | | | | | | | |
| Employment opportunities | The project will create employment opportunities during the construction stage | Regional | Long term | High | Definite | High | -Employ local individuals through the councillor to ensure equal employment opportunities. | High |
| Health and social issues | Potential accidents and illnesses. | Local | Short term | Low | Probable | Low | -Health and safety regulations should be enforced on all the workers. Safety regulations include life and health insurance, first aid kits; protective clothing such as uniforms and gloves. | Low |
| Process Issues I.e. Lack of adequate knowledge on the risks associated with the project | Local community may miss opportunities or fail to raise issues in time of the study. | Local | Long term | Medium | Definite | Medium | -Continue with public engagement through the headman and other government extension offices | Low |
| **Operational Phase** | | | | | | | | |
| Solid Waste from restaurant food waste, guests waste, packaging | Waste disposal into the natural environment can be detrimental to | Local | Long term | Medium | Definite | Medium | -Implement a waste management system, separating waste accordingly and employ sustainable disposal strategies. | Low |

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| | wild organisms and at times highly toxic | | | | | | -Recyclable, Reducing and Reusing waste should be adopted to minimise solid waste generation. | |
| -Carbon footprint from General emissions, energy usage etc. | Even though it is on a smaller scale any development has a carbon footprint that negatively affects the immediate atmospheric conditions and increasing greenhouse gasses in the atmosphere | Regional | Long term | Low | Definite | Medium | - Energy efficiency practices such as using solar energy options<br>-Use bio-waste as compost for the gardening<br>-Encourage quests and employees to switch off electrical appliances after use. | Low |
| General disturbance to the natural ecosystem of the area both fauna and flora ecological integrations. | Daily visits and camping will have an impact on the surrounding ecosystems through noise, human movements and forest tracks | Local | Long term | Low | Definite | Medium | -Restrict activities to defined areas.<br>- For movement in the bushes use designated tracks to avoid unnecessary removal of vegetation | Medium |

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|---|---|---|---|---|---|---|---|---|
| Impact on wildlife movement in the area | -The project site has little/no major wildlife because of human disturbance s in the area, however the project proponent intents to vegetate the area and conserve it to promote wildlife movement into the project area during operation. | Local | Long Term | Low | Definite | Medium | -Ensure that during operation animal habitats are not disturbed<br>-Planting of more trees to promote animals moving into the area to improve the lodge's aesthetic value through wild game viewing.<br>-Noise will be minimised from moving vehicles, human movements and domestic noise such as radios. | Low |
| Effluent waste from bathing showers and sewer connections | Environmental pollution especially to the nearby Kavango river | Local | Long term | Medium | Definite | High | - All sewerage waste will be channelled into the sewer reticulation system. | Low |
| Disturbance of biodiversity due to vibrations (Local animals such as birds | Local nuisance | Local | Long term | Medium | Definite | Medium | -Limit the moving of vehicles. | Low |

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| and small animals could be driven away from their habitats) | | | | | | | | |
| Physical Infrastructure immovable property | The area will have new landscape features which will bring in a change in the local scenery | Local | Long term | Medium | Definite | Medium | -The project proponent should limit infrastructure footprint by using local materials for construction to avoid usage of alien material. | Medium |
| Flooding | -Can result in property and natural environment damage. | Local | Long term | Low | Improbable | Low | -Sustainable storm water drains are to be approved by Katima Mulilo Municipality engineers. | Low |
| Population influx | -Results in social tensions and an increase infection of sexually transmitted diseases particularly HIV and AIDS, and other Sexual Transmitted Diseases (STDs). | -Local | -long term | Medium | Definite | High | -Educate employees and visitors on social integration and sexual behaviour.<br>-Provide for contraceptives such as condoms on the lodge.<br>-Work closely with Ministry of Health and Social services awareness programmes. | Medium |

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|---|---|---|---|---|---|---|---|---|
| Social integration | Potential for conflict between people of different backgrounds and cultural beliefs. | Local | Short Term | Medium | Probable | Medium | -The proponent should address and ensure prior agreed activities should be put in place to avoid conflict.<br>-The lodge should also establish a public relations policy guiding tourist visitor's contact with locals. | Low |
| Community development including promotion of local products | Employment creation and business integrations through selling of local products to visitors and supplies for the lodge. | Regional | Long term | High | Definite | High | -Promote local businesses and employ locals | High |

# 7 CHAPTER SEVEN: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

## 7.1 INTRODUCTION

This section is aimed at describing the Environmental Management Plan (EMP) for the proposed Petra Flamingo Getaway Lodge Establishment Project. The EMP stipulates the management of environmental programs in a systematic, planned and documented manner. The EMP below includes the organizational structure, planning and monitoring for environmental protection at the proposed farm area development and other areas of its influence. The aim is to ensure that the lodge facility maintains adequate control over the project operations to:

- To prevent negative impacts where possible;
- Reduce or minimise the extent of impact during project life cycle;
- Prevent long term environmental degradation.

## 7.2 EMP ADMINISTRATION AND TRAINING

There is a strong need to clearly outline the roles and responsibilities of all stakeholders to ensure that the EMP is fully implemented. There is also a need for the proponent to appoint an overall responsible person (Environmental Control Officer) to ensure the successful implementation of the EMP. The Environmental Control Officer needs to have qualifications and knowledge in environmental management /sciences, and understanding of EMP administration. Under the management actions, each action is allocated to a responsible entity to ensure that the specific action is managed and documented properly. All key role players such as contractors who will be involved during the construction of the services must be informed about the contents of this EMP and activities to be undertaken to mitigate the potential impacts identified. All key personnel who will be involved in project management and implementation will be informed about the contents of this EMP through structured training programs; this will form part of the regular site meetings and briefings.

## 7.3 Construction Phase Impacts

The proposed lodge construction phase forms an integral part of the project development cycle. It is however crucial to note that the development entails activities that will pose threats to the surrounding environs and impacts will range from vegetation removal, construction waste, noise and air pollution among other impacts. As assessed in the impact assessment chapter the EAPs noted crucial environmental impacts associated with the construction phase and as follow up to the impacts identified and assessed, the following impact management plan has been crafted:

**Table 7: Impacts associated with the Construction Phase**

| Impact | Description | Effects | Class | Time frame | Responsibility | Action |
|---|---|---|---|---|---|---|
| Noise pollution | Noise will be generated through:<br>-Access road upgrading<br>-Construction of site administration offices<br>-Moving vehicles. | - The health of working personnel could be disturbed.<br>- Residents could be disturbed by the noise.<br>- General annoyance<br>-Driving away of local animal species near the project site | Environmental | 2-3 months | Environmental Control Officer | - A construction interval will be established, and adhered to.<br>- Workers will be issued and provided with personal protective equipment.<br>- Public will be notified through printed timetable stating planned operational activities.<br>- Construction activities will be conducted during daytime. |
| Dust Generation | Dust will accumulate because of the land preparation, clearing and produced by movement of construction equipment | - Can lead to respiratory illnesses especially to those working in the area.<br>-increase Particulate matter levels in the air and cause visual pollution | Environmental/ occupational | 2-3 months | Environmental Control Officer Contractor | - Dust suppression will be done through watering dust source surfaces. |
| Debris Accumulation | Debris will accumulate due to construction activities, removal of existing dilapidated infrastructure on site | - Can be an eyesore.<br>- Can be source of water and soil pollution.<br>-can result in scenic pollution | Environmental | 2-3 months | Environmental Control Officer | - Reuse reusable material such as bricks.<br>- Collect all non-reusable debris and dispose applying appropriate waste management procedures. |
| occupational health and safety risks and accidents | Construction related Safety and Health hazards | -Injuries to workers such as Occupational dermatitis, slips and fall of humans and objects, musculoskeletal disorders, etc. | Health and safety | Project life time | Environmental Control Officer | - Equip workers with Personal Protective Equipment (PPE).<br>- provide trainings on how to effectively use the PPE.<br>-Provide platforms for briefings and meetings about possible |

| | | | | | | |
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| | | | | | | safety and health hazards in the work place |
| Employment creation | The construction exercise provides an opportunity of outsourcing work | - Improves disposable income to those employed and their immediate families. | Socio-economic | Project life time | Environmental Control Officer | - Work with the local headman and councillor on acquiring non-skilled labour from the residents. |
| Population Influx | The project will bring in skilled and unskilled workforce into Katima Mulilo from other places increasing population density in the area. | -There is potential for cultural systems conflict between locals and new people in the area<br>-Overpopulation around local surroundings, i.e. exceeding local area carrying capacity<br>-Potential for rife prostitution and spread of HIV/AIDS and other STDs<br>-Potential for scaring away of local wild animals, poaching and removal of protected indigenous vegetative species | Socio-economic | Project life time | Environmental Control Officer | -Train and brief employees to respect local cultures and leaders,<br>-Engage on massive sexual health training and awareness and providing contraceptives such as condoms, as well as provide means counselling for those that are affected by HIV/AIDS and other STDs,<br>- Provide environmental trainings and continue a regular basis briefing the employees about nature conservation (animal and plants), and discourage hunting of wildlife and cutting down of trees. |

## 7.4 OPERATIONAL PHASE

The operational phase is the most critical component of project implementation and it is normally associated with several severe impacts. The phase comprises of the actual operation of the lodge site. This phase is expected to last for over 50 years of operation if the venture is still viable. There will be several impacts that will occur daily or other sequential routine. The phase forms the basis of an Environmental Management Plan that is detailed in Chapter and will be followed by the decommissioning phase. The major impacts identified by this study for the operation phase are as detailed in the previous chapter.

**Table 8: Impacts associated with the Operation Phase**

| Impact | Description | Effects | Class | Time Frame | Responsibility | Action |
|---|---|---|---|---|---|---|
| Noise pollution | -Vehicle movements<br>-Periodic road upgrading | - The health of working personnel could be disturbed.<br>- Residents could be disturbed by the noise.<br>- General annoyance<br>-Driving away of local animal's species near the project site. | Environmental | Project life time | Environmental Control Officer | - Schedule road maintenance during day time and avoid upgrades over short periods of time.<br>- Provide public notices through printed timetable showing schedule of planned work |
| Solid waste pollution | Solid waste emanating from food wastes, packaging materials, containers, household waste, glass, wood, etc | - Can result health issues and some waste can be highly hazardous and toxic to the environment | Environmental | Project Life time | Environmental Control Officer | -An initial waste audit will be conducted to identify areas type and volume of waste<br>-When it is appropriate, materials will be reused and/or recycled to minimize the amount of waste generated. |
| Human movements | Visitors to the site will have interests in moving around the bush area and maybe nearby communities | -Movements may drive away animals within the radius of the site.<br>- This can also result in vehicle vibrations which maybe a nuisance to some people in the surrounding area. | -Ecological<br>-Social | Project life time | Operations manager | -Come up with a social contact policy guiding the movement of visitors around the area<br>-Promote the use of existing approved wild tracks and no vehicle tracks in the bushes to avoid driving away wild animals. |
| Flooding Management | During the consultation process it was noted that the area occasionally floods, like some other area flat terrain areas in Kavango East. | - There is potential for destruction of built property and cause losses to the project proponent. | Environmental<br>Economic<br>Social | Project life cycle | Operations Mnager | -There is need to be aware of possible flooding on the proposed area occasionally.<br>-The proponent will have to use a special foundation for the structure that will be constructed on site. |

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| | | | | | | -Construct elevated foundations to have building floor level at a higher elevation to avoid water flowing into the interior during the summer flooding periods<br>-Ensure that your entire main drains, gutters and down pipes are working correctly and are clear of all blockages.<br>-All electrical equipment and sockets should be installed to a higher level above known flood levels. |
| Water quality | Liquid waste from the lodge operations | -Ground and surface water contamination: Both chemical and physical contamination | Environmental | Project life time | DEA / Namwater | -Frequently monitor effluent waste quality<br>-Maintain all water and sewer reticulation pipes that connects to the biorock system. |
| Occupational Hazards / Work place accidents | Operating of household equipment such as stoves, irons, boilers etc can cause workplace injuries | -Potential accidents and illnesses. | Health, social | -Project life time | Ministry of Labour | -Health and safety regulations should be enforced on all the workers.<br>-Safety regulations include life and health insurance, first aid kits; protective clothing such as uniforms and gloves.<br>-Proper storage of highly flammable products such as gas etc, and installation of fire extinguishers. Workers should not be allowed to exceed working hours. |

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| Poor customer service | Daily running of lodge not properly managed. | Customer dissatisfaction | Economic Social | Project life time | -Operations Manager | -The manager should manage the daily operations and ensure good customer care |
| Employment creation | Employment creation for the residents | - Increases disposable income.<br>- Decreased Rural to urban migration. | Socio-economic | Project Life Time | Tyeye Village headman Operations Manager | - Provide information to the local community detailing labour requirements (number of workers and type of skills)<br>- Provide information on social benefits for the employees and the local community.<br>- Conduct transparent recruitment process of workers and of contractors, providing preferences to the locals where feasible. |
| Immoral Behaviour | Increased inflow of people into the area may result in immoral behaviour and increased sexual activities. | -Increased infection of HIV/AIDS and other sexual diseases.<br>-Increased unwanted and teenage pregnancies<br>-Increase in thieving incidences, assaults and robberies.<br>-Increased incidences of drugs and alcohol abuse. | Socio-economic | Project Life Time | Operations manager and Tyeye Village Headman | - Conduct awareness campaigns on promiscuity and HIV/AIDS issues.<br>- Conduct awareness programmes on the effect of alcohol and drug abuse.<br>- Support the creation of a nearby police post. |

## 7.5 DECOMMISSIONING PHASE

If the project proponent intents to decommission the project well before the completion of its expected lifespan, all the necessary steps will be taken to ensure that the application of the best environmental management practices and adherence to legal and policy legislations is upheld. These progressions shall follow an appropriate decommissioning plan prepared by an appointed Environmental Consultant that will work in the best environmentally friendly manner taking into considerations the principle of sustainable development. The anticipated impacts of a standard and provisional decommissioning plan will only be highlighted in the Environmental decommissioning plan, taking into consideration biophysical, economic, social and political issues related to project decommissioning.

## 7.6 SOLID WASTE MANAGEMENT

Petra Flamingo Getaway Lodge's solid waste management plan will follow the waste management principles of reusing, recycling and reducing. This will imply that at waste generation on site will be minimal to ensure that there is no waste management problem. Waste that can be reused will be put to appropriate use at the lodge such as reusing plastic packages, and containers.

Waste segregation will be done in relation to biodegradable and non-biodegradable waste. Biodegradable waste such as vegetables, food leftovers and paper will be composted on site and the compost will be used on lawn and flowers to be planted on site. All recyclable waste will be separated and delivered periodically by the proponent to waste recycling companies.

## 7.7 SEWAGE AND EFFLUENT WASTE MANAGEMENT

In the absence of the municipal sewage system, sewage is highly environmental dangerous and remains a hazard to human health if not properly managed according to public health and environmental standards. For this development, a Bierock Sewerage Technology using high grade conservancy tanks will be used for treating the effluent and sewage discharge from the lodge. The Biorock treatment technology enhances and combines the principles of primary separation (septic tank) and aerobic biological filtration (conventional trickling filters). This type technology is usually used for domestic purposes including lodges and can work independently from the municipal system. The treating process is biological and doesn't require power and produce odour. Treated water from the system will be recycled and used for watering the lawn and the plants while the sludge will be sucked out.

The installation is environmentally friendly and requires servicing twice less than the traditional septic tanks. The tank material is waterproof and durable; however ton enhance environmental safety the holding pit for the tanks will be lined with Structural Epoxy technology which incorporates a high build, fibre reinforced polymer (FRP) epoxy. This Epoxytec system is the highest build liner that is leachate and acid proof. This liner is being used because of the flooding risk of the area and thus there is need for an airtight system that will not be compromised during flooding periods. The Structural Epoxy System offers high flexural strength properties, impressive modulus and 16,000psi compressive strength for structural reclaiming needs and lining as an all-in-one-shot single system. The system is often specified for structures experiencing ultra-high levels of I&I pressure with ultra-high levels of H2S (up to 800 ppm).

**In relation to the sewerage system management on site the following guidelines are recommended:**

- A contingency plan must be drawn up to protect against overflow of the conservancy tank. A sump or lined pond can be designed below the conservancy tanks to contain any overflows.
- Ingress of storm water into the conservancy tanks must be prevented by providing appropriate drainage.
- The tanks siting will be located more than 200m from the river bank or any stream.
- The tanks must have airtight manhole covers to allow access to the tanks for the removal and safe disposal of the tanks contents.

**Furthermore, in relation to flooding risk the following specifications will be followed:**

- All sewage pipe penetrations through walls/foundations shall be sealed using an expansive sealant, a molded sleeve, an elastomeric seal, or a neoprene seal.
- The septic tank access cover shall be sealed with a neoprene gasket and bolted down.
- The septic tank inspection pipe shall have a watertight cover (i.e. a screw-on lid).
- The sewage connection pipe exiting the structure shall be either strapped to a vertical supporting component of the structure or embedded in the foundation to protect the pipe from flood damage.

All operations and maintenance activities will be responsibility of Petra Flamingo Getaway Lodge Management. When the tank is full the management should engage an experienced contractor to evaluate if the tank needs to be pumped often. Leaks occurring in the toilets and dripping faucets will be checked and repaired promptly. Soil around the treatment area should regularly check for wet or spongy soil around treatment area. Additionally, an alarm system can be installed to signal when there is a problem.

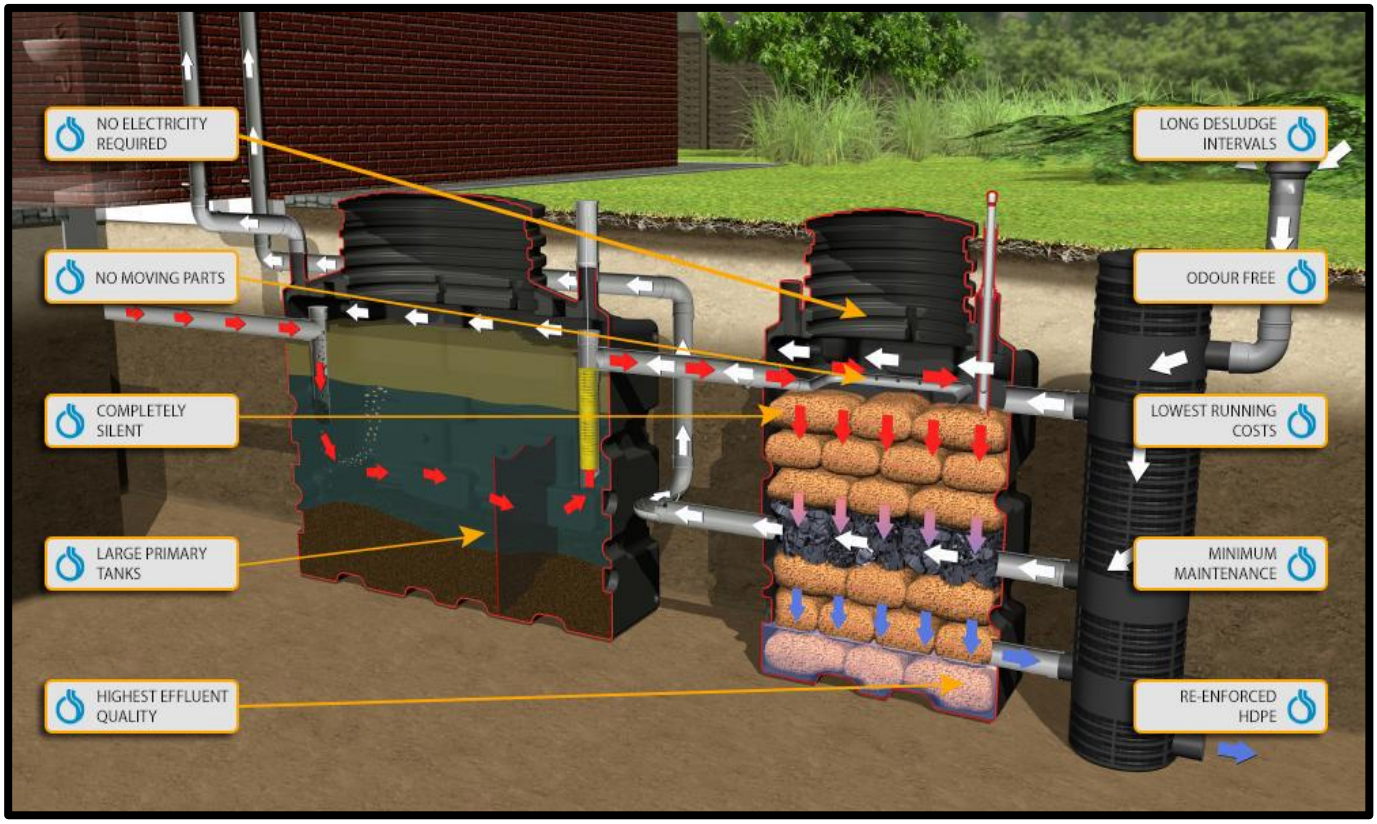


**Figure 5: Poly Biorock sewerage system flow diagram, source: Biorock Syatems inc, 2014**

# 8 CHAPTER EIGHT: CONCLUSION AND RECOMMENDATIONS

The environmental impact assessment process for the proposed Petra Flamingo Getaway Lodge was overall conducted in accordance to the Environmental Management Act 2007 and EMA Regulation 2012. Further consideration was given to relevant legislations such as Forest Act 2001, were also considered throughout the entire process to ensure a successful assessment process. Impacts likely to occur during project phases (construction, operation and decommission) were assessed depicting a positive outlook despite limited details of the magnitude of the lodge. Based on the assessment, the overall project is less damaging to the environment demonstrating job creation opportunities and community development. Impacts with negative effect were also identified and adresses in a form of environmental management plan to ensure sustainable implementation.

Protected trees such as Digitatia eriantha, Acacia erioloba, colophosperum mopane and peltophorum africanum and existing wildlife should be protected and conserved in order to maintain sustainable use of the environment. The proponent should refrain from indiscriminate clearing of vegetation which may lead to loss of habitat for birds etc. The factor of the locality's seasonal flooding should be considered in the lodge design construction and operation. Improved accessibility approach should be implemented to ensure smooth access during rainy season. It is important that the proponent observe and maintain accountability both socio-economically and environmentally to the activities of the project that the project is harmonized with policy, regulations, administrative frameworks and social interface with the public as proposed in the EMP. Failure to observe these measures will significantly affect the local environment and lead to non-compliance. Therefore, implementation environmental protection measures should be executed in consultation with the Key stakeholders.

It is however also dependent on MET:DEA that they also initiate monitoring programmes during construction and operation of these facilities frequently, to ensure that project developers are compliant to the EMPs

In this respect, Plan Africa Consulting cc recommends that MET: DEA grant an environmental clearance certificate for the proposed project, on condition that they will oblige to the provided EMP and conduct all compliance assessments on time.

# Appendix A: References

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# Appendix B: Public Consultation Documents

# Appendix C: Land ownership and Layout Plans

# Appendix D: Consultancy Team resumes