

# Scoping Report and EMP for Chobe Princess 1 Houseboat



October 2018

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## Abbreviations

DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
EMA	Environmental Management Act (No. 7 of 2007)
I&APs	Interested and Affected Parties
MET	Ministry of Environment and Tourism
MSDS	Materials Data Safety Sheet

## 1. Introduction

### 1.1 Project Location

Chobe Princess one (1) is the second largest in capacity of the houseboats under Zambezi Houseboats. Having begun its operation in 2014, it offers tourists accommodation and leisure activities on its cruise in the Chobe River. The houseboat embarks on a three day cruise of the Chobe River to its furthest point of mooring at Serondela. Two nights are spent at Serondela before embarking on a return trip to Impalila mooring harbour for re-stocking where another night is spent. The map below provides a view of the mooring points of Chobe Princess 1 houseboat.

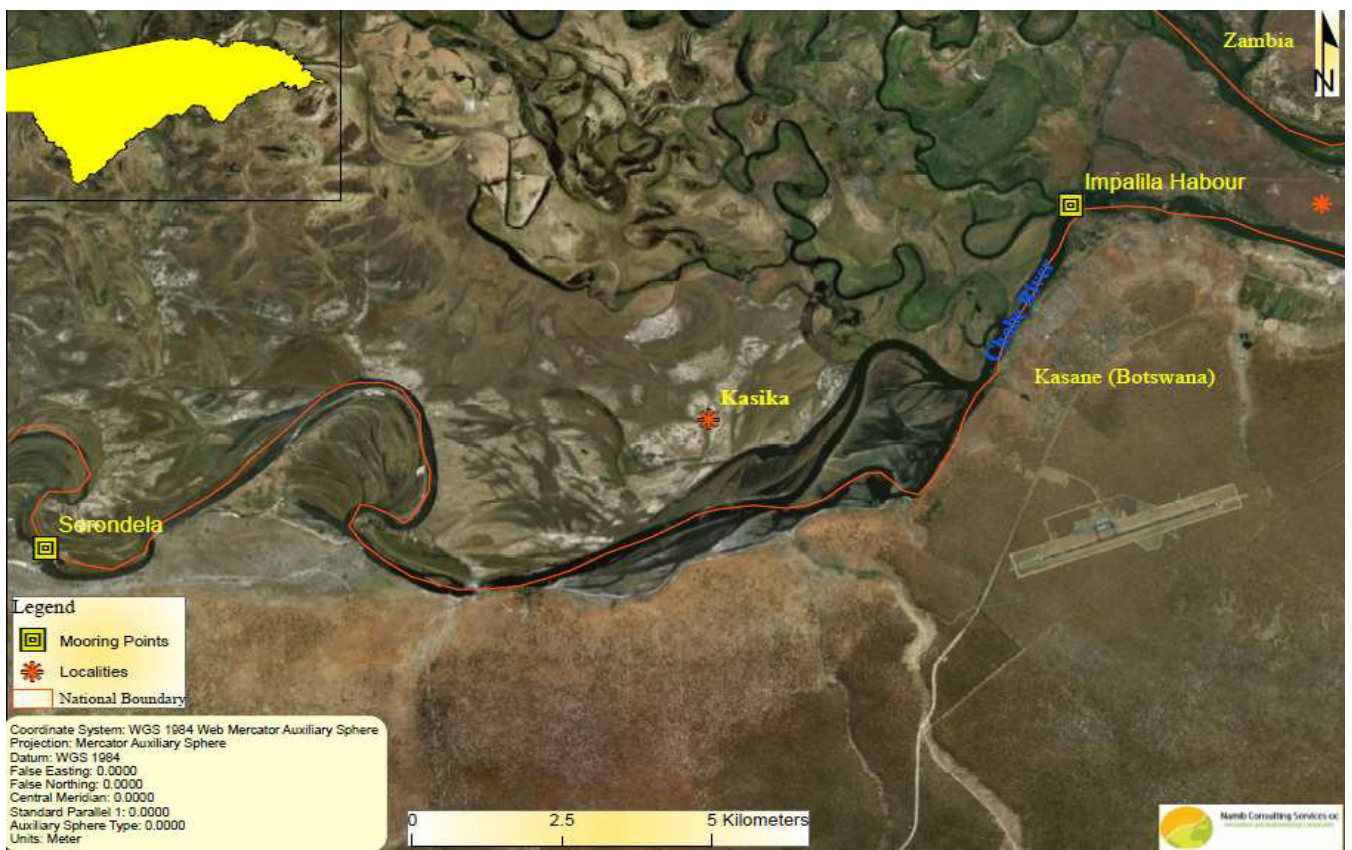


Figure 1 Mooring points of Chobe Princess 1

### 1.2 Project Motivation

The Environmental Management Act (No. 7 of 2007) and its regulations requires an environmental clearance be obtained prior to undertaking all listed activities. Subsequent to

gazetting the regulations of the Environmental Management Act (EIA Regulations (GN. No. 30 of 2012)), the Department of Environmental Affairs (DEA) of the MET has undertaken efforts to ensure compliance to the requirements of the act and regulations for any new developments. Moreover, their efforts extend to ensure that already existing activities mitigate the impacts of their operations to acceptable levels.

Therefore, this project responds to the efforts of DEA to ensure that operations of Chobe Princess 1 houseboat comply with provision of the EMA and its regulations. Moreover, beyond compliance to legislation, this endeavor aims to ensure best practices in managing environmental and social impacts of the operations of Chobe Princess 1 houseboat as such builds a formidable reputation that attracts foreign tourists to the country thus continue to support the Namibian economy and local communities.

## 2. Description of Houseboat facilities and Operations

The Operation of the Chobe Princess 1 Houseboat can be categorized into two parts; offshore based and onshore operations.

### Offshore Operations

#### 2.1 Onboard Accommodation and leisure

Chobe Princess 1 hosts five rooms with capacity to accommodate 10 guests and additional two rooms that accommodate a crew of five. Each of the rooms comprise a toilet and shower, except one of the crew's room which uses public toilets.

The top deck of the boat are dining area, bar and an open deck with swimming pool and a room. On the middle deck is the kitchen and ground deck mainly rooms. A typical room will comprise a double bed, toilet with sink and shower.



*Figure 2 Accommodation on Chobe Princess One (1) Houseboat*



## 2.2 Power supply

Power requirements for the boat is supplied from a diesel generator aboard. The boat comprises a 500 liters tank that stores diesel fuel that can serve for 7 days both for its cruises and generators. A fuel bowser designed tanker collects fuels from Kasane and refills the boat.



*Figure 3 Location of generator at back of the houseboat*

## 2.3 Water supply

Water used onboard the houseboat is abstracted directly from the Chobe River used in kitchens, sinks and lavatories onboard. Water for drinking is mostly procured bottled water.

## 2.4 Sewer systems

The sewer system aboard the houseboat comprises three tanks of 250 liters top deck and another 250 liters for lower deck and a third 500 liters that serve as holding tank. The following process is used for pre-treatment of the sewage;

- A first holding tank receives all the wastewater from sinks, showers and toilets on the upper deck of the boat and the second tank receives all waste water from lower deck inclusive of any public toilets. Biodegradation of the sewage begins in these two tanks with the aid of applied eco-tablets (Fig 4). The rise in level of sewer water in these tanks triggers effluent outflow into the third tank.



*Figure 4 Eco-tablets applied to sewer tanks aboard*

- The third holding tank receives the treated effluent from the first two tanks. The tank comprises a macerator pump that reduces solids to small pieces in order to deal with rags and other solid waste before it is pumped to sewerage boat (honey sucker tanker).
- Final step in handling effluent on the boat is pumping out by a honey sucker (tanker) for further onshore treatment and disposal at Ncheku-Kasika. This tanker has capacity of 5000 liters and collects from the houseboat once in a day to collect this effluent.



*Figure 5 Piping for pumping effluent off the houseboat's tanks*

## 2.5 Solid Waste Management

Solid waste from the houseboat separated aboard the houseboat as follows;

- Food waste is separated from other solid waste onboard and transferred to Ichingo lodge
- Combustible waste is also separated from other waste for further handling onshore at Ichingo Lodge
- The recyclables and other plastics, packaging and bottles are collected by food supplier Sea-Pride Foods for further handling and some disposed at Katima Mulilo town landfill site.



*Figure 6 Garbage bins for waste separation*



*Figure 7 Solid waste awaiting transfer from the boat to Ichingo Lodge*

## 2.6 Kitchen Operations

Greywater from kitchen operations is directly released into the river, however passing through a drain strainer to retain solids in the water.

## 2.7 Storage of chemical and Refueling

All chemicals for housekeeping as well as fuel for small boat is kept in a secure storeroom on the back side of the boat. The boat is refueled by a small fuel tanker fueled by a bowser refilled from Kasane.

## 2.8 Maintenance Works

All maintenance works are carried out onboard the boat. All redundant items are sent to a storeroom at Ichingo Lodge. Waste oil from generators/engines aboard are transferred to Ichingo lodge where it is placed in a drum at the workshop. Community members that request for this waste oil are provided for their uses.

## Onshore Operations

### 2.9 Onshore effluent treatment

After having pumped the effluent from the boat, the honey sucker (tanker) travels to Nchecku to transfers this pre-treated effluent to a land based treatment system.

The process on land involves a further six stage treatment system. The steps are as follows;

- Pre-treated effluent delivered to the land-based treatment system is collected into a first tank septic tank. The septic tank consists is mostly liquid which is level controlled and outflows into the second tank called the conservancy tank. The conservancy tank is utilized mainly for temporal storage of the sewerage whilst also level controlled and outflows outflow are into the third tank called the balancing tank. The purpose of the

balancing tank is ensure control of the outflow into the bio-tower tanks also called the trickling filters.



*Figure 8 Effluent treatment system at Ncheku-Kasika*

- In the bio-tower tank, pretreated wastewater is spread over the surface of a media, and as it trickles downward through the bed of filters the microbes feeds on the nutrients in water to forming a slime of microbes on the filters. As water continues to trickle down the filters, air circulates upward through the media as treated water is removed by an underdrain system. The biological slime of microbes on formed on the media as water drains may need removal. However, bio-towers are advantageously know for generating very little sludge.
- The fifth tank of the system is the disinfection tank, where treated effluent from the bio-towers is disinfected by ozonation as final effluent. The final tank is refereed as irrigation tank as it temporal stores treated effluent using a level trigger to release final effluent through a sprinkler system just beside the treatment plant.



*Figure 9 Final effluent release through sprinklers*

## 2.10 Solid Waste Management

Solid waste is transported to Ichingo Lodge for further handling. Depending on the type of waste, combustible waste is burnt at the incineration sit while organic waste is used to make compost manure. Plastics and other packaging are returned to the food supplier Sea-pride for handling or disposal in Katima Mulilo.

### 2.11 Laundry Operations

All laundry operations are carried out at Ichingo Chobe River Lodge. Laundry water is pumped into a 500 liter tank discharged through extending 300 meters away from the Chobe River on to a rocky vegetated area to soakaway. The impacts of the laundry are handled in the Ichingo Chobe River Lodge EMP.

### 2.12 Functional areas of the houseboat

Based on the above information, it is evident that the active operational areas of the houseboat both onboard and offshore can be summarized as;

- Guest and crew rooms and public lavatories
- Kitchen dining room and bar operations,
- Transfer of pre-treated effluent to a tanker (honey sucker)
- Transfer of fuels onto the boat and their storage
- Maintenance aboard the boat
- Solid waste transfer and handling onshore
- Laundry operations onshore

### 2.13 Chobe Princess One Employment Status

Chobe Princess 1 employs five crew member (1 female) aboard from the local community of Impalila and Kasika area. Crew staff include a captain, a chef, two guides and a housekeeper. Support staff do come from the Ichingo lodge

### 3. Biophysical Setting Description

#### 3.1 Introduction

The Impalila Island comprises a unique landform that is contrary of the extensive Zambezi-Chobe floodplain that lies to its west. This features make this area of significance both environmentally and socio-economically. The biophysical setting of the area is described below.

#### 3.2 Hydrology

The drainage of the far eastern parts of the Zambezi region is characterized by an extensive floodplain, with approximately 30% of the eastern parts of the region at risk of flooding in any given year (Mendelson and Roberts, 1997). The Zambezi River with mean annual flow of 40 000 m<sup>3</sup> per annum measured at Katima Mulilo flows eastward forming the border with Zambia in the north, while the Chobe swamp and River joins the Zambezi on the border with Botswana and Zimbabwe (IWRM Plan for Namibia Report, 2010). The Impalila Island is sandwiched within these two significant drainage systems, further bounded on the western side by its extensive floodplain of backwaters channels linking the Chobe and Zambezi systems. Both the Zambezi and Chobe Rivers are slow flowing with large floodplains and small, vegetated islands, with the only rapids being at Katima Mulilo and Impalila Island (WWF, 2007).

Rivers are critical to the survival of important wetlands providing clean water if unpolluted and support resources such as fish populations. Water quality of the Zambezi and Chobe River is less extensively studied, thus limited published literature exists. However, negligible available literature echoes declining water quality over many years of human settlement along the river. While the Zambezi River may appear less impacted due to its perennial nature, this is less so for the Chobe system which in drier month of the year is fragmented reducing its water quality to a muddy appearance and hugely maintained by a reverse flow reliant on the Zambezi River. However, experiencing different levels of flooding on a year to year basis, the water quality of the extensive Zambezi Chobe River system can be said to be fairly of good quality and many rural communities along the river draw and consume without much treatment. This is echoed in the IWRM Plan for Namibia Report (2010) highlighting that the northern perennial river of

Namibia and associated wetlands have yet been polluted extensively, with their exceptional diversity of fauna, these systems continues to retain their natural cleansing processes and cycles such that water is classed as excellent and flood cycles largely unregulated.

### 3.3 Geology and Soils

The Impalila Island in eastern Zambezi region belong to the quaternary age Kalahari sand group which is present in the eastern and north eastern parts of Namibia. It is widely believed the Kalahari sand cover originally represent a series of sand dunes oriented mainly in a linear manner. This scenario imply that contrary to present day tropical to sub-tropical conditions, the region was generally dry during the deposition of the wind-blown sand dunes. The base of the Kalahari sand cover is marked by the presence of Karoo basalts, which are exposed at the rapids near Katima Mulilo, and near Ngoma to the east, however, more of these basaltic rocks are extensively exposed within the Island of Impalila (Miller, 2008). The thick Kalahari sand cover has varying thickness across the region, but was established through water borehole southwest of Katima Mulilo to average around 216m (Miller, 2008). Older borehole logs has shown a succession of sand or clayey to sand/loam in various parts of the region, with some of the sand layers unconsolidated. This sand layer is fine to medium grained, getting coarser with increasing depth.

Being part of the extensive Kalahari basin that formed over 130 to 180 million years, much of the soils of the region characterized by sand shaped into dunes. To a great extent the soil texture determines the classification of the soil, with much of the flood-prone areas characterized by high clayish to sand content, and those westward of the region more sand content (Mendelson and Roberts, 1997).

### 3.4 Hydrogeology

The local hydrogeology of the area is less extensively examined by existing literature. This is attributed to non-existent utilization of groundwater resources given proximity of the Zambezi – Chobe surface systems. However, regionally characterized in the Kalahari Group formations that extensively overlays the eastern Zambezi Region. The Upper Kalahari Group is composed mainly of Aeolian sands, colluvium, alluvial/deltaic sands, interbedded alluvium, sand, silt and

clay, while the Lower Kalahari Group units include; conglomerates and gravel units which sporadically occur at the base of the Lower Kalahari Group and occasionally fine-grained, homogenous marls/clays; varicolored, sandstones; calcretes, silcretes and other duricrusts (Kawawa, 2015; Thomas & Shaw, 1991b). The Kalahari Sequence is characterized mainly of porous aquifers, however displays variability in properties over short distances (Struckmeier & Chritelis, 2001).

Groundwater table varies within 20 to 40 m below ground level in the far eastern parts of the region (Kawawa, 2015). The quality of groundwater is characterized as highly variable throughout the region, however areas in proximity to rivers generally have good quality due to surface-groundwater interactions.

Despite significant potential of groundwater both qualitatively and quantitatively on the Impalila Island, this resource is less utilized compared to its counterpart, surface water, however the former still valuable for maintaining ecosystem functioning.

### 3.5 Biodiversity

Locally, the Impalila Island falls within the registered Impalila Conservancy, while regionally under the extensive Kavango Zambezi Transfrontier Conservation (KAZA) area, evidence of the biodiversity value of the area. Closer assessment of the biodiversity of the area is provided below.

#### 3.5.1 Fauna

##### 3.5.1.1 Mammals

The Impalila conservancy lists among large mammals found in their conservation area the following species; elephant, buffalo, hippo, waterbuck, common impala, lechwe, sitatunga, warthogs and bushbuck. Much of these mammals are listed as specially protected or protected species under the Nature Conservation Ordinance (No 4 of 1975), however, of the list of these mammals, the Hippo is listed among vulnerable species on the IUCN Red list.



### 3.5.1.2 Reptiles

Among the common occurring reptiles in the Zambezi-Chobe system is the Nile crocodile. A wildlife survey of 2007 by Elephants Without Borders (EWB) funded by MET and cooperating partners indicated that crocodiles were widely distributed in the Chobe and Zambezi floodplains away from the main river channel. Moreover the no reptile species from the “four corners area” an area consisting of parts of Botswana, Namibia, Zambia and Zimbabwe sharing the Zambezi river appear on the 2002 IUCN Red List of Threatened Species, but all species in the lizard genus *Cordylus* and the Monitor lizard genus *Varanus*, in addition to *Python natalensis*, are listed on CITES Appendix 2 (AWF, 2004),.

### 3.5.1.3 Amphibians

Without limitation to the Zambezi -Chobe, but an extensive connected system including the Kwando-Linyanti when flooded is pronounced as having three-quarter of all known frogs found in Namibia. According to AWF (2004), no amphibian species from the “four Corners area” appear on the 2002 IUCN Red List of Threatened Species.

### 3.5.1.4 Birds

The water channel along confluence of the Zambezi/Chobe River provide habitat for many federally threatened bird species. The area is renowned for its high diversity of wetland birds. More than 44 species belonging to 17 different families has been recorded within the limits of its borders making it a great birding destination for tourism. Avitourism is one of the faster growing subsectors of ecotourism, recognized for its economic value. Birdwatchers are a diverse group, some of whom competitively seek vagrant birds (i.e., birds outside their normal geographic range). Notable birds species around the Zambezi/Chobe area includes the little egret, squacco heron, black heron, cormorants, African darter, Blacksmith lap-winged plover, African skimmer and the Pied king fisher. Birdlife is especially rich where permanent water is present. There are many fish eagles on the river, and their call is one of the most iconic sounds of Africa. Potential species includes skimmers along the sand banks, making a sighting particularly exciting for southern Africa bird watchers. Most wetland birds dwells on small fish, making wetlands ecologically and biologically important. In addition to food source, wetlands of the Zambezi/Chobe Rivers are idyllic breeding sites and pass ways

for migratory birds such as the heron, skimmers and the yellow billed storks. As a result, wetlands within the marginal border of the Zambezi/Chobe River must be viewed as important sites for future conservation of migratory birds.

#### 3.5.1.5 Fishery

The middle Zambezi and Chobe Floodplains provide breeding and feeding grounds for a moderately rich fish fauna including a near-endemic radiation of large riverine cichlids. There are around 89 fish species in the Zambezi/Chobe ecoregions (Hay et al., 2009). Cyprinids, Cichlids, Characins, Mochokidae, Claridae, Mormyridae and Schilbe dominate the fish fauna. The most common species consists mainly of cichlids: *Oreochromis andersonii*, *Oreochromis macrochir*, *Coptodon rendalli*, *Serranochromis spp*, but also *Hydrocynus vittatus* (Recreational species), *Clarias gariepinus* and *C. ngamensis*, smaller species such as *Schilbe intermedius*, *Marcusenius altisambesi*, *Synodontis spp*, *Brycinus lateralis*, small *Barbus*. *Hydrocynus vittatus*, *Oreochromis andersonii*, catfish, Nembwe and dusk breams are the target recreational species for tourists who practice catch and release.

#### 3.5.1.6 Flora

Vegetation of the Impalila Island is described by Mendelson & Roberts (1997) as Impalila woodlands, identifying this vegetation as not occurring elsewhere in Namibia. The drier areas of island areas are dominated by mopane including papyrus, baobab, water figs, pod mahogany, knobthorn and star chestnut, while margins of the island or riverine areas are dominated by species *Diospyros mesipiliformis*, *Lonchocarous capassa*, *Ficus sycomorus*, *Cassine tranvaalensis*, *Kigelia Africana* and *Syzygium guineense*. These plants species do not appear on the list of protected species of Namibia.

### 4. The Socio-Economics of Impalila Island

The Impalila Island comprises an area of 73 square kilometers and forms part of the Kabbe South Constituency of the Zambezi region. The population of the island is estimated at close to 2000 people, where majority of the people survive through a diversity of subsistence activities including crop production, vegetable gardening, fishing, livestock keeping and selling of thatching grass and reeds (NACSO, 2012). Formal employment on the island is primarily in public service (Ministries of Education, Health, Immigration and Safety and Security) although

described as mostly held by people from outside the island. Alternatively, tourism operations such as lodges, houseboats, along with the operations of the conservancy provides the economic backbone of the island.

### 5. Stakeholder Consultation

The purpose of stakeholder consultation is deliberate to enable them to voice concerns related to the project and its activities. While consultation is a critical step in the planning stage of a new development, the value of the process can still be harnessed even for projects already in operating stage of the project to ensure that concerns raised by I&APs are addressed. Moreover, the process is valuable as it enables I&APs to support the project and attain approval of the acceptable risk level for the project to continue operating.

A stakeholder consultation was conducted on the 5<sup>th</sup> of October 2018 to give the community of Impalila and Kasika an opportunity to be involved in providing their concerns. Concerns raised and responses are attached as appendix to this document.



*Figure 10 Stakeholder Consultation meeting at Impalila Sub-khuta*

## 6. Impact Assessment

Impacts of the existing operations and infrastructure of Chobe Princess 1 were identified through a process involving;

- A public consultation meeting
- Site inspections visits
- Academic knowledge and professional experience in the field

Before impact assessment, it would be worthy providing the following definitions that form part of the impact assessment table provided below.

- ⇒ An *activity* is described as a distinct process or risk undertaken by an organization for which a responsibility can be assigned, inclusive of infrastructure or pieces of infrastructure that are possessed by an organization.
- ⇒ *Impacts* are consequences of the aspects on social or natural environment or receptors with particular value or sensitivity.

Operations of Chobe Princess 1 have existed for years and therefore, this sections examines impacts of these activities and adequacy of the present measures to mitigate against them.

A simplified criteria of determining the level of impact was developed as described below. The likelihood was ignored as the report presents the present case scenarios of results of the lodge operations.

Impact severity scale/level;

- **Low impacts** activity has negligible change on the environment, lasting less than 12 month in duration and confined to point of occurrence.
- **Medium Impact** has moderate change on the environment, lasting over 1 to 3 years duration and of scale beyond the point of occurrence to 10km radius (i.e. beyond the local area but not nationally/Internationally).
- **High impacts** has prominent change lasting over 3 year's duration and going beyond national to international scale, beyond 10km radius.

6.1 Impacts of Existing lodge Operations, Present Mitigation and Environmental Risk Level

Activity/facilities	Waste type	Pathways	Receptor	Impact	Current practices	Risk Level with Present mitigation	Gaps/Risks
<b>Accommodation aboard inclusive of public lavatories aboard the Houseboat</b>	Blackwater	Water	Aquatic life, humans and wildlife	<ul style="list-style-type: none"> <li>○ Degradation of the aquatic environment resulting in fatality of aquatic life, deterioration of water quality for any uses</li> </ul>	<ul style="list-style-type: none"> <li>○ Septic tank treatment system of wastewater aboard</li> <li>○ Regular application of Eco-tablets for microbial degradation of the sewage.</li> <li>○ Treated effluent pumped into sewerage boat for disposal at Ncheku-Kasika treatment plant.</li> </ul>	Medium	<ul style="list-style-type: none"> <li>○ Lack of regular inspection of the system for leaks and overflows while ascertaining operability of the at all times.</li> </ul>
<b>Kitchen, dining and bar operations</b>	Solid waste	Water	Aquatic environment and humans	<ul style="list-style-type: none"> <li>○ Environmental health hazard</li> <li>○ Impair the aesthetic value of the water</li> <li>○ Foul odours from</li> </ul>	<ul style="list-style-type: none"> <li>○ Waste is separated aboard the houseboat</li> <li>○ Separated waste is transferred onshore for</li> </ul>	Low	<ul style="list-style-type: none"> <li>○ Measures adequate but need to be maintained consistently</li> </ul>

				degradation of the organic matter	further handling at Ichingo Lodge <ul style="list-style-type: none"> <li>○ Regular inspection of application of separation of waste</li> </ul>		
	Greywater	Water	Aquatic life, humans and wildlife	<ul style="list-style-type: none"> <li>○ Access fats and oils may interfere with air-water interface processes reducing oxygen diffusion process</li> </ul>	<ul style="list-style-type: none"> <li>○ Greywater is discharged directly into the river</li> <li>○ Sink drain strainer to remove solids in draining water</li> </ul>	Medium	<ul style="list-style-type: none"> <li>○ No fat traps aboard the boat</li> </ul>
<b>Transfer of pre-treated effluent to a tanker (honey sucker) and transfer to land-based treatment system</b>	Pre-treated Blackwater	Water or land	Aquatic life, humans and wildlife	<ul style="list-style-type: none"> <li>○ Degrade the quality of water in the area spreading outwards affecting aquatic life and make water unusable</li> <li>○ Environmental health hazard to humans and wildlife</li> </ul>	<ul style="list-style-type: none"> <li>○ The Pumping system involves couplings that locks together to avoid any leaks during the process</li> </ul>	Medium	<ul style="list-style-type: none"> <li>○ At completion of pumping and disconnection, some residual effluent left in the pipes drains into the river.</li> </ul>
<b>Transfer of fuels onto the boat and their storage</b>	Hazardous waste	water	Aquatic life, humans and wildlife	<ul style="list-style-type: none"> <li>○ Contamination of the aquatic system</li> </ul>	<ul style="list-style-type: none"> <li>○ Fueling point involves nozzle</li> </ul>	Medium	<ul style="list-style-type: none"> <li>○ Although fueling nozzles involves insertion into the</li> </ul>

				<ul style="list-style-type: none"> <li>○ Cause fatality to the local aquatic life</li> <li>○ Health hazard to humans and wildlife of the area that may use contaminated water</li> </ul>	<ul style="list-style-type: none"> <li>○ insertion into the tank to avoid spills</li> <li>○ Regular inspection through a 2 days shutdown per month for maintenance</li> <li>○ All portable fuels stored in a secure storage</li> </ul>		<ul style="list-style-type: none"> <li>○ tank, overflow of the tank and possible spills could still occur and need to be managed</li> <li>○ Refueling of small boats may result in spills.</li> </ul>
<b>Maintenance of the boat</b>	Hazardous waste mainly waste oil	Water or land	Aquatic life, humans and wildlife	<ul style="list-style-type: none"> <li>○ Contamination leading to degradation of water resources</li> <li>○ Impair the quality of land or water for any productive uses</li> </ul>	<ul style="list-style-type: none"> <li>○ During maintenance spillages are handled with engine cleaner onboard and resultant water pumped for disposal onshore.</li> <li>○ Any used oils transported to Ichingo and supplied to local community members for own uses</li> </ul>	Medium	<ul style="list-style-type: none"> <li>○ No formal standard operating procedure on spill handling</li> </ul>
<b>Offshore solid waste handling, transfer to</b>	Solid waste	Land	Humans and animals	<ul style="list-style-type: none"> <li>○ Impair aesthetic value of the area</li> </ul>	<ul style="list-style-type: none"> <li>○ All waste transported to Ichingo Lodge for</li> </ul>	Medium	<ul style="list-style-type: none"> <li>○ None-recyclable waste collected by food supplier for</li> </ul>

<b>onshore operations</b>				<ul style="list-style-type: none"> <li>○ A health hazard to humans and animals</li> <li>○ Release of foul odours due to degradation of the organic matter</li> </ul>	<p>further handling with the lodges waste.</p> <ul style="list-style-type: none"> <li>○ Recyclable waste and other waste is collected by Sea-Pride for further handling in Katima Mulilo</li> </ul>		<p>disposal at Katima Mulilo may put pressure on landfill site there</p>
<b>Storage chemicals and housekeeping detergents</b>	Hazardous waste	Water	Aquatic life, humans and wildlife	<ul style="list-style-type: none"> <li>○ Contamination of water resources</li> <li>○ Threaten the productiveness of the aquatic system</li> </ul>	<ul style="list-style-type: none"> <li>○ All detergents for kitchen and housekeeping are securely stored aboard and only accessible on requirement for use.</li> </ul>	Medium	<ul style="list-style-type: none"> <li>○ Keep record of available chemicals aboard and their safety risk levels (MSDS)</li> </ul>



## 7. Environmental Management Plans

An EMP is defined as a document outlining measures or management actions on how activities with significant impact on the environment will be mitigated, controlled and monitored during the various phases of the project or throughout the lifespan of an operation, but also ensuring capitalization of the positive benefits of the project or an operation.

Moreover, an EMP outlines the roles and responsibilities and timescales both for implementation of mitigation measures but also the provide basis for measurement of compliance and ensuring general best environmental management practices.

Although an EMP covers the entire project cycle from construction, operation and decommissioning, an existing facility such as Chobe Princess 1 operating for 10 years just about enacting of environmental legislation (EMA), an EMP will only be restricted to the operations and decommission components of the generic project cycle phases. Therefore, this EMP will concentrate on these two components of Chobe Princess 1 operations.

## 7.1 Mitigation Measures

Activity/facilities	Waste type	Current practices	Gaps/Risks	Revised or Additional Measures	Risk after Additional Mitigation	Status	Responsible
<b>Guest and host rooms and public lavatories onboard the Houseboat</b>	Blackwater	<ul style="list-style-type: none"> <li>○ Septic tank treatment system of wastewater aboard</li> <li>○ Regular application of eco-tabs for degradation of the sewage</li> <li>○ Treated effluent pumped into sewerage boat for disposal at Ncheku-Kasika treatment plant.</li> </ul>	<ul style="list-style-type: none"> <li>○ Lack of regular inspection of the system for leaks and overflows while ascertaining operability of the at all times.</li> </ul>	<ul style="list-style-type: none"> <li>○ Inspection of the operability of the septic system twice a week complementing the application of the eco-tablets to ascertain operability at all times</li> <li>○ Take urgent necessary measures to address any incidents of overflows or leaks and record the incidents</li> </ul>	Low		Captain
<b>Kitchen, dining operations and bar</b>	Solid waste	<ul style="list-style-type: none"> <li>○ Waste is separated aboard the houseboat</li> <li>○ Separated waste is transferred onshore for further handling</li> </ul>	<ul style="list-style-type: none"> <li>○ Need for consistency from</li> </ul>	<ul style="list-style-type: none"> <li>○ Maintain the practice of separation of waste and storage prior transfer from the boat</li> <li>○ Develop a log sheet/register for waste removal</li> </ul>	Low		Captain

	Greywater	<ul style="list-style-type: none"> <li>○ Greywater is discharged directly into the river</li> <li>○ Sink filters to remove excess fat and other solids in the water</li> </ul>	<ul style="list-style-type: none"> <li>○ No fat traps aboard the boat</li> </ul>	<ul style="list-style-type: none"> <li>○ Thorough scullery work removing fats and oils off kitchen equipment's prior sink washing.</li> <li>○ No greasy or oily food disposed through the sink drain</li> </ul>	Low	Captain
<b>Transfer of pre-treated effluent to a tanker (honey sucker) and transfer to land-based treatment system</b>	Pre-treated Blackwater	<ul style="list-style-type: none"> <li>○ The Pumping system involves couplings that locks together to avoid any leaks during the process</li> </ul>	<ul style="list-style-type: none"> <li>○ At completion of pumping and disconnection, some residual effluent left in the pipes drains into the river.</li> </ul>	<ul style="list-style-type: none"> <li>○ Design and implement a bucket system to collect the residual effluent in the pumping pipes at disconnection of couplings at all transfer locations to ensure no effluent leaks to into the water</li> </ul>	Low	Captain
<b>Transfer of fuels onto the boat and their storage</b>	Hazardous waste	<ul style="list-style-type: none"> <li>○ Fueling point involves nozzle insertion into the tank to avoid spills</li> <li>○ Regular inspection through a 2 days shutdown per month for maintenance</li> <li>○ All portable fuels stored in a secure storage</li> </ul>	<ul style="list-style-type: none"> <li>○ Although fueling nozzles involves insertion into the tank, overflow of the tank and possible spills could still occur and need to be managed</li> <li>○ Refueling of small boats may result in spills.</li> </ul>	<ul style="list-style-type: none"> <li>○ Use of one the following alternatives procedures; a funnel to fill the houseboat fuel tanks with drip or spillage tray under the tank opening or use of a fabric to block tank opening underneath to prevent overflow spills dripping into the river.</li> </ul>	Low	Captain

				<ul style="list-style-type: none"> <li>○ Filling up of the tanks should be conducted with full alertness and second person supervision</li> <li>○ All small boats tanks to be fueled with use of drip tray underneath</li> <li>○ The following procedure to apply for spillages or leakages into the water; Disperse saw dust to the area where contaminant petrochemicals had spread out then pump off the contaminated water before further spreading afar. The pumped out water with saw dust to be transferred and handled similarly as waste oil at Ichingo Lodge</li> </ul>		
<b>Maintenance aboard the boat</b>	Hazardous waste	○ During maintenance spillages are	○ No formal standard operating	○ The following procedure to apply for spillages or leakages	○ Low	Captain

	mainly waste oil	<p>handled with engine cleaner onboard and resultant water pumped for disposal onshore.</p> <ul style="list-style-type: none"> <li>○ Used oils transported to Ichingo Lodge</li> <li>○ All boat engines serviced at the workshop on land at Ichingo Lodge</li> <li>○</li> </ul>	procedure on spill handling	<p>into the water; Disperse saw dust to the area where contaminant petrochemicals had spread out then pump off the contaminated water before further spreading afar.</p> <ul style="list-style-type: none"> <li>○ The pumped out water with saw dust to be transferred and handled similarly as waste oil at Ichingo Lodge.</li> </ul>		
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## 7.2 Resource Utilization and Biodiversity Management

Activity	Requirements	Management Actions	Responsible
<b>Water resources and wastewater</b>	Water Act of 1956 Water abstraction from a river and treatment and disposal of wastewater must be in possession of a valid permit.	<ul style="list-style-type: none"> <li>○ Application for water abstraction permit from the Department of water affairs.</li> <li>○ Regular monitoring and reporting of abstraction volumes.</li> <li>○ Ensure that all leakages are reported and repaired with urgency</li> <li>○ Encourage guests to reuse linen, through discouraging daily change of linen to reduce laundry use thus water used per day and greywater discharged</li> </ul>	Regional Manager at Ichingo Chobe river lodge
<b>Electricity</b>	Minimize emissions and carbon footprint	<ul style="list-style-type: none"> <li>○ Keep unused lights off especially during the day</li> <li>○ Maintain use of gas stoves in kitchen</li> </ul>	Assistant Manager Houseboat Operations
<b>Biodiversity</b>	Nature conservation ordinance of 1975 Protection of Namibia's fauna and flora	<ul style="list-style-type: none"> <li>○ Movements of staff restricted to the operational sites and work areas only.</li> <li>○ No hunting, trapping, setting of snares, or any other disturbance of any fauna species allowed without a required permit</li> </ul>	Regional Manager at Ichingo Chobe river lodge
	Inland Fisheries Act (1 of 2003) as amended prescribes a need for recreational fishing license, fishing seasons and fishing areas, as well as type of fishing equipment's	<ul style="list-style-type: none"> <li>○ Acquire a license for undertaking recreational fishing.</li> <li>○ Familiarization with restricted fishing areas and closed fishing seasons</li> <li>○ Obtain registration of all boats used in inland water</li> </ul>	
	Forest Act of 2001 Section 21 of the Act prohibits cutting or removal of vegetation within 100m of a river or stream or watercourse except under	<ul style="list-style-type: none"> <li>○ No trees occurring in this environment may be damaged or removed for any purpose without the required permit</li> <li>○ Any construction in new areas need a permit to be obtained prior removing any vegetation</li> </ul>	

	authorization of a license.		
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### 7.3 Healthy and Safety and Heritage Management

Activity	Requirements	Management Actions	Responsible
<b>Healthy and safety of workers</b>	Health and safety act Chapter 3 of the acts prescribes conditions for ensuring the welfare of workers at workplaces Chapter 5 of the acts prescribes management of hazardous substances. Chapter 6 of the acts prescribes requirements for managing of physical hazards to the workers as well as provision of protective equipment's	<ul style="list-style-type: none"> <li>○ Establish formal protocols for handling of hazardous substances inclusive of proper protective wears where required.</li> <li>○ Maintain policy of no intoxication while at work to eliminate safety and health risks</li> </ul>	Regional Manager at Ichingo Chobe river lodge
	Hazardous Substances ordinance 14 of 1975 Prescribes restriction on storing and sale of Group I declared hazardous substances	<ul style="list-style-type: none"> <li>○ Familiarization with regulation for import, storage and sale of group I declared hazardous substances</li> </ul>	
<b>Employment and Employee welfare</b>	○ Labour Act of	<ul style="list-style-type: none"> <li>○ Any new employment opportunities should be filled with local employees</li> <li>○ Adhere to the legal provisions in the Labour Act for the recruitment of labour (target percentages for gender balance, optimal use of local labour and SME's, etc.) in the Contract.</li> <li>○</li> </ul>	
<b>Environmental training and Awareness</b>	Sensitization of lodge employees of environmental impacts of their operations	<ul style="list-style-type: none"> <li>○ Design a short induction training for new employees to sensitize them on environmental issues and expectations.</li> <li>○ The lodge to keep a record of these trainings.</li> </ul>	Assistant Manager for houseboat Operations at Ichingo Chobe River Lodge

		<ul style="list-style-type: none"> <li>○ Regular weekly briefings of the current staff to include environmental issues relating to maintain and improve waste separation, handling and maintaining hygienic practices at all times in various areas of their operations, inclusive of minimization of water wastage, electricity saving as well as matter relating to health and safety of workers.</li> <li>○ Explanation of the specific mitigation measures within this EMP especially unfamiliar provisions</li> <li>○ Explanation of the importance of complying with the EMP</li> </ul>	
<b>Local Community</b>	Local communities maintain their lifestyles without drastic alteration	<ul style="list-style-type: none"> <li>○ The Lodge to develop an engagement strategy for the local community to sensitize them to understand of the lodge operations inclusive of how various environmental, health and safety issues are handled</li> <li>○ Avoid drastic disturbance of social livelihood of local community</li> <li>○ Engage communities on possible areas of support and maintain record of social responsibility projects (e.g. schools, clinic etc.).</li> </ul>	Regional Manager at Ichingo Chobe river lodge

#### 7.4 Rehabilitation

The House boat (Chobe Princess 1) is planned to continue operations for an indefinite period in the future, therefore rather than plan for closure, the Zambezi Houseboat Company to develop



a strategy for decommission of redundant facilities or equipment's. The strategy to outline measures of handling and alternatives for decommissioning either facilities or equipment's that have become redundant as the boat continue its activities.

## 7.5 Roles and Responsibilities

Monitoring requirements	Frequency	Responsible
Inspection of septic system aboard	Weekly	Captain
Inspection of waste separation in all areas and proper storage prior transfer	Weekly	Captain
Inspection of chemicals Storeroom	Weekly	Captain
Inspection of sewage treatment process offshore and onshore by selected member of committee comprising community organizations in the area	Bi-monthly	Regional Manager

## 7.6 Reporting, EMP implementation and Review

### 7.6.1 Reporting

To ensure successfully implementation of the EMP, all employees are required to report incidents relating to environment, health and safety on the premises to their supervisors who shall report to the responsible manager responsible. All environmental, health and safety incidents or observation to be recorded and actions taken to address these incidents and ensure close-outs.

### 7.6.2 Implementation

Implementation of this EMP rests in the Regional Manager of Zambezi Houseboats as the overall head of all operation Chobe River Lodge. The manager may delegate responsibilities of specific areas of operations to his staff, however overall accountability is retained. Moreover, the Manager retains the accountability for;

- Reporting as required by competent authority
- Obtaining of all required permits as outlined in this EMP
- Review and update of this EMP document.

## 8. Conclusion and Recommendations

This document outlines that although the houseboat has been in operation since 2014 prior to consideration of the requirements of EMA and its regulations, the houseboat has adopted significant measures to ensure that impacts of the operation are minimized to acceptable levels. This document further indicates that with implementation of the prescribed mitigation measures in the EMP section, the residual impacts of the operations of Chobe Princess 1 will be minimal.

The public consultation meeting revealed a lack of cordial transparent relationship between the Lodge and the community, as such there appears to be intense speculation of the methods of handling waste on the lodge. This can only be addressed through engagement and transparency that can be created through awareness. It is therefore recommended that the Lodge make a commitment to establishing this transparent relationship through inviting a committee that may include representatives from the following institutions on the island; the traditional authority of the area (i.e. Induna of the Impalila and Kasika sub-khuta), the Impalila and Kasika conservancies, the Village Development Committee (VDC), ordinary members of the community and Ministry of Health to an awareness session on the practices of handling, treatment and disposal of waste from the lodge. Intervals of such engagements to be determined by the lodge and such a committee.

Secondly, lack of a designated landfill site on the island seems to be a major cause of inconsistent handling of waste both for lodge operations and local community. As per suggestions of the community at the consultation meeting to endeavor in seeking a portion of land from the people of the island to designate as landfill site, the lodge to support these efforts as it may potentially be beneficial and minimize environmental costs for own handling of waste.

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