Environmental Management Plan

for

Operations of Cheku Onshore Base Support Station for Zambezi Queen Houseboat Collections

December 2024

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Zambezi Queen Holidays (Pty) Ltd.
P. O. Box 1856
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Namibia

Project Information

Project Title	**Environmental Management Plan for Operations of Cheku Onshore Base Support Station for Zambezi Queen Houseboat Collections.**
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Abbreviations

ECC	: Environmental Clearance Certificate
EMP	: Environmental Management Plan
DEAF	: Directorate of Environmental Affairs and Forestry
MEFT	: Ministry of Environment, Forestry and Tourism
ZQH	: Zambezi Queen Housboats

1. Introduction

Zambezi Queen Holidays (Pty) Ltd hereon also referred as proponent utilise a piece of land located in the Kasika area of Zambezi Region, for purpose of a base station that supports the operations of the houseboats collections. The operation of the base station ascribes to tourism activities, and thus grouped under activity 6 of the annexure of the EIA Regulations (GN. 29 of 2012) of the Environmental Management Act (No. 7 of 2007). Subsequently, the proponent appointed Namib Consulting Services CC to determine the extent and significance of the environmental consequences associated with the existing operations of the onshore base support station and develop an environmental management plan for the operations.

2. Objective

This Environmental Management Plan (EMP) establishes a framework consolidating requirements towards mitigation of adverse impacts from the operations of Zambezi Queen Holidays at Cheku base station in Kasika area of Zambezi region.

3. Operational Locality

3.1 Location of Operations

Cheku is located on the banks of Ntonga backwater channel of the Chobe river in the Kasika area of Zambezi Region. The portion of land utilised for the base station comprises 2-hectares, hosting several structures including; staff accommodation with kitchen facility, workshop, storage facilities for fuels, machinery and equipment, administrative office, laundry facility, scrap storage area, wastewater treatment plant, and a solid waste disposal site. Figure 3:1 provides the overall outlook of the site.

Figure 3:1 Location of Cheku base station

3.2 Land Ownership and Uses

Land Ownership

Zambezi Queen Holidays (Pty) Ltd has occupied the portion and utilised the land where the current Cheku operations for 19 years with consent of land owners that is ratified by the Traditional Authority since 2011. This decision was recently reaffirmed by the traditional authority as per Authority letters complementary to this report, in line with the provisions of section 30 (4) of the Communal Land Reform Act of 2002.

Land Uses

The portion of land referred as Cheku is utilised for purposes described in detail in the next section, however, this portion falls within the greater area of Kasika Conservancy, as in Figure 3:2. Despite this overall land use characteristic, the communities in the area utilise various surrounding areas as part of ancestral land for subsistence livelihood activities including crop farming.

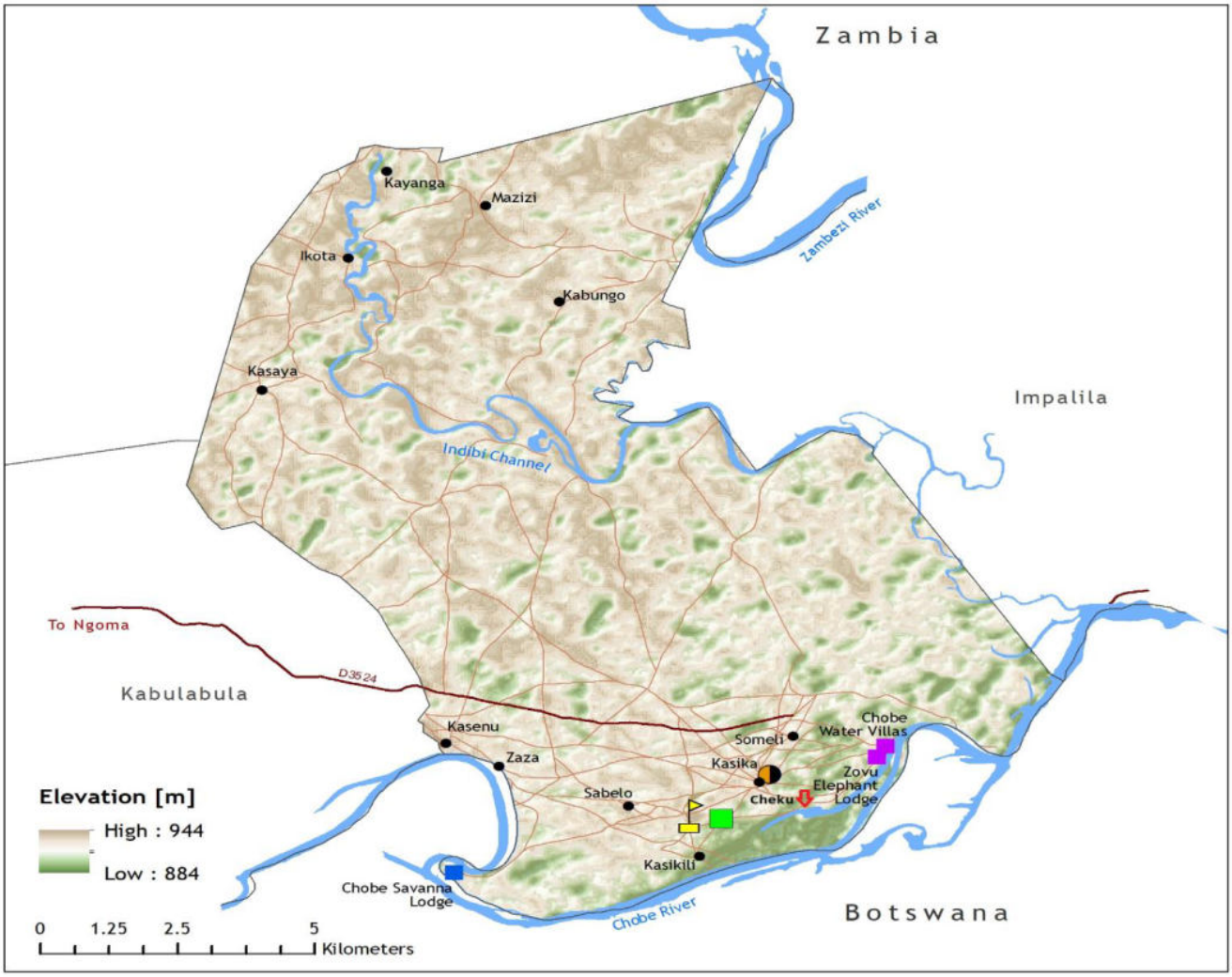

Figure 3:2 Kasika Conservancy area

4. Description of Site Activities and Associated Impacts

The operations at Cheku centre around providing support services to the Zambezi Queen Houseboat (ZQH) collections. The proponent operates four houseboats that offer leisure activities in the Chobe River and are serviced by facilities stationed at Cheku. Subsequently, a series of activities carried out at the site can be described as accordingly per site as follows;

i. Waste management operations
ii. Laundry operations
iii. Staff accommodation and associated operations
iv. Power generation/supply operations
v. Workshop and storage operations
vi. Administrative operations

The activities are described below in detail.

4.1 Waste Management Operations

Liquescent Waste Management Practices

Sewer generated from offshore operations (i.e. houseboats) is pre-treated however, transferred from the houseboats to onshore facilities for further treatment to acceptable quality standard. Therefore, the first phase in handling of this pre-treated effluent at Cheku is at the docking point (Figure 4:1). A honey sucker boat delivers the pre-treated effluent to the docking point, further followed by connecting of piping that transfers the content to a land based modular trickling filter treatment plant.

Figure 4:1 Cheku docking point

On land, the modular trickling filter system involves a six (6) step treatment process. The steps set as follows;

i. ***Pre-treated effluent*** from the honey sucker boat collects into a first conservancy receiver tank. The effluent comprises entirely liquid. This tank is level controlled to prevent overflows. At about 90% capacity of the tank, the level sensor triggers flow to the second and third balancing tanks. The balancing conservancy tanks are utilized mainly for temporal storage of pre-treated effluent, meanwhile balancing tank the outflow into the bio-tower tank, that hosts the trickling filters.
ii. In the ***bio-tower tank***, the effluent from balancing tanks is spread evenly on the surface of a filter bed, allowing the downward trickling of the effluent. As the water passes on the filter media, microorganisms feed on the nutrients in the water and produce a biofilm on the surface (slime). It is with this biofilm that causes further microorganisms activity to oxidise the organic matter in the wastewater to carbon dioxide while generating new biomass. As the water continues to trickle down the filters, treated water is removed by an underdrain system. Its further through the underdrain that air circulates upward through the media to ensure continuous functioning of the process. The biological slime of microbes formed on the media as water drains may need removal at certain intervals, however, bio-towers are advantageously known for generating very little sludge.

iii. The fifth tank of the system is the Ozonation treatment stage, where biologically treated effluent from the bio-towers is disinfected by ozonation.

iv. The final tank is referred to as the irrigation tank as it temporally stores treated effluent, and is with fitted with a level control sensor, controlling the releases final effluent through a sprinkler system as the tanks fills up. The sprinklers are located on the flood plain area away from the river channel.

Figure 4:2 Onshore modular wastewater treatment plant and irrigation/discharge areas of treated effluent

Beside effluent from houseboats, waste oil from servicing of houseboats is also transferred to Cheku for further handling and management. This waste oil is decanted into a 200 litre drum for storage, pending supply on request to community members. Those members of the community that request it, utilise it for treatment of termites on their thatched houses, reed fences and poles among others.

Associated Impacts

- *Potential pollution of the stream, groundwater or soils* – in the following ways;
  - Pipes that transfer pre-treated effluent from the honey sucker boat to the onshore receiver tank could leak or spillages at connecting points potential for pollution of the stream or soil surfaces.

  - The modular plant treatment steps may become malfunction or become ineffective over time if slime maintenance is not addressed, and thus potential failure to treat effluent to required

quality for discharge into the environment. This can be potential health hazard to the people that traverse the flood plain but also a source of diffuse pollution.

- The transfer, storage of waste oil also presents the risk of pollution if a series of the steps involved from the docking point to storage areas are not well managed. Furthermore, during storage containers could leak or spillages during decanting to local users. Occurrence of these could lead to potential pollution.

Solid Waste Management Practices

Solid waste comprises that from two streams; onshore and offshore facilities. waste from offshore facilities is pre-separated into recyclables and non-recyclables. Recyclables included plastic bottles and other plastic containers as well as cans that are delivered to Cheku. The separated empty cans are sent for crushing at another locality (i.e. Ichingo lodge at Impalila) and thereafter parked into plastics bags. These packaged recyclables are stored and await collection by the food supplier to ZQH collections. Sea Pride Company, the contracted supplier of food to the ZQH operations, transports these prepared recyclables to Katima Mulilo for further handling as necessary for recycling centres.

Figure 4:3 Recyclable solid waste

Non-recyclable waste that include papers, card boxes, empty cartons and food waste are indiscriminately disposed into a trench for later treatment by burning. The trench is fenced for seclusion (Figure 4:4).

Figure 4:4 Solid waste disposal site

Associated Impacts

- *Loss of landscape aesthetics* – waste such as plastics, paper and other mobile material could lead to loss of aesthetics of the area. Such could in future come from unmanaged recyclables as these need to be transferred to appropriate handlers to prevent accumulation and eventual need to merely dispose to the environment.

- *Threats to livestock or wildlife* – unmanaged solid waste of different types could pose a hazard to livestock or wildlife that could consume dispersed thin plastics or other material and resultant dreadful implications.

- *Nuisance of scavenging animals to the area*– the dumping of food leftovers from onshore and offshore facilities at the trench could attract scavenging domesticated or wild animals or flocking of birds.

4.2 Laundry Operations

Offshore accommodation facilities such as houseboat guest rooms rely on supply of housekeeping materials such as clean linen from land based laundering operations at Cheku. Therefore, the laundry building consists of four washing machines that are utilised preparation of required housekeeping materials. The laundry building facility is well kept and neat with dust bins for solid waste collection. Detergent water from the machines discharged through a pipe with a discharge point located some 40meters away from the building. The discharged effluent is into a small pond to allow natural filtration through soil media and but also exposed to the sun for evaporation.

Figure 4:5 Laundry facility

Solid waste from the laundry facility is handled as per earlier described solid waste management practices in this report.

Associated Impacts

- *Potential stream/groundwater/soil pollution*– flow or seepage of detergent water has potential contamination of soils, groundwater or overflow to reach the stream.

4.3 Staff Accommodation Facilities

Much of the employees on the ZQ houseboat are day workers, shuttled aboard every morning and leave for Cheku accommodation facility every evening. This facility comprises of six (6) tented chalets and two (2) flats. Each chalet has a toilet and a shower connected to an individual septic tank and can accommodate up to six (6) people in an open plan space.

The tents are separated to accommodate males and female personnel. Further to these accommodation is an open kitchen area for all employees for meal preparations. This kitchen facility area was observed not well maintained with reticulating lines from the kitchen observed to leak.

Figure 4:6 Staff accommodation facilities

Associated Impacts

- *Potential stream, groundwater or soils pollution* – leakage of sewer water from reticulating lines and potential overflow of the septic tanks has potential to pollute soils, groundwater or overflow into the stream.

- *Undermine the welfare of the employees* - unhygienic conditions from pools of water from overflows of septic tanks or conveyance lines can be breeding ground for mosquitoes or other water borne diseases.

  Moreover, lack of mosquito protection at these accommodation facilities may further lead to exposing staff to malaria disease.

4.4 Power Generation Operations

Cheku and Zambezi Queen houseboat operations are powered by a series of diesel generator sets (gen-sets). Three gen-sets are stationed on an impermeable surface within a lockable cage. Fuel supply for these gen-sets is from both Katima Mulilo and Kasane (Botswana). Fuel from Kasane is carried in 25 litres containers, while that from Katima is through filling a fuel bowser. The bowser has capacity to carry and store up to 400 litres.

Fuelling involves transfers directly from the 25 litre containers to the gen-sets or transfer from the bowser to the 25 litres containers for fuelling. Some of the containers are stored in the generator enclosure for emergency fuelling purposes. The empty fuel containers are stored in the workshop storeroom, while empty oil canisters are packed into waste bags for handling as recyclables. Waste oils from servicing of the generators is collected and combined with that received from offshore facilities and stored in the 200 litres drum as per earlier described practices.

Noticeable on the surfaces around the cage are traces of spillages of fuels and oils. The surroundings of the generator area not well maintained, indicating inconsistent and unsafe procedures for fuelling. Moreover, the surrounding area is not well maintained, with noticeable encroachment of vegetation towards the gen-sets area.

Figure 4:7 Power generation facilities

Associated Impacts

- *Potential stream, groundwater and soils pollution*– spillages of fuels and oils substances leakage has potential to end up polluting soils, groundwater or flow overland into the stream.

- *Loss of aesthetics of the gen-set area* – the appearance of the area indicates lack of good housing keeping practices and thus can be an eyesore to those on the site or passer-by.

- *Threats to wildlife* – waste oil if not well stored can be a danger to wildlife such as birds or small reptiles and insects that could find a way to storage area.

4.5 Workshop Facility

The workshop is utilised as storage of items some redundant and some still useable. Those that were identifiable include gas-bottles, redundant washing machines, fuel containers, a welding machine, tents, life jackets, mates and many others for various works including plumbing, joinery, metal fabrication. Repair works required on equipment and machines on land or for houseboats is carried out in this workshop. Noticeable is no order of organisation practiced in the workshop but random storage.

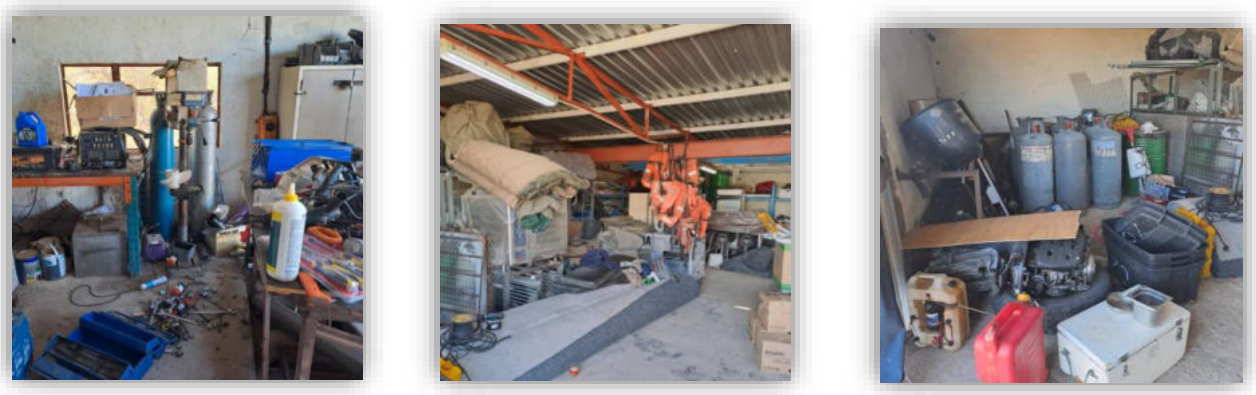

Figure 4:8 Workshop facilities

Beside the workshop, there is space in the yard where old redundant equipment and machines, including scrap metals, and wires are kept.

Associated Impacts

- *Compromised operational safety* – due to lack of proper housekeeping arrangements in the workshop, this could lead to tripping and accidents to personnel that utilise the workshop.

5. Review of relevant Legislation

Legislative Instrument	Requirement	Applicability
Namibian Constitution (1990)	Article 95 on maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources in a sustainable way for the benefit of all Namibians, both present and future.	A relatively high level of environmental protection is called for in respect of pollution control and waste management and protection of natural resources
Environmental Management Act No. 7 Of 2007 And Environmental Impact Assessment Regulations GN of 2012 and	Aims to promote the sustainable management of the environment and the use of natural resources. further provides for a process of assessment and control of activities which may have significant effects on the environment. The Act and its regulations prescribe the requirements for obtaining an ECC for listed activities.	As listed activity this project is to align with the requirements to develop an EMP towards compliance with the Act.
Inland Fisheries Resources Act 1 of 2003	Provides for the conservation and protection of aquatic ecosystems and the sustainable development of inland fisheries resources; to provide for the control and regulation of inland fishing; and to provide for related matters.	Required that measures are taken to protect and conserve fisheries and other associate aquatic resources.
Water Act No. 54 Of 1956 (The Water Resources Management Act No 11 of 2013)	Institutions responsible for an activity with potential for pollution to take necessary steps to prevent occurrence.	- Take all necessary efforts to prevent the pollution of the water source. - Handling and treatment of effluent requires a permit.
Labor Act Of 2007	The objectives of the Act are to ensure the health, safety and welfare of employees but also outlines the rights and obligation of employers.	The welfare of workers need be safeguarded in the work environment.
Soil Conservation Act 76 of 1969	Intends to combat and prevent soil erosion, and for the conservation, protection and improvement of the soil, vegetation and the sources and resources of the water supplies. Under section 4 the Minister may by means of a direction order the owner of land to construct the soil conservation works.	Operations shall not lead to exacerbated erosion.
National policy on human-wildlife conflict management, 2009	To provide the framework for addressing human-wildlife conflict efficiently and effectively in order to promote both biodiversity conservation as well as human development.	Operations in a conservancy may have potential for HWC and thus need to collaborate with existing structures/stakeholders in measures to avert such conflicts
Communal Land Reform Act 5 of 2002 (section 30)	To provide for the allocation of rights in respect of communal land; to establish Communal Land Boards; to provide for the powers of Chiefs and Traditional Authorities and boards in relation to communal land; and to make provision for incidental matters.	Rights over the portion of land need to follow necessary allocation process for security of the operations.
National Solid Waste Management Strategy	The strategy aims to strengthen institutional and legal framework for management of solid waste serving as a guide to institutions such as local authorities on sound waste management practices.	Provides a guide to managing solid waste based on sustainable development principles.
Nature Conservation Ordinance (No. 4 Of 1975) and It Amendment Act of 1996	Provides a framework for the conservation of wildlife. List wildlife species under protection and activities allowed and not allowed when in these	Adherence to the required conduct in designated conservation area.

	conservation areas. The act further provides for the establishment of conservancies.	
Convection on Biological Diversity (CBD)	Namibia is obliged under international law to conserve its biodiversity.	Projects should consider actions where the envisaged activity may cause damage to biodiversity.

6. Environmental Management Plan

6.1 Objective

This Environmental Management Plan (EMP) establishes a framework aimed at addressing adverse impacts from the operation of Cheku onshore base station. It is the overall objective of the EMP that activities at the site are carried out in a systematic approach towards mitigation of identified adverse impacts whilst enhancing the derivable benefits.

6.2 Roles and Responsibilities

The following roles and responsibilities are established towards the implementation and compliance to the EMP.

The Department of Environmental Affairs and Forestry (DEAF)

The Environmental Management Act (No. 7 of 2007) empowers the Environmental Commissioner (EC) in the MEFT as the designated authority responsible for approval of ESMPs. Once approved, an ESMP is a legally binding document and carries the obligation for implementation by the Proponent. The EC has the authority to enforce legal action towards the Proponent, subsequent to perpetuity of non-compliance after inspections and issuance of compliance orders.

The Proponent

The Proponent remains the Zambezi Queen Holidays (Pty) Ltd, through the designated area operational manager. The following responsibilities will reside with the stated area operational manager;

i. Ensure implementation of all requirements of the EMP, inclusive of legislative and financial requirements to ensure that the Proponent is compliant at all times with the entire scope of measures prescribed.
ii. Keep the Proponent constantly informed of the implementation of the EMP and all matters relating to monitoring, review, and updates.
iii. Lobby and secure resources required for comprehensive implementation of the EMP.
iv. Keep and maintain a monitoring, review, and update schedule on the progress of implementing the EMP.
v. Ensure other relevant stakeholders are updated and informed on the implementation of EMP. (i.e. the conservancy, local headmen, and village development representatives).
vi. Designated an environmental and safety officer towards comprehensive implementation of the EMP.
vii. Ensure that all the required environmental licenses and permits have been obtained as required.
viii. Ensure environmental inspections, audits and monitoring of environmental factors as established in EMP.
ix. Produce reports on environmental and social performance as per monitoring plan at stipulated intervals.
x. Ensure that operations are reviewed and new impacts identified from unforeseen activities and recommend necessary measures for avoidance, or mitigation.

Site Administrator

The Site Administrator shall be designated to the individual responsible for Cheku site. Due to the limitations of operations setup, such shall also assume the designation and responsibilities assigned to the Environment and Safety officer. The Site Administrator shall carry out the following;

i. Ensure that all relevant measures contained in the EMP are comprehensively implemented.
ii. Establish and maintain information and record system on incidents, corrective actions, grievances process and outcomes.
iii. Liaise with relevant authorities and contractors regarding compliance to legislation requirements.
iv. Ensure compliance to established safety standards and requirements for safer operations.
v. Providing recommendations for remedial action in the event of any non-compliance.
vi. Ensure an incident logbook is established, maintained, updated.
vii. Investigation as so necessary of grievances or incidents towards the resolution process.

6.3 Implementation Plan

(a) Waste Management Operations

Aspect/Activity	Impact	Mitigation	Responsible	Implementer	Frequency
Leakage or spills from the transfer of pre-treated sewer from a honey sucker boat to the onshore treatment facility	Pollution of stream, surface or groundwater resources.	Ensure that full drain is attained prior disconnection of couplings.	Area Operations Manager	Boat Pilot	Continuous as per transfer schedule
		Implement the placement of a bucket to collect residual effluent from connecting and disconnecting pipes from honey sucker boat to the onshore plant.			
Onshore treatment plant malfunctions or not effective in final treatment process of environmentally discharged effluent		Implement regular servicing of the modular plant for continued effective operations	Area Operations Manager	Area Operations Manager	As per Plant Operational Requirements
		Sample and test final effluent quality to ensure compliance to legislative requirements.		Site Administrator	Bi-annual
Dispersion of lightweight solid waste from the disposal area	Environmental and safety hazard to livestock, human and wildlife.	Regular inspection of the site to ensure no litter is generated around the site.	Site Administrator	Site Administrator	Bi-weekly
	Loss of landscape aesthetics.				
Indiscriminate disposal of food waste and others	Attraction of scavengers to the site	Implement improvement to waste separation targeting food waste from other solid wastes for proper handling.	Site Administrator	Waste handlers	Continuously
		Identify and collaborate with local communities to supply them food waste to piggeries or for composting purposes.		Site Administrator	Once off and Continuously
Open burning of waste at designated site.	Produces and disperses smoke to surrounding receptors such as communities that may be a health risk.	Design an incinerating unit from materials such as drum for controlled burning of waste such as paper and card boxes.	Site Administrator	Site Administrator	Once-off
		Open burning at the waste disposal site be discouraged at all times.	Site Manager	Waste handlers	Continuously
		No plastic waste, bottles and cans waste shall be burned along with other waste.			
Waste oil management across operations	Contamination of soils, stream and or subsurface environment	No disposal of water oil shall be carried out at the solid waste site.	Site Administrator	Waste handlers	Continuously
		Waste oil shall be retained and securely stored pending supply to relevant waste oil recyclers or safe alternative uses.			
		Keep record of all stored and all waste oils that leave the site in a register			

(b) Laundry facilities

Aspect/Activity	Impact	Mitigation	Responsible	Implementer	Frequency
Leakages from the laundry piping and fittings	Stagnant discharged water may lead to breeding ground for water borne diseases or cause for pollution from dissolved detergents	Regular inspection and maintenance of piping's and fittings to prevent leakages.	Site Administrator	Maintenance staff	Monthly
		Evaporation pond is constructed to minimise overflow of detergent water into the environment.	Site Administrator	Maintenance staff	Once for construction Operation continuously

(c) Staff accommodation facilities

Aspect/Activity	Impact	Mitigation	Responsible	Implementer	Timing and
Leakages from the septic tanks, shower reticulating lines and fittings	Pollution of soil, groundwater or stream	Regular inspection and maintenance of piping's and fittings to prevent leakages	Site Administrator	Maintenance staff	Monthly
		Regular inspection of conservancy tanks (i.e. septic) for integrity from leakages.			
Unhygienic conditions of the accommodation	Health hazard	Keep staff chalets clean by implementing good housekeeping practices.	Area Manager	Site Administrator/Assigned Occupants	Continuous
Lack of Mosquitoes prevention measures in staff quarters.	Prevalence of malaria infections among staff	Encourage and ensure access to necessary mosquito protection products to the staff.	Site Administrator	Occupants	Continuous

(d) Power generation facilities

Aspect/Activity	Impact	Mitigation	Responsible	Implementer	Frequency
Lack of proper storage and use protocols for petroleum products	Pollution of soil, groundwater or stream, including threats to wildlife.	Devise standard operating procedure to manage the use and storage of oils and fuels	Site Administrator	Site Administrator	Once-off
Poor housekeeping practices around the site		All hazardous substances to be labelled.			Once-off and as necessary
		Familiarise responsible personnel on proper fuelling of gen-sets avoiding spillages			Once-off and as necessary
		Use of drip buckets/trays be improved upon in fuelling of gen-sets.		Maintenance personnel	Continuously
		All used oils shall be safely collected and retained in marked containers.		Maintenance personnel	Continuously
		Clearance and maintenance of the areas surrounding the generators		Maintenance personnel	Continuously

(e) Workshop and associated storages

Aspect/Activity	Impact	Mitigation	Responsible	Implementer	Frequency
Poor housekeeping practices	Operational hazard to the staff	Demarcate areas for storage of material or substances based on typology.	Site Administrator	Maintenance personnel	Continuous
		Ensure current housekeeping arrangements are improved upon to provide neatness.			

6.4 Legal Compliance Requirements

Aspect	Objective	Relevant Authority	Frequency	
Compliance to effluent discharge quality	Effluent quality standards are maintained as per the water resources management Act. The standards are provided as Annexure X to this report.	Ministry of Agriculture, Water and Land Reform	Bi-annual	Site Administrator
Reporting on implementation of the EMP	Compliance to the EEC conditions	DEAF	Bi-annual or as may be determined upon issuance of ECC.	Area Operational Manager

7. Conclusion and Recommendations

This assessment took to establish the operations that exist at Cheku base station for the Zambezi Holidays Pty Ltd. These operations began in 2005 and have been in existence for over 19 years. Despite prior existence, it is required that these align with the requirements of Environmental Management Act and the EIA Regulations. This provides basis for the application by Zambezi Queen Holidays (Pty) Ltd for an ECC to align the operations at Cheku Base Station with the requirements.

The finds that the major environmental challenge for the operations are potential pollution from various sources that include;

a) Effluent produced both from offshore and onshore facilities.
b) Waste oil from onshore and offshore facilities
c) Greywater from laundry facilities

Further to potential liquid waste pollution, is potential negative impacts from;

d) Solid waste
e) Safety and health in the work environment

Premised on the established potential impacts, measures have been identified into a management plan. These measures are based on standard practice in the field of environmental management and more so considered contemporary. Practical and acceptable practice.

The Proponent through the established roles shall be liable for the implementation of the EMP and to achieve required level of implementation. Non-compliance shall be subject to legislative requirements and subsequent applicable processes by the Environmental Commissioner.

Recommendation

The Environmental Assessment Practitioner recommends to the Environmental Commissioner, that this developed EMP as sufficient tool and framework to adequately manage the potential significant adverse impacts established in the report from the operations at Cheku, through issuance of an environmental clearance certificate.

ANNEXURE 11
(Regulation 67)

WATER QUALITY STANDARDS WITH WHICH EFFLUENT DISCHARGE MUST COMPLY

Table 1: Water Quality Standards for Effluent

Effluent to be discharged or disposed of in areas with potential for drinking water source contamination; international rivers and dams and in water management and other areas				
			Special Standard	**General Standard**
DETERMINANTS	**UNIT**	**FORMAT**	**95 percentile requirements**	
PHYSICAL REQUIREMENTS				
Temperature	° C		Not more than 10P^{op}C higher than the recipient water body	
Turbidity	NTU		< 5	< 12
PH			6,5-9,5	6,5-9,5
Colour	mg/litre Pt		< 10	< 15
Smell			No offensive smell	
Electric conductivity 25 °C	mS/m		< 75 mS/m above the intake potable water quality	
Total Dissolved Solids	mg/litre		< 500 mg/litre above the intake potable water quality	
Total Suspended Solids	mg/litre		< 25	< 100
Dissolved oxygen	% satura-tion		>75	>75
Radioactivity	Units		below ambient water quality of the recipient water body	
ORGANIC REQUIREMENTS				
Biological Oxygen Demand	mg/litre	BOD	< 10	< 30
Chemical Oxygen Demand	mg/litre	COD	< 45	< 100
Detergents (soap)	mg/litre		< 0.2	< 3
Fat, oil & grease, individual	mg/litre	FOG	nil	< 2.5
Phenolic compounds	mg/litre	as phenol	< 0.01	< 0.10
Aldehyde	µg/litre		< 50	< 100
Adsorbable Organic Halogen	µg/litre	AOX	< 50	< 100
INORGANIC MACRO DETERMINANTS				
Ammonia (NHB_{4B} – N)	mg/litre	N	< 1	< 10
Nitrate (NOB_{3B}- N)	mg/litre	N	< 15	< 20
Nitrite (NOB_{2B}- N)	mg/litre	N	< 2	< 3
Total Kjeldahl Nitrogen (TKN)	mg/litre	N	< 18	< 33
Chloride	mg/litre	Cl	< 40 mg/litre above the intake potable water quality	< 70 mg/litre above the intake potable water quality

Effluent to be discharged or disposed of in areas with potential for drinking water source contamination; international rivers and dams and in water management and other areas				
			Special Standard	General Standard
DETERMINANTS	**UNIT**	**FORMAT**	**95 percentile requirements**	
Sodium	mg/litre	N	< 50 mg/litre above the intake potable water quality	<90 mg/litre above the intake potable water quality
Sulphate	mg/litre	SOB_{40}	< 20 mg/litre above the intake potable water quality	< 40 mg/litre above the intake potable water quality
Sulphide	mg/litre	S	< 0.05	< 0.5
Fluoride	mg/litre	F	1,0	2,0
Cyanide (Free)	µg/litre	CN	< 30	< 100
Cyanide (recoverable)	µg/litre	CN	< 70	< 200
Soluble Ortho phosphate	mg/litre	P	< 0.2	3,0
Zinc*	mg/litre	Zn	1	5

Effluent to be discharged or disposed of in areas with potential for drinking water source contamination; international rivers and dams and in water management and other areas				
			Special Standard	General Standard
DETERMINANTS	**UNIT**	**FORMAT**	**95 percentile requirements**	
INORGANIC MICRO DETERMINANTS				
Aluminium	µg/litre	Al	< 25	< 200
Antimony	µg/litre	Sb	< 5	< 50
Arsenic	µg/litre	As	< 50	< 150
Barium	µg/litre	Ba	< 50	< 200
Boron	µg/litre	B	< 500	< 1000
Cadmium*	µg/litre	Cd	< 5	< 50
Chromium, (hexavalent)	µg/litre	Cr	< 10	< 50
Chromium, Total*	µg/litre	Cr	< 50	< 1000
Copper*	µg/litre	Cu	< 500	< 2000
Iron	µg/litre	Fe	< 200	< 1000
Lead*	µg/litre	Pb	< 10	< 100
Manganese	µg/litre	Mn	< 100	< 400
Mercury*	µg/litre	Hg	< 1	< 2
Nickel	µg/litre	Ni	< 100	< 300
Selenium	µg/litre	Se	< 10	< 50
Strontium*	µg/litre	Sr	< 100	< 100
Thallium	µg/litre	Ti	< 5	< 10
Tin*	µg/litre	Sn	< 100	< 400
Titanium	µg/litre	Ti	< 100	< 300
Uranium*	µg/litre	U	< 15	< 500

Effluent to be discharged or disposed of in areas with potential for drinking water source contamination; international rivers and dams and in water management and other areas				
			Special Standard	**General Standard**
*Total for Heavy Metals (Sum of Cd,Cr,Cu,Hg, Peri-Urban Development Board	µg/litre	Cd,Cr,Cu, Hg & Pb	< 200	< 500
UNSPECIFIED COMPOUNDS FROM ANTHROPOGENIC ACTIVITIES				
Agricultural chemical compounds	µg/litre		Any in-/organic compound recognized as an agro-chemical is to be avoided or reduced as far as possible. Maximum acceptable contaminant levels will be site specific, dependent on chemical usage and based the water quality of the recipient water body	
Industrial and mining chemical compounds, including unlisted metals and persistent organic pollutants	µg/litre		Any in-/ organic compound recognized as an industrial chemical including unlisted metals is to be avoided or reduced as far as possible. Maximum acceptable contaminant levels will be site specific dependent on chemical usage and based the water quality of the recipient water body	
Endocrine Disruptive Compounds (EDC)	µg/litre		Any chemical compound that is suspected of having endocrine disruptive effects is to be avoided as far as is possible. Maximum acceptable contaminant levels will be site specific dependent on chemical usage and based the water quality of the recipient water body.	
Hydrocarbons (Benzene, Ethyl Benzene, Toluene and Xylene	µg/litre		Below detection level	Below detection level
Organo-metallic compounds: methyl mercury, tributyl tin (TBT), etc.	µg/litre		Below detection level	Below detection level
DISINFECTION				
Residual chlorine	mg/litre		< 0.1 Dependent on recipient water body	< 0.3 Dependent on recipient water body

Effluent to be discharged or disposed of in areas with potential for drinking water source contamination; international rivers and dams and in water management and other areas				
			Special Standard	General Standard
DETERMINANTS	**UNIT**	**FORMAT**		
BIOLOGICAL REQUIREMENTS (Algae and parasites)				
Further treatment of the effluent is dependent on: 1. the water quality of the recipient water body if any 2. the distance from any point of potable water abstraction 3. an acceptable maximum contaminant level downstream of the point of discharge 4. the exposure to human and animal consumption downstream of the point of discharge 5. any re-use option that may be implemented..				
MICROBIOLOGY				
Further treatment of the effluent is dependent on: 1. the water quality of the recipient water body if any 2. the distance from any point of potable water abstraction 3. an acceptable maximum contaminant level downstream of the point of discharge 4. the exposure to human and animal consumption downstream of the point of discharge 5. any water re-use option that may be implemented.				

APPENDIX 2 –AUTHORITIES LETTERS