

APP-003528

**OKAHIRONGO ELEPHANT LODGE, PURROS, KUNENE
REGION**

ENVIRONMENTAL MANAGEMENT PLAN



Prepared by:




Prepared for:

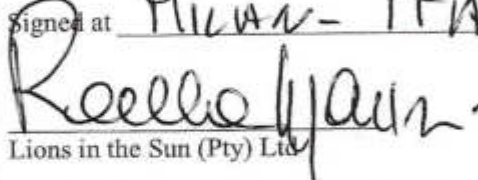
**Lions in the Sun (Pty) Ltd,
T/A:**



February 2022

Project:	OKAHIRONGO ELEPHANT LODGE, PURROS, KUNENE REGION: ENVIRONMENTAL MANAGEMENT PLAN	
Report: Version/Date:	Final February 2022	
Prepared for: (Proponent)	Lions in the Sun (Pty) Ltd, trading as Okahirongo Lodges & Camps P O Box 30078 Windhoek Namibia	
Lead Consultant	Geo Pollution Technologies (Pty) Ltd PO Box 11073 Windhoek Namibia	TEL.: (+264-61) 257411 FAX.: (+264) 88626368
Main Project Team:	Pierre Botha (B.Sc. Geography/Geology); (B.Sc. (Hons) Geohydrology) André Faul (B.Sc. Zoology/Biochemistry); (B.Sc. (Hons) Zoology); (M.Sc. Conservation Ecology); (Ph.D. Medical Bioscience) Wikus Coetzer (B.Sc. Environmental and Biological Sciences); (B.Sc. (Hons) Environmental Sciences)	
Cite this document as:	Botha P, Faul A, Coetzer W. 2022 February; Okahirongo Elephant Lodge, Purros, Kunene Region: Environmental Management Plan	
Copyright	Copyright on this document is reserved. No part of this document may be utilised without the written permission of Geo Pollution Technologies (Pty) Ltd.	
Report Approval	 Pierre Botha Environmental Assessment Practitioner	

I _____ acting as a representative of Lions in the Sun (Pty) Ltd, hereby confirm that the project description contained in this report is a true reflection of the information which the Proponent provided to Geo Pollution Technologies. All material information in the possession of the proponent that reasonably has or may have the potential of influencing any decision or the objectivity of this assessment is fairly represented in this report and the report is hereby approved.

Signed at MUAN-ITACY on the 1 day of MARCH 2022.

Lions in the Sun (Pty) Ltd

2004/166
Business Registration Number

TABLE OF CONTENTS

1	INTRODUCTION.....	1
2	SCOPE	1
3	LODGE OPERATIONS AND RELATED ACTIVITIES.....	2
3.1	LODGE.....	2
3.2	RESTAURANT, SWIMMING POOL AND SHOP	2
3.3	ADMINISTRATIVE, MAINTENANCE AND SUPPORT INFRASTRUCTURE	2
3.4	SERVICES SUPPLY	3
3.5	SUSTAINABILITY INITIATIVES.....	4
4	ADMINISTRATIVE, LEGAL AND POLICY REQUIREMENTS	5
5	ENVIRONMENTAL CHARACTERISTICS.....	9
5.1	LOCALITY AND SURROUNDING LAND USE	9
5.2	CLIMATE	9
5.3	TOPOGRAPHY AND DRAINAGE	11
5.4	GEOLOGY AND HYDROGEOLOGY	12
5.5	WATER SUPPLY	14
5.6	FAUNA AND FLORA	14
5.7	DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS.....	15
6	ENVIRONMENTAL MANAGEMENT PLAN.....	16
6.1	OBJECTIVES OF THE EMP.....	16
6.2	IMPLEMENTATION OF THE EMP	16
6.3	MANAGEMENT OF IMPACTS: OPERATIONS AND CONSTRUCTION.....	16
6.3.1	<i>Planning.....</i>	<i>16</i>
6.3.2	<i>Skills, Technology and Development</i>	<i>18</i>
6.3.3	<i>Economic Resilience and Employment</i>	<i>19</i>
6.3.4	<i>Demographic Profile and Community Health</i>	<i>20</i>
6.3.5	<i>Traffic</i>	<i>21</i>
6.3.6	<i>Health, Safety and Security.....</i>	<i>22</i>
6.3.7	<i>Fire</i>	<i>23</i>
6.3.8	<i>Noise</i>	<i>24</i>
6.3.9	<i>Waste production</i>	<i>25</i>
6.3.10	<i>Ecosystem and Biodiversity Impact</i>	<i>26</i>
6.3.11	<i>Groundwater, Surface Water and Soil Contamination</i>	<i>27</i>
6.3.12	<i>Visual Impact.....</i>	<i>28</i>
6.3.13	<i>Cumulative Impact.....</i>	<i>29</i>
6.4	DECOMMISSIONING AND REHABILITATION	30
6.5	ENVIRONMENTAL MANAGEMENT SYSTEM.....	30
7	CONCLUSION.....	31
8	REFERENCES.....	32

LIST OF FIGURES

FIGURE 2-1 PROJECT LOCATION	2
FIGURE 3-1 LODGE AIRSTRIP	3
FIGURE 3-2 LODGE INFRASTRUCTURE.....	4
FIGURE 5-1 DAILY AND SEASONAL RAINFALL FROM CHIRPS-2 DATA (FUNK ET AL., 2015)	11
FIGURE 5-2 AVERAGE ANNUAL RAINFALL FROM CHIRPS-2 DATA (FUNK ET AL., 2015).....	11
FIGURE 5-3 SURFACE FLOW AND DRAINAGE DIRECTION OF THE PROJECT AREA	12
FIGURE 5-4 GEOLOGY OF THE PROJECT AREA	13

LIST OF PHOTOS

PHOTO 1	LODGE MAIN COMPLEX AREA	5
PHOTO 2	ELEPHANT MADE FROM DISCARDED ESPRESSO CUPS (WWW.OKAHIRONGOLODGE.COM) ..	5
PHOTO 3	DRINKING WATER FILTRATION SYSTEM	5
PHOTO 4	CONSUMER FUEL INSTALLATION.....	5

LIST OF TABLES

TABLE 4-1	NAMIBIAN LAW APPLICABLE TO THE LODGE.....	6
TABLE 4-2	STANDARDS OR CODES OF PRACTISE.....	8
TABLE 4-3	RELEVANT MULTILATERAL ENVIRONMENTAL AGREEMENTS FOR NAMIBIA AND THE DEVELOPMENT	8
TABLE 5-1	SUMMARY OF CLIMATE DATA FOR THE PROJECT AREA (ATLAS OF NAMIBIA PROJECT, 2002) 10	
TABLE 5-2	RAINFALL STATISTICS BASED ON CHIRPS-2 DATA (FUNK ET AL., 2015).....	10
TABLE 5-3	GENERAL FLORA DATA (ATLAS OF NAMIBIA PROJECT, 2002).....	14
TABLE 5-4	GENERAL FAUNA DATA (ATLAS OF NAMIBIA PROJECT, 2002)	15
TABLE 5-5	DEMOGRAPHIC CHARACTERISTICS OF SESFONTEIN CONSTITUENCY, THE KUNENE REGION AND NATIONALLY (NAMIBIA STATISTICS AGENCY, 2011).....	15

LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
BE	Biological/Ecological
BTF	Bulk to Farmer
DWA	Department of Water Affairs
DEA	Directorate of Environmental Affairs
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMA	Environmental Management Act No 7 of 2007
EMP	Environmental Management Plan
EMS	Environmental Management System
EO	Economic/Operational
ES	Environmental Classification
FGASA	Field Guides Association of Southern Africa
GPT	Geo Pollution Technologies
HIV	Human Immunodeficiency Virus
IAPs	Interested and Affected Parties
IUCN	International Union for Conservation of Nature
LNAPL	Light Non-Aqueous Phase Liquids
m/s	Meter per second
mbs	Meters below surface
MEFT	Ministry of Environment, Forestry and Tourism
mm/a	Millimetres per annum
MSDS	Material Safety Data Sheet
NATH	Namibian Academy for Tourism and Hospitality
NCAA	Namibia Civil Aviation Authority
PC	Physical/Chemical
PPE	Personal Protective Equipment
ppm	Parts per million
SADC	Southern African Development Community
SANS	South African National Standards
SC	Sociological/Cultural
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization

GLOSSARY OF TERMS

Alternatives - A possible course of action, in place of another, that would meet the same purpose and need but which would avoid or minimize negative impacts or enhance project benefits. These can include alternative locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The “no-go” alternative constitutes the ‘without project’ option and provides a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid undesirable negative impacts.

Assessment - The process of collecting, organising, analysing, interpreting and communicating information relevant to decision making.

Competent Authority - means a body or person empowered under the local authorities act or Environmental Management Act to enforce the rule of law.

Construction - means the building, erection or modification of a facility, structure or infrastructure that is necessary for the undertaking of an activity, including the modification, alteration, upgrading or decommissioning of such facility, structure or infrastructure.

Cumulative Impacts - in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Environment - As defined in the Environmental Assessment Policy and Environmental Management Act - “land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, palaeontological or social values”.

Environmental Impact Assessment (EIA) - process of assessment of the effects of a development on the environment.

Environmental Management Plan (EMP) - A working document on environmental and socio-economic mitigation measures, which must be implemented by several responsible parties during all the phases of the project.

Environmental Management System (EMS) - An Environment Management System, or EMS, is a comprehensive approach to managing environmental issues, integrating environment-oriented thinking into every aspect of business management. An EMS ensures environmental considerations are a priority, along with other concerns such as costs, product quality, investments, PR productivity and strategic planning. An EMS generally makes a positive impact on a company’s bottom line. It increases efficiency and focuses on customer needs and marketplace conditions, improving both the company’s financial and environmental performance. By using an EMS to convert environmental problems into commercial opportunities, companies usually become more competitive.

Evaluation – means the process of ascertaining the relative importance or significance of information, the light of people’s values, preference and judgements in order to make a decision.

Hazard - Anything that has the potential to cause damage to life, property and/or the environment. The hazard of a particular material or installation is constant; that is, it would present the same hazard wherever it was present.

Interested and Affected Party (IAP) - any person, group of persons or organisation interested in, or affected by an activity; and any organ of state that may have jurisdiction over any aspect of the activity.

Mitigate - The implementation of practical measures to reduce adverse impacts.

Proponent (Applicant) - Any person who has submitted or intends to submit an application for an authorisation, as legislated by the Environmental Management Act no. 7 of 2007, to undertake an

activity or activities identified as a listed activity or listed activities; or in any other notice published by the Minister or Ministry of Environment & Tourism.

Public - Citizens who have diverse cultural, educational, political and socio-economic characteristics. The public is not a homogeneous and unified group of people with a set of agreed common interests and aims. There is no single public. There are a number of publics, some of whom may emerge at any time during the process depending on their particular concerns and the issues involved.

Scoping Process - process of identifying: issues that will be relevant for consideration of the application; the potential environmental impacts of the proposed activity; and alternatives to the proposed activity that are feasible and reasonable.

Significant Effect/Impact - means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Stakeholder Engagement - The process of engagement between stakeholders (the proponent, authorities and IAPs) during the planning, assessment, implementation and/or management of proposals or activities. The level of stakeholder engagement varies depending on the nature of the proposal or activity as well as the level of commitment by stakeholders to the process. Stakeholder engagement can therefore be described by a spectrum or continuum of increasing levels of engagement in the decision-making process. The term is considered to be more appropriate than the term “public participation”.

Stakeholders - A sub-group of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term therefore includes the proponent, authorities (both the lead authority and other authorities) and all interested and affected parties (IAPs). The principle that environmental consultants and stakeholder engagement practitioners should be independent and unbiased excludes these groups from being considered stakeholders.

Sustainable Development - “Development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs and aspirations” – the definition of the World Commission on Environment and Development (1987). “Improving the quality of human life while living within the carrying capacity of supporting ecosystems” – the definition given in a publication called “Caring for the Earth: A Strategy for Sustainable Living” by the International Union for Conservation of Nature (IUCN), the United Nations Environment Programme and the World Wide Fund for Nature (1991).

1 INTRODUCTION

Lions in the Sun (Pty) Ltd, trading as Okahirongo Lodges and Camps (the Proponent), requested Geo Pollution Technologies (Pty) Ltd to update their existing environmental management plan (EMP) for the Okahirongo Elephant Lodge, situated in the Purros Conservancy, Kunene Region. The initial Environmental Assessment and EMP for the development of the lodge was drafted in 2005. The lodge has nine rooms, a villa, four pilot rooms and four staff rooms, a restaurant, shop, swimming pool and related support infrastructure. Operational activities are typical of similar tourism facilities in the region and include day to day lodge operations and maintenance, guided local tours and a number of other tourist activities.

In order to comply with Namibian legislation, and to adhere to all codes and standards applied in their operations, the Proponent wishes to apply for renewal of their existing environmental clearance certificate (ECC) for the lodge operations. In support of the ECC renewal application, the updated EMP will be submitted to the Ministry of Environment, Forestry and Tourism (MEFT). The EMP provides management options to ensure environmental impacts of the lodge are continually minimised. The environment being defined in the Environmental Assessment Policy and Environmental Management Act as “land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, paleontological or social values”.

The EMP is a tool used to take pro-active action by addressing potential problems before they occur. This limits potential future corrective measures that may need to be implemented and allows for application of mitigation measures for unavoidable impacts. This document should continue to be used as an on-site reference document during all phases (planning, construction (care and maintenance), operations and decommissioning) of the lodge. All monitoring and records kept should be included in a report to ensure compliance with the EMP. Parties responsible for transgression of the EMP should be held responsible for any rehabilitation that may need to be undertaken. A Health, Safety, Environment and Quality (HSEQ) policy as well as Environmental Policy could be used in conjunction with the EMP. Operators and responsible personnel must be taught the contents of these documents. Relevant regulations and guidelines must be adhered to and monitored regularly as outlined in the EMP.

The updated EMP will be used to apply for renewal of the existing ECC in compliance with Namibia’s Environmental Management Act (Act No 7 of 2007).

2 SCOPE

The scope of the EMP is to:

- ◆ Provide a brief overview of all components and related operations of the lodge.
- ◆ Summarise the legal and regulatory framework within which the lodge operates.
- ◆ Provide a brief overview of the environment, i.e. the physical, biological, social and economic conditions, potentially impacted by the lodge.
- ◆ Identify a range of management actions which could mitigate the potential adverse impacts to acceptable levels.
- ◆ To provide sufficient information to the relevant competent authorities and the MEFT to make informed decisions regarding the development.

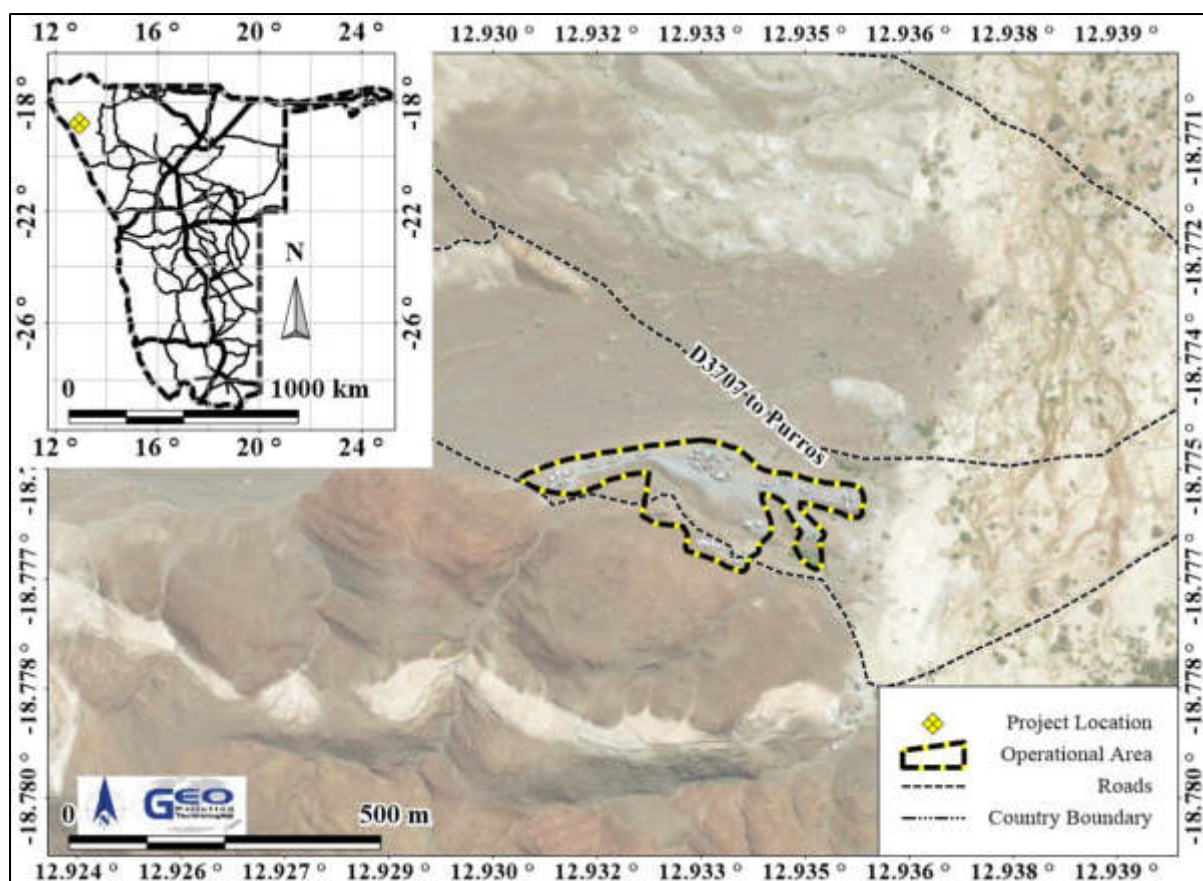


Figure 2-1 Project location

3 LODGE OPERATIONS AND RELATED ACTIVITIES

Okahirongo Elephant Lodge is an existing lodge which was constructed in 2005. The following section provides a brief description of the infrastructure, services supply and operations of the lodge.

3.1 LODGE

During the planning and construction phase, the architecture of the lodge was designed to assimilate to the surrounding natural environment incorporating biophysical features. In doing so, limited vegetation clearance was conducted to maximise integration between the lodge and surrounding environment. Nine double rooms, each with their own bathroom, four pilot rooms and a villa with four bedrooms and a living room, are stand-alone units, separate from the main lodge complex. The rooms operate on a dinner, bed and breakfast principle. All food preparations are done at the lodge kitchen and served at the dining area. Staff who are not from the Purros Conservancy are accommodated in four staff rooms, the remainder of the employees reside at the nearby Purros Village.

3.2 RESTAURANT, SWIMMING POOL AND SHOP

The main complex area at the lodge hosts a restaurant, reception area, a large swimming pool, lounges and a small library. Food and drinks are prepared in an onsite kitchen and all food is sourced from third party suppliers. A small tourist shop sells, among others, curios, books and clothing to guests.

3.3 ADMINISTRATIVE, MAINTENANCE AND SUPPORT INFRASTRUCTURE

Offices for staff and managers are present at the lodge. A number of support buildings include maintenance workshop and generator room, a consumer fuel installation and parking areas. The consumer fuel installation has five 2.2 m³ BTF (Bulk to Farmer) diesel tanks and 8 x 200 l mobile

drums which are used when fuel demand is low. Fuel is used to supply guide vehicles and the backup generator with diesel.

Okahirongo Elephant Lodge employs 20 staff members. Managers and employees not from the conservancy are accommodated in staff rooms at the lodge while general staff live at the nearby Purros village. Staff is transported between the village and the lodge at the beginning and end of shifts. Staff receive education through an informal education programme implemented by management.

The main airstrip utilised for guests to the lodge is the Purros Conservancy airstrip, approximately 9 km southeast of the lodge. The lodge further operates their own emergency airstrip approximately 1.5 km northwest of the lodge (Figure 3-1). The airstrip is mainly used when the river is in flood and access cannot be gained by road or from the Purros Conservancy airstrip. The airstrip is approximately 1 km long and there are no telecommunication towers or other high structures in close proximity to the airstrip.

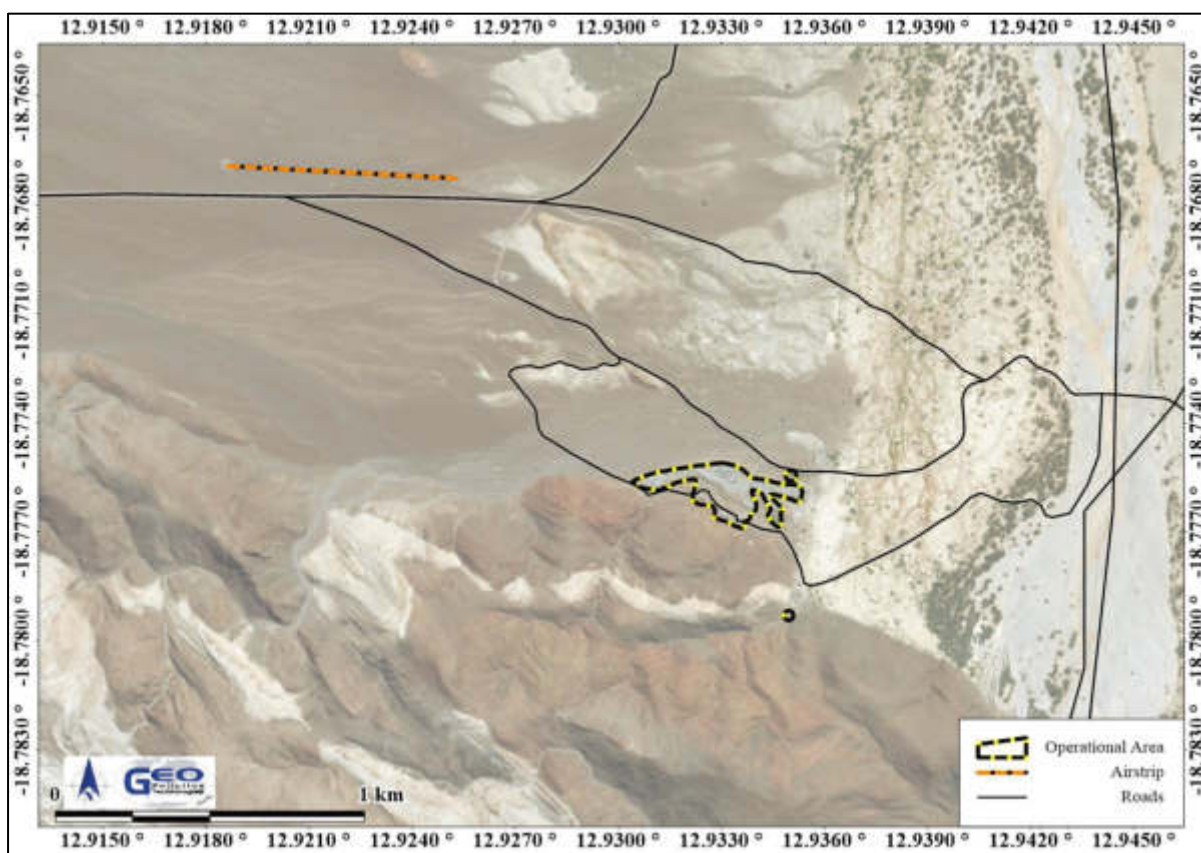


Figure 3-1 Lodge airstrip

3.4 SERVICES SUPPLY

Electricity for operations is generated through the use of a photovoltaic system. Solar panels for the system is situated 120 m southwest of the main complex area. The lodge further hosts a backup diesel driven generator to supply electricity when shortages are experienced (Figure 3-2). To ensure energy consumption is kept to a minimal, rooms are not fitted with air conditioning.

Water is supplied from a nearby borehole situated on the banks of the Hoarusib River. Guest are encouraged to take part in water saving initiatives such as collecting water in buckets while waiting for warm water, which is later used by staff for cleaning purposes.

All waste produced is collected and temporarily stored in a designated waste storage area. Non-toxic combustible waste such as paper, cardboard and food is burnt on site at a designated waste storage area, while other waste such as plastic and tins are transported to the Sesfontein waste

disposal facility. The lodge implements a plastic reduction campaign by providing clean, tested potable water from the tap and reusable water bottles to guests.

All wastewater and sewerage of the lodge goes to two septic tanks, each connected to its own soak-away, situated approximately 200 m east and southeast respectively of the main lodge area.

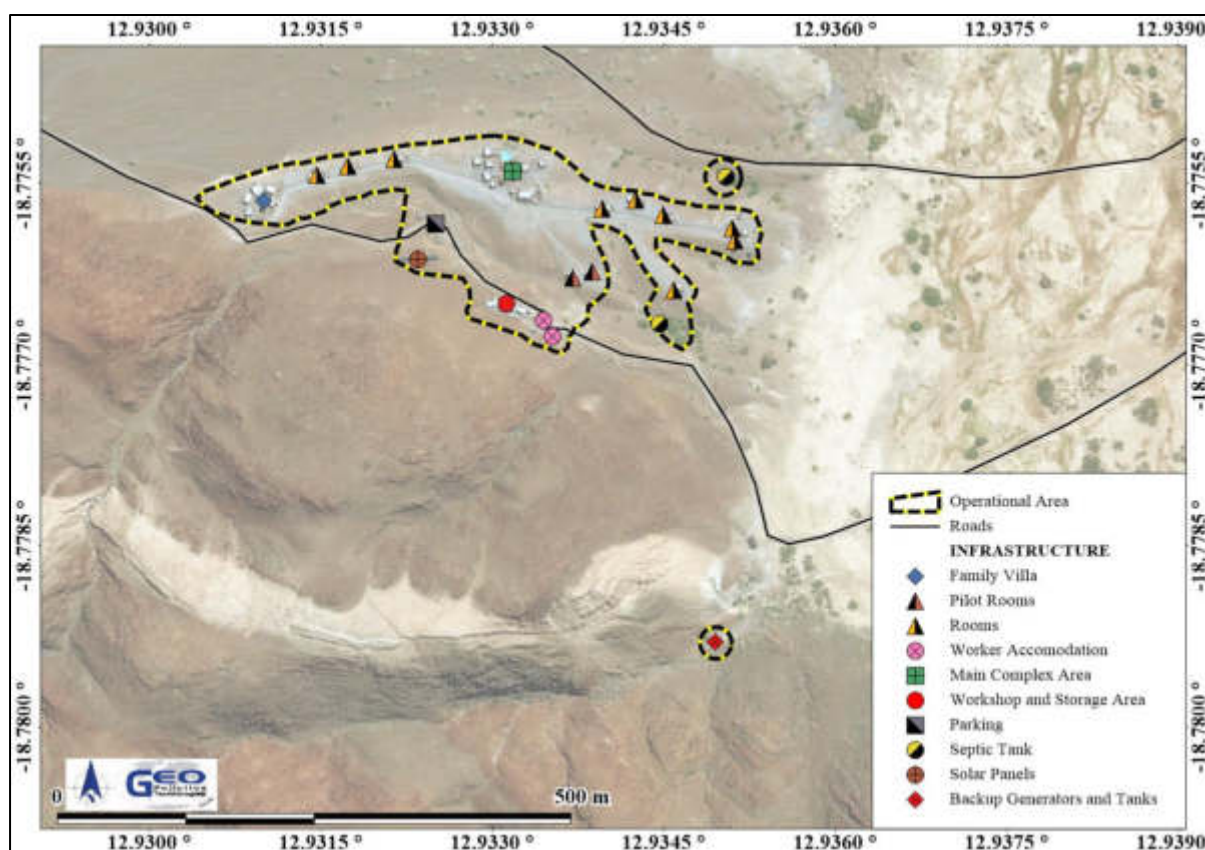


Figure 3-2 Lodge infrastructure

3.5 SUSTAINABILITY INITIATIVES

Okahirongo Elephant Lodge implements various initiatives to ensure the lodge is managed in a sustainable manner. This includes waste reduction measures and recycling initiatives, energy saving initiatives, employment and training of local people. Recycling initiatives are implemented where local community members use some of the waste generated to make valuable items which are sold to tourists, see Photo 2. A monthly fee is paid to the Purros Conservancy with fixed increases included in a contract between the lodge and the conservancy. In addition to this, a percentage of revenue generated is donated to the local conservancy, as well as various support initiatives for local schools etc. Furthermore, a community development levy is paid per guest staying at the lodge, and an additional levy per guest visiting the Ovahimba village.



Photo 1 Lodge main complex area

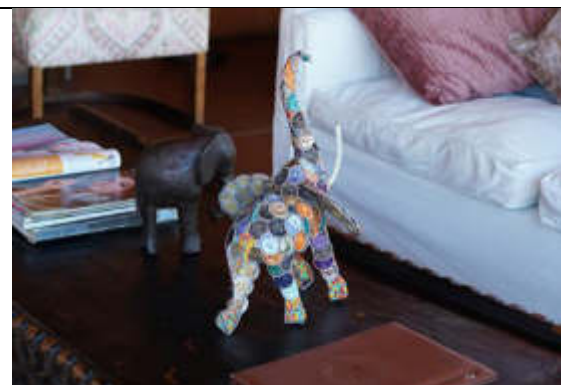


Photo 2 Elephant made from discarded espresso cups (www.okahirongolodge.com)



Photo 3 Drinking water filtration system



Photo 4 Consumer fuel installation

4 ADMINISTRATIVE, LEGAL AND POLICY REQUIREMENTS

To protect the environment and achieve sustainable development, all projects, plans, programmes and policies deemed to have adverse impacts on the environment require an ECC, as per the Namibian legislation. The legislation and standards provided in Table 4-1 to Table 4-3 govern the environmental assessment process in Namibia and/or are relevant to the lodge.

Table 4-1 Namibian law applicable to the lodge

Law	Key Aspects
The Namibian Constitution	<ul style="list-style-type: none"> ◆ Promote the welfare of people. ◆ Incorporates a high level of environmental protection. ◆ Incorporates international agreements as part of Namibian law.
Environmental Management Act Act No. 7 of 2007, Government Notice No. 232 of 2007	<ul style="list-style-type: none"> ◆ Defines the environment. ◆ Promote sustainable management of the environment and the use of natural resources. ◆ Provide a process of assessment and control of activities with possible significant effects on the environment.
Environmental Management Act Regulations Government Notice No. 28-30 of 2012	<ul style="list-style-type: none"> ◆ Commencement of the Environmental Management Act. ◆ List activities that requires an environmental clearance certificate. ◆ Provide Environmental Impact Assessment Regulations.
Namibia Tourism Board Act Act no. 21 of 2000, Government Notice 261 of 200, 2000	<ul style="list-style-type: none"> ◆ Provide for the registration and grading of accommodation establishments. ◆ Provide for the declaration of any sector of the tourism industry as a regulated sector and for the registration of businesses falling within a regulated sector. ◆ Provides regulations and minimum requirements pertaining to: <ul style="list-style-type: none"> ○ Levies payable. ○ Registrations of regulated businesses. ○ Registrations of accommodation establishments.
Accommodation Establishments and Tourism Ordinance 20 of 1973	<ul style="list-style-type: none"> ◆ Consolidate and amend the laws relating to accommodation establishments and tourism and to provide for the establishment of tourist recreation areas and incidental matters. ◆ Provides for regulations of tourism establishments. ◆ Numerous amendments and repeals.
Petroleum Products and Energy Act Act No. 13 of 1990, Government Notice No. 45 of 1990	<ul style="list-style-type: none"> ◆ Regulates petroleum industry. ◆ Makes provision for impact assessment. ◆ Petroleum Products Regulations (Government Notice No. 155 of 2000). <ul style="list-style-type: none"> ○ Prescribes South African National Standards (SANS) or equivalents for construction, operation and decommissioning of petroleum facilities (refer to Government Notice No. 21 of 2002).
The Water Act Act No. 54 of 1956	<ul style="list-style-type: none"> ◆ Remains in force until the new Water Resources Management Act comes into force. ◆ Defines the interests of the state in protecting water resources. ◆ Controls the disposal of effluent. ◆ Numerous amendments.

Law	Key Aspects
Water Resources Management Act Act No. 11 of 2013	<ul style="list-style-type: none"> ◆ Provide for management, protection, development, use and conservation of water resources. ◆ Prevention of water pollution and assignment of liability. ◆ Not in force yet.
Forest Act (Act 12 of 2001, Government Notice No. 248 of 2001)	<ul style="list-style-type: none"> ◆ Makes provision for the protection of the environment and the control and management of forest fires. ◆ Provides the licencing and permit conditions for the removal of woody and other vegetation as well as the disturbance and removal of soil from forested areas.
Forest Regulations: Forest Act, 2001 Government Notice No. 170 of 2015	<ul style="list-style-type: none"> ◆ Declares protected trees or plants. ◆ Issuing of permits to remove protected tree and plant species.
Civil Aviation Act Act No. 6 of 2016, Government Notice 137 of 2016	<ul style="list-style-type: none"> ◆ Consolidate the laws relating to civil aviation and civil aviation offences. ◆ Provide for a civil aviation regulatory and control framework for maintaining, enhancing and promoting the safety and security of civil aviation for ensuring the implementation of international aviation agreements. ◆ Provides for Namibia Civil Aviation Regulations And Technical Standards.
Aerodrome Ordinance Ordinance 12 of 1963	<ul style="list-style-type: none"> ◆ Provide for the establishment, management and maintenance of aerodromes.
Local Authorities Act Act No. 23 of 1992, Government Notice No. 116 of 1992	<ul style="list-style-type: none"> ◆ Define the powers, duties and functions of local authority councils. ◆ Regulates discharges into sewers.
Public Health Act Act No. 36 of 1919	<ul style="list-style-type: none"> ◆ Provides for the protection of health of all people.
Public and Environmental Health Act Act No. 1 of 2015, Government Notice No. 86 of 2015	<ul style="list-style-type: none"> ◆ Provides a framework for a structured more uniform public and environmental health system, and for incidental matters. ◆ Deals with Integrated Waste Management including waste collection disposal and recycling; waste generation and storage; and sanitation.
Labour Act Act No 11 of 2007, Government Notice No. 236 of 2007	<ul style="list-style-type: none"> ◆ Provides for Labour Law and the protection and safety of employees. ◆ Labour Act, 1992: Regulations relating to the health and safety of employees at work (Government Notice No. 156 of 1997).
Atmospheric Pollution Prevention Ordinance Ordinance No. 11 of 1976	<ul style="list-style-type: none"> ◆ Governs the control of noxious or offensive gases ◆ Prohibits scheduled process without a registration certificate in a controlled area. ◆ Requires best practical means for preventing or reducing the escape into the atmosphere of noxious or offensive gases produced by the scheduled process.

Law	Key Aspects
Hazardous Substances Ordinance Ordinance No. 14 of 1974	<ul style="list-style-type: none"> ◆ Applies to the manufacture, sale, use, disposal and dumping of hazardous substances as well as their import and export. ◆ Aims to prevent hazardous substances from causing injury, ill-health or the death of human beings.
Pollution Control and Waste Management Bill (draft document)	<ul style="list-style-type: none"> ◆ Not in force yet. ◆ Provides for prevention and control of pollution and waste. ◆ Provides for procedures to be followed for licence applications.

Table 4-2 Standards or codes of practise

Standard or Code	Key Aspects
South African National Standards (SANS)	<ul style="list-style-type: none"> ◆ The Petroleum Products and Energy Act prescribes SANS standards for the construction, operations and demolition of petroleum facilities. ◆ SANS 10131 is specifically aimed at storage and distribution of petroleum products in aboveground storage tanks. <ul style="list-style-type: none"> ○ Provide requirements for spill control infrastructure.

Table 4-3 Relevant multilateral environmental agreements for Namibia and the development

Agreement	Key Aspects
Charter of the Regional Tourism Organisation of Southern Africa (RETOSA), 1997	<ul style="list-style-type: none"> ◆ Development of tourism through effective marketing of the Region in collaboration with the public and private sector. ◆ To facilitate, encourage and assist in the development of legal and ethical tourism throughout the Southern African Region taking due consideration of the overall development of the people, the Region and the Region's natural and cultural resources.
Stockholm Declaration on the Human Environment, Stockholm 1972.	<ul style="list-style-type: none"> ◆ Recognizes the need for a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment.
Protocol on the Development of Tourism in SADC, 1998	<ul style="list-style-type: none"> ◆ The Protocol sets out SADC's objective to build upon the region's potential as a tourist destination.
Statutes of the World Tourism Organization, 1970	<ul style="list-style-type: none"> ◆ Promotion and development of tourism with a view to contributing to economic development, international understanding, peace, prosperity, and universal respect for, and observance of, human rights and fundamental freedoms for all without distinction as to race, sex, language or religion.
United Nations Framework Convention on Climate Change (UNFCCC)	<ul style="list-style-type: none"> ◆ The Convention recognises that developing countries should be accorded appropriate assistance to enable them to fulfil the terms of the Convention.
Convention on Biological Diversity, Rio de Janeiro, 1992	<ul style="list-style-type: none"> ◆ Under article 14 of The Convention, EIAs must be conducted for projects that may negatively affect biological diversity.

Listed activities which require an ECC application (Government Regulation No 29 of 2012) related to this project include the following:

Section 2 of Government Notice No. 29 of 2012: Waste Management, Treatment, Handling and Disposal Activities

- ◆ 2.1 The construction of facilities for waste sites, treatment of waste and disposal of waste. The Proponent temporarily stores waste for disposal at an external landfill, the proponent further burns general, non-toxic combustible waste such as paper, cardboard and food at the site.

Section 6 of Government Notice No. 29 of 2012: Tourism Development Activities

- ◆ 6. The construction of resorts, lodges, hotels or other tourism and hospitality facilities. The lodge and related tourism facility was constructed and currently in operation and maintained accordingly.

Section 8 of Government Notice No. 29 of 2012: Water Resource Developments

- ◆ 8.1. The abstraction of ground or surface water for industrial or commercial purposes: Water is abstracted from borehole for current commercial (tourism) operations.
- ◆ 8.6 Construction of industrial and domestic wastewater treatment plants and related pipeline systems: The Proponent has installed wastewater treatment facilities (two septic tanks with individual soak-away systems) within the operational area to manage mainly black and grey water.

Section 9 of Government Notice No. 29 of 2012: Hazardous Substance Treatment, Handling and Storage

- ◆ 9.5 Construction of filling stations or any other facility for the underground and aboveground storage of dangerous goods, including petrol, diesel, liquid, petroleum, gas or paraffin. The Proponent has a fuel installation for *storing* diesel in aboveground tanks and drums which has a combined capacity of 12,6m³, 11m³ of which is allocated to BTF tanks.

Section 10: Infrastructure

- ◆ 10.1 (d) The construction of airports and airfields. An airfield was constructed and is operated and maintained by the Proponent.

5 ENVIRONMENTAL CHARACTERISTICS

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

5.1 LOCALITY AND SURROUNDING LAND USE

The lodge is located within the Purros Conservancy, in the Kunene Region (18.7753°S, 12.9331°E) (Figure 2-1). Access to the site is gained from the D3707 district road or by aircraft. The nearest development to the site is the Purros village, situated approximately 1.5 km northeast of the lodge. The airstrip is located 1.5 km northwest of the lodge (18.7672°S, 12.9205°E) Figure 3-1.

Implications and Impacts

The lodge facilitates tourism to the Purros Conservancy, located on communal land, by providing hospitality facilities in the remote area. Contribution to the local community is conducted through direct employment and profit sharing. The lodge has diversified the local and regional land-use, thereby strengthening the local economic resilience.

5.2 CLIMATE

The lodge is situated in the arid Kaokoland, an area classified by the Köppen Climate Classification as BWh (Kunene River Awareness Kit, 2022), meaning a hot desert and low-latitude climate. A low-latitude steppe generally refers to a climate with an average temperature > 18°C with the coldest month having an average > 0 °C (Varma, 2018). The general lack of functioning weather stations in Namibia limits the availability of long term, true weather data.

The lodge does not have a weather station. As a best possible workaround, long term climate data was obtained from the Atlas of Namibia Project (2002) and the CHIRPS-2 database (Funk et al., 2015), see Table 5-1, Table 5-2, Figure 5-1 and Figure 5-2. Atlas of Namibia Project data was compiled from almost 300 rainfall stations across Namibia, the data was contoured in 50 mm intervals prior to 1999 for variable length data sets. The CHIRPS-2 dataset (Climate Hazards Group Infra-Red Precipitation with Station data version 2) consist of long term rainfall data (1981 to near-present) obtained from satellite imagery and, where present, in-situ station data. The resultant dataset provides a reasonably well represented overview of the climatic conditions and historic weather conditions of a general area. True values for single, site specific meteorological events may however differ to some degree. This is especially true where the dominant rainfall is depended on localized storm cells that causes a high rainfall variability over short distances.

In the project area, days are mostly warm with very hot days during the summer months, while nights are generally cool. The rain season normally starts in October and last until April, peaking in December. Heavier rainfall (single day events) occur between October and December, with a single event of 13.8 mm in December (last 40 years data) being the highest (Table 5-2).

The average annual rainfall for the last 40 years was calculated as 49 mm/a, with a coefficient of variance of 27% (Table 5-2). This average annual rainfall and coefficient of variance however does not correlate directly with Atlas of Namibia Project data which calculated average rainfall at 50-100 mm/a and variation in rainfall at 80-90 %, see Table 5-1. Daily and seasonal rainfall data (Funk et al., 2015) is presented in Figure 5-1. Seasonal (July to June) total rainfall, centred on the average line for the last 40 years, is presented, with the daily total rainfall and the seasonal cumulative rainfall.

From the figure it is clear that the area has received mostly below average rainfall since the 2012-2013 season to the 2021 season. The driest year (last 40 years data) being 2019 with about 11 mm recorded (Figure 5-2).

Table 5-1 Summary of climate data for the project area (Atlas of Namibia Project, 2002)

Average annual rainfall (mm/a)	50-100
Variation in annual rainfall (%)	80-90
Average annual evaporation (mm/a)	2,600-2,800
Water deficit (mm/a)	1,701-1,900
Average annual temperatures (°C)	19-20

Table 5-2 Rainfall statistics based on CHIRPS-2 data (Funk et al., 2015)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum (mm)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.0	3.2
Maximum (mm)	11.8	20.5	21.4	1.3	1.4	0.1	0.0	0.3	0.5	21.8	15.3	35.9
Average (mm)	4.5	6.4	7.0	0.2	0.1	0.0	0.0	0.0	0.0	8.5	7.0	13.9
Variability (%)	68.0	77.0	78.0	200.0	436.0	624.0	0.0	624.0	609.0	33.0	54.0	56.0
Daily maximum (mm)	5.2	9.2	7.5	1.1	1.4	0.0	0.0	0.1	0.5	13.5	13.3	13.8
Average rain days	4	5	4	1	0	0	0	0	0	2	2	3
Season July - June average: 49 mm						Season coefficient of variation: 27 %						
Data range	1981-Jul-01 to					2021-Jun-30			Lat: -18.7757°S Long: 12.9309°E			

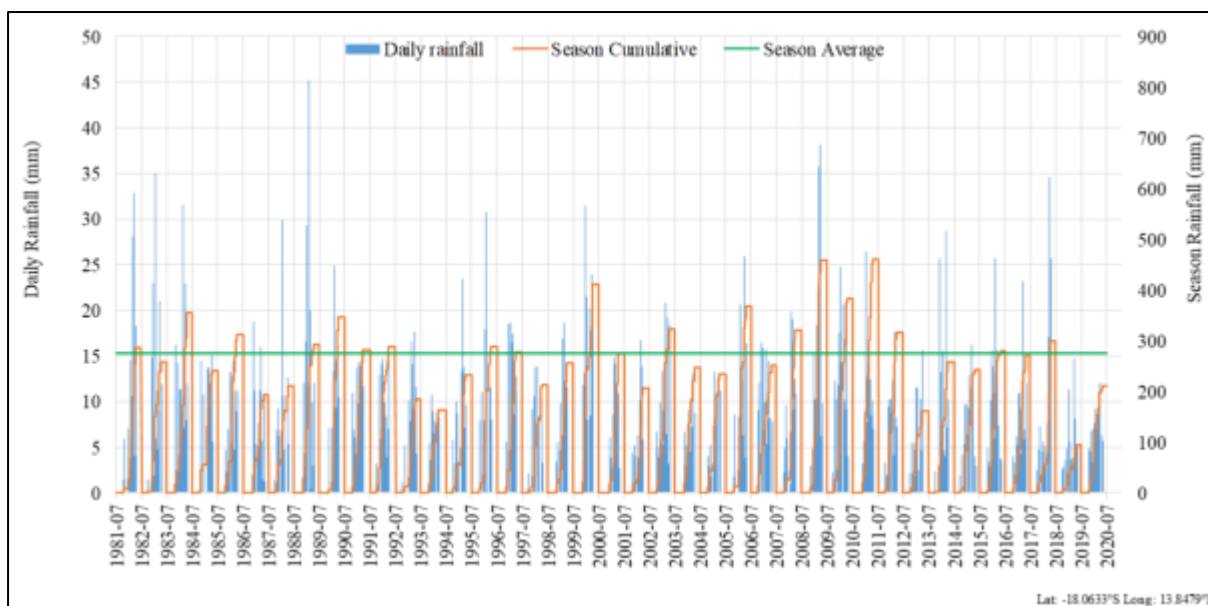


Figure 5-1 Daily and seasonal rainfall from CHIRPS-2 data (Funk et al., 2015)

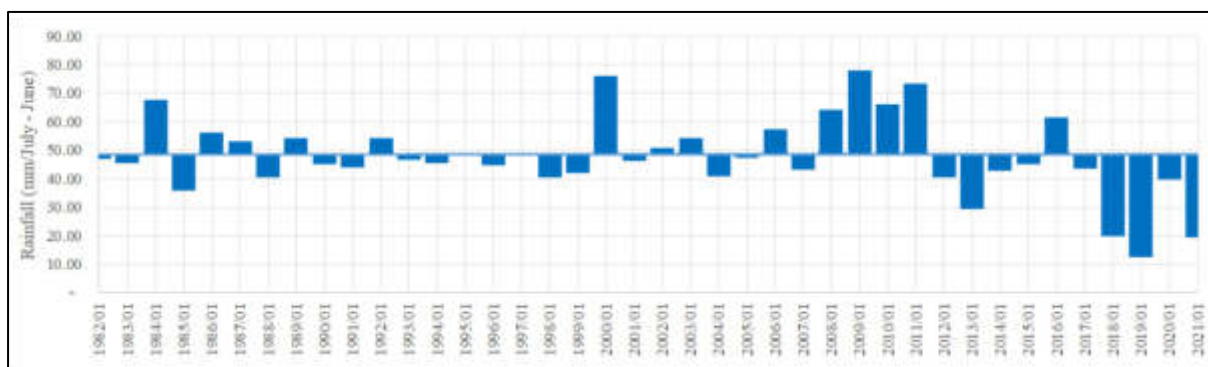


Figure 5-2 Average annual rainfall from CHIRPS-2 data (Funk et al., 2015)

Implications and Impacts

Water is a scarce and valuable resource in Namibia and the extreme variability in seasonal rainfall makes water an extremely vulnerable resource. Rainfall events are typically thunderstorms with heavy rainfall that can occur in short periods of time (cloud bursts). Raw sewerage that enter the groundwater may pollute the valuable resource. Failing fuel storage structure on site may result in hydrocarbon spills which may enter the environment and potentially render the groundwater unusable. However, adherence to SANS standards for the consumer fuel installation will successfully mitigate this risk.

5.3 TOPOGRAPHY AND DRAINAGE

The greater Purros Conservancy is dominated by long northwest trending valleys with high relief and large scale geological folding. The lodge is situated within the valley and catchment of the Hoarusib River, an ephemeral river which cuts through the Permian age hills draining in a south westerly direction. The lodge is situated on the foothill of a northeast facing hill, with a shallow valley cutting between the lodge and the larger hill. As a result, the relief north and east of the site is lower closer to the Hoarusib River. Surface drainage from the area is generally towards the Hoarusib River, in a north and north-eastern direction along the slopes where drainage then collects and flow is directed to the southwest. A map showing surface drainage directions is depicted in Figure 5-3.

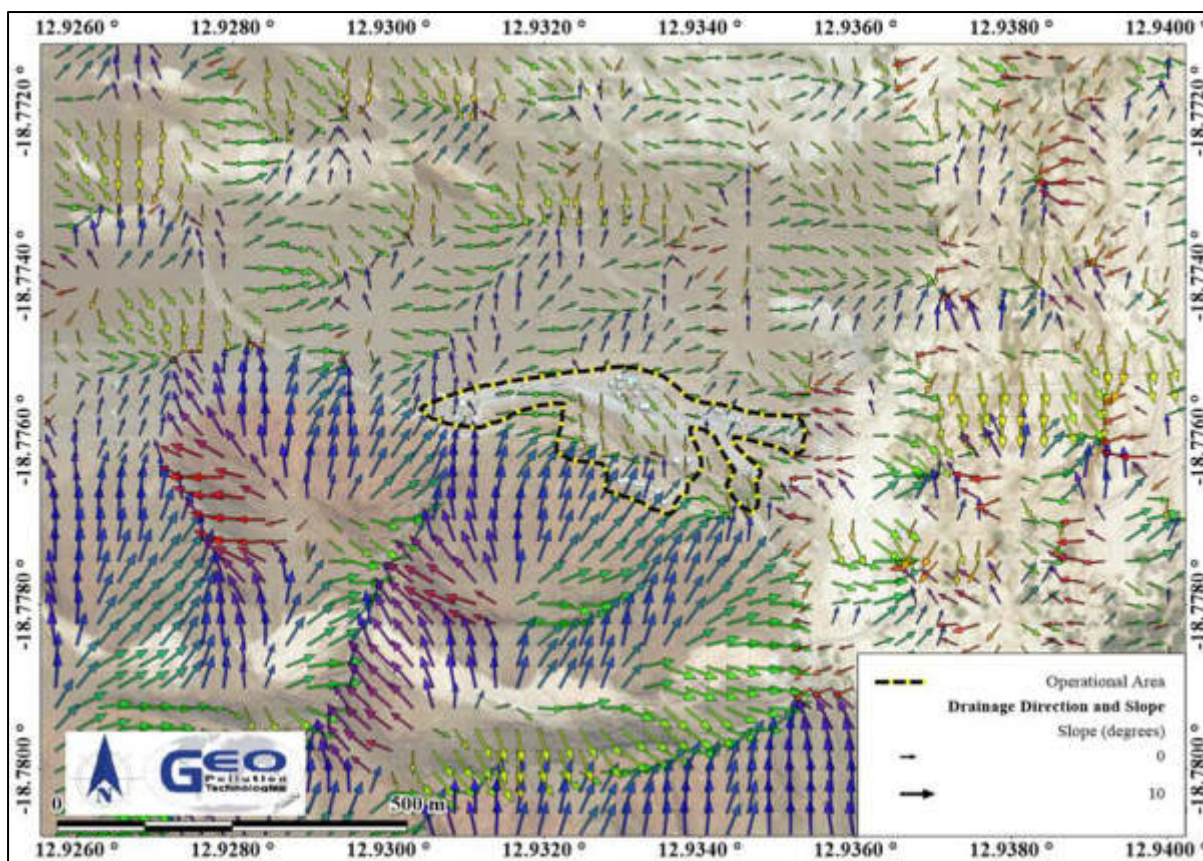


Figure 5-3 Surface flow and drainage direction of the project area

Implications and Impacts

Topographical features around the site, visually aids the integration of the lodge to the surrounding environment while informing the location of the airstrip and placement of the backup generation. Flash floods may present a risk to the lodges, however, the probability thereof is low. Any pollutants that are not contained and are transported via surface water flow will be transported away from the project location and potentially pollute surrounding areas and ultimately the Hoarusib River. Therefore, the storage and use of fuel must be strictly controlled according to SANS requirements.

5.4 GEOLOGY AND HYDROGEOLOGY

The geology of the project area mainly consist of rocks and deposits from the Namibian Age, the Vaalian Age and the Permo-Carboniferous Age. The Namibian Age geology of the area comprise of the Karibib Formation of the Swakop Group of the Damara Sequence. Lithology include marble, schist, ortho-amphibolite and quartzite. Vaalian Age geology consist of rocks of the Epupa Complex and the Permo-Carboniferous age geology consist of rocks of the Dwyka Formation, Karoo Sequence. The Dwyka Formation generally consist sedimentary rocks such as tillite, boulder shale, shale, sandstone and Limestone. The Epupa Complex consist of metasedimentary rocks such as paragneiss and orthogneiss. A thin layer of surficial deposits may occur with rocks from the Epupa Complex making up the subsurface geology of the project area itself.

Numerous faulting-, thrusting- rifting- folding episodes have complicated the geology in the project area. Groundwater flow is expected to take place through primary porosity in the surface cover (where present) and in the alluvial aquifer of the Hoarusib River, while it is expected to flow along fractures, faults, dykes/mineralised faults or along contact zones (secondary porosity) and other geological structures present within the underlying formations (hard rock formations).

The project location is situated in the Kunene North Groundwater Basin. Localised groundwater flow may take place along preferred flow paths in different directions, but the general flow is expected to be in a western direction, with the Hoarusib River aquifer serving as a local recharge zone. The average expected depth of the groundwater is 7 m below surface. The project location falls outside a water control area and therefore a permit from the Ministry of Agriculture, Water and Land Reform is not required for drilling or abstraction of water. All groundwater remains the property of the Government of Namibia.

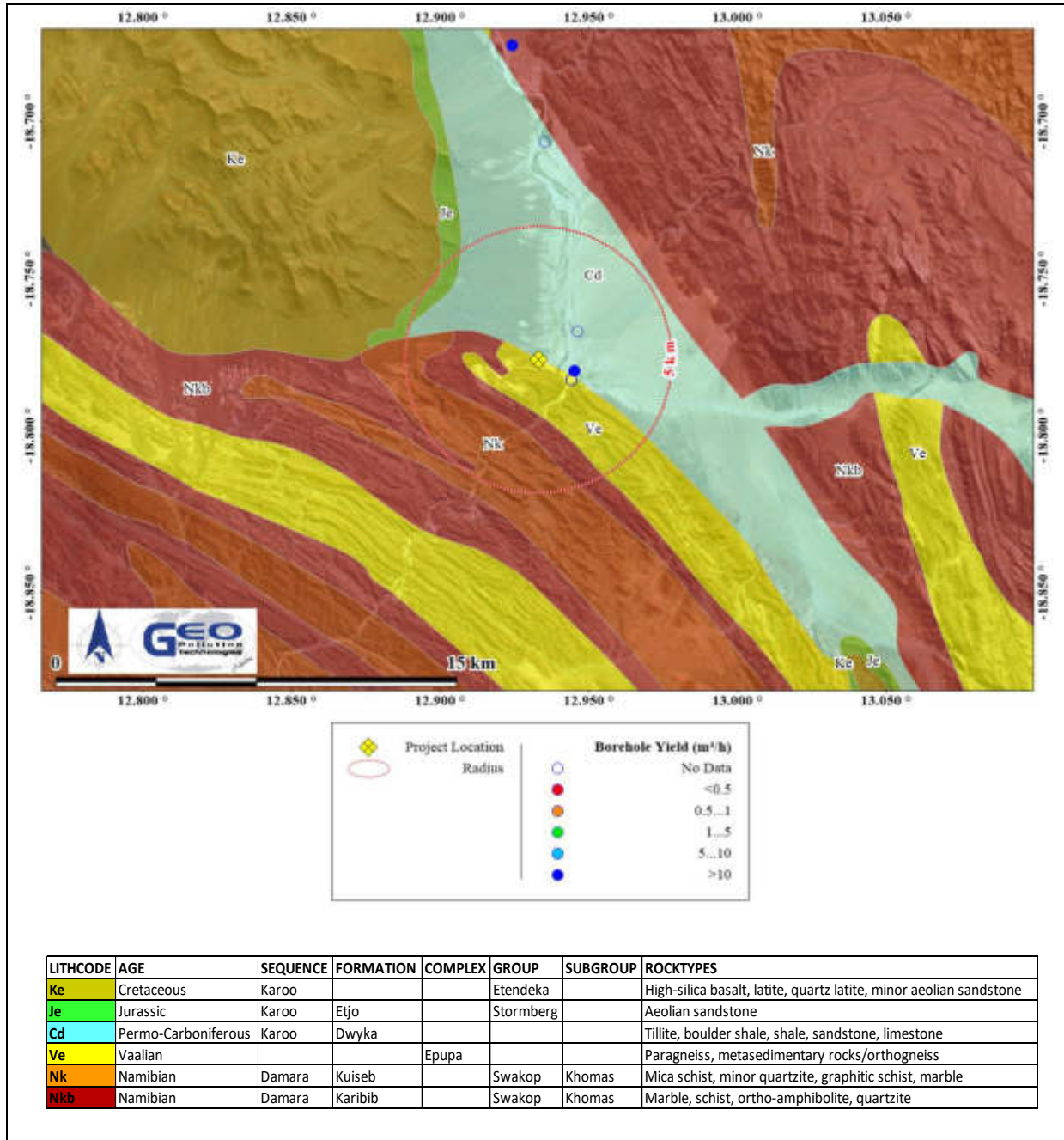


Figure 5-4 Geology of the project area

Implications and Impacts

A risk to groundwater pollution exists due to the geological sensitivity of the area. This is mainly due to the nature of the surficial deposits (river bed) and karstic geology, which is sensitive to contamination, as well as the shallow groundwater. Groundwater remains an important resource and would be at risk if sewage / fuel spills are not contained, cleaned and disposed of properly.

5.5 WATER SUPPLY

Groundwater is the only bulk water supply to the area. Water is supplied to the lodge through a borehole situated on the banks of the Hoarusb River and stored in a 10 m³ water tank at the lodge. Based on calculation made during the initial EIA, it was estimated that the lodge will require an estimate of 7 m³ per day (Everett, 2005), however current actual usage is estimated at 5 m³ during peak periods and 2 – 3 m³ per day during quieter periods. Public water supply is sourced from boreholes within the area.

Implications and Impacts

Groundwater in the area is an extremely valuable resource which, however unlikely, may be at risk if over abstraction occurs. Chemical or raw sewage spills may potentially contaminate groundwater if not contained, cleaned and disposed of properly. Water usage of the lodge is not expected to impact on the availability of groundwater.

5.6 FAUNA AND FLORA

The site lies in the Nama-Karoo biome with a north-western escarpment and inselbergs vegetation type. Plant species such as *Stipagrostis giesii*, *Stipagrostis uniplumis*, *Stipagrostis hirtigluma*, *Schmidtia kalahariensis*, *Eragrostis porosa*, *Colophospermum mopane* and a variety of other grass, shrub and tree species are characteristic of this vegetation type. Table 5-3 and Table 5-4 present a summary of the general fauna and flora of the broader area. Endemism for the area is relatively high with around 50 species of birds, reptiles, mammals, frogs, plant and scorpions being endemic.

The lodge is an existing facility and has been designed to incorporate the natural vegetation and fauna. Wild animals such as lions and elephants are frequently sighted at the lodge and surrounding areas.

Table 5-3 General flora data (Atlas of Namibia Project, 2002)

Biome	Nama-Karoo
Vegetation type	North-western escarpment and inselbergs
Vegetation structure type	Sparse shrubland
Diversity of higher plants	Low medium (Diversity rank = 5 [1 to 7 representing highest to lowest diversity])
Number of plant species	100 – 150
Percentage tree cover	< 0.1
Tree height (m)	2 – 5
Percentage shrub cover	2 – 10
Shrub height (m)	1 – 2
Percentage dwarf shrub cover	2 – 10
Dwarf shrub height (m)	< 0.5
Percentage grass cover	51 – 57
Grass height (m)	0.5 – 1
Dominant plant species	<i>Stipagrostis giesii</i> , <i>Stipagrostis uniplumis</i> , <i>Stipagrostis hirtigluma</i> , <i>Schmidtia kalahariensis</i> , <i>Eragrostis porosa</i> , <i>Colophospermum mopane</i>
Important Plant Species	Mopane (<i>Colophospermum mopane</i>)

Table 5-4 General fauna data (Atlas of Namibia Project, 2002)

Mammal Diversity	61 - 75 Species
Rodent Diversity	12 - 15 Species
Bird Diversity	111-140 Species
Reptile Diversity	41 - 50 Species
Snake Diversity	15 - 19 Species
Lizard Diversity	32 - 35 Species
Frog Diversity	4 - 7 Species
Termite Diversity	7 - 9 Genera
Scorpion Diversity	14 - 15 Species

Implications and Impacts

The lodge itself does not present a threat to the regional biodiversity. Possible pollution and changes or creation of habitats (such as close to the soakaway system), may create a suitable environment for species not traditionally know in the area or not frequenting the area– these include fauna and flora species. Temporary storage of food waste may present an opportunity for wildlife scavenging etc. while uncontrolled pollution (such a hydrocarbon spills) may and can cause damage to the local biodiversity.

While certain insects are considered pests (such ants, mosquito, locusts, etc.), the use of pesticides may not be as effective and have detrimental effects on other insects as well. The presence of scorpions and other venomous species present safety risks to the staff and lodge patrons. Mammals such as baboons and elephant may be destructive to infrastructure. Continued caution related to the operation of the airstrip and lodge should be conducted to prevent unnecessary dangerous wildlife encounters.

Poaching and illegal collection of plant, geological and animal material may impact on the local environment. Patrons and staff alike should be made aware of the implications of poaching.

5.7 DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS

The site is located near the Purros village, within the Purros Conservancy. The conservancy, with a surface area of 3,562 km² was registered in 2000. It is estimated that the conservancy has around 640 residents (Wildlife Credits, 2022). The area falls within the Sesfontein Constituency of the Kunene Region. The Kunene Region has a population of 88,300 and a density of approximately 0.8 people per km². Table 5-5 provides demographic information for the Sesfontein Constituency, the region and nationally.

Table 5-5 Demographic characteristics of Sesfontein constituency, the Kunene Region and Nationally (Namibia Statistics Agency, 2011)

	Sesfontein Constituency	Kunene Region	Namibia
Population (Males)	4,392	43,603	1,021,912
Population (Females)	4,042	43,253	1,091,165
Population (Total)	8,434	86,856	2,113,077
Unemployment (15+ years)	46%	24%	33.8%
Literacy (15+ years)	72%	64.9%	87.7%

Implications and Impacts

Current operations have increased employment locally and created positive economic spin-offs for mainly the Purros village. Profit sharing with the conservancy is a direct, continued economic benefit to the area. Employment opportunities and economic diversification, as brought on through the lodge, may influence the demographic profile of the village through mainly in-

migration and education. Skills development and training benefit employees while the lodge may have an influence on further stimulating economic growth for the area. However, additional people would also put additional pressure on existing limited infrastructure, services and natural resources in the area.

6 ENVIRONMENTAL MANAGEMENT PLAN

The purpose of this section is to list the most pertinent environmental impacts that are expected from the operational, construction (upgrades, maintenance, etc.) and potential decommissioning activities of the lodge.

6.1 OBJECTIVES OF THE EMP

The EMP provides management options to ensure impacts of the lodge is minimised. An EMP is a tool used to take pro-active action by addressing potential problems before they occur. This should limit the corrective measures needed, although additional mitigation measures might be included if necessary. The environmental management measures are provided in the tables and descriptions below. These management measures should be adhered to during the various phases of the operation of the lodge. This section of the report can act as a stand-alone document. All personnel taking part in the operations of the lodge should be made aware of the contents in this section, so as to plan the operations accordingly and in an environmentally sound manner.

The objectives of the EMP are:

- ◆ to include all components of construction activities (upgrades, maintenance, etc.) and operations of the lodge;
- ◆ to prescribe the best practicable control methods to lessen the environmental impacts associated with the lodge;
- ◆ to monitor and audit the performance of operational personnel in applying such controls; and
- ◆ to ensure that appropriate environmental training is provided to responsible operational personnel.

6.2 IMPLEMENTATION OF THE EMP

Section 6.3 outline the management of the environmental elements that may be affected by the different activities. Impacts addressed and mitigation measures proposed are seen as minimum requirements which have to be elaborated on. Delegation of prevention and mitigation measures as well as reporting activities, should be determined by the Proponent and included in the EMP. The EMP is a living document that must be prepared in detail, and regularly updated, by the Proponent as the project progress and evolve.

The EMP and ECC must be communicated to the lodge managers. A copy of the ECC and EMP should be kept on site. All monitoring results must be reported on as indicated. Reporting is important for any future renewals of the ECC and must be submitted to the MEFT. Renewal of ECC will require six monthly reports based on the monitoring prescribed in this EMP.

Various potential and definite impacts will emanate from the operations and decommissioning phases. The majority of these impacts can be mitigated or prevented. The prevention and mitigation measures are listed below.

6.3 MANAGEMENT OF IMPACTS: OPERATIONS AND CONSTRUCTION

The following section provide management measures for both the operational phase as well as construction activities related to the lodge.

6.3.1 Planning

During the phases of planning for operations, construction and decommissioning of the lodge, it is the responsibility of the Proponent to ensure they are and remain compliant with all legal requirements. The Proponent must also ensure that all required management measures are in place prior to and during all phases, to ensure potential impacts and risks are minimised. The

following actions are recommended for the planning phase and should continue during various other phases of the project:

- ◆ Ensure that all necessary permits from the various ministries, local authorities and any other bodies that governs the construction activities and operations of the project are in place and remains valid. This includes registration with the Hospitality Association of Namibia (HAN), consumer installation certificate (petroleum products licence) and effluent disposal permit.
- ◆ Ensure all appointed contractors and employees enter into an agreement which includes the EMP. Ensure that the contents of the EMP are understood by the contractors, sub-contractors, employees and all personnel present or who will be present on site.
- ◆ Make provisions to have a Health, Safety and Environmental Coordinator to implement the EMP and oversee occupational health and safety as well as general environmental related compliance at the site.
- ◆ Have the following emergency plans, equipment and personnel on site where reasonable to deal with all potential emergencies:
 - Risk management / mitigation / EMP/ Emergency Response Plan and HSE Manuals,
 - Adequate protection and indemnity insurance cover for incidents;
 - Comply with the provisions of all relevant safety standards;
 - Procedures, equipment and materials required for emergencies.
- ◆ If one has not already been established, establish and maintain a fund for future ecological restoration of the project site should project activities cease and the site is decommissioned and environmental restoration or pollution remediation is required.
- ◆ Ensure all agreements entered into between the Proponent and the Purros Conservancy are continually adhered to, and updated in writing if and where required.
- ◆ Establish and / or maintain a reporting system to report on aspects of construction activities, operations and decommissioning as outlined in the EMP.
- ◆ Submit bi-annual reports to the MEFT to allow for environmental clearance certificate renewal after three years. This is a requirement by MEFT.
- ◆ Appoint a specialist environmental consultant to update the EMP and apply for renewal of the environmental clearance certificate prior to expiry.

6.3.2 Skills, Technology and Development

During various phases of the lodge, training is provided to a portion of the workforce to be able to conduct certain tasks according to the required standards. Skills are periodically transferred to an unskilled workforce for general tasks. Development of people and technology are key to economic development. During normal operations, employees will enhance their working expertise while some individuals may be identified for promotion and additional skills development and training.

Desired Outcome: To see an increase in skills of local Namibians, as well as development and technology advancements in the tourism industry and local community.

Actions

Enhancement:

- ◆ If the skills exist locally, contractors must first be sourced from the region and then nationally. Deviations from this practice must be justified.
- ◆ Skills development and improvement programs to be made available as identified during performance assessments.
- ◆ Employees to be informed about parameters and requirements for references upon employment.
- ◆ The Proponent must employ local Namibians from the Conservancy where possible. Deviations from this practise should be justified appropriately.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Record should be kept of training provided.
- ◆ Ensure that all training is certified or managerial reference provided (proof provided to the employees) inclusive of training attendance, completion and implementation.
- ◆ Bi-annual summary report based on employee training.

6.3.3 Economic Resilience and Employment

The change in land use, from communal to tourism, lead to changes in the way revenue is generated and paid to the national treasury. Skilled and unskilled labour are required for the operations and maintenance / construction activities associated with the lodge. Furthermore, a fixed monthly fee is paid to the conservancy by the lodge, along with this a percentage of income generated is donated towards the Purros Conservancy for development and conservation purposes. A report released by the World Travel and Tourism Council (2018), prior to the Covid19 pandemic, estimated that Namibia will see a growth of 3.6% in travel and tourism's contribution to employment over the next 10 years. The expected growth is higher than estimations for Sub-Sahara Africa (2.3%). As a result of the ongoing Covid19 pandemic, Namibia has seen a significant reduction in tourism, however the tourism sector is beginning to slowly recover. Increased travel within Namibia and specifically to this region is therefore expected to increase the demand for accommodation and related services.

Desired Outcome: Contribution to national treasury and continued remuneration of temporary and permanent employees as per the Labour Act. Continued contributions to social security.

Actions

Enhancement:

- ◆ The Proponent must employ local Namibians from the Conservancy where possible.
- ◆ If the skills exist locally, employees must first be sourced from the town, then the region and then nationally.
- ◆ Deviations from this practice must be justified.
- ◆ Minimum salary agreements made with the Conservancy should be re-negotiated at least every two years.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Bi-annual summary report based on employee records and financial contributions to the various institutions such as social security, receiver of revenue etc.

6.3.4 Demographic Profile and Community Health

Greater economic prosperity as linked to the flourishing lodge operations may lead to a change in the demographic profile of the local community. Change will result with an influx of job seekers over time and further densification of the settlement. Community structures may change with an increase in population while the economic profile will be adjusted as the employment structure of the area is changed. Community health may be exposed to factors such as communicable disease like HIV/AIDS and alcoholism/drug abuse. An increase in people in the area may potentially increase the risk of criminal and socially deviant behaviour such as vandalism and poaching. More people in the area will exert additional pressure on governmental services, particularly essential services such as health care. Medical assistance, emergency services and the policing of the community may become strained.

Desired Outcome: To prevent the occurrence of social ills and prevent the spread of diseases such as HIV/AIDS.

Actions:

Prevention:

- Employ only local people from the conservancy where possible, deviations from this practice should be justified appropriately.
- Ensure sanitation facilities and all related sanitation requirements are available and maintained at the lodge for all employees.
- To prevent conflict between families within the village, employment should be divided in such a manner that ensures adequate distribution between families as far as possible.
- Educational programmes for employees on various topics of social behaviour HIV/AIDS and general upliftment of employees' social status.
- To ensure disturbances to Ovahimba tribes and important cultural and sacred sites are limited, the lodges should only allow guided visits, based on terms set by the Conservancy.
- Appointment of reputable contractors.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Facility inspection sheet for all areas which may present environmental health risks, kept on file.
- Bi-annual summary report based on educational programmes and training conducted.

6.3.5 Traffic

As the lodge is located in a remote area, traffic impact are expected to be unlikely, and mostly related to degradation of road surfaces and dust generation.

Desired Outcome: Minimum impact on traffic and no transport or traffic related incidents.

Actions

Prevention:

- Erect clear signage regarding access and exit points at the lodge.
- Vehicle accessing and leaving the lodge should remain on existing established roads / tracks and maintain low speeds.
- If any traffic impacts are expected, possibly as a result of delivery of equipment or construction material, traffic management should be performed to prevent these.

Mitigation:

- Treated grey water may be used for dust suppression purposes on access roads to the lodge.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Any complaints received regarding traffic issues should be recorded together with action taken to prevent impacts from repeating itself.
- A bi-annual report should be compiled of all incidents reported, complaints received, and action taken.

6.3.6 Health, Safety and Security

Activity associated with operations and maintenance / construction is reliant on human labour and therefore health and safety risks exist. Activities such as the operation of vehicles and machinery as well as handling of hazardous chemicals pose risks to employees. The site is frequently visited by wild animals such as elephants and lions. Encounters with wild animals, including venomous species like snakes and scorpions may pose risks to staff and uninformed guests. The air strip may pose safety risk which may lead to injury and even death if not properly designed and operated, and regularly maintained. Security risks will be related to unauthorized entry, theft and sabotage.

Desired Outcome: To prevent injury, health impacts and theft.

Actions

Prevention:

- Clearly label dangerous and restricted areas as well as dangerous equipment and products. This includes the chemical store and consumer fuel installation.
- Equipment and goods that will be locked away on site must be placed in a way that does not encourage criminal activities (e.g. theft).
- Provide all employees with required and adequate personal protective equipment (PPE).
- Staff should be educated / trained on human wildlife conflict management, and guest should be informed upon arrival not to approach wild animals and to be vigilant for, and not to confront, snakes or other potentially venomous / dangerous animals.
- Although the frequency of malaria infection in this area is low, personnel and guests should be encouraged to, during times of mosquito activity, take measures to prevent mosquito bites including wearing long sleeved clothing, applying insect repellents and sleeping under mosquito nets.
- All Health and Safety standards specified in the Labour Act should be complied with.
- Implementation of maintenance register for all equipment and fuel/hazardous substance storage areas.
- All industry specific health and safety procedures and regulations applicable to the kitchen and the preparation of food for guests should be in place and adhered to.
- Consult with the Namibia Civil Aviation Authority (NCAA) on the design, operational procedures and maintenance of the air strip to ensure all necessary safety parameters are in place.

Mitigation:

- Selected personnel should be trained in first aid and a first aid kit must be available on site. The contact details of all emergency services must be readily available.
- Implement and maintain an integrated health and safety management system, to act as a monitoring and mitigating tool, which includes: colour coding of pipes, operational, safe work and medical procedures, permits to work, emergency response plans, housekeeping rules, MSDS's and signage requirements (PPE, flammable etc.).
- Educate staff on the symptoms of malaria and encourage them to report such symptoms.
- Security procedures and proper security measures must be in place to protect workers and clients, especially during cash in transit activities.
- Reduce the amount of cash kept on site to reduce the risk of robberies

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Any incidents must be recorded with action taken to prevent future occurrences.
- A bi-annual report should be compiled of all incidents reported. The report should contain dates when training were conducted and when safety equipment and structures were inspected and maintained.

6.3.7 Fire

Construction activities, failing electrical infrastructure and fires outside of designated areas may increase the risk of the occurrence of uncontrolled fires which may spread into the nearby vegetation. Similarly machinery can ignite dry vegetation if sufficient heat (e.g. exhaust pipes) or sparks are produced. Chemicals and fuels stored and used for general activities may be flammable. Improper waste burning or discarding of cigarette buds further increases fire risks.

Desired Outcome: To prevent property damage, veld fires, possible injury and impacts caused by uncontrolled fires.

Actions:

Prevention:

- ◆ Prepare a holistic fire protection and prevention plan. This plan must include evacuation plans and signage, an emergency response plan and a firefighting plan.
- ◆ Personnel training (safe operational procedures, firefighting, fire prevention and responsible housekeeping practices).
- ◆ Ensure all flammable chemicals are stored according to material safety data sheet (MSDS) and SANS instructions and all spills or leaks are cleaned up immediately.
- ◆ Maintain regular site, mechanical and electrical inspections and maintenance.
- ◆ Maintain firefighting equipment and promote good housekeeping.
- ◆ Ensure that burning is never left unattended.
- ◆ Fire used for purposes such as cooking (by staff and campers) must only be allowed within designated areas.

Mitigation:

- ◆ Implement the fire protection and firefighting plan in the event of a fire.
- ◆ Quick response time by trained staff will limit the spread and impact of fire.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ A register of all incidents must be maintained on a daily basis. This should include measures taken to ensure that such incidents do not repeat themselves.
- ◆ A bi-annual report should be compiled of all incidents reported. The report should contain dates when fire drills were conducted and when fire equipment was tested and training given.

6.3.8 Noise

Since the lodge is a tourist establishment, noise are typically kept to a minimum not to be a disturbance to guests. However, during construction and maintenance activities some noise generating activities can exist that may lead to hearing loss in workers. Aircraft landing and taking off from the airstrip may cause noise disturbances at nearby receptors. The closest receptor to the airstrip is the lodge itself, approximately 1,500 m from the airstrip. Furthermore aircraft will visit the airstrip very infrequently and landing and take-off will be during the day unless there are some sort of emergency. The backup generator is located south of the lodge with a solid topographical feature buffering its sound from the lodge.

Desired Outcome: To prevent any nuisance and hearing loss due to noise generated.

Actions

Prevention:

- Follow World Health Organization (WHO) guidelines on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment.
- Only light aircraft may fly in the area, and stick to direct routes to and from the airstrip, no additional scenic flights of low level flights over the river should be allowed.
- All machinery and vehicles must be regularly serviced to ensure minimal noise production.

Mitigation:

- Hearing protectors as standard PPE for workers in situations with elevated noise levels.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- WHO Guidelines.
- Maintain a complaints register.
- Bi-annual reporting on complaints and actions taken to address complaints and prevent future occurrences.

6.3.9 Waste production

Various waste streams are produced during the operational and construction / maintenance phases. Waste may include hazardous waste associated with hydrocarbon products and chemicals and soil and water contaminated with such products. Construction waste may include building rubble and discarded equipment. Domestic waste will be generated by the lodge and related operations. Waste presents a contamination risk and when not removed regularly may become a health and / or fire hazard and attract wild animals and scavengers. Sewage is a form of liquid biological waste that needs disposal.

Desired Outcome: To reduce the amount of waste produced, and prevent pollution and littering.

Actions

Prevention:

- Waste reduction measures should be implemented and all waste that can be re-used / recycled must be kept separate.
- Ensure adequate disposal storage facilities are available.
- Ensure waste cannot be blown away by wind.
- Prevent scavenging (human and non-human) of waste.
- Sewage water and grey water should be treated separately to reduce the amount of sewage water generated.
- The septic tank should be designed and operated according to the general guidelines set forth in the *Department of Water Affairs and Forestry, Code of Practice: Volume 1, Septic tank Systems*.
- The septic tank should be located >500 m from any drinking water source.
- No foreign objects, hazardous chemicals, fuels or excessive amounts of cooking grease may enter the sewage system.
- Use only bio-degradable, septic tank friendly cleaning chemicals.
- All regulation and by-laws relating to environmental health should be adhered to.
- Adhere to effluent disposal permit conditions for the disposal of treated water from the septic tank systems.
- Ensure all ablution facilities are connected to properly constructed and maintained effluent treatment system to prevent groundwater contamination.
- Should any buildings or structures be decommissioned, all waste and infrastructure should be removed from the site and disposed of at a recognised landfill site.
- Should the septic tanks be decommissioned, all waste should be removed from the tank and disposed of in an appropriate manner. The tanks may then be crushed in place and the holes effectively backfilled.

Mitigation:

- Waste should be disposed of regularly and at appropriately classified disposal facilities, this includes hazardous material (empty chemical containers, contaminated rugs, paper water and soil).
- See the material safety data sheets available from suppliers for disposal of contaminated products and empty containers.
- Liaise with the local authority regarding waste and handling of hazardous waste.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- A register of hazardous waste disposal should be kept. This should include type of waste, volume as well as disposal method/facility.
- Any complaints received regarding waste should be recorded with notes on action taken.
- All information and reporting to be included in a bi-annual report.

6.3.10 Ecosystem and Biodiversity Impact

Okahirongo Elephant Lodge is an existing facility and no further impact on vegetation is expected. The lodge further indirectly contributes to biodiversity management by contributing a portion of income generated to the Purros Conservancy. Poaching and illegal collection of plant and animal materials may occur. Impacts may also be related to pollution of the environment. Birds and animals colliding with aircraft landing or taking-off from the airstrip. Human / wildlife interactions further presents a risk to both the wildlife and the people involved if not properly managed.

Desired Outcome: To avoid pollution of and impacts on the ecological environment.

Actions.

Prevention:

- ◆ Where possible, removal of trees, especially protected species and large trees, must be avoided during construction activities.
- ◆ The necessary permits from the Directorate of Forestry, MEFT must be obtained for removal of all protected species.
- ◆ Educate all contracted and permanent employees on the value of biodiversity.
- ◆ Strict conditions prohibiting harvesting and poaching of fauna and flora should be part of employment contracts. This includes prohibitions or regulations on the collection of firewood.
- ◆ Regular inspection of surrounding areas and river courses for snares, traps or any other illegal activities.
- ◆ Disciplinary actions to be taken against all employees failing to comply with contractual conditions related to poaching and the environment.
- ◆ Ensure that no animals or birds are present on the airstrip prior to aircraft landing or taking off (e.g. fly-overs or driving length of airstrip with vehicle).
- ◆ Only guided wildlife tours should be allowed from the lodge, and should be limited to existing established roads.
- ◆ Guides employed should be either NATH or FGASA accredited
- ◆ Policy documents should be drafted and implemented on how to deal with wildlife interactions and visits to villages, this should include:
 - Training requirements for guides,
 - Induction requirements for clients,
 - Routes that may be used.

Mitigation:

- ◆ For construction activities, if any, contain construction material to a designated laydown area and prevent unnecessary movement out of areas earmarked for clearing and construction.
- ◆ Report any extraordinary animal sightings, conflict or incidents to the MEFT.
- ◆ Mitigation measures related to waste handling and the prevention of groundwater, surface water and soil contamination should limit ecosystem and biodiversity impacts.
- ◆ Avoid scavenging of waste by fauna.

Responsible Body:

- ◆ Contractor
- ◆ Proponent

Data Sources and Monitoring:

- ◆ All information and reporting to be included in a bi-annual report.

6.3.11 Groundwater, Surface Water and Soil Contamination

Various sources exist that may potentially pollute soil and subsequently groundwater. This include vehicles and machinery that leak oil or hydraulic fluids (e.g. earthmoving equipment and graders). Operations entail the storage and handling of chemicals in small quantities which present contamination risks if not sufficiently contained. Raw sewage not sufficiently treated that enters the environment can reach groundwater.

Desired Outcome: To prevent the contamination of water and soil.

Actions

Prevention:

- Proper training of operators of machinery and vehicles and employees must be conducted on a regular basis (fuel and chemical handling, spill detection, spill control).
- All machinery and vehicles should be properly maintained to be in a good working condition during operations.
- Employ drip trays and spill kits when servicing / repairs of equipment is needed.
- The septic tanks must be regularly inspected and serviced as required.
- If water from the swimming pool will enter the environment, biodegradable / environmentally friendly chemicals should be used for water treatment.
- All chemical should be stored in a sufficiently bunded area.
- The storage and handling of fuel should be done in accordance with SANS requirements.

Mitigation:

- Any chemical spillage of more than 200 litre must be reported to the Ministry of Mines and Energy.
- Spill clean-up means must be readily available on site as per the relevant MSDS.
- The fuel tanks' bund area must be cleaned if any fuel products are present and this waste must be disposed of at a suitably classified hazardous waste disposal facility.
- Any spill must be cleaned up immediately.

Responsible Body:

- Department of Water Affairs, Ministry of Agriculture, Water and Land Reform
- Proponent
- Contractors

Data Sources and Monitoring:

- Effluent disposal permit.
- A report should be compiled bi-annually of all spills or leakages reported. The report should contain the following information: date and duration of spill, product spilled, volume of spill, remedial action taken.

6.3.12 Visual Impact

This impact is not only associated with the aesthetics of the site, but also the structural integrity. The existing lodge was designed to form part of the landscape character. The lodge is uniquely located and serves as a point of interest to tourists and patrons to the area, it should be kept clean, tidy and maintained to ensure it remains aesthetically pleasing.

Desired Outcome: To minimise aesthetic impacts associated with the lodge.

Actions

Prevention:

- Regular waste disposal, good housekeeping and routine maintenance on infrastructure will ensure that the longevity of structures are maximised and a low visual impact is maintained.
- Low brightness lights should be used and directed downwards to ensure a minimal visual impact is maintained.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- A maintenance record should be kept.
- A report should be compiled of all complaints received and actions taken.

6.3.13 Cumulative Impact

Possible cumulative impacts associated with the operational phase and any maintenance / construction activities are mainly linked to increased traffic. Being isolated, cumulative impacts are however expected to be unlikely.

Desired Outcome: To minimise cumulative all impacts associated with the lodge.

Actions

Mitigation:

- ◆ Adherence to the exclusive use zone of the lodge (20 km radius around the lodge) will reduce possible cumulative impacts. This excludes existing camps.
- ◆ Strategies should be put in place, in conjunction with the Conservancy, to reduce impacts on popular tourist spots “pressure points” within the vicinity.
- ◆ Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.
- ◆ Reviewing biannual and annual reports for any new or re-occurring impacts or problems would aid in identifying cumulative impacts and help in planning if the existing mitigations are insufficient.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Bi-annual summary report based on all other impacts must be created to give an overall assessment of the impact of the operational phase.

6.4 DECOMMISSIONING AND REHABILITATION

Decommissioning is not foreseen during the validity of the ECC. Construction activities may however include modification and decommissioning. Should decommissioning occur at any stage, rehabilitation of the area may be required. Prior to the complete decommissioning of the lodge, the post closure land use should be assessed. It is recommended that the lodge either be sold, or all infrastructure be offered to the local community in order to continue with the operations. This will mitigate the possible impacts associated with job losses etc. Should the lodge be donated to the local community / sold, all existing contamination at the site should be cleared / remediated prior to the transfer of infrastructure, the existing EIA and EMP should further be transferred to the new owner to ensure continual compliance with EMP requirements.

In the event where the lodge cannot be sold or transferred to the local community, decommissioning will entail the complete removal of all infrastructure including buildings and underground infrastructure, if any, not forming part of post decommissioning land use. Any pollution present on the site must be remediated. The impacts associated with this phase include noise and waste production as structures are dismantled. Noise must be kept within WHO standards and waste should be contained and disposed of at an appropriately classified and approved waste facility and not dumped in the surrounding areas. Should operations be decommissioned with no employment or remuneration plan for the conservancy and employees, a significant social and economic impact will be suffered by the local community. The EMP for the lodge will have to be reviewed and updated prior to decommissioning to cater for changes made to the site and implement guidelines and mitigation measures related to social and environmental aspects.

6.5 ENVIRONMENTAL MANAGEMENT SYSTEM

The Proponent could implement an Environmental Management System (EMS) for their operations. An EMS is an internationally recognized and certified management system that will ensure ongoing incorporation of environmental constraints. At the heart of an EMS is the concept of continual improvement of environmental performance with resulting increases in operational efficiency, financial savings and reduction in environmental, health and safety risks. An effective EMS would need to include the following elements:

- ◆ A stated environmental policy which sets the desired level of environmental performance;
- ◆ An environmental legal register;
- ◆ An institutional structure which sets out the responsibility, authority, lines of communication and resources needed to implement the EMS;
- ◆ Identification of environmental, safety and health training needs;
- ◆ An environmental program(s) stipulating environmental objectives and targets to be met, and work instructions and controls to be applied in order to achieve compliance with the environmental policy; and
- ◆ Periodic (internal and external) audits and reviews of environmental performance and the effectiveness of the EMS.
- ◆ The EMP.

7 CONCLUSION

Operations of Okahirongo Elephant Lodge has a positive impact on the tourism sector operational in the area and Namibia. It provides luxury accommodation and tourism related services in a remote area, increasing ease of accessibility. It provides employment opportunities and skills development to a local workforce. Revenue is generated that contributes to the Purros Conservancy as well as the Namibian economy.

Negative impacts associated with the operations and maintenance / construction activities can successfully be mitigated. Implementing a safety, health, environment and quality (SHEQ) policy will contribute to effective management procedures to prevent and mitigate impacts. All regulations relating to tourism and health and safety legislation should be implemented. Groundwater and soil pollution must be prevented at all times. Fire prevention should be key and fire response plans must be in place and regular training provided. All staff must be made aware of the importance of biodiversity and the poaching or illegal harvesting of animal and plant products prohibited. Any waste produced must be removed from site and disposed of at an appropriate facility or re-used or recycled where possible. Hazardous waste must be disposed of at an approved hazardous waste disposal site.

The updated EMP should continue to be used as an on-site reference document for the operations of the lodge. Parties responsible for transgressing of the EMP should be held responsible for any rehabilitation that may need to be undertaken. The Proponent could use an in-house Environment Management System in conjunction with the environmental management plan. All operational personnel must be taught the contents of these documents.

8 REFERENCES

- Atlas of Namibia Project. 2002. Digital Atlas of Namibia Unpublished Report. Ministry of Environment & Tourism
- Directorate of Environmental Affairs, 2008. Procedures and Guidelines for Environmental Impact Assessment (EIA) and Environmental Management Plans (EMP), Directorate of Environmental Affairs, Ministry of Environment and Tourism, Windhoek.
- Everett M.J. 2005. An Environmental Impact Assessment and Management Plan for the Proposed Okahirongo Lodge in Purros, North West Namibia. Enviroolutions cc
- Funk, C., Peterson, P., Landsfeld, M., Pedreros, D., Verdin, J., Shukla, S., Husak, G., Rowland, J., Harrison, L., Hoell, A. and Michaelsen, J., (2015) The climate hazards group infrared precipitation with stations - A new environmental record for monitoring extremes. Scientific Data, 2, 150066. <https://doi.org/10.1038/sdata.2015.66>.
- <https://www.okahirongolodge.com/>. Date Accessed: 02 February 2022
- Kunene River Awareness Kit. 2022. Climate Classification in the Basin. http://www.kunene.riverawarenesskit.com/kunenerak_com/EN/RIVER/CLIMATE_AND_WEATHER/CLIMATE_OF_THE_KUNENE_RIVER_BAS/CLIMATIC_CLASSIFICATION.HTM. Date Accessed: 17 February 2022.
- Namibia Statistics Agency. Namibia household Income and Expenditure Survey 2009/2010.
- Namibia Statistics Agency. Namibia 2011 Population and Housing Census Main Report.
- Varma, P. 2018. Köppen Climate Classification. <https://alchetron.com/K%C3%B6ppen-climate-classification#Group-B-Dry-arid-and-semiarid-climates>. Date Accessed: 17 February 2022.
- Wildlife credits. 2022. <https://wildlifecredits.com/conservancy-info/puros>. Date Accessed: 02 February 2022
- World Travel and Tourism Council 2018: Travel & Tourism Economic Impact 2018 Namibia.

Appendix A: Environmental Clearance Certificate



14-1/0015

REPUBLIC OF NAMIBIA

MINISTRY OF ENVIRONMENT AND TOURISM

Enquiries: Dr. F.M. Sikabongo
 Tel.: 00264 61 249015
 Fax: 00264 61 243309
freddy@dea.met.gov.na

FGI Building, 1st Floor
 Post Street Mall
 P/Bag 13346
 Windhoek

The Manager
 EnviroSolutions
 P.O. Box 3046
 Swakopmund
 Namibia

28 January 2005

Cell: 081 292 2553
 Cell: 081 253 9077

For Attention Mr M.J. Everett

Dear Sir

Re: Environmental Clearance for the Environmental Management Plan: Okahirongo Lodge in Purros, North West Namibia

Thank you for the submission of the environmental management plan for the above-mentioned project.

The management plan done is sufficient as it took into account the key environmental issues concerning the proposed activities. It is recommended that once the project is implemented regular Environmental Monitoring and Evaluations on environmental performance should be conducted. Targets for improvements should be established and monitored throughout this process.

On the basis of the above, this letter serves as an environmental clearance for the above project to proceed. However, this clearance does not in any way hold the Ministry of Environment and Tourism accountable of any wrong or insufficient information, nor any adverse effects that may arise from this project's activities. Instead, full accountability rests with the developer and her consultants.

Thank you for your kind co-operation.

Regards,


 M. Lindeque
 Permanent Secretary



All official correspondence must be addressed to the Permanent Secretary

Appendix B: Consultants' Curriculum Vitae

HYDROGEOLOGIST**Pierre Botha**

Pierre Botha is the Managing Director of Geo Pollution Technologies, Namibia. Mr. Botha has excellent experience and knowledge in Environmental Impact Assessments, groundwater pollution assessment, groundwater exploration, resource evaluation, urban and rural water supply, groundwater management, monitoring and hydrochemistry. He gained most of his experience in Namibia and is involved in the Namibian groundwater industry since 1992.

Mr Botha's experience in the environmental / groundwater field has been gained from various projects ranging from groundwater exploration, groundwater management and modelling, environmental impact assessments, pollution mapping and rehabilitation to health risk evaluations.

CURRICULUM VITAE PIERRE BOTHA

- ◆ Name of Firm : Geo Pollution Technologies (Pty) Ltd.
- ◆ Name of Staff : PIERRE BOTHA
- ◆ Profession : Hydrogeologist / Hydrologist
- ◆ Environmental Assessment Practitioner
- ◆ Years' Experience : 28
- ◆ Nationality : Namibian
- ◆ Position : Managing Director
- ◆ Specialisation : Hydrogeology
- ◆ Languages : Afrikaans – speaking, reading, writing – excellent
- ◆ English – speaking, reading, writing – excellent
- ◆ Subsurface Interface Radar in Engineering and Geophysical Investigations GSSI 2007
- ◆ First Aid Class A EMTSS, 2017
- ◆ Basic Fire Fighting EMTSS, 2017

EDUCATION AND PROFESSIONAL STATUS:

- ◆ B.Sc. Geology & Geography : University of OFS, 1992
- ◆ B.Sc. (Hons.)(*cum laude*) Geohydrology/Hydrology : University of OFS, 1994

PROFESSIONAL SOCIETY AFFILIATION:

- ◆ Environmental Assessment Professionals of Namibia (EAPAN) – *President 2014 - Vice President 2012, 2013*
- ◆ Hydrogeological Association of Namibia (HAN)
- ◆ Geological Association of Namibia

AREAS OF EXPERTISE:

- ◆ Knowledge and expertise in:
- ◆ risk based corrective action analyses
- ◆ bioremediation
- ◆ monitoring, mapping and evaluation of groundwater pollution
- ◆ hydrochemistry studies
- ◆ environmental impact assessments
- ◆ project management
- ◆ soil vapour surveys
- ◆ groundwater modelling
- ◆ groundwater monitoring
- ◆ hydrocensus
- ◆ hydrogeological data evaluation and interpretation
- ◆ groundwater exploration and resource evaluation
- ◆ geophysical interpretations (Ground Penetrating Radar, Electrical Resistivity, Electromagnetic & Magnetic)
- ◆ urban and rural water supply
- ◆ groundwater management
- ◆ borehole siting, drilling and test pumping supervision
- ◆ aquifer testing

EMPLOYMENT:

- ◆ 1998-Date : Geo Pollution Technologies (Pty) Ltd
- ◆ 1995 : Parkman Namibia (Groundwater Consulting Services) - Hydrogeologist
- ◆ 1994 : Institute for Groundwater Studies, University of the Orange Free State - Hydrogeologist
- ◆ 1992-1993 : Groundwater Consulting Services - Field Geologist
- ◆ 1988 : Tsumeb Corporation Ltd - Student geologist

PUBLICATIONS:

- ◆ Contract reports : +500
- ◆ Publications : 1

ENVIRONMENTAL GEOLOGIST**Wikus Coetzer**

Wikus has 6 years' experience in environmental science related fields with 4 years' experience in conducting environmental impact assessments and preparation of environmental management plans. He holds an honours degree in Environmental Sciences – Environmental Geology from the Northwest-University Potchefstroom (NWU) South Africa. He first completed a B.Sc. degree in Geology and Botany in the required time also from the Northwest University Potchefstroom, South Africa. His honours project focused on the rehabilitation and phytoremediation of various tailings types and soils.

He has working experience as an environmental monitor / assisting environmental officer at Petra Diamonds, Cullinan Diamond Mine (CDM) where he gained a proper understanding of environmental monitoring responsibilities as well as legislations, regulations and the implementation of EMS/ISO14001. He started working at Geo Pollution Technologies in 2017, and regularly conducts/assists and report on environmental impact assessments, environmental management plans and pollution surveys.

CURRICULUM VITAE WIKUS COETZER

Name of Firm	:	Geo Pollution Technologies (Pty) Ltd.
Name of Staff	:	WIKUS COETZER
Profession	:	Environmental Geologist
Nationality	:	South African
Position	:	Environmental Geologist
Specialisation	:	Environmental Geology/ Geochemistry
Languages	:	Afrikaans – speaking, reading, writing English – speaking, reading, writing

EDUCATION AND PROFESSIONAL STATUS:

B.Sc. Environmental and Biological Sciences – Geology & Botany	:	NWU Potchefstroom 2013
B.Sc. (Hons.) Environmental Sciences – Environmental Geology	:	NWU Potchefstroom 2014

First Aid Class A	EMTSS, 2017
Basic Fire Fighting	EMTSS, 2017

AREAS OF EXPERTISE:

Knowledge and expertise in:

- ◆ Phytoremediation
- ◆ Environmental Geology / Geochemistry
- ◆ Environmental Monitoring
- ◆ Environmental Compliance
- ◆ Environmental Impact Assessments
- ◆ Environmental Management Plans

EMPLOYMENT:

2017 - Date:	Geo Pollution Technologies
2015 - 2016:	Petra Diamonds CDM – Environmental monitor / Assisting environmental officer
2015:	Petra Diamonds CDM – Graduate program: Environmental Officer
2014:	NWU Potchefstroom department of Geo and Spatial Sciences – Research assistant

PUBLICATIONS:

Contract Reports: +50