

## **Comprehensive Environmental Management Plan (EMP) & Closure Plan**

**The Operations and Maintenance of the Existing Dumpsite for Outapi  
Town in the Omusati Region – An Application for Environmental  
Clearance Certificate**



**ECC Application No.:**

**APP-004222**

**Proponent:**

**Outapi Town Council**



**P. O. Box 853 Outapi, Namibia**

**July 2024**

**DOCUMENT INFORMATION**

Title: Comprehensive Environmental Management Plan (EMP) & Closure Plan for the Operations and Maintenance of the Existing Dumpsite for Outapi Town in the Omusati Region: An Application for Environmental Clearance Certificate (ECC)

**Prepared by:**

<b>Author:</b>	Fredrika N. Shagama (Hydrogeologist & Environmental Consultant / Environmental Assessment Practitioner (EAP))
<b>Qualifications:</b>	<p>PhD. Student: Civil Engineering (Geotechnics &amp; Hydrogeology), VSB - Technical University of Ostrava, Czech Republic</p> <p>MSc. Geological Engineering (<i>cum laude</i>) with primary focus in Hydrogeology, VSB - Technical University of Ostrava, Czech Republic</p> <p>BSc. Geological Engineering, VSB - Technical University of Ostrava, Czech Republic</p>
<b>Professional Affiliations:</b>	<p>International Association of Hydrogeologists (IAH) - Full Member, Membership No.139790</p> <p>Namibian Hydrogeological Association (NHA) – Member</p> <p>Environmental Assessment Professionals of Namibia (EAPAN) - Ordinary Member Practitioner (Membership No. 183)</p>
<b>Contact Details:</b>	<p>Mobile: +264 81 407 5536</p> <p>Email: <a href="mailto:eias.public@serjaconsultants.com">eias.public@serjaconsultants.com</a></p> <p>Postal Address: P. O. Box 27318 Windhoek, Namibia</p>
<b>Signature:</b>	
<b>Date:</b>	15 July 2024

**SERJA' STATEMENT OF INDEPENDENCE**

As the Appointed Environmental Consultant to prepare this Comprehensive Environmental Management Plan (EMP) & Closure Plan for the Operations and Maintenance of the Existing Dumpsite for Outapi Town in the Omusati Region, Serja Hydrogeo-Environmental Consultants cc declare that, we:

- do not have, to our knowledge, any information or relationship with any staff member from the Outapi Town Council nor the Ministry of Environment, Forestry and Tourism (MEFT)'s Department of Environmental Affairs and Forestry (DEAF) that may reasonably have potential of influencing the outcome of this EMP evaluation and the subsequent Environmental Clearance Certificate applied for.
- have knowledge of and experience in conducting environmental assessments, the Environmental Management Act (EMA) No. 7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulation as well as other relevant national and international legislation, guidelines, policies, and standards that govern the proposed project as presented herein.
- have performed work related to the ECC application in an objective manner, even if the results in views and findings or some of these may not be favorable to the Proponent.
- have complied with the EMA and other relevant regulations, guidelines and other applicable laws as listed in this document.
- declare that we do not have and will not have any involvement or financial interest in the undertaking/implementation of the proposed project, other than remuneration for work performed to conduct the EIA and apply for the ECC in terms of the EIA Regulations' requirement as an Environmental Assessment Practitioner (EAP).

**Disclaimer:** Serja Hydrogeo-Environmental Consultants will not be held responsible for any omissions and inconsistencies that may result from information that was not available at the time this document was prepared and submitted for evaluation.



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**Signature:**

Fredrika N. Shagama, Environmental Assessment Practitioner

**Date:** 15 July 2024

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**List of Abbreviations**

Abbreviation	Meaning
CEB	Cuvelai - Etosha Basin
CFP	Chance Find Procedure
DEAF	Department of Environmental Affairs and Forestry
DWA	Department of Water Affairs
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment

<b>Abbreviation</b>	<b>Meaning</b>
<b>EMA</b>	Environmental Management Act
<b>EMP</b>	Environmental Management Plan
<b>GG</b>	Government Gazette
<b>GN</b>	Government Notice
<b>HDPE liner</b>	High-density polyethylene (thermoplastic polymer from petroleum)
<b>KPI</b>	Key Performance Indicator
<b>MAWLR</b>	Ministry of Agriculture, Water and Land Reform
<b>mg/l</b>	Milligram per litre
<b>MSDS</b>	Material Safety Data Sheet
<b>MEFT</b>	Ministry of Environment, Forestry and Tourism
<b>PPE</b>	Personal Protective Equipment
<b>PRO</b>	Public Relation Officer
<b>S</b>	Section
<b>SHE Officer</b>	Safety, Health and Environment Officer
<b>SPCC</b>	Spill Prevention, Control, and Countermeasure
<b>SWMS</b>	Solid Waste Management Strategy
<b>TDS</b>	Total Dissolved Solids

# 1 INTRODUCTION

## 1.1 Background and Project Location

Outapi Town Council (the Proponent) manages the Town’s dumping site (dumpsite) located on the outskirts of Outapi Town near the now-tarred D3612 (M0123) (Outapi-Tsandi main road) about 5km southwest of the Town in the Omusati Region - Figure 1-1. The site was fenced off around April/May 2024 to bring it up to standard and ensure effective management of the solid waste. The site covers an area of 5.07 hectares (Ha) which is equivalent to 50,700m<sup>2</sup>.

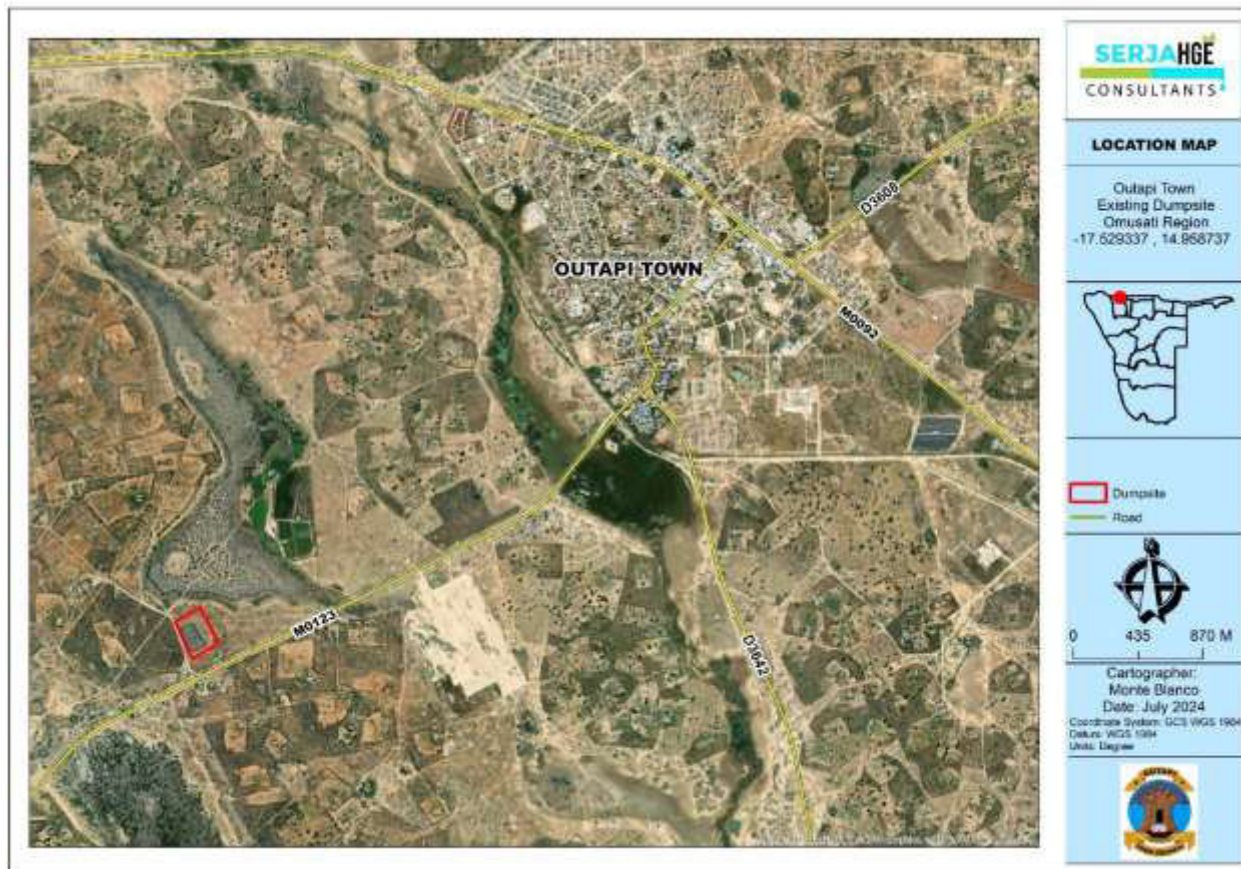


Figure 1-1: Locality map of the existing Dumpsite for Outapi Town in the Omusati Region

## 1.2 The Need for the Dumpsite

As the urban populations grow and urbanization increases, so does the volume of waste generated by residents and business operations in towns. Therefore, Outapi Town is no different. The dumping site provides a designated area where solid waste can be safely disposed of, preventing it from accumulating in public spaces or natural environments.



The establishment and good upkeep of a solid dumping site will also improve public health because incorrect disposal of waste can lead to significant health hazards due to contamination of soil, water, and air. The controlled collection of recyclable and re-usable waste can also help to conserve resources that would otherwise be create from new raw materials, thus, depleting existing natural resources.

### **1.3 The Need for an Environmental Clearance Certificate (ECC)**

The Environmental Management Act (Act No. 7 of 2007) (EMA) and its 2012 EIA Regulations lists activities that must not be undertaken without an Environmental Clearance Certificate (ECC). The Town's solid waste dumping site includes activities listed under the 2012 Regulations' activity No.2:

#### **"2. WASTE MANAGEMENT, TREATMENT, HANDLING AND DISPOSAL ACTIVITIES**

Listed activity 2.1 the construction of facilities for waste sites, treatment of waste and disposal of waste."

However, the dumping site has never been cleared environmentally (i.e., no ECC issued before). This could be attributed to the fact that like other similar local authorities' facilities in Namibia, have been established before the promulgation of the Environmental Management Act (EMA) No. of 7 of 2007 and its EIA regulations in 2012. The Town's dumpsite was established in 2003 (21 years ago), hence no ECC for it.

To ensure that the dumping site obtains full compliance with the environmental legislation and ensure environmental protection, an environmental clearance certificate must be issued by the Environmental Commissioner at the Ministry of Environment, Forestry and Tourism: Department of Environmental Affairs and Forestry (MEFT: DEAF).

Since the site has already been in operation, the ECC application should be made and accompanied by a Draft Environmental Management Plan (EMP) and EMP and Closure Plan. The Draft EMP will then be evaluated by the Environmental Commissioner for consideration of the site ECC

### **1.4 Purpose of the Environmental Management Plan (EMP)**

Regulation 8 of the Environmental Management Act's (EMA) (7 of 2007) Environmental Impact Assessment Regulations (2012) requires that a draft Environmental Management Plan (EMP) be included as part of an Environmental Assessment (EA) process. A 'management plan' is defined as:

*"...a plan that describes how activities that may have significant environments effects on the environment are to be mitigated, controlled and monitored."*

An EMP is one of the most important outputs of the EA process as it synthesises all the proposed mitigation and monitoring actions, set to a timeline and with specific assigned responsibilities. It provides a link between the impacts identified in the environmental assessment process and the required environmental management on the ground during project implementation and subsequent operations. It is important to note that an EMP is a legally binding document and a person who contravenes the provisions of this EMP may face imprisonment and/or a fine. This EMP is a living document and should be amended to adapt to address project changes and/or environmental conditions and feedback from compliance monitoring.

The purpose of this document is therefore to guide environmental management throughout the following life-cycle stages of the project phases. The project phases are addressed in this EMP are as follows:

- Operation and maintenance phase - the period during which the now-upgraded dumpsite is operational and maintenance done by the Outapi Town Council, as deemed necessary in collaboration with an external specialist, if necessary.
- Decommissioning (closure): This is the stage at which the dumpsite reaches capacity, and the Town Council ceases to dispose the solid waste onsite (this could be due to relocation or siting of a new site). The dumping site would be decommissioned, and the Town Council will need to look for another site.

This EMP and Closure Plan thereto have been prepared for the management of potential impacts associated with the operations and the closure of the dumpsite for the Outapi Town.

### **1.5 The Environmental Assessment Practitioner (Consultant)**

Subsequently, to comply with the EMA and its EIA Regulations and ensure environmental sustainability, the Proponent (through Hulina Offshore Energy (Pty) Ltd) has appointed Serja Hydrogeo-Environmental Consultants CC (Serja HGE Consultants), independent environmental consultants to apply for the ECC on their behalf. An application for the ECC is being launched with the Ministry of Environment, Forestry and Tourism (MEFT)'s Department of Environmental Affairs and Forestry (DEAF) by Serja Consultants. Upon screening of this Background Information Document (BID), Serja Consultants will be required to prepare an Environmental Management Plan (EMP) in an application for the ECC. The EMP (a comprehensive one) will be submitted to MEFT's for evaluation and consideration of the ECC.

This document was compiled by Ms. Fredrika Shagama of Serja. Ms. Shagama is a qualified and experienced hydrogeologist with over 8 years of experience in water and environmental management consulting and a member of the International Association of Hydrogeologists. She is also an experienced and registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Professionals of Namibia (EAPAN).

The brief description of the proposed project activities are provided under Chapter 2.

## 2 BRIEF DESCRIPTION OF THE PROPOSED PROJECT ACTIVITIES

A site visit and assessment was done around the dumping site on the 05<sup>th</sup> of July 2024. The activities and services currently undertaken and utilized onsite, respectively are presented under the sections below.

### 2.1 Operations and Maintenance

The dumping of solid waste (domestic and building rubbles) is done by the Town Council through the 6 appointed waste removal and disposal contractors – Figure 2-1.



**Figure 2-1: The waste truck offloading onsite**

The contractors collect waste from the Town for disposal to the dumpsite thrice a week per contractors, i.e., 18 trips per day. There are two onsite security guards who work on shifts (daytime and nighttime) to ensure the security of the site and prevent possible vandalism of the site infrastructure. There is controlled access of who enters the site or waste dumping because there is a fence and gate. The fencing of the dumpsite was also done after community grievances in the past to the Town Council to fence the site. As part of implementing the 3 R's, there are some authorized members of the public onsite who were collecting waste for re-use and recycling - Figure 2-2.



**Figure 2-2: Some of the authorized members of the public (reclaimers) collecting solid waste for re-use and recycling**

After waste is sorted by reclaimers, the rest is burnt by reclaimers (waste sorters) everyday around 4pm.

## **2.2 Services and Resources**

The required resources and services that are required for the dumpsite operations by the Town Council are as follows:

### **2.2.1 Human Resources**

The contractor managing the waste dumping has people working for them (unspecified number), while the Town Council has one dumpsite supervisor and there are 5 local waste reclaimers (not employed by the Town Council). The site is equipped with 2 security personnel working on shifts to look after the site. There is no onsite accommodation as the workers reside in their homes in Outapi or nearby homesteads.

### **2.2.2 Equipment and Vehicles**

Each waste removal and disposal contractor has one open deck truck that are currently utilized by the waste management contractor to collect waste from the Town to the site.

### 2.2.3 Water and Power Supply

There is currently no water supply onsite. Water required by site workers, visitors and inspectors for drinking is brought onsite by individuals in personal containers.

Currently, the site is not equipped with electricity.

### 2.2.4 Site accessibility

The site is accessible from the D3612 (Outapi-Tsandi road) via a well-maintained unpaved road that passes the dumpsite to its immediate south - Figure 2-3.



Figure 2-3: View of the local unpaved and well-maintained access road at the dumpsite area

### 2.2.5 Site security

The dumping site has recently been fenced off with an anti-climbing wall spike razor barbed mesh wire - see Figure 2-4 below.



Figure 2-4: A view of the security fence around the site (eastern side)

The new fencing has replaced the basic mesh fencing that has been vandalised by some community members over the years (a common challenge experienced by most if not all local authorities in Namibia). The fencing is aimed at controlling access and protect the public from potential health and safety risks stemming from some waste onsite.

### 2.2.6 Occupational and Community Health and safety

Site workers are supplied with appropriate and adequate personal protective equipment (PPE). It was however noted that the authorized community members who collect waste for re-use and recycling do not have any form of PPE. Therefore, they need to start wearing overall with reflective colours or reflective vests on top of overalls for visibility as well as properly closed shoes.

There is no first aid kit onsite. Therefore, this needs to be provided and the site personnel trained on how to administer first aid to others for minor injuries. Major injuries would be treated at Outapi health centres.

### 2.2.7 Accidental Fire Management

At least two fire extinguishers should be placed onsite inside the site access building at the gate. The onsite personnel should be equipped with basic firefighting skills for small fires and for big fire outbreaks, while qualified and experienced fire fighters are making their way to site.

### 2.2.8 Waste management

The waste is currently managed onsite as follow with further improvement to effectively manage the dumping site operations:

- **Solid waste:** The site control room is equipped with secured waste bins for domestic waste for storage before disposing into the dumpsite.
- **Hazardous waste:** There is no hazardous waste (oil, grease and fuels) dumped onsite. However, for management of this waste in Town, it is properly captured, stored in designated waste containers at the Omusati Regional Hospital in Outapi and finally transported to Windhoek. This is done 4 times a year. Therefore, no hazardous waste are disposed of onsite.
- **Construction rubbles from the Town:** these are stored at a designated area onsite.
- **Alternative use of waste:** The implementation of the three R's (Reducing, Recycling, and Reuse) Waste Management Hierarchy at the site to minimize the accumulation of waste onsite. Hence, the Town Council has some community members who are allowed to collect waste for recycling and re-use. However, this practice needs to be improved to make it safer for reclaimers and effective.
- **Human waste (sewage):** There are no ablution facility onsite. Therefore, the Town Council needs to consider installing two toilets for the site workers and visitors onsite, given that there are people who spent the day and night onsite.

The summary of legal requirements that govern the project activities are provided under the next chapter.

### 3 APPLICABLE LEGAL FRAMEWORK: AUTHORISATIONS

This section covers information on the legal obligations (legislations, policies, and guidelines) that governs certain project activities, where permitting and/or licensing may or may not be required from different applicable regulatory authorities - refer to Table 3-1 below.

**Table 3-1: Applicable legislations in terms of permits or licenses for the site activities**

Legislation	Provisions	Contact Details
Environmental Management Act 2007  Environmental Impact Assessment (EIA) Regulations (EIAR) (GG No. 4878): <b>Regulated under the Ministry of Environment, Forestry and Tourism (MEFT)</b>	Activities listed in Government Notice (GN) No. 29 of GG No. 4878 require an Environmental Clearance Certificate (ECC).  The amendment, transfer, or renewal of the ECC (EMA S39-42; EIA Regs19 & 20).  Amendments to this EMP will require an amendment of the ECC.  <u><b>The ECC needs to be renewed every 3 years.</b></u>	The ECC is only valid for 3 years and should be renewed at least 1 month before its expiry date throughout the operation and existence of the dumpsite.  The ECC renewal application should be made to the office of the Environmental Commissioner: (Department of Environmental Affairs and Forestry (DEAF))  <b>Mr. Timoteus Mufeti:</b> <b>Environmental Commissioner</b>  <b>Tel: +264 61 284 2701</b>
Local Authorities Act No. 23 of 1992: <b>Regulated under the Ministry of Urban and Rural Development</b>	To provide for the determination, for purposes of local government, of local authority councils; the establishment of such local authority councils; and to define the powers, duties and functions of local authority councils; and to provide for incidental matters.  This includes the management of waste. , as relevant to the project.	The Town Council is the responsible Local Authority of the area, and the project Proponent. Regardless, they should ensure that the site activities follow the Act and its Regulations.  <b>No permit or license required.</b>
Water Resources Management Act (No 11 of 2013) and 2023 Water Regulations: <b>Regulated under the Ministry of Agriculture, Water and Land Reform</b>	Since there will be no Groundwater abstraction and Use, the permit for commercial use is therefore not applicable. However, the Proponent will be required to prioritize the protection water resources and systems within the vicinity of the dumpsite from pollution	<b>No permit or license required.</b>

Legislation	Provisions	Contact Details
Public Health Act (No. 36 of 1919): <b>Regulated under the Ministry of Health and Social Services</b>	Section 119 states that “no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.”	The Proponent and all its employees should ensure compliance with the provisions of these legal instruments.  This includes the provision of health and safety measures, wearing of Personal Protective Equipment (PPE), Health & Safety Trainings, etc.
Health and Safety Regulations GN 156/1997 (Government Gazette 1617): <b>Regulated under the Ministry of Health and Social Services</b>	Details various requirements regarding health and safety of labourers.	This safety and health of the community around the dumping site. This include prohibiting unauthorized access of members of the public.
Public and Environmental Health Act No. 1 of 2015: <b>Regulated under the Ministry of Health and Social Services</b>	To provide a framework for a structured uniform public and environmental health system in Namibia; and to provide for incidental matters.	<b>No permit or license required.</b>
Atmospheric Pollution Prevention Ordinance (1976): <b>Regulated under the Ministry of Health and Social Services</b>	This ordinance provides for the prevention of air pollution and is affected by the Health Act 21 of 1988. Under this ordinance, the entire area of Namibia, apart from East Caprivi, is proclaimed as a controlled area for the purposes of section 4(1) (a) of the ordinance.	The project and related activities should be undertaken in such a way that they do not pollute or compromise the surrounding air quality.  <b>No permit or license required.</b>
Hazardous Substance Ordinance, No. 14 of 1974: <b>Regulated under the Ministry of Health and Social Services</b>	The ordinance provides for the control of toxic substances. It covers manufacture, sale, use, disposal and dumping as well as import and export. Although the environmental aspects are not explicitly stated, the ordinance provides for the importing, storage, and handling.	The Proponent should handle and manage the storage and use of hazardous substances on site so that they do not harm or compromise the site environment.  <b>No permit or license required.</b>
Pollution Control and Waste Management Bill: <b>Regulated under the Ministry of Environment, Forestry and Tourism (MEFT)</b>	The bill aims to “prevent and regulate the discharge of pollutants to the air, water and land” Of particular reference to the Project is: Section 21 “(1) Subject to sub-section (4) and section 22, no person shall cause or permit the discharge of pollutants or waste into any water or watercourse.”	The Proponent and their workers should continue with the good waste management work (directly or indirectly) to ensure that the waste does not cause environmental threat and degradation.



Legislation	Provisions	Contact Details
	<p>Section 55 “(1) No person may produce, collect, transport, sort, recover, treat, store, dispose of or otherwise manage waste in a manner that results in or creates a significant risk of harm to human health or the environment.”</p>	<p><b>No permit or license required.</b></p>
<p>The National Solid Waste Management Strategy, 2018: <b>Regulated under the Ministry of Environment, Forestry and Tourism (MEFT)</b></p>	<p>Having identified solid waste as a hazard, the Ministry of Environment, Forestry and Tourism developed the Solid Waste Management Strategy (SWMS) to guide future directions, develop regulations. The SWMS has also been aimed at funding strategy and action plans to improve solid waste management and ensure these are properly coordinated and are consistent with national policy to facilitate cooperation among stakeholders. The objectives of this Strategy are to:</p> <ul style="list-style-type: none"> <li>(a) strengthen the institutional, organisational and legal framework for solid waste management, including capacity development;</li> <li>(b) instil a culture of waste minimisation and expand recycling systems;</li> <li>(c) implement formalised waste collection and management systems in all populated areas;</li> <li>(d) enforce improvements in the municipal waste disposal standards; and</li> <li>(e) plan and implement feasible options for hazardous waste management.</li> </ul>	<p>The SWMS would be enforced to ensure that the risks to the environment and public health emanating from waste disposal sites and illegal dumping in Namibia. This will include complete improvement of waste collection at all local authorities (in this case, the Outapi Town Council), in particular in the informal housing settlements, etc.</p>
<p>Soil Conservation Act (No 76 of 1969): <b>Regulated under the Ministry of Agriculture, Water and Land Reform</b></p>	<p>The Act makes provision for the prevention and control of soil erosion and the protection, improvement and conservation of soil, vegetation and water supply sources and resources, through directives declared by the Minister.</p>	<p>Duty of care must be applied to soil conservation and management measures must be included in the EMP. This is mainly aimed at soil disturbance through unnecessary</p>

Legislation	Provisions	Contact Details
		creation of new tracks and pollution from project related activities.  <b>No permit or license required.</b>
Forestry Act (No. 12 of 2001): <b>Regulated under the Ministry of Environment, Forestry and Tourism (MEFT)</b>	Permits are required for the removal of protected plants species.	If the need to remove certain vegetation such as Mopani (mopane) and camelthorn trees within the site footprint, the site footprint (for any future expansion consideration), a permit should be obtained from the nearest MEFT' Forestry Office prior to removal.
Nature Conservation Ordinance No. 4 of 1975 (as amended): <b>Regulated under the Ministry of Environment, Forestry and Tourism (MEFT)</b>		<b>Mr. Johnson Ndokosho: Director of Forestry Division</b>  <b>Tel: +264 61 208 7666</b>
Labour Act (No. 6 of 1992): <b>Regulated under the Ministry of Labour, Industrial Relations and Employment Creation (MLIREC)</b>	MLIERC is aimed at ensuring harmonious labour relations through promoting social justice, occupational health and safety and enhanced labour market services for the benefit of all Namibians. This ministry ensures effective implementation of the Labour Act No. 6 of 1992, specifically its Regulations, No. 156 Labour Act, 1992: Regulations relating to the health and safety of employees at work.	The Proponent should ensure that the site operations, and maintenance works, do not compromise the safety and welfare of workers.  <b>No permit or license required</b>
National Heritage Act (Act No. 27 of 2004)  The National Monuments Act (No. 28 of 1969): <b>Regulated under the Ministry of Education, Arts and Culture</b>	Should any objects of heritage significance be identified during maintenance of the dumpsite, the work must cease immediately in the affected sites and the necessary steps taken to seek authorisation from the Council.	Should heritage resources (e.g., artefacts, human remains/bones in the subsurface etc.) are discovered at some point on and /or around the site particularly during maintenance and decommissioning, these should be reported to the National Heritage Council of Namibia for relocation.  <b>Ms. Erica Ndalikokule: Director – National Heritage Council of Namibia</b>

<b>Legislation</b>	<b>Provisions</b>	<b>Contact Details</b>
		<b>Tel: +264 61 301 903</b>

The dumpsite is located in a specific biophysical and social environment. Understanding the existing environment would aid in identifying the sensitive or potentially affected features and how these can be protected by the development and implementation of mitigation or management measures. Therefore, the relevant features of this environment are presented under the next chapter.

## 4 THE RECEIVING ENVIRONMENT: BIOPHYSICAL AND SOCIAL

This chapter provides an overview of the baseline environment (biological, physical and social conditions) that have a key relevance to the project activities. An understanding of the existing or receiving environment can inform the management of potential impacts, particularly negative impacts.

### 4.1 Biological and Physical Environmental Components

#### 4.1.1 Fauna and Flora

During the site visit carried out on the 05<sup>th</sup> of July 2024 there were some livestock (cattle) droppings or feces near the dumpsite fence and goats seen near the dumpsite (Figure 4-1). There were prints of cattle hooves on the ground, although no cattle were found onsite that day. Given, the fact that the site is in a rural area, further livestock in the area include sheep, donkeys and pigs kept in the village homesteads.



Figure 4-1: Cattle droppings and some local goats near the site

The site and project area is dominated by *Colophospermum mopane* (mopane/mopani) shrubs and young trees as shown in Figure 4-2. Towards the eastern side of the dumpsite and along the D3612 road, there are young and older trees of camelthorn species (*Vachellia*), including *V. erioloba* and *V. reficiens*.

Further from the dumpsite, there are also scattered stink bush or sweat bush (*Pechuel-loeschea*) which is common in the northern regions of Namibia.



Figure 4-2: Mopane shrubs and young trees around the site

#### 4.1.2 Climate

The climatic conditions of Outapi are classified as semi-arid. The brief climatic conditions of the Outapi are as follows, according to Shagama (2022):

- Rainfall and Precipitation: The average rainfall in the area is between 350 and 400mm per year. The variation in rainfall is averaged to be between 40-50% per year. The high summer rains are experienced in February. The storm events occur between October and April, and they are irregular, unpredictable, unpredictable, high intensity and highly localised.
- Evaporation: The average evaporation is between 2,800-3,200 mm per year.
- Temperatures: Outapi highest temperatures are measured in December with an average daily maximum of 31°C and minimum of 17.3°C. The coldest temperatures are measured in July with an average daily maximum of 20.4°C and minimum of 6.4°C.

#### 4.1.3 Topography and Landscape

Outapi and most areas in northern Namibia are situated in the Cuvelai Basin whereby most of the land surface is very flat, dipping from 1,150 m above sea level in the northeast to 1,080 m above sea level in the Etosha Pan to the south (Lohe et al., 2021). With regards to topography, the Omusati Region is

generally flat with an altitude ranging from 800 to 1,200m above sea level (Mendelsohn et al., 2009). The landscape of the project area falls under the Cuvelai System.

The topography and landscape map of the project site and its immediate surrounding area is shown in Figure 4-3. The map indicates that the elevation of the dumpsite area ranges between 951 and 1,216 meter above sea level.

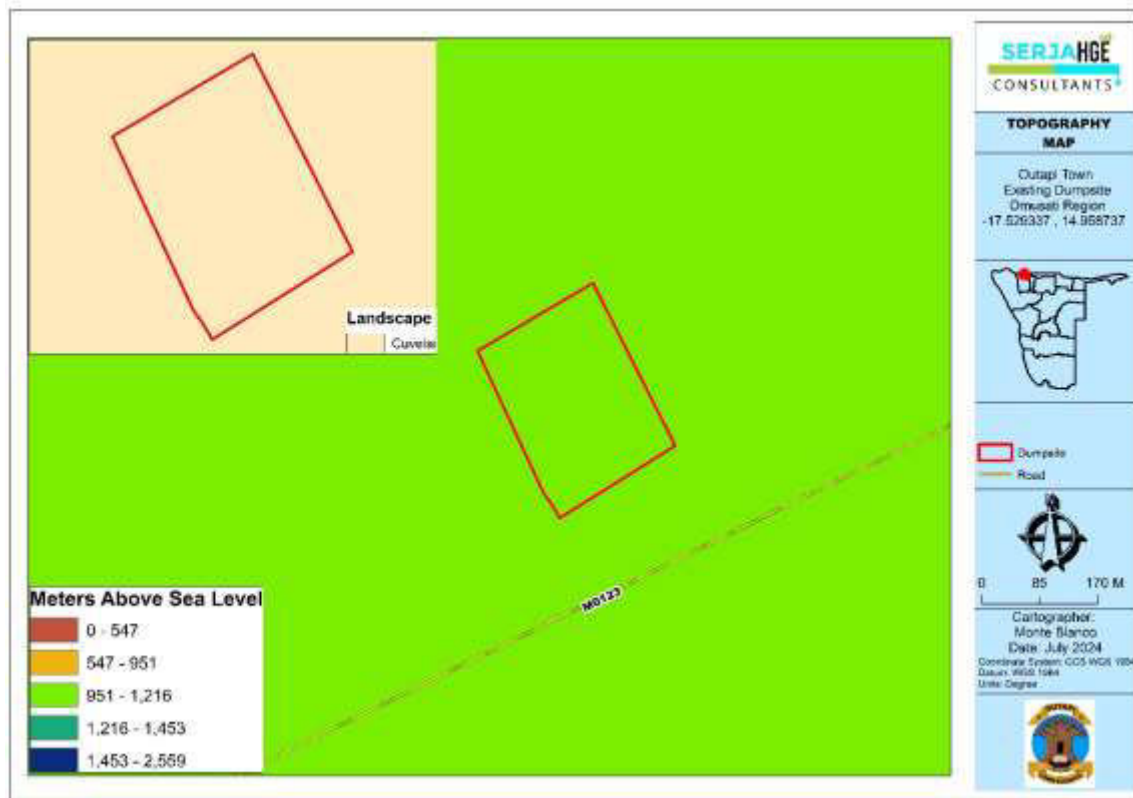


Figure 4-3: Topography and landscape on and around the site

#### 4.1.4 Soils and Geology

The dominant soil types in the Omusati Region are cambic arenosols and some areas eutric cambisols as per Dominant Soil Map by Mendelsohn et al., (2002). The soil types in the Omusati Region vary considerably, for the most part the soil consists of volatile sand mixed with a small percentage of silt and clay (arenosols), in the north-east there are also soils deriving from oshana deposits and in the south the soils are mainly clayey (luvisols), deposits (cambisols) or rocky outcrops. The soils in this area are categorized as sands and loams, where wind and water has repeatedly reworked the soil to create a mixture of deposits, they are generally saline, hence the dominance of mopane vegetation which can grow on these soils. However, some areas of sands and loams that are not as saline and provide good soils for crop growth in the area (Environam Consultants, 2019).

The soil type on and around the dumpsite are eutric cambisols as shown in Figure 4-4.

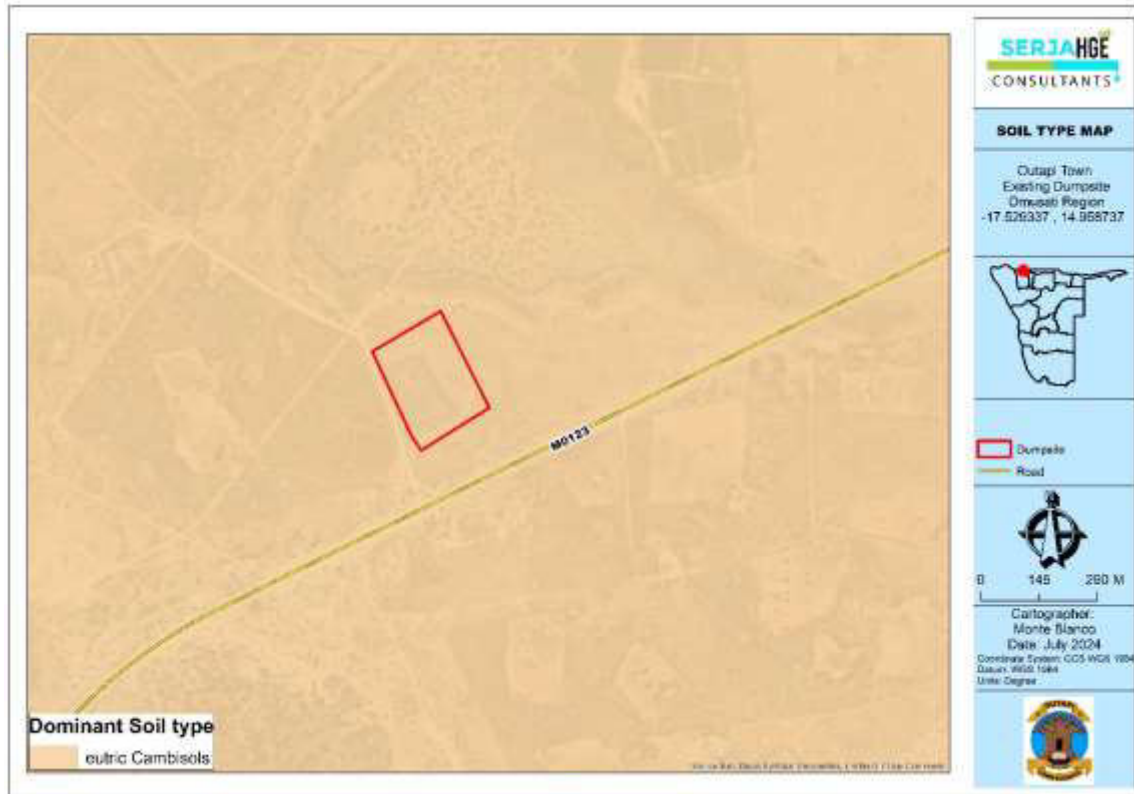


Figure 4-4: The dominant soil map of the project site area

Soils around the site are sandy loamy with a light brown color as shown in Figure 4-5 below. Closer to the dumpsite fence and inside the site, the soils are highly influenced by the activities of the dumpsite (burning of waste and decomposing of biodegradable waste).



Figure 4-5: The light brown sandy loamy soils around the site

The geology of areas surrounding Outapi is characterized by the unconsolidated to semi-consolidated sands, calcrete and gravel sediments of the Quaternary and Tertiary age of the Kalahari Group. Much of the areas in the northern part of Namibia, including Omusati Region fall within the Cuvelai landscape, lies on silt, clay, limestone, and sandstone sediments. The area is distinguished by a myriad of drainage channels locally known as *oshanas*. These *oshanas* are often filled with water during heavy rainy seasons and cut into the underlying sediments (Shagama, 2022).

*According to Lohe et al, (2021), Oshanas are shallow, often vegetated and poorly defined but are interconnected flood channels and pans. These surface water channels flow slowly or may form ponds depending on the intensity of the floods (known locally as “Efundja”).*

The geology of and around the dumpsite is shown in Figure 4-6 which indicates that the site lies over unconsolidated alluvium, sand, gravel, and calcrete and these unconsolidated sediments are underlain by the rock units of red mudstone, siltstone, sandstone and conglomerate.



Figure 4-6: The geology of the project site area

#### 4.1.5 Geohydrology

The project area (Outapi) and the Omusati Region at large falls under the Cuvelai - Etosha Basin (CEB), which is defined as the Namibian part of the Cuvelai river catchment. The hydrogeology of the CEB comprises in addition to Omusati, the Oshana, Ohangwena, Oshikoto Regions and parts of the Kunene



Region (Lohe et al., 2021). Groundwater flow is mostly through primary porosity in the Kalahari cover, but flow along secondary structures known as fractures, faults. The flow can also be influenced by the presence of other geological structures underlying formations such as contact rock unit zones.

The CEB Unit 1 and 2, including Ohangwena Aquifer System (Unit 2) is a three-layered system dominated by unconsolidated sand with some sandstones, with an average aquifer thickness of 220m. It has a high primary porosity and an average transmissivity value of 220m<sup>2</sup>/day (Christelis et al., 2018).

The groundwater in and around the project site is hosted in the porous Kalahari sediments as shown in Figure 4-7. The sediments are in some areas of Basin underlain by bedrocks of limestone, sandstone, conglomerate, mudstone, and silt stone as the CEB aquifers and lithology characteristics presented in Lohe et al., (2021). The groundwater flow in the project area can be expected to flow in a south-eastern direction towards the Etosha Pan.

There are no boreholes presence around the site, as the only boreholes within 5km of the site are two boreholes in Town as shown on the map below.



Figure 4-7: The geohydrology map of the project site area

#### 4.1.6 Groundwater Quality

The groundwater quality over much of the Basin is extremely poor and severely limits its use and this could explain the heavy reliance on surface water schemes for water supply in the Basin. North of the Etosha Pan, the Kalahari and Karoo sequences and the upper part of the Owambo Formation form a large reservoir

#### Outapi Town Existing Dumpsite

containing highly saline groundwater. There is little anthropogenic contamination of groundwater in general, but untreated wastewater in some communities causes degradation of quality. There are some cases of increased nitrate concentration linked to cattle farming, and some natural occurrence of elevated nitrate. The main groundwater quality problem in Namibia is naturally high TDS and fluoride (Christelis et al., 2018), which explains the poor quality in the CEB in under which the project site is found.

The total dissolved solid (TDS) ranges from 30,000 to 100,000 milligram per litre (mg/l) and chloride concentrations are 10,000 to 40,000 mg/l. The water quality is especially poor in the central areas extending south from Namibia-Angola border between Oshikango and Ruacana in a south easterly direction towards Etosha and Oshivelo (Christelis and Struckmeier, 2011).

#### **4.1.7 Vulnerability of Site Groundwater Resources to Pollution**

In most cases, areas with extensive agricultural, mining, waste management, industrial activities, and of course, township establishments practises are carried out with poor prior planning, groundwater pollution becomes a concern due to high potential of pollution associated with such practises. Given the nature of the dumpsite activities, groundwater vulnerability to pollution could be anticipated, especially if the waste leachate reaches the groundwater table through infiltration of rainwater into the groundwater during heavy rainy seasons (months of the year, November to April) and eventually recharging groundwater with contaminated water.

According to the Groundwater Resources Vulnerability Map of Namibia by Van Wyk et al, (2001) in Figure 4-8, the vulnerability of groundwater to pollution onsite and in the general project area is moderate. The vulnerability of groundwater to pollution in the area could be explained by the porous nature of the sediments overlying the project site and surrounding areas once pollution lands on the ground surface. Groundwater pollution would generally be a concern on such areas that are overlain by the porous sediments and alluvial (sediments) aquifers if there is a significant point source of pollution from the dumpsite.

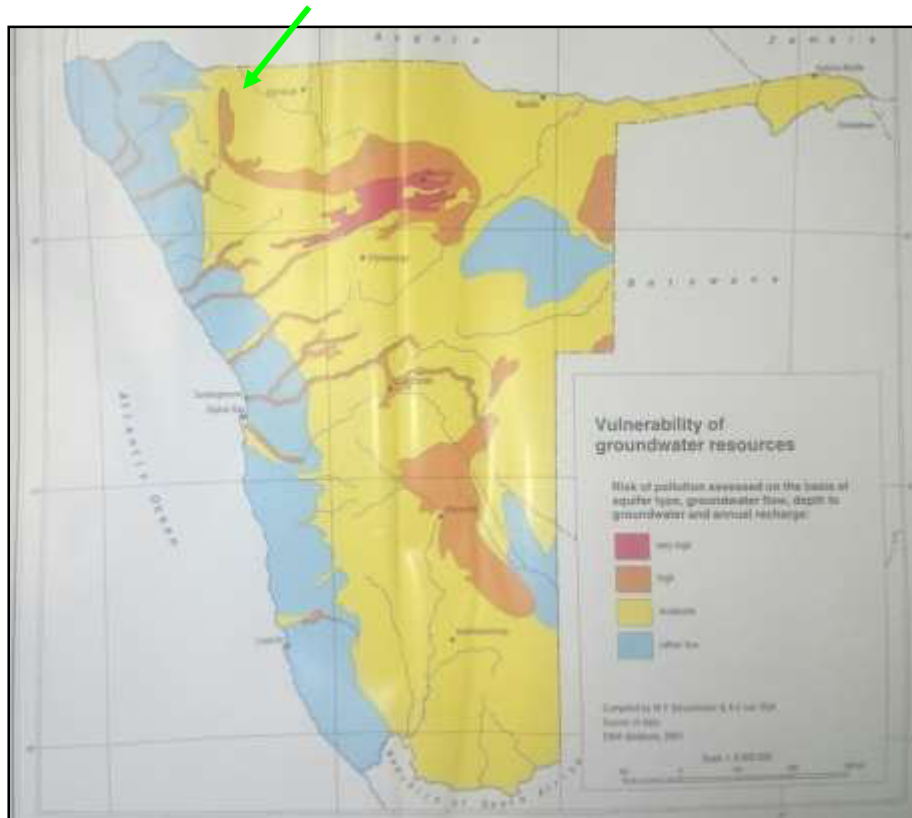


Figure 4-8: The Vulnerability of groundwater resources to Pollution (Van Wyk *et.al*, 2001) – the project site area shown by the green arrow

#### 4.1.8 Surface water

The site area falls within the Cuvelai Basin which is characterized by many open oshanas that fill with rainwater during good rainy seasons. All the basin surface drainage, therefore, flows slowly in the direction of the Etosha Pan. There is one open water system (oshana) to the northwestern side of the dumpsite as shown in Figure 4-9.



Figure 4-9: The open dried out water system (*oshana*) behind the dumpsite to the northwest

#### 4.1.9 Surface water vulnerability to pollution

With regards to surface water, potential pollution is likely to occur activities such as burnt waste and decomposed waste are washed into the nearby water bodies (*oshanas*) during heavy rain seasons. i.e., between November and March or April.

## 4.2 Socio-economic Environment

### 4.2.1 Demography

The Outapi Town is found within the Omusati Region, which according to the 2011 National Housing and Population Census had a population of 243,166 (133,621 females and 109,545 males). The population of Outapi Constituency for both rural and urban was recorded at 14,857, with the urban area (Outapi Town) amounting to 6,437 (Namibia Statistics Agency (NSA), 2014). The population density was recorded at 9.2 people per square kilometres (km<sup>2</sup>).

Pending the official results for the 2023 National Housing and Population Census, the City Population website (2024) indicated that the population of Outapi electoral constituency is 53,594 with a population density of 56 people per km<sup>2</sup>

### 4.2.2 Economy

Outapi is the capital town of the Omusati Region and most of the region's economic activities are taking place in the Town. The livelihoods of Outapi Town and surrounding areas rely on subsistence farming, comprising cattle farming as well as crop production (mahangu, maize, beans, sorghum, etc.). Subsistence farming, wages & salaries as well as pension are the main sources of income with 22%, 25% and 31% of households in the Region, respectively.

Furthermore, Omusati Region has some tourist destinations such as the Omugulugombashe Monument about 20km southwest of Tsandi Village (about 30km southwest of Outapi), and the Ruacana Water Falls in Ruacana Town. On a local level, Outapi area is home to the Ombalantu Baobab Tree Heritage Centre.

Outapi Town has health centres such as hospitals and clinic as well as schools that form the major attraction of the formal workforce, supplemented by a number of Ministries and Departments that got established in the town through decentralisation programs/initiative (Outapi Town Council, 2024). The services form a collective source of buying/purchasing power for Outapi Town. Furthermore, residents of the Omusati Region, and the Town itself thrive from a mainstay culture of 'capital transfer' from family members who work elsewhere in Namibia and abroad. This is an open secret behind a mysterious-constant buying/purchasing power for the region and for the Outapi Town in particular

The buying/purchasing power in the Town) has attracted the mushrooming of commercial banks in the magnetic-fast growing Town. In this regard, there are cases of one bank operating more than three ATMs in this single town. Moreover, Agriculture is the common activity among the regional inhabitants (Outapi Town Council, 2024).

### 4.2.3 Infrastructure

The town is strategically located, and can be easily and reached from Windhoek via Kamanjab-Omakange road (C35) and Otjiwarongo- Tsumeb Road (B1) and the C46 (from Oshakati). It is also the Gateway to the famous tourist-attraction Ruacana Waterfalls, which is just 80km away. The proximity of Outapi town to the southern Angola renders it to be one of the few Namibia's strategic town, from business point of view. This is another source of its "perpetual" buying/purchasing power. Thus, the authorities of Outapi continue on inviting potential investors to exploiting endless-untapped opportunities across industries and/or sectors, including infrastructures and services (Outapi Town Council, 2024).

### 4.2.4 Waste Management

The Town's waste is managed as follows:

- Solid and domestic waste: stored on a household level and disposed of at the existing dumping site (by the six external waste removal contractors).
- Sewage: in formal houses, the sewage is managed through the municipal sewer reticulation line to a sewage management facility (oxidation ponds on the western edge of the Town).

- Hazardous waste: the waste is managed and stored in the Town at a designated temporary facility before it is transported to Windhoek at the approved and capable hazardous waste facility.

#### 4.2.5 Surrounding Land Use (Neighbours)

The dumpsite is bordered to its eastern side by the D3612, to the immediate south by an unpaved road and one homestead's fence - Figure 4-10, to the west there are shrubs of Mopani and further over 1km is another homestead. To the north, there is a dry open *oshana* and further over 1km from site are homesteads.



Figure 4-10: Significant neighbouring features around the dumpsite

The roles and responsibilities of implementing this EMP (the management and mitigation measures in Chapter 7) is presented under the next chapter.

## 5 EMP IMPLEMENTATION ROLES AND RESPONSIBILITIES

The EMP has identified the Proponent, Site Manager (Supervisor), appointed decommissioning (closure) contractor, Environmental Health Officer (EHO) or Safety, Health and Environment (SHE) Officer as important roles to guide the environmental management of the site activities. It should be noted that in practice, however, these roles may be assigned to and performed by one person, due to various foreseen and unforeseen circumstances.

A list of specific responsibilities and duties to be undertaken by each are provided below. It should also be noted that the above-mentioned roles are delegated roles and Outapi Town Council is ultimately responsible for the overall implementation of the EMP from the operational and maintenance as well as closure (decommissioning) phase of the dumpsite.

### 5.1 Outapi Town Council (The Proponent)

The Town Council as the owner and operator of the dumpsite, will be responsible for the following during the operational and maintenance as well as decommissioning phase:

- Managing/overseeing the implementation of this EMP and updating and maintaining it when necessary,
- Issuing fines to individuals who contravene EMP provisions and if necessary, removing such individuals from site,
- Setting up and managing the schedule for the day-to-day activities,
- Liaison with all relevant interested and affected parties/stakeholders,
- Ensuring all incidents are recorded and documented, and
- Undertaking an annual review of the EMP and amending the document when necessary.

### 5.2 Site Manager or Supervisor

Overall responsibility for all activities that take place on the project site will reside with the applicable phase site manager. In this regard the following roles and responsibilities are applicable:

- The implementation of and compliance with the environmental management measures proposed in this document,

- Ensuring compliance with relevant environmental and related authorisations and license conditions, and
- Identifying and appointing of appropriately qualified specialists (were necessary) to undertake the programmes in a timeous manner and to acceptable standards.

### **5.3 Safety, Health and Environmental (SHE) Officer or Environmental Health Officer (EHO)**

The SHE Officer or EHO will be responsible for the following activities:

- Planning and carrying out site inductions to the workers on-site and visitors to the dumpsite,
- Ensure that the requirements of the EMP are carried out during applicable activities throughout the project life span,
- Liaising between the affected residents/community members and Town Council, and
- Monitor the overall implementation of the EMP,
- Ensure effective communication with stakeholders (affected residents), media (if necessary), and
- Managing public relations issues.

### **5.4 Decommissioning (Closure) Contractor**

The dumpsite closure or decommissioning contractor (as appropriate) will:

- Ensure the relevant commitments contained in the EMP action plans are adhered to,
- Compile relevant procedures and method statements for approval by the applicable phase site manager prior to initiation of activities,
- Ensure relevant staff are trained in procedures, and
- Maintain records of all relevant environmental documentation.

### **5.5 Public Relation Officer (PRO)**

The Public Relation Officer will be responsible for the following tasks:



- Ensure effective communication with stakeholders (affected residents), media (if necessary) and the public, and
- Managing public relations issues.

## **5.6 Outapi Town Residents (Affected Community) and neighbours**

The residents and community will be involved in the EMP implementation by carrying out the following:

- Monitor implementation of the EMP and notify the Proponent or SHE officer/EHO,
- Actively participate in stakeholder forums,
- Make use of the grievances mechanisms to communicate issues to the Proponent (through the EHO and/ or to relevant authorities,
- Monitor legal compliance,
- Review performance reports, and
- Sanction poor performance and non-compliance where appropriate through directives, penalties, and fines.

## **5.7 Technical Staff and Consultants**

The project's technical experts and consultants will be responsible to:

- Safely and effectively monitor various technical parameters related to:
  - ✓ maintenance of the site and associated facilities
  - ✓ waste management and handling
  - ✓ Soil preservation/ protection
  - ✓ water resources protection
  - ✓ environmental management and compliance auditing
  - ✓ employee / contractors' health.

The Proponent should assess these commitments in detail and should acknowledge their obligation to the specific management actions detailed in the Tables of the following sections.

The potential environmental (and social) impacts identified to stem from the dumpsite activities are presented under the next chapter.

## 6 ENVIRONMENTAL AND SOCIAL IMPACTS

The operation and maintenance of solid waste management facilities (dumpsites) are usually associated with some impacts, both positive and negative. The potential impacts that have been identified so far are as follows:

### 6.1 Key Potential Positive Impacts

The benefits (positive impacts) of the project as anticipated are briefly described below:

- Improved local public and environment health through a better and environmentally managed dumping site. This would improve the local public and environment health. This is positive move by the Town Council, thus, the significance of the impact is high.
- Improvement for the town's planning regarding future solid waste management.
- Employment and business opportunities: creation of jobs to the locals (permanent / contractual work for dumping site operations workforce such as security guards and maintenance opportunities for external local businesses). The income generated from the employment opportunities and procurement of goods and services positively impacts the employees and their families for the betterment of their livelihoods, therefore the impact' significance is high

### 6.2 Key identified Potential Negative Impacts

The listed key potential negative impacts associated with the project activities were identified, and briefly described as follows: These impacts are considered medium significant, but upon implementation of the management and mitigation measures, the significance will be reduced to low.

- Water resources (surface water and groundwater) pollution from infiltration of dissolved waste into surrounding soils and eventually water resources systems through run-offs during heavy rains. Rainwater may carry wastes from the dumping site to nearby open *oshanas* (open surface water systems).
- Impact on the site soils: the travelling of heavy and light vehicles on and around the dumpsite may result in soil compaction which can lead to soil erosion.
- General environmental pollution through mishandling of project related waste during operational phase such as plastics and papers blown off site by wind.

- Air pollution: the burning of site waste at the wrong time of the day as well as dust generated by vehicles travelling to and from site on the untarred roads during waste offloading/disposal may compromise air quality in the area resulting health risks such as respiratory illnesses.
- Accidental fire outbreaks: the burning of waste at the dumping site either from wind-blown papers or plastics or uncontrolled (uncontained) fires may result in accidental fires spreading offsite into the nearby vegetation and potential destruction of habitats and biodiversity (vegetation). Accidental fires would pose immediate risks to nearby communities, buildings (homesteads and fences) as well as other private and public properties.
- Visual impact due to the presence of the piling waste heaps over time when the town expands towards the dumpsite or located close to roads and waste blown by wind on surrounding vegetation (if not managed properly).
- Health and safety: improper handling of site materials and equipment by the site workers and waste collecting community members especially without proper PPE and sufficient awareness may cause health (injuries) and safety risks. The unauthorized entrance of public (children) onsite may lead health risks and hazards.
- Vehicular traffic and associated noise: Vehicles transporting waste to site can increase vehicular traffic related accidents, collisions. Another vehicular impact is infrastructure deterioration (impact on local roads) when heavy vehicles associated with the dumping site operations accelerates road deterioration, leading to increased maintenance costs and traffic disruptions in the area, particularly on D3612 and unpaved local access road that provides access to the dumpsite and used by residents travelling to the western side of the dumpsite.
- Noise: the movement of vehicles such as waste trucks to site may create noise that may be a nuisance to the local (one neighbouring homestead located to the southern side of the site). This is a cumulative impact as there is already traffic operations on the D3612 (Outapi-Tsandi) on the eastern-southern side of the site.
- Archaeological or cultural heritage impact through uncovering of unknown objects on site (when carrying out earthworks during site maintenance and mainly during the decommissioning or closure of the site, given that the site was established over 20 years ago and there were no proper environmental measures followed to set it up). There is a potential of inadvertent uncovering of subsurface unknown graves, artefacts and other archaeological resources during earthworks.

The environmental measures have been developed to manage and or mitigate the above listed adverse (negative) impacts in Chapter 6 impacts and these are presented under the next chapter (Chapter 7).

## 7 ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURES

The environmental and social mitigations measures (management plan actions) for certain project activities are presented under this chapter. The management plan actions provided under this chapter are mainly for the adverse (negative) impacts. The aim of the plan actions is therefore to avoid these potential impacts where possible, and where impacts cannot be avoided, measures are provided to reduce the impacts' significance.

This chapter also presents the measures that will be implemented to minimize the impacts from the dumpsite operations and its eventual decommissioning activities.

### 7.1 The Mitigation of Potential Adverse Environmental and Social Impacts

The management plan actions for the mitigation of potential adverse impacts are presented in section 6.2 – for the operational and maintenance phase and when capacity is reached, the decommissioning (closure) phase (Chapter 8).

The required management plan actions have been presented together with key performance indicators, responsible person(s), resources or proof and the timeline of such management actions. The five forms the headings of Table 7-1 and they are briefly explained as follows:

- Environmental aspect,
- Issues for which management actions are required,
- Proposed impact mitigation measures,
- Key performance indicator (KPI) for monitoring success levels of management actions, and
- Responsible person(s) for implementing the proposed management actions.

Table 7-1: Environmental Management and Mitigation measures (action plans) for the Operational and Maintenance Phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility
<b>Continued Operational and Maintenance Mitigation Measures</b>				
EMP implementation and training	Lack of EMP awareness and implications thereof	<ul style="list-style-type: none"> <li>-EMP trainings should be provided to all site personnel.</li> <li>-All site personnel should be aware of necessary health, safety, and environmental considerations.</li> <li>-The implementation of this EMP should be monitored.</li> <li>The site should be inspected, and a compliance audit done throughout <u>the project activities (bi-annually)</u>.</li> <li>-Implement EMP non-compliance penalty system onsite.</li> </ul>	<ul style="list-style-type: none"> <li>-Compliance monitoring conducted bi-annually and should be recorded.</li> <li>-The ECC is renewed every 3 years</li> <li>-Bi-annual reports</li> <li>-Records of EMP training conducted.</li> </ul>	<ul style="list-style-type: none"> <li>-Proponent</li> <li>-Site Supervisor</li> <li>-EHO / SHE Officer</li> </ul>
Goods and services procurement	The procurement of goods and service from outsiders over local business may lead to conflicts and overlooking local suppliers	<ul style="list-style-type: none"> <li>-The procurement of works for site maintenance works and waste removal should follow a fair and transparent process.</li> <li>-Procurements for goods and services should be open only to local and Namibian companies with strong local participation.</li> <li>-The business opportunities such as bulk waste disposal and site maintenance should be given to local companies.</li> </ul>	<ul style="list-style-type: none"> <li>-Site maintenance goods and services are procured from Outapi and or surrounding areas</li> <li>-Local businesses are considered for procurement opportunities</li> </ul>	<ul style="list-style-type: none"> <li>-Proponent (Procurement Department)</li> </ul>
Communication between the Proponent and residents	Lack of communication (proper liaison) between residents/community and Proponent	<ul style="list-style-type: none"> <li>-A clear communication procedure/plan which includes a grievance and response mechanism should be compiled.</li> </ul>	<ul style="list-style-type: none"> <li>-The EHO is notified of this responsibility and part of the project personnel</li> <li>-Grievance logbook</li> <li>-residents / affected communities</li> </ul>	<ul style="list-style-type: none"> <li>-Proponent</li> <li>-Site Manager/Supervisor</li> </ul>

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility
			Communication to run throughout the project activities	
Soils	Physical soil / land disturbance and loss of topsoil during site maintenance or if necessary, expansion	<p>-The topsoil stripped from certain site areas to enable maintenance works and can be returned to its initial position, should be returned. This is to avoid unnecessary stockpiling of site soils which would leave them prone to erosion.</p> <p>-All maintenance pits and trenches excavated on site should be rehabilitated and returned to their pre-excavation state as possible.</p> <p>-Soils that are not within the intended footprints of the site areas should be left undisturbed and soil conservation implemented as far as possible.</p> <p>-Project related vehicles/machinery should stick to access roads provide and or meant for the project operations but not to unnecessarily create further tracks on and around the site by driving everywhere resulting in soil compaction.</p>	<p>-No stockpiled soils after completion of works</p> <p>-No new erosion gullies.</p>	<p>-Site Manager</p> <p>-EHO / SHE Officer</p>
Site Fire outbreaks	Accidental fire outbreaks risks	<p>-Warning signs of ‘<i>No Smoking</i>’ and ‘<i>No throwing of live cigarettes or firewood inside the dumping site/No open fires</i>’ should be clearly written (in English and Oshiwambo) and pasted at dumping site entrance.</p> <p>-The site should be equipped with at least two fire extinguishers at the security gate and should be serviced accordingly. The personnel should be trained on how to use extinguishers (basic fire firefighting skills).</p>	<p>-No open fires by site personnel or visitors</p> <p>-Fire extinguishers are readily available and up to date with service</p>	<p>-Site Manager</p> <p>-SHE Officer</p>

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility
		<p>-No open fires should be created onsite.</p> <p>-The contact details of fire services should be readily and visibly displayed at the entrance office/security control.</p> <p>-All personnel must be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials (e.g., rubbish, dry vegetation, and hydrocarbon-soaked soil) onsite.</p> <p>-The burning of waste onsite should be done between 8am and 15h00 to ensure that there is someone onsite to monitor the fire until it is completely put out before leaving the site, i.e., no open fire should be left onsite unattended.</p>		
Site safety and security	Compromising site security and safety	<p>-The condition of the site fence should monitored regularly and where damage is observed, it should be repaired right away.</p> <p>-The site should be equipped with 24-hour security presence in case of opportunistic activities such as theft and vandalism.</p>	-The site fence and security measures are in place	<p>-Proponent</p> <p>-Site Manager</p>
Occupational and community health and safety	Project related injuries and other health and safety related issues on personnel and locals	<p>-Project personnel should be inducted provided on the health &amp; safety measures, including the risks of mishandling equipment, materials on site.</p> <p>-The contact details of ambulance and other extensive health care services should be readily and visibly displayed onsite for the site personnel.</p>	<p>-Comprehensive health and safety plan for all project activities compiled.</p> <p>-Occupational Health and Safety Personnel</p> <p>-Health and Safety Trainings</p> <p>-Fully equipped first aid kit onsite</p> <p>-Trained workers to administer first aid</p>	<p>-Site Manager</p> <p>-SHE Officer</p>

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility
		<p>-A fully furnished first aid kit should always be onsite and ensure that 2 site personnel are trained on administering first aid.</p> <p>-Employees and visitors should be properly equipped with adequate personal protective equipment (PPE) such as coveralls, gloves, safety boots, earplugs, or safety glasses (depending on the job undertaken onsite or sites visited, etc.)</p> <p>-Heavy vehicle, equipment and machinery at or to site should be properly secured to prevent any harm or injury to the Proponent’s personnel.</p> <p>-An emergency preparedness plan should be compiled, and all personnel appropriately trained.</p> <p>-Personnel should not be allowed to drink alcohol prior to and during working hours nor allowed on site when under the influence of alcohol (leading to health &amp; safety risks).</p> <p>-The scavenging of waste by community members should be prohibited as certain waste items could pose health and safety risks such as stumbling on unnoticed broken bottles, rotten food items, chemicals and other potential unhealthy items contained in waste.</p> <p>- Prohibit the entrance of children under the age of 18 into the dumpsite. The waste collection for re-use and recycling should be supervised and done through a designated site workers and following proper procedures.</p>		



Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility
Water Resources Use	Over-utilization of water resources	<p>-If a water storage tank is to be installed onsite, the tank should be inspected daily to ensure that there is no leakage, resulting in wasted water.</p> <p>-Water conservation awareness and saving measures training should be provided to all the project workers so that they understand the importance of conserving water and become accountable.</p>	<p>-No water leakages from site water storage tanks</p> <p>-Water is recycled where possible</p>	<p>-Site Manager</p> <p>-SHE Officer</p>
Soils and water resources	Soils and water resources pollution	<p>-Particularly during site maintenance where fuel may be used, spill control preventive measures should be in place on site to management soil pollution. An HDPE liner should be used to eliminate the risk of possible leakage/leachate.</p> <p>-Sensitized personnel on the impacts of soil pollution.</p> <p>-Project machines and equipment should be equipped with drip trays to contain possible oil spills.</p> <p>-Polluted soil should be removed immediately and disposed of at an approved and appropriately classified hazardous waste treatment facility.</p> <p>-Refuelling of vehicles should be done offsite (at filling stations in Town only).</p> <p>-Washing of equipment contaminated hydrocarbons, as well as the washing and servicing of vehicles should take place at a dedicated area in Town only.</p>	<p>-No complaints of pollutants on the soils due to project activities</p> <p>-No visible oil spills on the ground or pollution spots.</p> <p>-Sufficient waste containers provided onsite</p> <p>-Non-permeable material are used on areas where hydrocarbons and potential pollutants are utilized during maintenance works.</p>	-SHE Officer
Biodiversity	Loss Fauna and Flora	-Avoid the killing or snaring of animals (birds, reptiles, mammals encountered onsite.	-No killing or disturbance of biodiversity	-SHE Officer

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility
		<p>-Environmental awareness on importance of biodiversity preservation should be provided to personnel.</p>		<p>-Site Manager</p>
<p>Road use and safety</p>	<p>Increase in vehicular traffic flow</p>	<p>-The transportation of materials (from and to site) should be limited to once a week</p> <p>-The transportation of waste to site should be limited to three times a week only to limit the impact on the roads.</p> <p>-Ensure that the access roads are frequently maintained and have sufficient road signs.</p> <p>-Drivers should possess valid and appropriate driving licenses and adhere to road safety rules.</p> <p>-Drivers should drive 40km/hour and be on the lookout for people and local animals on the roadsides</p> <p>-Drivers should not be allowed to operate vehicles while under the influence of alcohol.</p> <p>-The deliveries of waste to the site should be done during weekdays between the hours of 8am and 5pm.</p>	<p>-No complaints from members of the public regarding vehicular traffic issues related to the project activities.</p> <p>-All vehicle drivers are appropriately licensed and possession of valid driving licenses.</p>	<p>-Proponent</p> <p>-SHE Officer</p> <p>-Site Manager</p>
<p>Archaeology and heritage</p>	<p>Accidental disturbance of archaeological or heritage objects</p>	<p>-During site maintenance where excavation is needed, the contractor should be sensitized to exercise and recognize Heritage "Chance Finds Procedure (CFP) – <a href="#">Appendix 1</a>.</p> <p>-Adhere to the provisions of Section 55 of the National Heritage Act in event significant heritage</p>	<p>-Preservation of all artefacts and objects that are discovered on and around the project site during maintenance earthworks</p>	<p>-Site Manager (guiding site maintenance contractor, when needed)</p> <p>-SHE Officer</p>

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility
		and culture features are discovered while conducting site works.  -When the removing topsoil and subsoil on the site for site maintenance works, the site should be monitored for subsurface archaeological materials.		
Littering and waste management (general waste and sanitation)	Environmental Pollution	-Personnel should be sensitized to dispose of waste in a responsible manner and not to litter.  -Ensure that there are no wastes left or disposed of outside the site.  -No waste may be buried on site.  -Maintain separate areas for different wastes waste onsite.  -Encourage the recycling of waste such as bottles, garden refuse and plastic by setting up a recycling centre at the dumping site.  -Educate people on the importance of re-usable household waste and encourage recycling of waste.	-No visible litter within and around the site area owing to the Project  -Provision of sufficient waste storage containers  -Waste management awareness	-Site Manager  -SHE Officer
	Wastewater (sewage)	-Ensure that there is at least 2 sufficient toilets (septic tank system) for the workers reclaimers and visitors onsite.  -Sewage and wastewater generated onsite should be properly contained for transportation to the Town's sewage treatment facility  -Open defecation on and around the site is strictly prohibited.	-Adequate toilet and basic ablution facilities on site.	-Proponent  -Site Manager

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility
Air Quality	Dust generation, fumes (poor air quality)	-Vehicles should only be driven at the authorized site speed of 40km per hour to avoid dust generation. -The heavy vehicles and fumes generating equipment (during site maintenance) should not be left idling when not in use.	-No complaints from the public about vehicle emissions and dust generation. -Visible efforts to curb dust	-Site Manager -SHE Officer
Noise	Nuisance	-Noise from operations' vehicles and equipment on the sites should be at acceptable levels. -The disposal of waste at the dumpsite and maintenance activities should not be carried out during the night or before 08h00 in the morning or after 17h00 and should be carried out during weekdays only. Therefore, working hours for these activities should be restricted to between 8am and 5pm to avoid noise. -Site workers and contractors should be equipped with PPE such as earplugs to reduce exposure to excessive noise during waste offloading and maintenance, when exposed to high noise levels.	-No complaints from local communities such as neighbours about excessive noise from site -Noise protective equipment for workers	-Site Manager -SHE Officer
Visual	Visual nuisance due to the waste heap built-up	-Consider compacting waste to prevent a built-up of a waste heap onsite. -All the available options to improve the aesthetic of the site should be considered to enhance for a better appeal.	Visual impact is addressed	-Proponent -Site Manager

## **7.2 Environmental Monitoring**

To ensure that the implementation of recommended environmental management and mitigation measures is effective and produces the desired results (to minimize and or eliminate adverse impacts), implementation of measures will need to be monitored and reported on. Monitoring is crucial as it helps with early identification of new adverse impacts that would arise during project operations/implementation and timely development of mitigation measures for implementation.

The Bi-annual environmental monitoring reports should be compiled by the Proponent's availed resources (EHO or SHE Officer) and submitted to the DEAF for archiving on a bi-annual basis (every 6 months throughout the project) as required by the Environmental Commissioner on the conditions to be attached to the ECC. The reports should be audited annually by an Independent Environmental Consultant and prior to applying for an ECC renewal.

## 8 ENVIRONMENTAL REHABILITATION AND CLOSURE

### 8.1 General Overview of Dumpsite Rehabilitation

Before rehabilitating an existing dumpsite, the following need to be taken into consideration and implemented. This will entail the:

- Backfilling of dumpsite depressions with suitable cover material compacted to minimize seepage,
- Landscaping and sloping to prevent water ponding over footprint of old dumpsite,
- Revegetation (this would also depend on the planned post-use of the closed dumpsite), and
- Construction of shallow cut or shallow cut off trench around perimeter of rehabilitated site to avoid ingress of runoff into contaminated area, and
- The removal of perimeter fences.

The improper management of waste at facilities such as open dumpsites have an environmental and health impact. According to Joseph and Visvanathan (2001), there are several major risks and impacts of the dumpsites on the environment, and these include:

- The leachate generated because of decomposition of waste contaminates surface and groundwater sources which become unfit for human consumption.
- Air pollution from open burning, fire hazards and explosions cause public health risks as well as add to the emission of greenhouse gases (methane and carbon dioxide).
- Scattering of wastes by wind and scavenging by birds, animals and waste pickers creates aesthetic nuisance.
- Malodour emanating due to the degradation of the waste in the dumpsite restricts land use development as it decreases the economic and social values in surrounding areas. The absence of daily cover on the dumped waste attracts the animal and human scavengers alike.

The environmental and health impact of dumpsites can be reduced by dumpsite rehabilitation. Joseph and Visvanathan (2001) further indicated that this can be defined as a process by which disposed wastes in an existing dumpsite is excavated and either reused or disposed in an environmentally friendly manner. Excavated waste may require to be moved or relocated to higher portions of the site or placed in appropriate areas to enable an adequate gradient for the closed site. Dumpsite rehabilitation projects are initiated due to one of the following reasons:

- Presence of marketable material in the dumpsite that can be excavated for sale or use,
- Reduction in the closure and post operation monitoring costs of the site,
- Stipulated requirement by the owner/regulator of the landfill to close and rehabilitate the site, and
- Presence of toxic wastes within the dump site that poses public health risks.

The basic requirements for closing an open dumpsite include providing final soil cover, vegetation layer, drainage control system, leachate and gas management systems, monitoring systems and site security (aftercare programme). The closure of dumpsites typically requires re-gradation of site slopes, capping of landfill with impermeable cover, placement of leachate collection and treatment systems, installation of landfill gas collection and flaring system and aesthetic landscaping of the closed dumpsite. If landfill gas volumes are significant, then a landfill gas utilization project by way of power generation/direct supply to neighboring community for use as fuel may be installed. As appropriate, waste materials may be moved or relocated to higher portions of the site or placed in appropriate areas to help sloping of the closed site. It is important to promote surface water drainage from landfill areas to prevent it from infiltration and further percolation through the garbage and the soil underneath, thus creating ground and surface water degradation.

Rehabilitation actions will be aimed at both reduction and stabilisation of the risks associated with the accumulated waste, i.e. leachate control, landfill gas removal, and nuisance reduction (odour, wind scatter, birds, scavengers, pests, etc.). The general transition to dumpsite closure will include the following works: shaping the main capping, topsoil application, grass sowing (and possibly bush planting), gas collection and removal, and leachate management (Joseph et al., 2005)

The rehabilitation measures of the existing Town Council dumpsite are provided under the next subsection.

## **8.2 Scope of Planned activities: Safe Closure of the Existing Dumpsite**

### **8.2.1 Environmental Rehabilitation Plan for the Existing Waste Dumpsite**

The Town Council is planning to decommission the existing waste dumpsite in the Town once capacity has been reached. Therefore, to ensure that the site does not continue to be a nuisance to the environment, residents, nearby communities and even travellers of the Town, a rehabilitation Plan in a form of rehabilitation management measures has been developed. These are presented in Table 8-1. The proposed uses of the rehabilitated (post-closure) dumpsite are also provided in the same table. The implementation of the Rehabilitation Plan (measures) is entirely the responsibility of the Outapi Town Council.

According to Joseph et al., (2005), before the dumpsite stops receiving wastes, it is important that a final closure plan is prepared, approved, and available for implementation. The main components of the closure plan include, but are not limited, to the following:

- Stabilization, landscaping and sloping of landform slopes,
- Final cover,
- Drainage control systems,
- Fire control,
- Prevention of further illegal dumping,

- Resettlement action plan (if necessary)
- Security,
- Leachate and gas management systems (this could be expensive for Outapi Town Council), and
- Feasibility studies for beneficial end use options

Given the above, it is therefore crucial for the Town Council to make provision for both financial and technical resources for site rehabilitation in the financial budget for these activities.

### 8.2.2 Cost Estimates for the Rehabilitation of the Existing Waste Dumpsite

The estimated cost of decommissioning the dumpsite depends on several factors **but not limited** to the following.

- Size and state of the dumpsite (lined or not lined),
- The type of supporting infrastructures and facilities onsite,
- Preferred closure and the associated methodology, i.e., backfilling of dumpsite "cells" to re-vegetate or backfill and compact the site areas,
- If site backfilling is considered, how far are the potential sources of backfilling of materials (borrow pits) and if available,
- The type of waste onsite by the time of closure,
- Compaction waste as one "cell" or divided into many "cells" onsite,
- Fencing consideration (cost of materials),
- Civil works (site clearing, levelling and earthworks), and
- Engineering design professional and associated fees (costs).

**With that said, the cost can range between N\$8 million and N\$20 million.** However, the actual cost would only be determined by a professional engineer to be appointed for the feasibility study to plan and design the closure of the dumpsite when the time comes. Therefore, the estimated range cannot be deemed final because it was estimate based on a dumpsite in Ohangwena Region (Helao Nafidi Town Council) that is currently undergoing closure. In other words, the cost for closure cannot be tailored as one-cost for all across sites as there are different factors that need to be considered and these differ from site to site.

Table 8-1 overleaf presents the decommissioning measures to be implemented for closure of the dumpsite to meet the requirements of the Environmental Management Act.



Table 8-1: The Environmental Rehabilitation Measures and Post-Closure Uses of the Existing Waste Dumpsite

Aspect	Mitigation Measure(s)	Completion criteria
Contaminated soils	<p>-A Soil Scientist should be appointed to undertake a full Soil Contamination Assessment (including sampling) to ascertain the extent of pollution onsite and thus, recommending site specific remediation measures.</p> <p>-A Geochemical Assessment and Waste Characterization should be done for the site.</p> <p>-Removal of visibly contaminated soils to depth of 1m for offsite cleaning and clean it up and returned to where it was taken.</p>	<p>-Sign-off by a Soil Scientist upon completion of the rehabilitation/remediation of contaminated soils to ensure successful exercise and safety of site soils</p> <p>-The soil is cleaned and returned onsite, and the site can be safely utilized post-closure.</p>
Stockpiled soils, disturbed areas and trench-looking like site depressions	<p>-The stockpiled soils should be levelled into visible uneven site depressions and trenches.</p> <p>-Site trenches and pits / holes should be backfilled.</p>	<p>-The site soils are levelled, and depressions backfilled, and the site can be used for other uses.</p>
Existing piles of wastes	<p>-The waste should be sorted. What can be re-used and recycle should be handled as such.</p> <p>-Waste that cannot be re-used or recycled should be carefully handled and transported to the new waste dumpsite once it is constructed and ready for operations.</p>	<p>-The waste is handled and managed better by preparing for re-use, recycling and proper disposal at the future dumpsite.</p> <p>-The site is made safe for the next use.</p>
Dumpsite slope edges and stability	<p>-A Geotechnical Engineer (Engineering geologist) should be contracted to undertake a geotechnical assessment of the dumpsite and make the necessary, recommendations and action regarding ultimate landform slopes, type of cover material to be used and how those should be compacted to minimize runoff ingress.</p> <p>-A simple method for stabilization of the steep side slopes of the dumpsite is to reprofile and regrade them to gentle slope of 4 (horizontal): 1 (vertical).</p>	<p>-A geotechnical and materials investigation completed over the site as well as on existing nearby borrow sources by a qualified and experienced Engineering geologist. Such report shall contain recommendations of safe final slopes, type and sources for cover material, compaction requirements.</p>

Aspect	Mitigation Measure(s)	Completion criteria
	<p>-The slope of waste filled portions is a primary concern as adequate gradient is required to promote surface water runoff without ponding or waterlogging or erosion of the final cover.</p> <p><b>!!!Closed dumpsites are not suitable for buildings or permanent structures without extensive site engineering or improvement.</b></p>	
<p>Surface infrastructure and structures</p>	<p><b><u>Service infrastructure to be removed</u></b></p> <p>-All infrastructures and structures that will no longer be required for the post-closure should be dismantled and removed from site. These structures include fences and gates.</p> <p>-All access roads that may have been created for the site should be temporary close, pending post-closure use of the site.</p>	<p>-All other infrastructure decommissioned to ground level and removed from site</p>
<p><b><i>“When disposal operations have ceased and final cover or capping has been applied to the waste, the dumpsite is considered as “closed”. It is important to ensure that illegal dumping does not continue at any closed dumpsite.”</i></b></p>		
<p align="center"><b><u>POSSIBLE POST-USES OF THE EXISTING WASTE DUMPSITE</u></b></p>		
<p>-The uses for a closed dumpsite after thorough rehabilitation and remediation are limited to:</p> <ul style="list-style-type: none"> <li>○ <b><u>Recreational uses</u></b> such as golf courses, public parks, fields, and walking or biking trails for public use. These uses are relatively easy to construct and maintain because the waste decomposition does not adversely affect recreational facilities like they do with buildings.</li> <li>○ <b><u>Structures:</u></b> construction of commercial or industrial buildings to repurpose the land for such uses, but any structure, including pavement, built atop a landfill has increased engineering problems associated with it, especially if the structure is large. Hence, this option is not deemed suitable. If structures are to be placed on this site proper ground improvement must be done prior, and foundation designs should be tailored accordingly. Only lightly loaded structures must be considered</li> <li>○ <b><u>Renewable Energy source site:</u></b> The closed dumpsite can be converted into a solar plant park to produce solar energy that can supplement the town’s energy demand, and <b><u>Agriculture:</u></b> for agricultural use due to the large open area on top of a dumpsite.</li> </ul>		

## 9 RECOMMENDATIONS AND CONCLUSIONS

The following recommendations and conclusions have been made with regards to the operations and maintenance as well as decommissioning of the Outapi Town dumpsite.

### 9.1 Recommendations

The Environmental Consultant is confident that the potential negative impacts associated with the dumpsite activities can be mitigated by effectively implementing the recommended management action measures and with more effort and commitment put on monitoring the implementation of these measures. It is therefore, recommended that the dumpsite can be granted an Environmental Clearance Certificate, and provided that:

- All respective management measures (mitigations) provided in the EMP be effectively and progressively implemented and backed up by consistent monitoring of environmental components listed in the EMP to achieve full Environmental compliance.
- All required permits, licenses and approvals for the project activities are obtained as required.
- The Proponent and all their project workers or contractors comply with the legal requirements governing dumpsite and its associated activities and ensure that project permits and or approvals required to undertake specific site activities are obtained and renewed as stipulated by issuing authorities.
- All the necessary environmental and social (occupational health and safety) precautions provided are adhered to.
- Environmental Compliance Monitoring (EMP implementation) should be conducted bi-annually EHO / SHE Officer and. Environmental Compliance monitoring reports should be compiled and submitted to the DEAF.

### 9.2 Conclusions

It is crucial for the Proponent, employees (workers) and their contractors to effectively implementation of the recommended management measures to protect both the biophysical and social environment throughout the project phases (operational & maintenance as well as decommissioning phase). All these would be done with the aim of promoting environmental sustainability while ensuring a smooth and harmonious existence and purpose of the project activities in the community and environment at large.

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## APPENDIX 1: CHANCE FINDS PROCEDURE (AFTER KINAHAN, 2020)

Areas of proposed development activity are subject to heritage survey and assessment at the planning stage. These surveys are based on surface indications alone, and it is therefore possible that sites or items of heritage significance will be found during development (operations and maintenance as well as decommissioning) works. The procedure set out here covers the reporting and management of such finds.

**Scope:** The “*chance finds*” procedure covers the actions to be taken from the discovery of a heritage site or item to its investigation and assessment by a trained archaeologist or other appropriately qualified person.

**Compliance:** The “chance finds” procedure is intended to ensure compliance with relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): “*a person who discovers any archaeological .... object .....must as soon as practicable report the discovery to the Council*”. The procedure of reporting set out below must be observed so that heritage remains reported to the NHC are correctly identified in the field.

The Site Manager/Supervisor must report the findings to the following competent authorities:

- **National Heritage Council of Namibia: Head Office: +264 61 244 375**  
**Technical Office +264 61 301 903**
- **National Museum (+264 61 276 800)**
- **National Forensic Laboratory (+264 61 240 461)**

### Responsibility:

<b>Operator:</b>	To exercise due caution if archaeological remains are found
<b>Foreman:</b>	To secure site and advise management timeously
<b>Superintendent</b>	To determine safe working boundary and request inspection
<b>Archaeologist</b>	To inspect, identify, advise management, and recover remains

### Procedure:

#### Action by person identifying archaeological or heritage material

- a) If operating machinery or equipment stop work
- b) Identify the site with flag tape
- c) Determine GPS position if possible

### Outapi Town Existing Dumpsite

d) Report findings to foreman

Action by foreman

a) Report findings, site location and actions taken to superintendent

b) Cease any works in immediate vicinity

Action by superintendent

a) Visit site and determine whether work can proceed without damage to findings

b) Determine and mark exclusion boundary

c) Site location and details to be added to project GIS for field confirmation by an archaeologist

Action by Archaeologist

a) Inspect site and confirm addition to project GIS

b) Advise NHC and request written permission to remove findings from work area

c) Recovery, packaging and labelling of findings for transfer to National Museum

In the event of discovering human remains

a) Actions as above

b) Field inspection by archaeologist to confirm that remains are human

c) Advise and liaise with NHC and Police

d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.