ENVIRONMENTAL SCOPING REPORT: Proposed Construction and Operation of Six Oxidation Ponds in Sesfontein Settlement Area, Kunene Region

PROPOSED CONSTRUCTION AND OPERATION OF SIX OXIDATION PONDS IN SESFONTEIN SETTLEMENT AREA, KUNENE REGION

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LIST OF ACRONYMS

AIDS	Acquired immune deficiency syndrome
CRR	Comments and response report
dB	Decibels
DESR	Draft Environmental Scoping Report
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
EAR	Environmental Assessment Report
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
FESR	Final Environmental Scoping Report
ESR	Environmental Scoping Report
HIV	Human immunodeficiency virus
I&AP	Interested and Affected Party
IUCN	International Union for Conservation of Nature
MEFT	Ministry of Environment, Forestry and Tourism
MEFT: DEA	Ministry of Environment, Forestry and Tourism: Department of Environmental Affairs
MURD	Ministry of Urban and Rural Development
PPP	Public Participation Process

1. INTRODUCTION

1.1 Project Background

Oxidation ponds, also called stabilization ponds or wastewater lagoons, are large shallow water bodies that treat wastewater naturally. They play a crucial role in the treatment of diverse wastewater types, including municipal sewage, industrial effluents, and agricultural runoff. The use of oxidation ponds is regarded as a cost-effective and sustainable method of treating wastewater. The Kunene Regional Council intends to undertake a project to construct six oxidation ponds in the settlement of Sesfontein.

This project aims to provide basic services to the community of Sesfontein by providing a bulk sewerage line and a sewage treatment facility. The development is projected to service 235 of housing units that exist in Sesfontein Village. It is anticipated that similar housing developments will be built in the future, which could increase the housing stock to 2500 units. Therefore, there will be 250m^3 of sewer water inflow in the future that will need to be treated. The Oxidation Ponds will be located approximately 1.5 km south-east of Sesfontein, on the main road between Sesfontein and Kamanjab. In order to provide Sesfontein residents with the best services and development, a holistic approach is needed.

The Kunene Regional Council (KRC) initially appointed engineers to facilitate the installation of the Advanced Immobilized Cell Reactor. However, due to concerns raised over the costs of installation, maintenance and operation of the Advanced Immobilized Cell Reactor, other Sewage Treatment Alternatives were considered. It was further highlighted that the system would only work for the intended, if normal operational procedures and maintenance are performed effectively.

The options were narrowed down to two Alternative Treatment Technologies:

- Oxidation Ponds
- Trickling Filter

An Assessment Report was compiled on the Different Sewage Treatment Alternatives deemed to be viable for the area. Based on the Assessment Report, KRC decided that the oxidation pond systems are considered more viable, mainly as there is no electricity required; limited maintenance required; has very little maintenance costs and unskilled operators can be used. Oxygen pond systems although expensive to construct and require vast areas for evaporation, are simple to operate and can be incorporated easily in rural communities.

The Proponent has thus appointed Environam Consultants Trading (ECT) to undertake the Environmental Impact Assessment (EIA) process for this project and to apply for an Environmental Clearance certificate (ECC).

The process will be undertaken in terms of the gazetted Namibian Government Notice No. 30 Environmental Impact Assessment Regulations (herein referred to as EA Regulations) of the Environmental Management Act (No 7 of 2007) (herein referred to as the EMA). As part of the EA process, the proposed development and related infrastructure and services will be evaluated for potential bio-physical and socioeconomic impacts.

In addition, the EA process will give the public and key stakeholders a chance to provide comments. The study will also inform MEFT's decision-making process and that of the proponent.

1.2 Project Location

The Oxidation Ponds will be located approximately 1.5 km south-east of Sesfontein on the main road between Sesfontein and Kamanjab, on centre coordinates 19.132858°S, 13.626433°E. See Figures 1 and 2 below for the locality maps of Sesfontein and the development site.

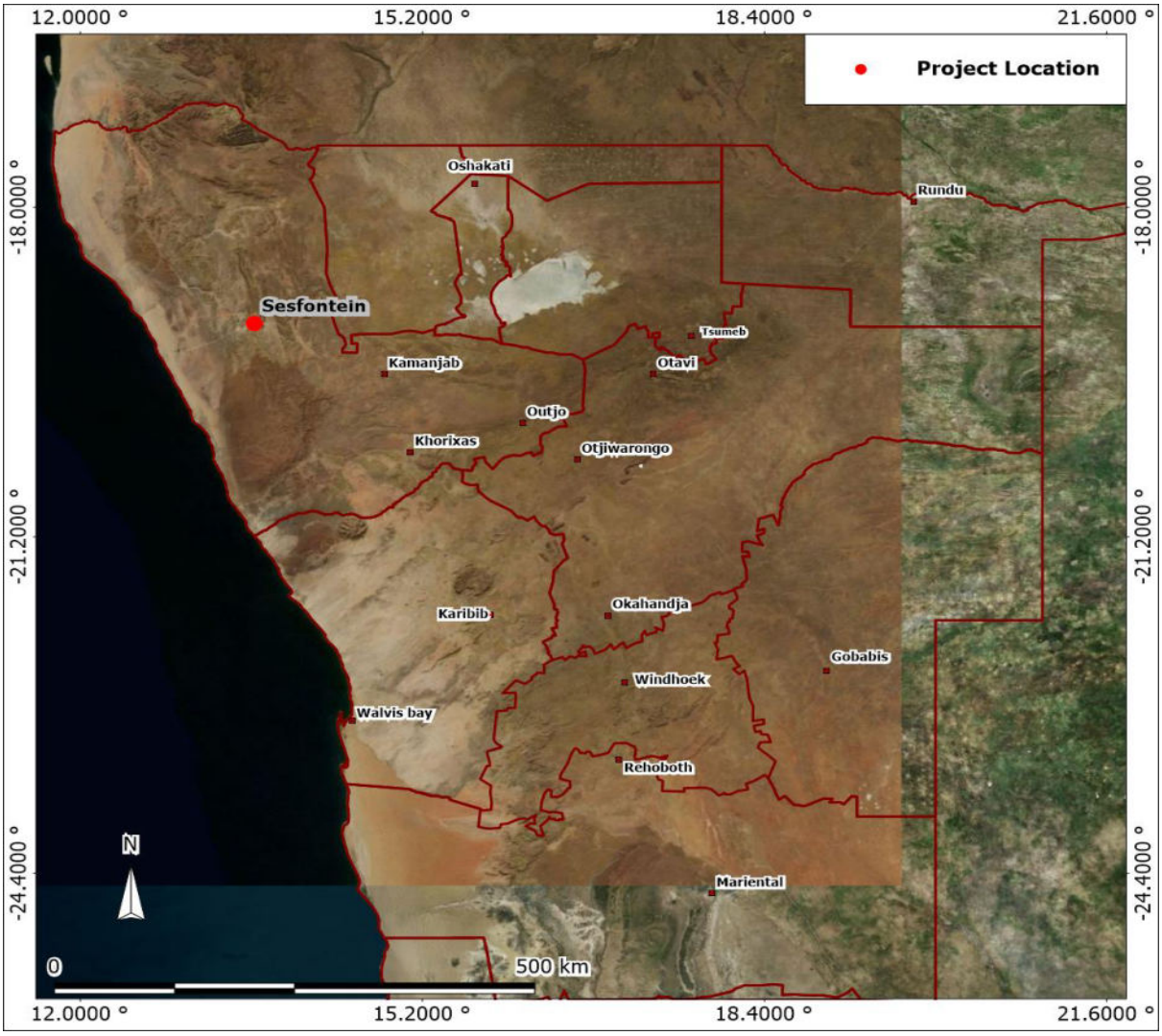

Figure 1: Locality map of Sesfontein

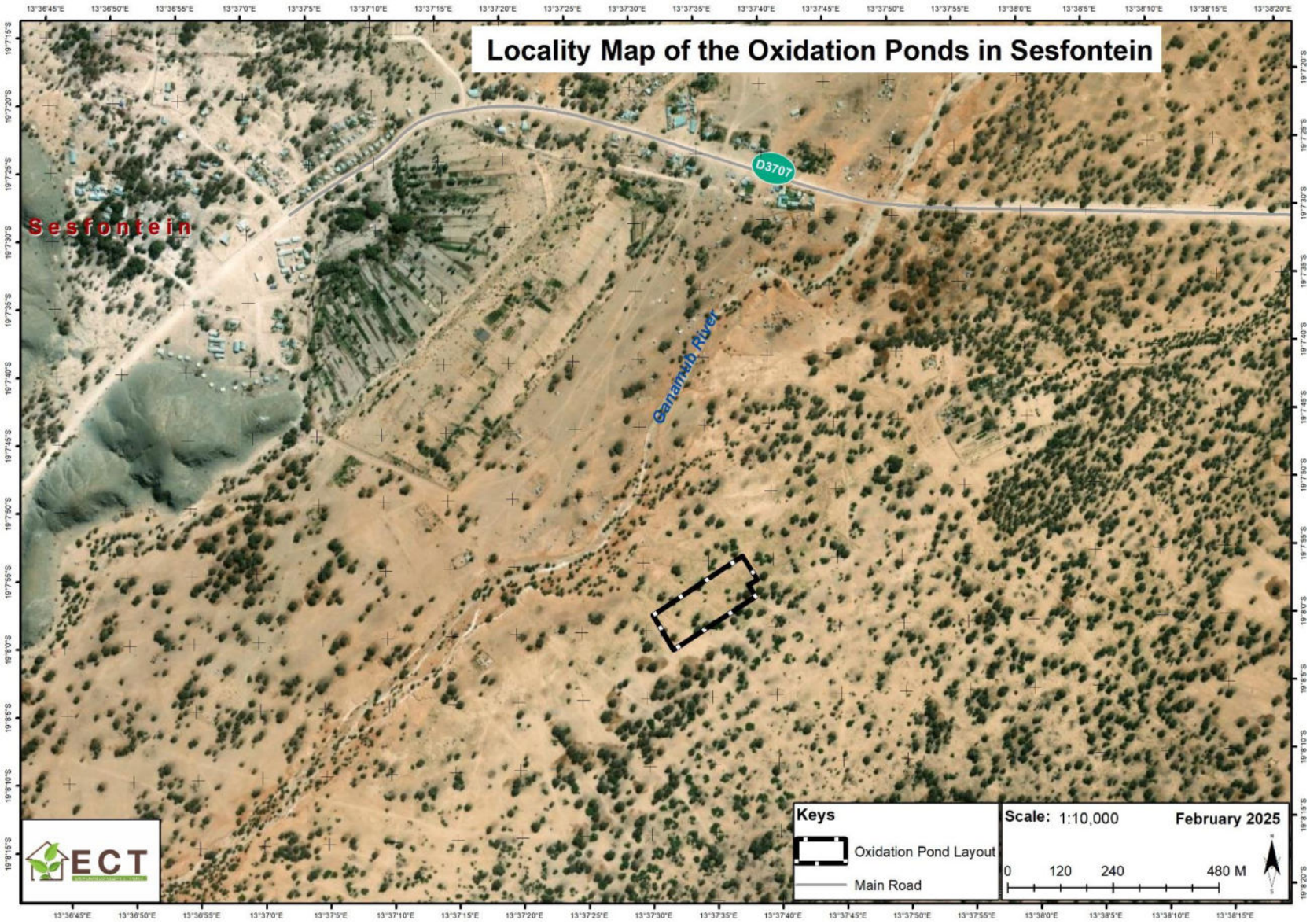

Figure 2: Locality map of the proposed development

1.3 Terms of Reference and Scope of Project

Kunene regional Council (KRC) has commissioned an Environmental Impact Assessment (EIA) for the proposed construction of six oxidation ponds in Sesfontein, Kunene Region.

Environam Consultants Trading was appointed to undertake the Environmental Impact Assessment of the proposed. This study will enable decision makers to make an informed decision regarding the development and make sure it does not have significant impacts and that they are mitigated. The scope is limited to conducting an environmental impact assessment and applying for an Environmental Clearance Certificate for the proposed construction and operation of six oxidation ponds, including its associated infrastructure in Sesfontein. This includes consultations with client; site investigations and analysis; stakeholder consultations; impact analysis; mitigation formulation; report writing; and draft Environmental Management Plan.

The scope of the EIA aims at identifying and evaluating potential environmental impacts emanating from the construction, operations and possible decommissioning of the proposed oxidation ponds. Relevant data have been compiled by making use of secondary sources and from project site visits. Potential environmental impacts and associated social impacts will be identified and addressed in this report.

The environmental impact assessment report aims to address the following:

- Identification of potential positive and negative environmental impacts.
- Provide sufficient information to determine if the proposed project will result in significant adverse impacts.
- Identification of “hotspots” which should be avoided where possible due to the significance of impacts.
- Evaluation of the nature and extent of potential environmental impacts
- Identify a range of management actions which could mitigate the potential adverse impacts to required levels.
- Provide sufficient information to the Ministry of Environment to make an informed decision regarding the proposed project.
- Conduct a public participation exercise.
- Present and incorporate comments made by stakeholders.

1.4 Assumptions and Limitations

In undertaking this investigation and compiling the Environmental Assessment, the following assumptions and limitations apply:

- Assumes the information provided by the proponent is accurate and discloses all information available.

1.5 Content of Environmental Scoping Report

Section 8 of the gazetted EA Regulations makes provision for the contents of a Scoping Report. Table 1 below delineate for ease reference, where this content is found in the Environmental Scoping Report.

Table 1: Contents of the Scoping / Environmental Assessment Report

Section	Description	Section of ESR/ Annexure
8 (a)	The curriculum vitae of the EAPs who prepared the report;	Refer to **Annexure E**
8 (b)	A description of the proposed activity;	Refer to Chapter 4
8 (c)	A description of the site on which the activity is to be undertaken and the location of the activity on the site;	Refer to Chapter 3
8 (d)	A description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed listed activity;	Refer to Chapter 3
8 (e)	An identification of laws and guidelines that have been considered in the preparation of the scoping report;	Refer to Chapter 2
8 (f)	Details of the public consultation process conducted in terms of regulation 7(1) in connection with the application, including	Refer to Chapter 5
	(i) the steps that were taken to notify potentially interested and affected parties of the proposed application	Refer to Chapter 5
	(ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given;	Refer to **Annexures A** and **B** for site notices and advertisements respectively.
	(iii) a list of all persons, organisations and organs of state that were registered in terms of regulation 22 as interested and affected parties in relation to the application;	Refer to **Annexure D**
	(iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;	Refer to **Annexure D**
8 (g)	A description of the need and desirability of the proposed listed activity and any identified alternatives to the proposed activity that are	Refer to Chapter 4

Section	Description	Section of ESR/ Annexure
	feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives have on the environment and on the community that may be affected by the activity;	
8 (h)	A description and assessment of the significance of any significant effects, including cumulative effects, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the proposed listed activity;	Refer to Chapter 7
8 (i)	terms of reference for the detailed assessment;	Refer to Chapter 1
8 (j)	An environmental management plan	Refer to **Annexure F**

2. LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK

The principle environmental regulatory agency in Namibia is the Office of the Environmental Commissioner within the Directorate of Environmental Affairs of the Ministry of Environment, Forestry and Tourism. Most of the policies and legislative instruments have their basis in two clauses of the Namibian Constitution, i.e. Article 91 (c) and Article 95 (l); however, good environmental management finds recourse in multiple legal instruments. Table 2 below provides a summary of the legal framework considered to be relevant to this development and the environmental assessment process.

Table 2: Legislation applicable to the proposed development

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
The Constitution of the Republic of Namibia as Amended	Article 91 (c) provides for duty to guard against "the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia." Article 95(l) deals with the "maintenance of ecosystems, essential ecological processes and biological diversity" and sustainable use of the country's natural resources.	Sustainable development should be at the forefront of this development.
Environmental Management Act No. 7 of 2007 (EMA)	Section 2 outlines the objective of the Act and the means to achieve that. Section 3 details the principle of Environmental Management	The development should be informed by the EMA.
EA Regulations GN 28, 29, and 30 of EMA (2012)	GN 29 Identifies and lists certain activities that cannot be undertaken without an environmental clearance certificate. GN 30 provides the regulations governing the environmental assessment (EA) process.	**Activity 2.1** The construction of facilities for waste sites, treatment of waste and disposal of waste. **Activity 8.6** Construction of industrial and domestic wastewater treatment plants and related pipeline systems. **Activity 8.9** Construction and other activities within a catchment area. **Activity 9.2** Any process or activity which requires a permit, licence or other form of authorisation, or the modification of or changes to existing facilities for any process or activity which requires an amendment of an existing permit, licence or authorisation or which requires a new permit, licence or authorisation in terms of a law governing the generation or release of emissions, pollution, effluent or waste. **Activity 10.1 (a)** The construction of – Oil, water, gas and petrochemical and other bulk supply pipelines.
Convention on Biological Diversity (1992)	Article 1 lists the conservation of biological diversity amongst the objectives of the convention.	The project should consider the impact it will have on the biodiversity of the area.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
Draft Procedures and Guidelines for conducting EAs and compiling EMPs (2008)	Part 1, Stage 8 of the guidelines states that if a proposal is likely to affect people, certain guidelines should be considered by the proponent in the scoping process.	The EA process should incorporate the aspects outlined in the guidelines.
Namibia Vision 2030	Vision 2030 states that the solitude, silence and natural beauty that many areas in Namibia provide are becoming sought after commodities and must be regarded as valuable natural assets.	Care should be taken that the development does not lead to the degradation of the natural beauty of the area.
Water Resources Management Act 11 of 2013.	A permit application in terms of Sections 72(1) of the Water Act is required for the disposal of industrial or domestic waste water and effluent.	The pollution of water resources should be avoided during construction and operation of the development.
The Ministry of Environment, Forestry and Tourism (MEFT) Policy on HIV & AIDS	MEFT has developed a policy on HIV and AIDS. In addition, it has also initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments.	The proponent and its contractor(s) have to adhere to the guidelines provided to manage the aspects of HIV/AIDS. Experience with construction projects has shown that a significant risk is created when construction workers interact with local communities.
Regional Councils Act No. 22 of 1992	Section 28(c) makes provision for Regional Councils to establish, manage and control settlement areas.	The Sesfontein Settlement is managed by the Kunene Regional Council.
Labour Act no 11 of 2007	Chapter 2 details the fundamental rights and protections. Chapter 3 deals with the basic conditions of employment.	Given the employment opportunities presented by the development, compliance with the labour law is essential.
Public and Environmental Health Act of 2015	The Act serves to protect the public from nuisance and states that person may not cause a health nuisance or may not permit to exist on a land or premises owned or occupied by him or her, or of which he or she is in charge, a health nuisance or other condition liable to be injurious or dangerous to health.	The construction of infrastructure will take place across publicly accessible premises. The proponent should ensure that the site is off limits from public during construction to avoid incidences.
Nature Conservation Ordinance no 4 of 1975	Chapter 6 provides for legislation regarding the protection of indigenous plants	Indigenous and protected plants have to be managed within the legal confines.
Atmospheric Pollution Prevention Ordinance (No. 11 of 1976).	The Ordinance objective is to provide for the prevention of the pollution of the atmosphere, and for matters incidental thereto.	All activities on the site will have to take due consideration of the provisions of this legislation.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
Roads Ordinance 17 of 1972	This Ordinance consolidates the laws relating to roads.	The provisions of this legislation have to be taken into consideration in as far as access to the development site is concerned.
Roads Authority Act, 1999	Section 16(5) of this Act places a duty on the Roads Authority to ensure a safe road system.	Some functions of the Roads Ordinance 17 of 1972 have been assigned to the Roads Authority.

This EA process will be undertaken in accordance with the EA Regulations. A Flow Diagram (refer to **Figure 3** below) provides an outline of the EA process to be followed.

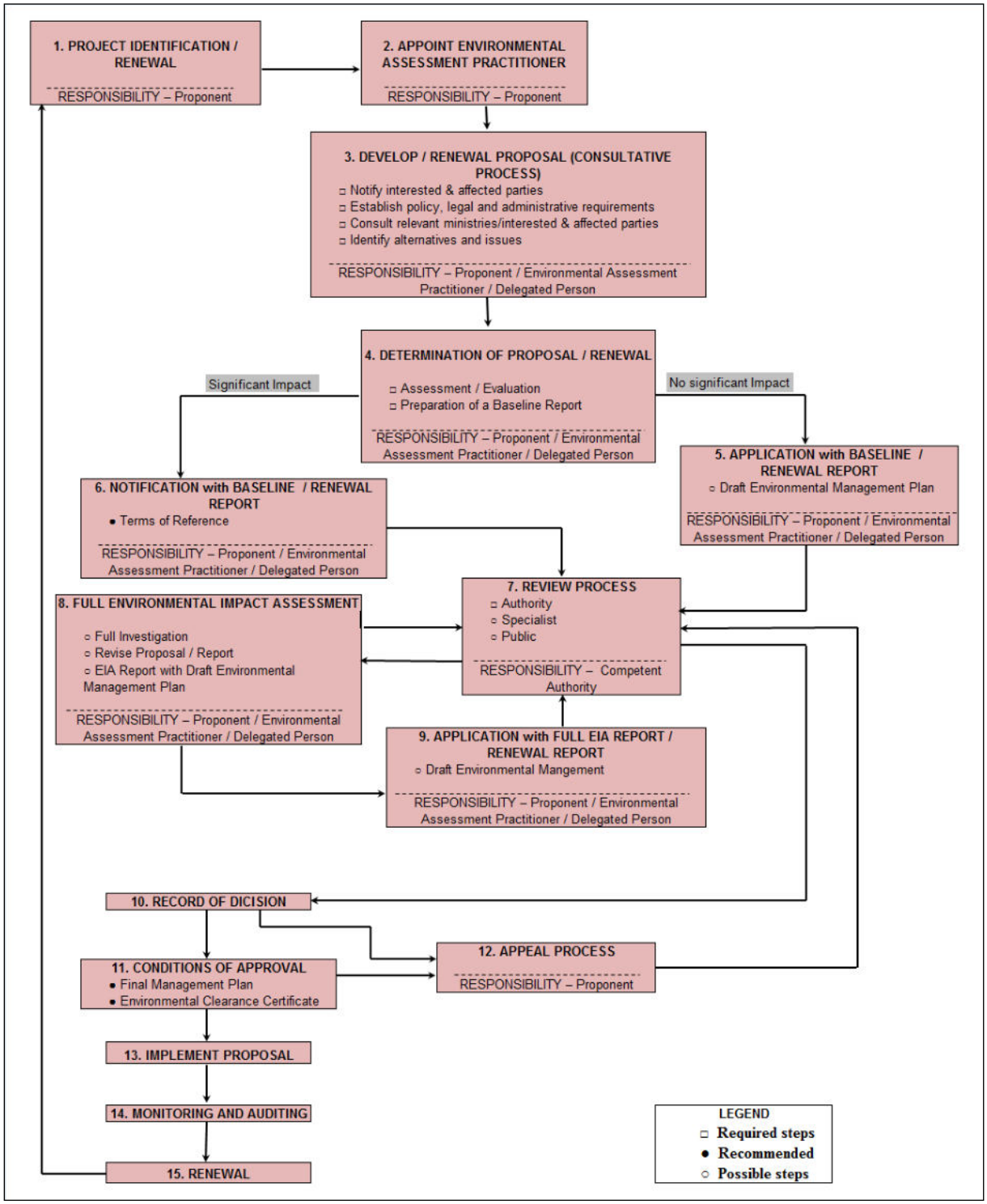

Figure 3: EA Flowchart for Namibia (Environmental Assessment Policy of 1995)

3. ENVIRONMENTAL BASELINE DESCRIPTION

3.1. Social Environment

3.1.1. Socio-Economic Context

The Kunene Region is home to Namibia's indigenous ethnic groups, the Ovahimba, Ovatue, and Ovazemba, whose lifestyles, traditions, values, and culture have not changed despite centuries of colonialism. Located on the border of Namibia and Angola, Kunene is named after the Kunene River, which forms the northern boundary of the region. The Kunene Region covers an area of 115, 293 km^2 and is Namibia's second largest region after the Karas Region. Livestock production is one of the main sources of livelihood for many rural households in Kunene Region. There are many farmers in the region who turn to formal auctions, such as those held in Outjo, Kamanjab, Khorixas, as well as informal sales in Opuwo, as a source of income (KRC, 2025).

The region's diverse scenery and wildlife contribute to its tourism growth. The Kunene region is home to the big four, namely the Leopard, Elephant, Rhino, and Lion, which can be found roaming freely in their natural habitat. Additionally, the mining sector is growing significantly, particularly for minerals such as iron ore at Orumana, copper at Otuani, diamonds at Otjinungua, and rare earth at Khorixas. The region has seven constituencies and one municipality, Outjo Municipal Council, while Khorixas and Opuwo are town councils. Kamanjab Village Council is the only village council in the region (KRC, 2025).

The Sesfontein Constituency covers an area of 20,198 km^2 and has a population of just over 8,845 (NSA, 2023). Eco-tourism and geo-exploration are the main economic activities in this area, with +/- 10 privately owned lodges, 6 campsites, and 5 communal conservancies housing a variety of wildlife, including desert elephants, rhinos, lions, giraffes, and a wide variety of birds. In accordance with the Local Authority Act of 1992, Kunene Regional Council (KRC) administers three settlement areas: Fransfontein Settlement Area, Okangwati Settlement Area and Sesfontein Settlement Area (KRC, 2025).

Sesfontein Settlement is located within the Sesfontein Constituency and derives its name from six fountains identified nearby. On the 14th of July 2005, Sesfontein was proclaimed as a settlement area by the Kunene Regional Council. KRC governs and administers the Settlement area, with a satellite office in charge of day-to-day management and administration. The Sesfontein settlement area is the gateway to both Cape and Angra Fira, both locations earmarked for development of future harbours and diamond mining at Kunene Mouth.

3.1.2. Archaeological and Heritage Context

While many archaeological sites have been found in the Kunene Region and some sites provide evidence of occupation for a long time, many of these are considered “lucky finds” since the chances of artefacts surviving long and then being found are obviously small. As a result, the number of known archaeological sites with very old artefacts is few (Raison, 2016). It is unlikely that the development site will have any significant archaeological resources; however, an accidental find procedure may be required. If any heritage or culturally significant artefacts

are found during the construction, construction must stop and the National Heritage Council of Namibia immediately notified.

3.2. Bio-Physical Environment

3.2.1. Climate

Annual rainfall in the region varies significantly, increasing from the west (Namib Desert) to the east, where it ranges from less than 50 mm to 415 mm per year and occurs sporadically. The region, like the rest of the country, experiences an arid climate with a brief wet season mainly from February to April. Rainfall generally decreases from north to south. The first light rains typically arrive in October and November, followed by a dry period in December. The western areas of the region tend to receive less precipitation than the eastern regions. For most of the year, the climate remains dry, accompanied by dust storms especially prevalent from August to October (KRC, 2025).

The terrain is semi-arid, transitioning to desert as one approaches the Skeleton Coast. Summer daytime temperatures frequently soar to 35 degrees Celsius, with average minimum temperatures around 14 degrees Celsius. In winter, temperatures typically range from an average of 5 to 26 degrees Celsius. Observations of climate change in the area highlight ongoing natural variability, and the shifts in rainfall patterns over recent years have significantly affected the livelihoods of local residents (KRC, 2025).

Fog is common along the coastline, especially during the winter months. The eastern limit of this fog is approximately 20 kilometers from the coast. It originates from the cool Benguela current to the south. Occasionally, the fog can reach as far as 60 kilometers inland. Typically, an anti-cyclonic high-pressure system over the South Atlantic Ocean directs westerly winds toward the escarpment, preventing moist air masses from the east from advancing into the western desert regions. Rain clouds that manage to travel this far across the continent from the Indian Ocean can only penetrate the desert when the westerly winds and temperature inversions diminish, resulting in sporadic thunderstorms. During the winter season, the influence of the Atlantic high-pressure system weakens, allowing for the arrival of a very dry easterly wind (KRC, 2025).

The wind rose for Sesfontein shows how many hours per year the wind blows from the indicated direction. The predominant wind directions in the Sesfontein area are southwest, west-southwest and east. See Figure 5 below.

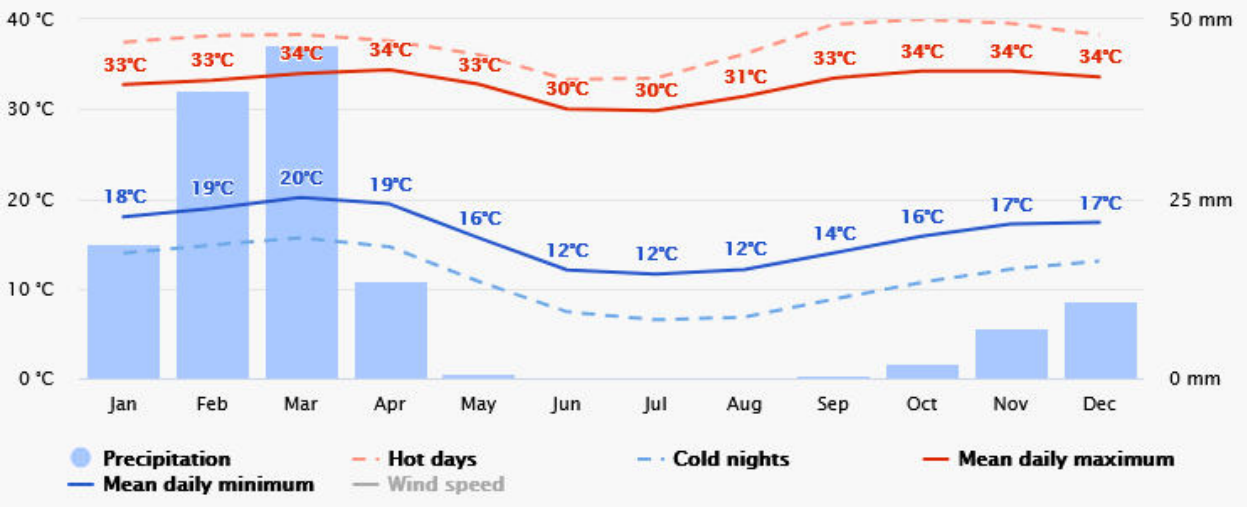

Figure 4: Average temperature and precipitation graph for Sesfontein (Meteoblue, 2025)

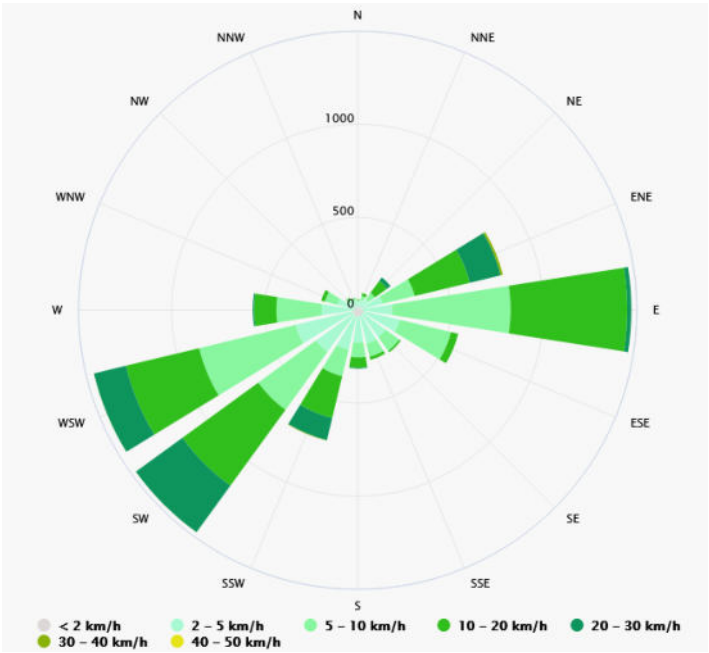

Figure 5: Windrose for Sesfontein (Meteoblue, 2025)

3.2.2. Topography, Geology and Hydrogeology

I. Topography

Sesfontein is characterized by a diverse landscape featuring rugged mountains, rolling hills, and extensive plains. The settlement is situated near the Grootberg Plateau, which rises steeply from the surrounding terrain. Elevation levels in the area vary significantly, with the plateau providing stunning views of the surrounding landscape. The topography influences local climate patterns, as the elevation can lead to cooler temperatures at higher altitudes while lower areas

tend to be warmer and drier. The vegetation varies according to elevation and water availability, with higher regions supporting scrub forests, while valleys may host denser plant life. This varied topography also influences human settlement patterns, agriculture, and the availability of resources.

II. Geology

The geology of Sesfontein predominantly includes ancient rock formations typical of the arid regions of Namibia. The area features schists, granites, and quartzites, which are primarily metamorphic and igneous rocks. These formations date back to the Proterozoic Era, making them millions of years old and indicative of extensive geological processes, including tectonic activity and erosion. The hardness of the rocks influences soil composition and fertility, critical for agricultural practices. Moreover, the geological stability of the area has implications for construction and land use, allowing the settlement to develop with relatively low seismic risk.

III. Hydrogeology

Volcanic rocks of the Etendeka Formation crop out between Sesfontein and the Huab River. Some smaller units are present in the area south of Orupembe. These volcanic rocks build the typical table mountain landscape of Damaraland. Underlying shale and mudstone of the Dwyka Formation are present in the area west and east of Orupembe, in the Opuwo area, west of Sesfontein and at Ruacana. The most recent rocks are calcretes (in the area of Khorixas, Fransfontein and Sesfontein) as well as alluvial deposits occurring locally in the ephemeral river beds. As far as tectonic structures are concerned, the most well-known ones are the Sesfontein Thrust and the Purros Lineament. The Sesfontein Thrust represents the contact between the Otavi Dolomites and metamorphosed rocks, represented by phyllites of the Mulden Group. This contact zone gave rise to the springs found at Sesfontein.

The area is well known for its numerous springs that provide water for wildlife and to villages. Small-scale irrigation schemes are in operation at some of the higher yielding springs, like Warm quelle, Kaoko-Otavi and Sesfontein. There are also a number of thermal springs in the area, e.g. Warmquelle, Ongongo, Monte Carlo and springs at Okangwati.

The Sesfontein settlement relies on aquifers for its water supply, often found within the porous rock formations. The main aquifer in the region is typically composed of fractured dolomite and sandstone, allowing for the storage and movement of water. All of the underlying formations are classified as hard rock formations, hence groundwater flow would be mostly along fractures, faults (secondary porosity) and other geological structures present within these formations. Groundwater quality can vary, with mineral content influenced by the geological substrate.

Challenges in managing these resources include seasonal variations in rainfall, which affect recharge rates, and the increasing demand for water from the growing population. Drought

conditions are a concern for the community, necessitating sustainable water management practices to ensure long-term availability.

According to the Department of Water Affairs (DWA) database, no borehole (or any other water point) exists within a 1km radius of the site. The nearest water point (fountain) is located at the Sesfontein conservancy office, approximately 1.2km northwest of the site.

The area does not fall within a groundwater control area; however groundwater remains the property of the government of Namibia. This means that government controls the exploration and usage of it. See Figure 6 for the hydrogeological map.

3.2.2.1 Groundwater Pollution Vulnerability

The geological framework that hosts the groundwater systems of the project area consists of intensely folded rocks of the Mulden Group. The numerous folding, thrusting and faulting episodes, of which the geology of the area was subjected to, resulted in geological structures and lineaments been created. The main faults and dykes in the project area show north-northwest, northeast and subordinate northwest and easterly trends. The presence of these sensitive geological structures present in the area could form preferential pathways to the underlying aquifer.

The sources of contamination in Sesfontein include pit latrines; soak ways, graveyards, natural fertiliser (manure), cattle and other livestock kraals and small refuse disposal sites. Pollutants arising from both point and diffuse sources are transported downwards by infiltrating rainwater through the unsaturated zone and into the saturated groundwater zone. The effectiveness of such a process depends on the amount of groundwater recharged, the characteristics of the soils and underlying geological strata, and their thickness above the water table. In order to protect these groundwater resources, pollution to these structures should be avoided at all cost.

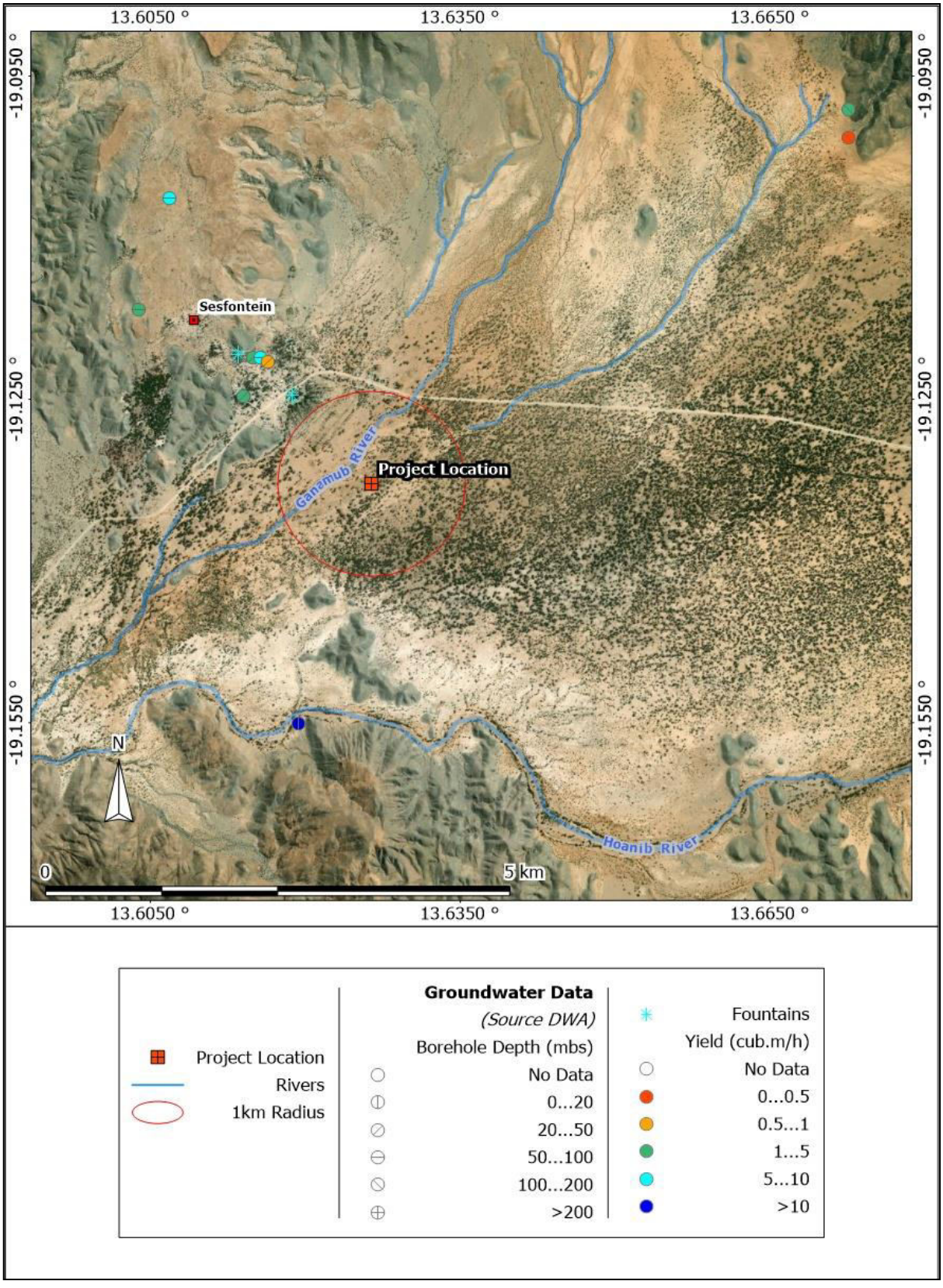

Figure 6: Hydrogeological map

3.2.2.2 Groundwater Monitoring

Sewage discharge is a major component of water pollution, contributing to oxygen demand and nutrient loading of the water resources, promoting toxic algal blooms and leading to a destabilized aquatic ecosystem. Local authorities have a responsibility for control of new waste treatment facilities through the planning process. Clear measures to prevent pollution must be outlined. Groundwater and surface water are therefore essentially one resource, physically connected by the hydrologic cycle. Streams interact with groundwater in three basic ways, i.e. streams gain water from inflow of groundwater through the streambed, streams lose water by outflow through the streambed, or they do both depending upon the location along the stream. It is the groundwater contribution that keeps streams flowing between precipitation events. Groundwater from the local fractured network is used for human consumption.

It is recommended that at least three (3) monitoring boreholes be installed in and around the site, in order to monitor groundwater pollution. A protective manhole should be placed over each borehole installed. The purpose of these boreholes will be to monitor any contamination in the subsurface emanating from the oxidation ponds; and to monitor the migration of possible contamination off site.

Baseline water samples must be collected from the boreholes immediately after drilling completion, in order to represent baseline conditions at the site. As such, these conditions can be important in forecasting potential environmental impacts during the site operations, and can become measurements against which future changes are compared.

3.2.3. Terrestrial Ecology

Sesfontein settlement is characterized by its unique ecological and biological diversity. This area is not only rich in various species of flora and fauna but also has vital cultural and historical significance for the communities that inhabit it. The Sesfontein area is primarily characterized by arid and semi-arid ecosystems that feature a range of habitats, from savannah grasslands to mountainous terrains. Notable plant species include the acacia tree, which plays a crucial role in providing fodder for livestock, and various succulents that have adapted to the harsh conditions of the region (Ecosystem Consulting, 2019). The area supports communal livestock that can be observed grazing onsite.

The dominant plants on the footprint of the project site and surround are the *Acacia erioloba* and *Salvadora persica*.

The *Acacia erioloba*, also commonly known as the Camel Thorn tree, is considered a protected species under the Forest Act, 2001, meaning its harvesting and removal is regulated due to its ecological importance as a widespread and vital tree in the Namibian landscape.

The *Salvadora persica,* commonly known as the mustard bush, khooris or toothbrush tree is a versatile plant that has significant cultural, medicinal, and ecological importance in Namibia. *Salvadora persica* is not considered a protected species and is listed as "Least Concern" on the

IUCN conservation status, meaning it is widely distributed and not currently threatened in Namibia. *Salvadora persica* has been traditionally used as a natural toothbrush. The branches of the tree are chewed to clean teeth, which is believed to help prevent dental issues. *Salvadora persica* is well-adapted to arid environments, making it an essential component of Namibia's ecosystem. Its deep root system helps stabilize soil and prevent erosion, while its foliage provides shelter and food for various wildlife species. The plant's ability to thrive in harsh conditions also contributes to biodiversity, as it supports various insects and birds, enhancing the resilience of the ecosystem.

Figure 7. Predominant vegetation at the project site

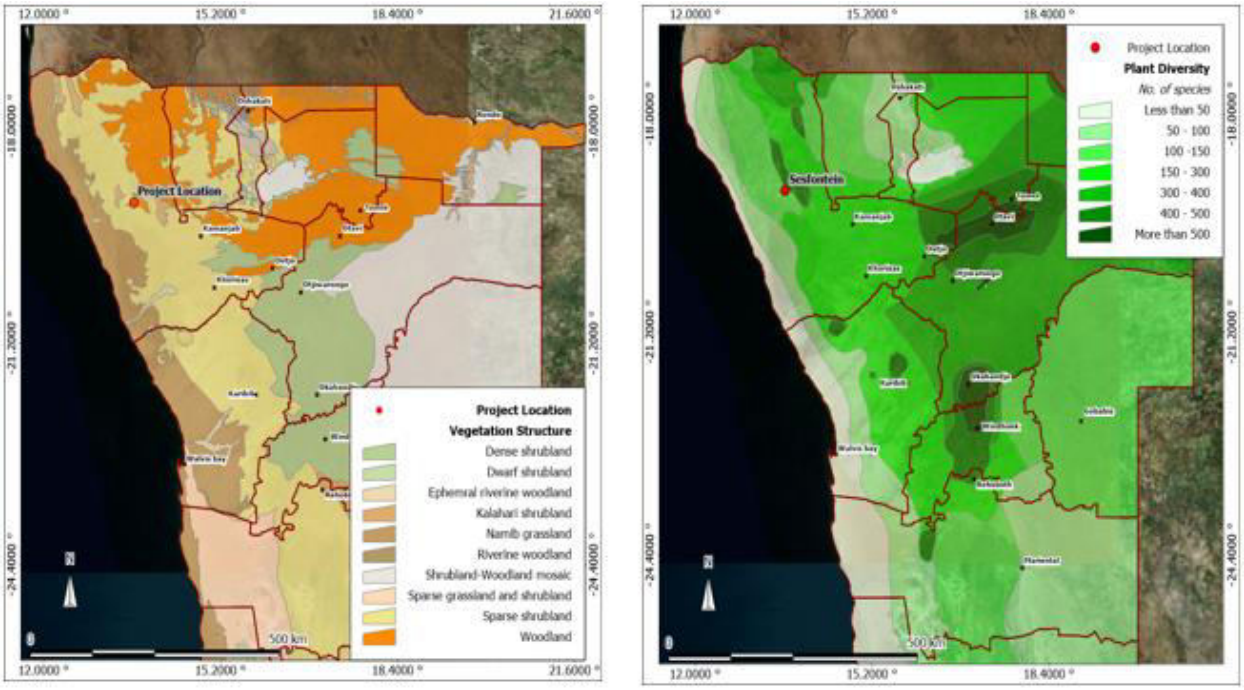

Figure 8: Vegetation structure and plant diversity

The fauna in Sesfontein includes a variety of vertebrate Fauna mammals, birds, reptiles, and insects. Species such as the desert-adapted elephant and the endangered black rhino are significant to the ecological balance of the region (Dimo Mada, 2020). The area serves as a vital habitat for a diverse array of birdlife, including the Beyers' lapwing and numerous raptor species, which are indicators of environmental health (Namibia Nature Foundation, 2021).

The biodiversity in Sesfontein contributes to several ecological functions. Plants not only provide food and shelter for various animal species but also play a critical role in soil stabilization and the water cycle. Animal species contribute to pollination and seed dispersal, fostering the growth of vegetation that is essential for maintaining the habitat's integrity (Gorham & Smit, 2022).

Furthermore, the interactions among species create a complex web of dependencies that enhance the resilience of the ecosystem. For instance, herbivores rely on specific plants for nourishment, while predators, such as the lion and leopard, help control herbivore populations, thereby maintaining ecological balance (Namibian Environmental Assessment Forum, 2018).

The Sesfontein conservancy in the project area covers a land size of 2,465 km^2 and is home to a variety of major wildlife resources, such as Elephant, Black Rhino, Lion, Leopard, Cheetah, Mountain Zebra, Kudu, Oryx, Ostrich, Springbok, Steenbok, Jackal and Klipspringer (NACSO, 2006 and 2010). The general project area is regarded as “low” in overall (all terrestrial species) diversity; overall terrestrial endemism is “high” (Mendelsohn et al., 2002). The overall diversity and abundance of large herbivorous mammals (big game) is viewed as “low to medium” (three to four species), while the overall diversity of large carnivorous mammals (large predators) is determined as “average to high” (four to five species). Lion, Leopard, Spotted Hyena, Cheetah and Brown Hyena are the most important large carnivorous mammals with “medium” densities expected in the area (Mendelsohn et al., 2002).

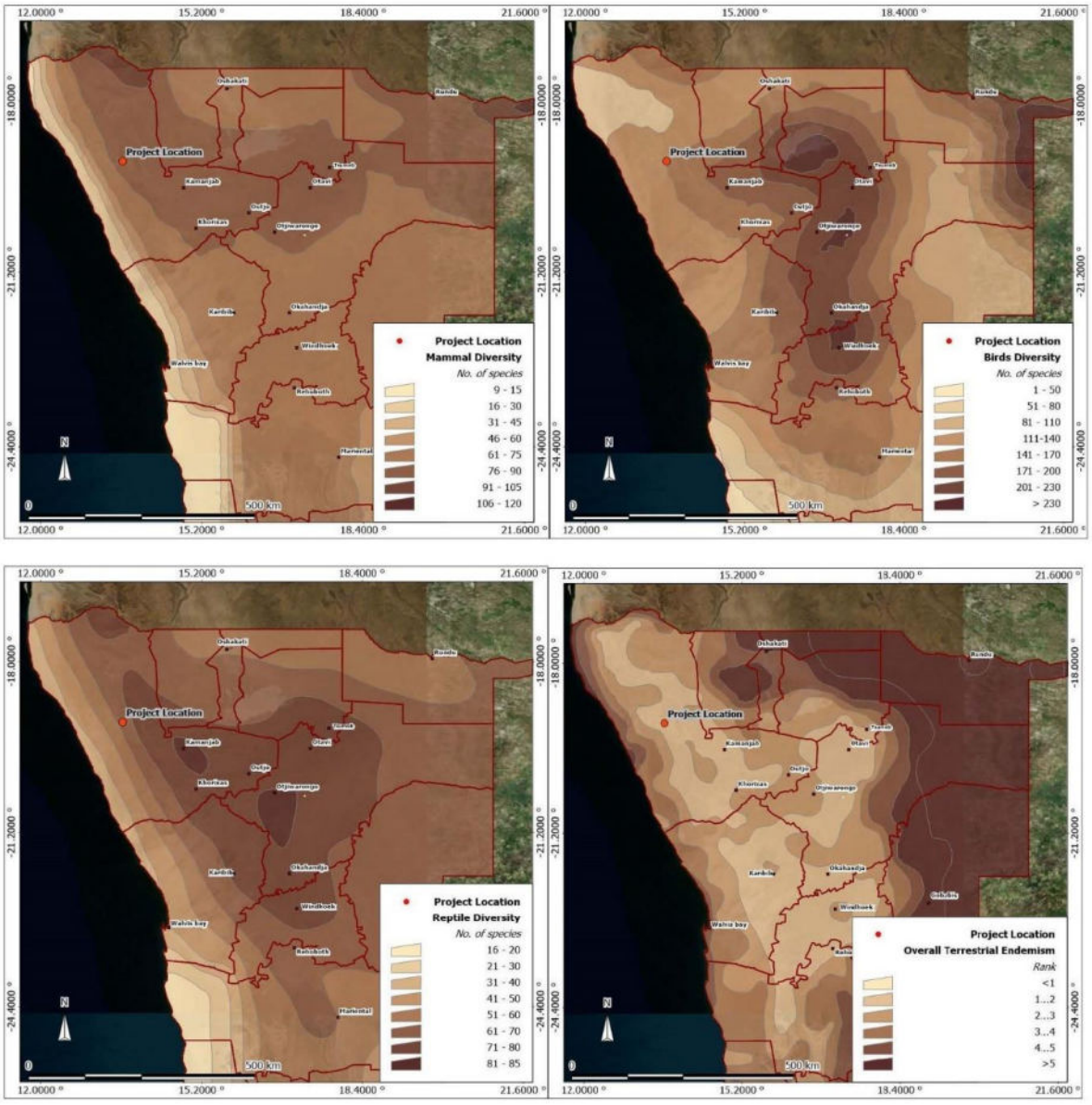

Figure 9. Diversity of some fauna

The preservation of biodiversity in Sesfontein is essential not only for ecological reasons but also for the socio-economic wellbeing of the local communities. Several conservation initiatives have been introduced in recent years, focusing on sustainable land use and wildlife conservation. The establishment of conservancies has empowered local communities to manage their resources effectively, as seen in the Sesfontein Conservancy (Ministry of Environment and Tourism, 2017).

These efforts are supported by various NGOs and government agencies aiming to promote biodiversity conservation while enabling economic development through eco-tourism and

sustainable agriculture. This integrated approach not only protects the biodiversity of the Sesfontein area but also enhances livelihoods by providing alternative income sources for the local population (Oleson et al., 2019). Figure 10 below provides a view of the general area and surrounds of the proposed development site.

Figure 10: General area of the proposed development site

3.3. Surrounding Land Use

The Oxidation Ponds would be located approximately 1.5 km south-east of Sesfontein on the main road between Sesfontein and Kamanjab. The site measures a land size of approximately 2Ha. The area is generally undeveloped and used mainly to provide grazing for livestock. The Ganamub river runs across north-northwest of the area, while to the north-northeast a few households can be found.

3.4.Physical Environment

The infrastructure needs of the proposed project includes the following:

- Access roads
- Rising mains
- Pump station

4. PROJECT DESCRIPTION

4.1. Project Activities

As indicated this project aims to provide basic services to the community of Sesfontein by providing a sewage treatment facility. The design guidelines as set out in the DWAF Code of Practice, Volume 2 (DWAF, 2008), must be strictly followed. The following requirements need to be taken into consideration:

- The anaerobic ponds must be lined with an impenetrable liner;
- No final effluent may be produced, i.e. all effluent must be evaporated;
- The ponds must be properly fenced-in and locked at all times;
- The distance to the closest residential area should not be less than 500 m and preferably 1 000 m;
- If reuse is considered, maturation ponds of not less than 40 days' retention time must be added after the oxidation/facultative ponds.

The proposed oxidation ponds are designed for a population of approximately 235 housing units, with a volumetric inflow of 23.5 m^3/day. The peak dry weather flow of 47 m^3/day and an average wet weather flow of 70.5 m^3/day is expected. The complete pond system for sewage treatment at Sesfontein consists of the following setup.

- 2 Anaerobic ponds with depths of 4 meters. Each pond has a volume capacity of 90m^3 (therefore, 2 ponds = 180m^3).
- 1 Primary pond with a depth of 1.5 meters. The pond has a volume capacity of 2301m^3.
- 2 Aerobic ponds with depths of 1.2 meters. Each pond has a volume capacity of 240m^3 (therefore, 2 ponds = 480m^3).
- 4 Evaporation ponds with depths of 1.5 meters. Each pond has a volume capacity of 2,925m^3 (therefore, 4 ponds = 11,700m^3).

The process flow:

- Inlet Works flows into Anaerobic Ponds
- Anaerobic ponds flows into Primary Ponds
- Primary Ponds flows into Aerobic Ponds
- Aerobic Ponds flows into Evaporation Ponds

The process of biological oxidation in these ponds is facilitated by two main types of microorganisms: aerobic bacteria and algae. Aerobic bacteria consume organic matter in the wastewater and produce carbon dioxide. This carbon dioxide is then used by algae for photosynthesis, which in turn produces oxygen.

- Anaerobic ponds receive all the raw sewage (primary treatment) and will be constructed deeper than ponds downstream. They have a retention period of 2 to 5 days and might release odour but this can be mitigated by alkaline methane fermentation.
- Primary pond acts as the first stage in the wastewater treatment process, where physical treatment takes place. It is typically a large, shallow pond where sedimentation occurs, and heavier solids settle at the bottom. It also allows some initial biological treatment by bacteria that start breaking down organic material.
- Aerobic ponds are mainly used in algal culture and harvesting rather than treatment. Algae is there to ensure that levels of desired DO are maintained for the aerobic organisms to proliferate. Oxygen is typically supplied to the pond by natural aeration or mechanical means.
- Maturation ponds will allow algae to grow on the surface, which will provide the water with oxygen leading to both anaerobic digestion and aerobic oxidation of the organic pollutants. Due to the algal activity, the pH rises leading to inactivation of some pathogens and volatilisation of ammonia.
- Evaporation ponds will ensure that no final outflow to the environment is allowed so all discharged water should evaporate. This pond has the largest surface area for all the water to evaporate. Sizing is based on evaporation-infiltration rate and annual rainfall.

The oxidation pond site will be protected by a perimeter fence, with signs to be placed inside the fenced off pond area that warn people of the danger of the ponds, which pose a health and safety risk.

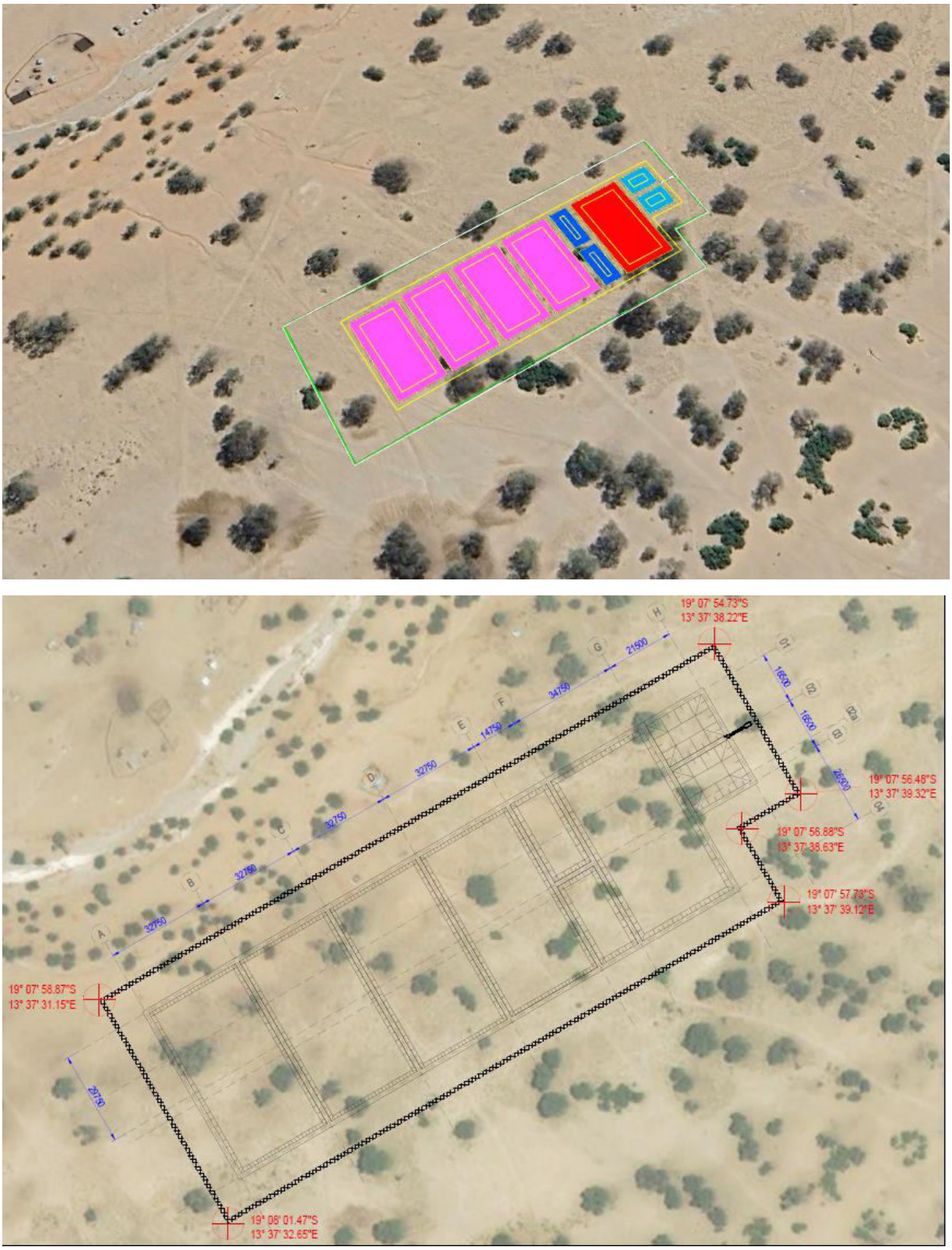

Figure 11: Layout of development site

4.2. Decision Factors

The following factors served as informants and were considered when preparing the layout designs for the proposed development:

- Sesfontein development plan.
- Character of the general area.
- Comparative advantage and strategic value of Sesfontein as an investment location.
- Location of the oxidation ponds relative to the residential properties.
- Predominant wind directions.

4.3. Description of Alternatives

4.3.1 No-Go Alternative

The no-development alternative is the option of not establishing the oxidation ponds. Should the proposed development not take place, proper management of sewage-effluent and development of the area in general will be hindered. The No-development option is thus not considered to be a feasible alternative at this stage.

4.3.2 Site Alternative

The project site is generally suitable for this type of operation. The environmental footprint is expected to be minimal as the project site is partially disturbed. The potential impacts at the project location, both environmental and socio-economic, are of such a nature that they can be mitigated through good practice and compliance to the EMP.

The proximity of the Ganamub River (approximately 200m northwest) to the site increases the risk of surface water contamination and pollution from leaking oxidation ponds; however the risk will be lowered by the design and management of the facility. Proper containment mechanisms installed should be able to contain any leakages that might occur during the operation of the facility.

5. PUBLIC PARTICIPATION PROCESS

5.1. Public Consultation Process Phase 1

In terms of Section 21 of the EA Regulations a call for public consultation with all I&APs during the EA process is required. This entails consultation with members of the public and providing them an opportunity to comment on the proposed project. The Public Consultation Process does not only incorporate the requirements of Namibia's legislation, but also takes account of national and international best practises. Please see Table 5 below for the activities undertaken as part of the statutory public participation process.

Table 3: Table of Public Consultation Activities

ACTIVITY	REMARKS
Placement of site notices/posters in Sesfontein	See **Annexure A**
Placing advertisements in three newspapers for two consecutive weeks, namely The Namibian and Confidente	See **Annexure B**
Written notice to Interested and Affected Parties via Email	See **Annexure D**
Public meeting in Sesfontein	13 February 2025
Focal Consultative meeting with: - Sesfontein Constituency Office - Sesfontein Conservancy - Nami-daman Traditional Authority	13 February 2025

A consultative focal meeting with key stakeholders; followed by a public meeting was held on 13 February 2025, at the Community Garden of the Sesfontein Conservancy Office in Sesfontein, Kunene Region. The public meeting was attendant by 40 local residents and regional administrators, who provided input to the proposed development. A background information document was availed to all interested and affected parties in attendance, and those that requested the information. The comment period of the initial public participation process commenced on 31 January 2025 and ended on 20 February 2025.

A summary of the issues and comments raised during the initial consultation phase is found below (See i and ii). A more detailed issues and response matrix is attached as Annexure D(3) of this report. A high volume of comments and inputs were received from the I&APs during this phase, therefore similar comments were grouped and addressed collectively.

i. Sesfontein Constituency Office (Mr Hendrik Gaobaeb, Constituency Councillor) Sesfontein Conservancy (Mr Usiel Nuab, Chairman)

1. Welcomed the development to the region and applauded the regional council for conducting commissioning the environmental study.
2. Stressed the importance of public consultation and stakeholder engagement for projects that can have detrimental effects to the environment.
3. He welcomed the oxidation pond technology for Sesfontein settlement as it brings a wastewater treatment solution to the settlement. He raised concerns about the improperly constructed septic tanks currently in use in most households at Sesfontein.
4. He raised concerns on the tedious and delayed progress in implementation of this critical and much needed service at the settlement.

ii. Summary and Issues from the Interested and Affected Parties

1. Concerns over pollution and contamination of the local groundwater.
2. Concerns over access control, whether the site will be fenced off and the risk of the boundary fence being stolen.
3. Concerns over compensation for affected land owners.

4. Concerns on grazing of the livestock in the area.

5.2. Public Consultation Process Phase 2

The second phase of the Public Consultation Process involves the lodging of the Draft Environmental Scoping Report (DESR) to all registered I&AP for comment. Registered and potential I&APs are informed of the availability of the DESR for public comment. I&APs are given time until **25 March 2025** to submit comments or raise any issues or concerns they may have with regard to the proposed project.

6. ASSSESSMENT METHODOLGY

Impact assessments depend on the nature and magnitude of the proposed activity, as well as the type of environmental control envisaged for the particular project. Given the nature of the proposed activity, i.e. a construction project, the identification and assessment of the potential impacts will be based on the type and scale of the various activities associated with the project.

Assessment of the predicted significance of impacts for a proposed development is by its nature, inherently uncertain. To deal with such uncertainty in a uniform manner, standardised and internationally recognised methodologies have been developed. One such accepted methodology is applied in this study to assess the significance of the potential environmental impacts of the proposed development, outlined as follows in Table 6.

Table 4: Impact Assessment Criteria

CRITERIA	CATEGORY
Impact	Description of the expected impact
Nature Describe type of effect	**Positive**: The activity will have a social / economical / environmental benefit. **Neutral**: The activity will have no effect **Negative**: The activity will have a social / economical / environmental harmful effect
Extent Describe the scale of the impact	**Site Specific:** Expanding only as far as the activity itself (onsite) **Small:** restricted to the site's immediate environment within 1 km of the site (limited) **Medium:** Within 5 km of the site (local) **Large:** Beyond 5 km of the site (regional)
Duration Predicts the lifetime of the impact.	**Temporary:** < 1 year (not including construction) **Short-term:** 1 – 5 years **Medium term:** 5 – 15 years **Long-term:** >15 years (Impact will stop after the operational or running life of the activity, either due to natural course or by human interference) **Permanent:** Impact will be where mitigation or moderation by natural course or by human interference will not occur in a

CRITERIA	CATEGORY
	particular means or in a particular time period that the impact can be considered temporary
Intensity Describe the magnitude (scale/size) of the Impact	**Zero:** Social and/or natural functions and/ or processes remain unaltered **Very low:** Affects the environment in such a way that natural and/or social functions/processes are not affected **Low:** Natural and/or social functions/processes are slightly altered **Medium:** Natural and/or social functions/processes are notably altered in a modified way **High:** Natural and/or social functions/processes are severely altered and may temporarily or permanently cease
Probability of occurrence Describe the probability of the Impact actually occurring	**Improbable:** Not at all likely **Probable:** Distinctive possibility **Highly probable:** Most likely to happen **Definite:** Impact will occur regardless of any prevention measures
Degree of Confidence in predictions State the degree of confidence in predictions based on availability of information and specialist knowledge	**Unsure/Low:** Little confidence regarding information available (<40%) **Probable/Med:** Moderate confidence regarding information available (40-80%) **Definite/High:** Great confidence regarding information available (>80%)
Significance Rating The impact on each component is determined by a combination of the above criteria.	**Neutral:** A potential concern which was found to have no impact when evaluated **Very low:** Impacts will be site specific and temporary with no mitigation necessary. **Low:** The impacts will have a minor influence on the proposed development and/or environment. These impacts require some thought to adjustment of the project design where achievable, or alternative mitigation measures **Medium:** Impacts will be experienced in the local and surrounding areas for the life span of the development and may result in long term changes. The impact can be lessened or improved by an amendment in the project design or implementation of effective mitigation measures. **High:** Impacts have a high magnitude and will be experienced regionally for at least the life span of the development, or will be irreversible. The impacts could have the no-go proposition on portions of the development in spite of any mitigation measures that could be implemented.

*NOTE: Where applicable, the magnitude of the impact has to be related to the relevant standard (threshold value specified and source referenced). The magnitude of impact is based on specialist knowledge of that particular field.

For each impact, the EXTENT (spatial scale), MAGNITUDE (size or degree scale) and DURATION (time scale) are described. These criteria are used to ascertain the SIGNIFICANCE of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in

place. The decision as to which combination of alternatives and mitigation measures to apply lies with the proponent, and their acceptance and approval ultimately with the relevant environmental authority.

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. Such significance is also informed by the context of the impact, i.e. the character and identity of the receptor of the impact.

7. MITIGATION HIERACHY

The mitigation hierarchy (Figure 12) is a widely used tool that guides users towards limiting as far as possible the negative impacts on biodiversity from development projects. It emphasises best-practice of avoiding and minimising any negative impacts, and then restoring sites no longer used by a project, before finally considering offsetting residual impacts.

Following the hierarchy is crucial for all development projects aiming to achieve no overall negative impact on biodiversity or on balance, a net gain – also referred to as no net loss and the net positive approach, respectively. It is based on a series of essential, sequential – but iterative – steps taken throughout the project's life cycle in order to limit any negative impacts on biodiversity.

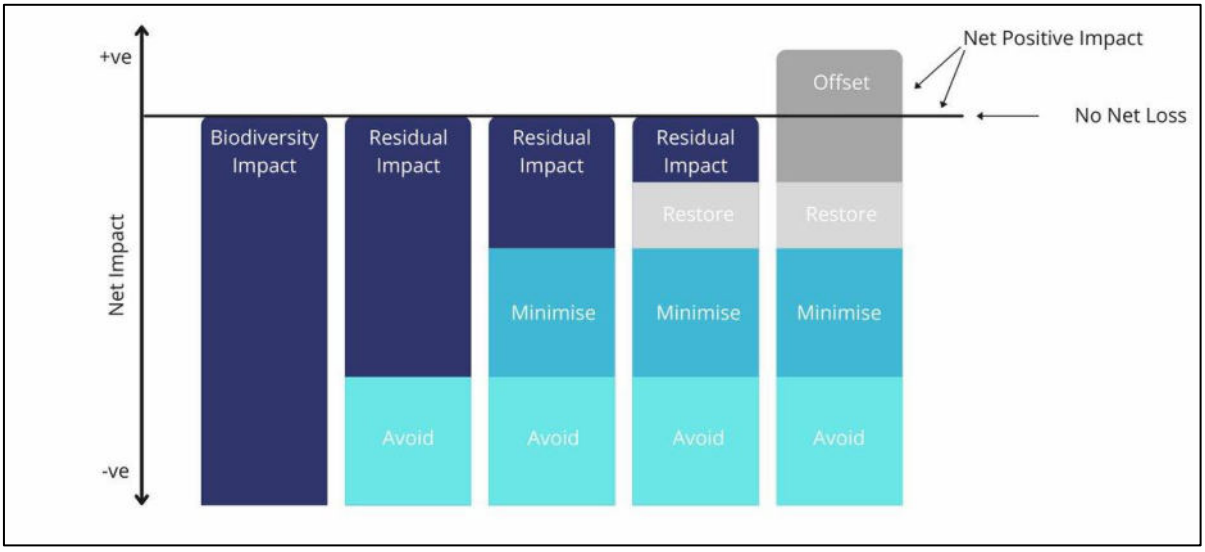

Figure 12: Mitigation Hierarchy

Sequential steps of the mitigation hierarchy

1. **Avoidance**: the first step of the mitigation hierarchy comprises measures taken to avoid creating impacts from the outset, such as careful spatial placement of infrastructure, or timing construction sensitively to avoid or disturbance. Examples include the placement of roads outside of rare habitats or key species' breeding grounds, or timing

of seismic operations when aggregations of whales are not present. Avoidance is often the easiest, cheapest and most effective way of reducing potential negative impacts, but it requires biodiversity to be considered in the early stages of a project.

2. **Minimisation**: these are measures taken to reduce the duration, intensity and/or extent of impacts that cannot be completely avoided. Effective minimisation can eliminate some negative impacts, such as measures to reduce noise and pollution, designing powerlines to reduce the likelihood of bird electrocutions, or building wildlife crossings on roads.

3. **Rehabilitation/restoration**: The aim of this step is to improve degraded or removed ecosystems following exposure to impacts that cannot be completely avoided or minimised. Restoration tries to return an area to the original ecosystem that was present before impacts, whereas rehabilitation only aims to restore basic ecological functions and/or ecosystem services – such as through planting trees to stabilise bare soil. Rehabilitation and restoration are frequently needed towards the end of a project's life cycle but may be possible in some areas during operation.

   Collectively, avoidance, minimisation and rehabilitation/restoration serve to reduce, as far as possible, the residual impacts that a project has on biodiversity. Typically, however, even after their effective application, additional steps will be required to achieve no overall negative impact or a net gain for biodiversity.

4. **Offset**: offsetting aims to compensate for any residual, adverse impacts after full implementation of the previous three steps of the mitigation hierarchy. Biodiversity offsets are of two main types: 'restoration offsets' which aim to rehabilitate or restore degraded habitat, and 'averted loss offsets' which aim to reduce or stop biodiversity loss in areas where this is predicted. Offsets are often complex and expensive, so attention to earlier steps in the mitigation hierarchy is usually preferable.

   Supporting Conservation Actions: measures taken which have positive – but difficult to quantify – effects on biodiversity. These qualitative outcomes do not fit easily into the mitigation hierarchy, but may provide crucial support to mitigation actions. For example, awareness activities may encourage changes in government policy that are necessary for implementation of novel mitigation, research on threatened species may be essential to designing effective minimisation measures, or capacity building might be necessary for local stakeholders to engage with biodiversity offset implementation.

8. POTENTIAL IMPACTS

This Chapter describes the potential impacts on the biophysical and socio-economic environments, which may occur due to the proposed activities. These include potential impacts, which may arise during the planning and design phase, potential construction related impacts (i.e. short to medium term) as well as the operational impacts of the proposed development (i.e. long-term impacts).

The assessment of potential impacts will help to inform and confirm the selection of the preferred project plan and design to be submitted to MEFT: DEA for consideration. In turn, MEFT: DEA's decision on the environmental acceptability of the proposed project and the setting of conditions of authorisation (should the project be authorised) will be informed by this chapter, amongst other information contained in this Report.

The baseline and potential impacts that could result from the proposed development are described and assessed with mitigation measures recommended. Finally, comment is provided on the potential cumulative impacts which could result should this development, and others like it in the area, be approved.

8.1 Planning and Design Phase

During the planning and design phase, consideration is given to aspects such as compliance; possible community resettlement; public engagement, environmental awareness, health and safety aspects.

8.1.1. Compliance Requirements

The proposed development is listed as a project requiring an environmental assessment as per the listed activities in the National environmental requirements. Conduct an environmental and social management Plan (ESMP) to comply with the Environmental Management Act (2007) and its regulations of 2012. Identify and address all environmental and social issues.

8.1.2. Community Resettlement

Should resettlement of people or communities be required for the proposed development. Compensation and resettlement efforts should aim to restore or improve the living conditions and livelihoods of displaced people, regardless of their land ownership status. Resettlement plans should protect people from exposure to natural hazards or climate change risks.

8.1.3. Public Consultation

Consultation with the public forms an integral component of an environmental impact assessment. Initiate participation of Interested and affected parties (I&APs). Inform I&APs and key stakeholders about the proposed development. Identify issues and concerns of key stakeholders and I&APs with regards to the proposed development. Develop a communication structure with stakeholder and I&APs.

8.1.4. Environmental Awareness

Ensure that all persons involved in the project are aware of, and are familiar with the environmental requirements for the project. Develop and implement environmental emergency preparedness procedures.

8.1.5. Health and Safety Aspects

Establish personnel protection standards and mandatory safety practices and procedures for the field activities related to Corrective Actions at the site. Establish the lines of communication among contractors and subcontractors involved in work operations for safety and health matters.

Conduct HIV /Aids Awareness Programme on Site for not less than 90% of workers inclusive of all direct and indirect costs. Provide and maintain condom dispenser. Provide and maintain HIVÁIDS awareness posters. Provide information regarding the voluntary testing of construction workers and counselling, support and care.

8.2 Construction Phase Impacts

During the construction phase the following potential impacts have been identified: fauna and flora; pressure on the existing infrastructure; surface and ground water; health, safety and security impacts; air quality; noise, traffic; solid waste management; hazardous substances; and social impact.

8.2.1 Fauna and Flora

The general area is sparsely populated with flora, predominantly the *Acacia erioloba* and *Salvadora persica*. The existing vegetation is more characteristic and typical of the local environment. The proposed development areas and associated infrastructure would be relatively small and thus only have localised negative implications on the environment and associated fauna and flora. The overall impact on the local fauna and flora and associated habitat would be relatively small. While no obvious large animals could be observed on the development site, the area support species of smaller vertebrates such as reptiles, amphibians, mammals and birds.

8.2.2 Surface and Ground Water Impacts

Surface and ground water impacts may be encountered during the construction phase. The risk of contaminating such water sources can be increased by accidental spillage of oils and fuels and any other equipment used during construction; chemical contamination from construction materials such as cement, paint and mechanical fluids. This risk is minimised by the fact that the construction period will be a short-term activity.

8.2.3 Health, Safety and Security Impacts

Due to a high demand of construction workers during this phase of the project, the deployment of a temporary construction workforce in Sesfontein may be necessary. These types of projects, where construction workers have the opportunity to interact with the local community, create a significant risk for the development of social conditions and behaviors that contribute to the spread of HIV, AIDS and Covid-19. The Ministry of Environment, Forestry and Tourism has initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments. Safety and security aspects are a critical part of any construction activity and high standards have to be upheld, for the duration of the construction period.

8.2.4 Air Quality

During the construction phase fugitive dust and exhaust gases generated have a potential impact on the air quality of the area and its surroundings. Dust is a major component of air pollution and could negatively affect the health of nearby communities, if not mitigated. Due to the distance of the development site to the D3707 road in the area (approximately 950 m), traffic on these roads is not expected to be impacted by dust during construction.

Dust is generated mainly from the following activities:

- Excavations and stockpiles during site clearance;
- Use of heavy vehicles, machinery and equipment;
- Procurement and transport of construction materials to the site.

It is not expected to have a large fleet of vehicles and machinery, given the scale and size of the development.

8.2.5 Noise Impacts

Noise is perceived as one of the most undesirable consequences of a construction activity. The most common reported impacts are interference in oral communication and sleep disturbance. The construction of the services, and other structures will result in associated noise impacts. These noise impacts will mainly be associated with construction machinery and vehicles, concrete and mixing; and excavation for foundations. It is important that noise is managed well to avoid a negative impact to the surrounding communities and other developments in the vicinity during the short-term construction phase.

8.2.6 Traffic Impacts

Traffic is expected to slightly increase in the area during the construction phase of the project. Trucks and other heavy machinery will be required to deliver, handle and position construction materials as well as to remove spoil material. Not only will the increase in traffic result in associated noise impacts, it will also impact on the vehicular traffic in the area. The use of slow-moving heavy construction trucks has the potential to cause traffic jams. This will add additional pressure on the existing D3707 road, if not well managed.

8.2.7 Solid Waste Management

The construction activities will lead to the generation of significant amounts of solid waste mainly in the form of rock cuttings and building rubble. This could have a negative environmental impact if not managed well. Therefore, enough waste bins and skip containers should be availed to manage the solid waste. All solid waste should be disposed of at the designated landfill site of Sesfontein, as approved by the local authority.

8.2.8 Storage and Utilisation of Hazardous Substances

Hazardous substances are regarded by the Hazardous Substance Ordinance (No. 14 of 1974) as those substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure in certain circumstances. It covers manufacture, sale, use, disposal and dumping as well as import and export. During the construction period, the use and storage of these types of hazardous substances, such as shutter oil, curing compounds, types of solvents, primers and adhesives and diesel, on-site, could have negative impact on the surrounding environment, if these substances spill and enter the environment.

8.2.9 Social Impacts

The project will result in long-term positive impacts as far as the social welfare of the affected community is concerned. There is potential of an influx of migrant workers to the settlement. This can boost the local economic development of the settlement as a result of an increase in consumers of goods, and spending power. However, this can also boost the social evils, such as theft, alcohol abuse, unemployment, etc.

8.3 Operational Phase Impacts

The operational phase impacts that have been identified are: environmental monitoring and evaluation; noise; odour; health, safety and security; waste management; social; and visual impact.

8.3.1 Environmental Monitoring and Evaluation

The Environmental Commissioner requires regular environmental monitoring and evaluation on environmental performance to be conducted on approved developments, as well as the setting and monitoring of targets for improvement. As part of this exercise bi-annual reports have to be submitted to the Office of the Environmental Commissioner for the duration of the environmental clearance certificate.

8.3.2 Noise Impacts

The operational phase could typically generate noise through the amount and frequency of use of the various types of vehicles that will be used during maintenance of the oxidation ponds.

Namibia has no environmental noise and impact guidelines, reference is made to guidelines published by the International Finance Corporation (IFC, 2007) (See Table 7 below) and the

South African Bureau of Standards (SABS) (SANS 10103, 2008). Both these guidelines are in line with the World Health Organisation (WHO) Guidelines for Community Noise (WHO, 1999).

Table 5: Environmental Noise standard

Noise Level Guidelines (IFC, 2007)		
Area	**One Hour LAeq (dBA) 07:00 to 22:0**	**One Hour LAeq (dBA) 22:00 to 07:00**
Industrial receptors	70	70
Residential, institutional and educational receptors	55	45

By applying a series of the mitigation measures as proposed for general developments of this nature it is believed that any potential nuisance can be significantly reduced.

8.3.3 Health, Safety and Security Impacts

The critical group likely for public exposure would be the personnel responsible for maintenance activities. Care should be taken to ensure that the maintenance personnel is aware of the risks involved, and should be equipped with the right PPEs for the job. Care should also be taken when handling hazardous substance, such as waste sludge, waste water etc.

8.3.4 Waste Management

Waste generated at the site will mainly be the occasional removal of waste sludge.

8.3.5 Social Impact

The development will have a positive impact on the socio-economic status of Sesfontein and its residents. This is due to the job opportunities that will be created both directly related to the operations and indirectly from supporting services. During the construction phase a few temporary jobs will be created but more permanent jobs will be created when operations commence.

By using natural processes and reducing their negative effects on the environment, these oxidation ponds are a sustainable wastewater treatment solution that can improve the standard of living of the residents of Sesfontein.

8.3.6 Visual and Sense of Place Impacts

Individuals who frequent the area on a regular basis will experience a change in their sense of place of the area. The extent of this disturbance will depend on how high they valued the initial

aesthetic quality of the site. Therefore, the aesthetics quality of the new infrastructure has to be pleasing and designed to blend in with the natural surrounds.

9 SUMMARY OF POTENTIAL IMPACTS

A summary of the significance of the potential impacts from the proposed project assessed above is included in **Table 8**. The **Tables 9 – 12** provide a summary of the mitigation measures proposed for the impacts.

Table 6: Summary of potential impacts

Impacts	Negative		Positive		No Impact
	Short Term	Long Term	Short Term	Long Term	
Planning and Design Phase					
1. Compliance Requirements				X	
2. Community Resettlement	X				
3. Public Consultation				X	
4. Environmental Awareness				X	
5. Health and Safety Aspects				X	
Construction Phase					
6. Fauna and Flora	X				
7. Surface and Ground Water Impacts	X				
8. Health, Safety and Security Impacts	X				
9. Air Quality	X				
10. Noise Impacts	X				
11. Traffic Impacts	X				
12. Solid Waste Management	X				
13. Storage and Utilisation of Hazardous Substances	X				
14. Social Impacts	X				
15. Fauna and Flora	X				
Operational Phase					

16. Environmental Monitoring and Evaluation				X	
17. Noise Impacts	X				
18. Health, Safety and Security Impacts		X			
19. Waste Management		X			
20. Social Impact				X	
21. Visual and Sense of Place Impacts	X				

Table 7: Proposed mitigation measures for the planning and design phase

PLANNING AND DESIGN PHASE IMPACTS	
Impact	**Mitigation Measures**
Surface and ground water	• The service infrastructure should be designed and constructed by suitably qualified engineering professionals. • Develop and implement an efficient maintenance plan for the development. • No dumping of waste products of any kind in or in close proximity to any water bodies. • Ensure that surface water accumulating on-site are channelled away from site, though proper drainage systems. • Wastewater should not be discharged directly into the environment. • The oxidation pond walls and floors must be properly lined with impenetrable material, to ensure no seepage to the ground. • Frequent monitoring to establish the level of wastewater in the ponds. • Ensure frequent removal of sludge to prevent overflow. • Removal and disposal of waste sludge from the oxidation ponds should be properly managed.
Fauna and Flora	• The camel thorn tree (Acacia Erioloba) is protected under Namibia's Forest Act and is listed as a Protected Plant Species. The tree may not be harvested, damaged, or removed without consent and permitting from the relevant authorities. • Adapt the proposed development to the local environment – e.g. small adjustments to the site layout to avoid potential features such as existing vegetation. • Prevent the introduction of potentially invasive alien ornamental plant species such as; Lantana, Opuntia, Prosopis, Tecoma, etc. as part of the landscaping as these species could infestate the area further over time.
Infrastructure	• Construction of infrastructure should be in line with the International and National Requirements for waste water treatment facilities, and for storage of wastewater. • Implement robust containment measures for wastewater to prevent leaks from the oxidation ponds. • Installing barriers or protective structures around the project site to prevent unauthorized access and minimize the risk of accidents. • Ensure professional design and construction of the infrastructure from qualified and registered engineers. • Adhere to the provisions of wastewater management, water resources conservation and protection guidelines in terms of The Water Resource Management Act.
Traffic	• Implement traffic control measures (where necessary). • In cooperation with the local authority, erect clear signage regarding restricted areas, access and exit points to the oxidation ponds, speed limits, traffic rules, etc.

Table 8: Proposed mitigation measures for the construction phase

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
Erosion and Sedimentation	• Avoid unnecessary removal of topsoil cover during construction. • Ensure stockpiles are located within the boundary of the site and are protected from erosion. • Stabilize cleared areas as soon as possible to prevent and control surface erosion. • Limit clearing of vegetation to those areas within the footprint of construction. • Minimise open areas and reduce the frequency of disturbance.
Fauna and flora	• The camel thorn tree *(Acacia Erioloba)* is protected under Namibia's Forest Act and is listed as a Protected Plant Species. The tree may not be harvested, damaged, or removed without consent and permitting from the relevant authorities. • Prevent contractors from collecting wood, veld food, etc. during the construction phase. • Limit clearing of vegetation to those areas within the footprint of construction site. • Disturbance of areas outside the designated working zone is not allowed. • No vegetation should be removed outside the designated project area.
Surface and Ground Water	• Use drip trays, linings or concrete floors when evidence of leaks are observed on construction vehicles or equipment. • Remove leaking vehicles from project location immediately. • No servicing and maintenance of vehicles and/or equipment should be conducted on site. • Any spillage of hazardous substances including fuel, oil, paint or cleaning solvent must be cleaned up immediately and disposed of at a designated disposal facility. • Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons into the nearby river. • Prevent illegal washing out of containers in nearby water courses. • Properly secure all temporary / portable toilets (if any) to the ground to prevent them toppling due to wind or any other cause. • Maintain toilets in a hygienic state and remove waste to a licensed disposal facility. • Ensure that no spillages occur when the toilets are cleaned or emptied. Prohibit urination on site, other than at designated facilities. • Contain contaminated water from batching operations and allow sediments to settle before being disposed of as waste water.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Stabilize cleared areas as soon as possible to prevent and control surface erosion. • Proper environmental awareness and remedial response training of operators must be conducted on a regular basis. • An emergency plan should be in place on how to deal with spillages and leakages during this phase.
Health, Safety and Security	• Provide suitable emergency and safety signage on site (manufactured of durable, weatherproof material). The signage signs should be placed at strategic locations to ensure awareness. • Demarcate and barricade any areas which may pose a safety risk (including hazardous substances, deep excavations etc). These notices must be worded in English, and local Damara and Otjiherero languages. • Enforce the use of appropriate Personal Protective Equipment (PPE) for the right task or duties at all times. • Prevent illegal access to the construction site by implementing appropriate security measures. These security measures must not pose a threat to surrounding communities. • Should a construction camp be necessary, it should be located in such a way that it does not pose a risk to the public. • Equipment housed on site must be placed in a way that does not encourage criminal activities. • For safety and security reasons it is recommended that the entire site (construction site and camp) be fenced-off and security personnel be employed to safeguard the premises and to avert criminal activates. • Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles or machinery not being used. • The contractor is advised to ensure that the team is equipped with first aid kits and that they are available on site, at all times. • Proper barricading and/or fencing around the work sites should be erected to avoid entrance of animals and/or unauthorized persons. • Adequate lighting within and around the construction location should be erected, when visibility becomes an issue.
Air quality	• All loose material should be kept on site for the shortest possible time. • Ensure measures are in place to minimise dust generated during the construction phase. • Use appropriate dust suppression measures when dust generation is unavoidable, e.g. dampening with water, particularly during prolonged periods of dry weather. • Avoid excavation, handling and transport of materials which may generate dust under high wind conditions.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Locate stockpiles of construction materials in sheltered areas where they are not exposed to erosive effects of the wind. • Ensure all vehicle, plant and equipment are in good condition. • Encourage reduction of engine idling.
Noise	• Inform neighbouring communities of construction activities to commence and provide for continuous communication between them and contractor. • Limit construction times to acceptable daylight hours. • Install technology such as silencers on construction machinery. • Do not allow the use of horns/hooters as a general communication tool, but use it only where necessary as a safety measure. • Provide protective equipment such as ear muffs, masks and ear plugs to workers.
Traffic	• Limit and control the number of access points to the site. • Ensure that road junctions have good sightlines. • Construction vehicles need to be in a road worthy condition and maintained throughout the construction phase. • Transport the materials in the least number of trips as possible. • Construction vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents. • Adhere to the speed limit. • Implement traffic control measures where necessary. • Minimise the movement of heavy vehicles during peak time.
Waste Management	• It is recommended that waste from the portable toilets be disposed of at a suitable waste disposal site, on a regular basis. Consultation with the local authority should be sought in this regard. • A sufficient number of waste bins should be placed around the site for the soft refuse. • A sufficient number of skip containers for the heavy waste and rubble should be provided for around the site. • The waste containers should be able to be closed to prevent birds and other animals from scavenging. • Solid waste will be collected and disposed of at an appropriate local landfill in Sesfontein, in consultation with the local authority.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
Hazardous Substances	• All chemicals and other hazardous substances (if any), must be stored and maintained in accordance with the Hazardous Substances Ordinance (No. 14 of 1974), with all relevant licences and permits to be obtained where applicable. • Given the potential harm to human health during handling and use of any of hazardous substances it is essential that all staff be trained with regards to the proper handling of these substances, as well as First Aid, in the case of spillage or intoxication. • Storage areas for all substances should be bunded and capable to hold 120% of the total volume of a given substance stored on site.
Heritage	• There are no known heritage areas envisaged in the area; however the contractor might come across archaeological features or objects that possess cultural values during construction activities. • If such remains or objects with cultural values (e.g. bones, weapons, ancient cutlery, graves etc) are uncovered at the project location or surrounding, it should be barricaded off, and • The relevant authorities (i.e. the local police and National Heritage Council of Namibia) should be contacted immediately.
Social	• Ensure locals enjoy priority in terms of job opportunities, to the extent possible, for skills that are available locally. • Ensure local procurement where commodities are available locally.

Table 9: Proposed mitigation measures for the operational phase

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
Environmental monitoring and Evaluation	• An Environmental Practitioner should monitor the implementation of the EMP, and recommend any changes to the document when necessary. • The Environmental Practitioner should inspect the site on a regular basis (preferably monthly or bi-monthly). • Biannual reports are to be submitted to the Environmental Commissioner.
Surface and Ground Water	• Proper containment mechanisms installed should be able to contain any leakages that might occur during the operation of the facility. • Proper monitoring of the oxidation pond levels must take place to eliminate overfilling. • Ensure frequent removal of waste sludge to prevent overflow. • Maintaining the installation in good operating order is of paramount importance in preventing ponds and equipment failure. • During maintenance operations, remove leaking vehicles and/or equipment from project location immediately. • The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently. • Remove all excess sedimentation, rubble and any other waste material present in waterways and dispose of in a suitable manner to ensure proper drainage runoff. • Develop and implement a groundwater monitoring system and programme, with the aim of monitoring possible contamination from the ponds. • Groundwater monitoring boreholes should be installed, sampled and analysed periodically.
Health, Safety and Security	• Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises. • Staff must be properly trained and made aware of safety and hazardous nature of the ponds and wastewater. • Firefighting equipment and first aid kit should be made available at the project site and serviced regularly. • Display contact details of emergency services in the area at strategic locations of the facility. • Demarcate and place signage on any areas which may pose a safety risk (including trenches, excavations etc). • The project personnel are advised to ensure that proper personal protective gear and first aid kits are available, at all times. • Staff should be properly trained in first aid and safety awareness.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Ensure no unauthorised entry to the ponds. Regularly inspect the perimeter security fence and repair immediately if there is any breach.
Visual and Sense of Place	• It is recommended that more 'green' technologies be implemented within the engineering designs and building materials of the development where possible in order to minimise the visual prominence of such a development within the more natural surrounding landscape.
Noise	• All maintenance vehicles, machinery and equipment must be regularly serviced to ensure minimal noise production. • The use of low frequency white noise or flashing lights should be considered instead of audible high frequency warning signals for moving maintenance vehicles. • Placement of noise producing equipment, e.g. compressors, in such a way that noise is directed away from receptors and / or are attenuated. • Where possible, use infrastructure to act as noise barriers to sensitive environments. • Provide hearing protectors as standard PPE for workers in situations with elevated noise levels. • Maintain the grievance mechanism to capture public perceptions and complaints with regard to noise impacts, track investigation actions and introduce corrective measures for continuous improvement.
Waste management	• Removed collected solids (sludge) from the ponds using appropriate equipment. • Ensure the use of proper equipment, containers and/or vehicles, and then dispose of the collected solids at an approved dumpsite. • Ensure all project maintenance personnel wear proper personal protective equipment. • Any waste generated must be contained and disposed of accordingly. • Waste bins / containers must be readily available at the project site at all times.
Social	• Employment creation should be targeted at the residence of Sesfontein, or nearby communities. • Maintenance contractors should be sourced from Sesfontein, or nearby communities. • Locally source services required during the operational process, such as securities, plant hire, etc.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
Air quality	• Ensure frequent removal of waste solids from the settlement ponds. • Introduce aeration methods to increase decomposition when odours become unbearable. • Regular air quality monitoring should be conducted at the site. • Keep a complaints register regarding bad odour / smells at the site; and act on it if becomes a regular complaint.
General	• Minimize the frequency of slow-growing grass or vegetation that would be problem for the anaerobic ponds. • Mosquitos breeding habits can be prevented by cutting, pruning and removing the vegetation that grows in the pond. • Removal of floating cum and macrophytes (e.g. Lemna spp.) from facultative and maturation ponds to maximize photosynthesis and surface re-aeration, and prevent fly and mosquito breeding. • Removal of mosquitos and flies can be achieved by spraying the scum on the surface with clean water. • Removal of any accumulated solids in the ponds inlets and outlets. • Rodents or other animals can cause damage to the embankments, so its necessary to repair them when they are located.

Table 10: Proposed mitigation measures for the decommissioning phase

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
Fauna and flora	• Disturbance of areas outside the designated working zone is not allowed. • No vegetation should be removed outside the designated project area. • Prevent contractors from collecting wood, veld food, etc. during the decommissioning phase.
Surface and Ground Water Impacts	• Use drip trays, linings or concrete floors when evidence of leaks are observed on construction vehicles or equipment. • Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons in close proximity to the nearby river. • Decommissioning activities should be planned outside of the rainy season in order to limit the risk of ground and surface water pollution. • Contaminated runoff from the project site should be prevented from entering the nearby river.

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Waste disposal from the site should be properly managed and taken to the local disposal site. • Should it be necessary to wash equipment used during decommissioning activities, this should be done at an area properly suited and prepared to receive and contain contaminated waters. • An emergency plan should be in place on how to deal with spillages and leakages during this phase. • Proper environmental awareness and remedial response training of the decommissioning team must be conducted on a regular basis.
Health, Safety and Security	• Ensure that all construction personnel are properly trained depending on the nature of their work. • Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles or machinery not being used. • Enforce the use of appropriate Personal Protective Equipment (PPE) for the right task or duties at all times. • Provide for first aid kit and properly trained personnel to apply first aid when necessary. • A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases and Covid-19. • Provide free condoms in the workplace throughout the decommissioning phase. • Facilitate access to antiretroviral medication for construction personnel. • Conform to the stipulated protocols related to Covid-19. • Restrict unauthorized access to the site and implement access control measures. • Clearly demarcate the decommissioning site boundaries along with signage of no unauthorized access. • Clearly demarcate dangerous areas and no go areas on site. • Adequate lighting within and around the decommissioned location should be erected, when visibility becomes an issue. • Staff and visitors to the site must be fully aware of all health and safety measures and emergency procedures. • The contractor/s must comply with all applicable occupational health and safety requirements.
Traffic	• Limit and control the number of access points to the site. • Construction vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents. • Construction vehicles need to be in a road worthy condition and maintained throughout the decommissioning phase. • Transport materials in the least number of trips as possible. • Adhere to the speed limit. • Implement traffic control measures where necessary. • Construction vehicles should not be allowed to obstruct the D3707 road, or any other prominent roads, hence no

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
	stopping in the road, wholly or partially, but rather pull off the road or park on the roadside.
Noise	• No amplified music should be allowed on site. • Inform neighbouring communities of decommissioning activities to commence and provide for continuous communication between them and contractor. • Limit decommissioning times to acceptable daylight hours. • Install technology such as silencers on machinery utilised during decommissioning activities. • Do not allow the use of horns/hooters as a general communication tool, but use it only where necessary as a safety measure. • Provide protective equipment such as masks, ear muffs and ear plugs to workers.
Air quality	• All loose material should be kept on site for the shortest possible time. • It is recommended that dust suppressants such as Dustex be applied to all the decommissioning clearing activities to minimise dust. • Construction vehicles to only use designated roads. • During high wind conditions the contractor must make the decision to cease works until the wind has calmed down. • Cover any stockpiles with plastic to minimise windblown dust. • Ensure construction vehicles are well maintained to prevent excessive emission of smoke.
Waste management	• A sufficient number of waste bins should be placed around the site for the soft refuse. • A sufficient number of skip containers for the heavy waste and rubble should be provided for around the site. • The waste containers should be able to be closed to prevent birds and other animals from scavenging. • Solid waste will be collected and disposed of at an appropriate local disposal site in Sesfontein, in consultation with the local authority.
Socio-economic	• Ensure locals enjoy priority in terms of job opportunities, to the extent possible, for skills that are available locally. • Ensure local procurement where commodities are available locally.

10 CONCLUSION AND RECOMMENDATIONS

In general, the proposed development would pose limited environmental and social risks. The site is generally suitable for the proposed stabilising or oxidation ponds. All environmental risks can be minimised and managed through implementing preventative measures and sound management systems. It is recommended that this information be made available to the community on a regular basis.

The Environmental Management Plan should be used as an on-site tool during all phases of the proposed development. Monitoring of surface and groundwater pollution should be conducted on a regular basis. Environmental audits should be carried out on a regular basis to ensure compliance of the EMP and environmental regulations of Namibia. Parties responsible for non-conformances of the EMP will be held responsible for any rehabilitation that may need to be undertaken.

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