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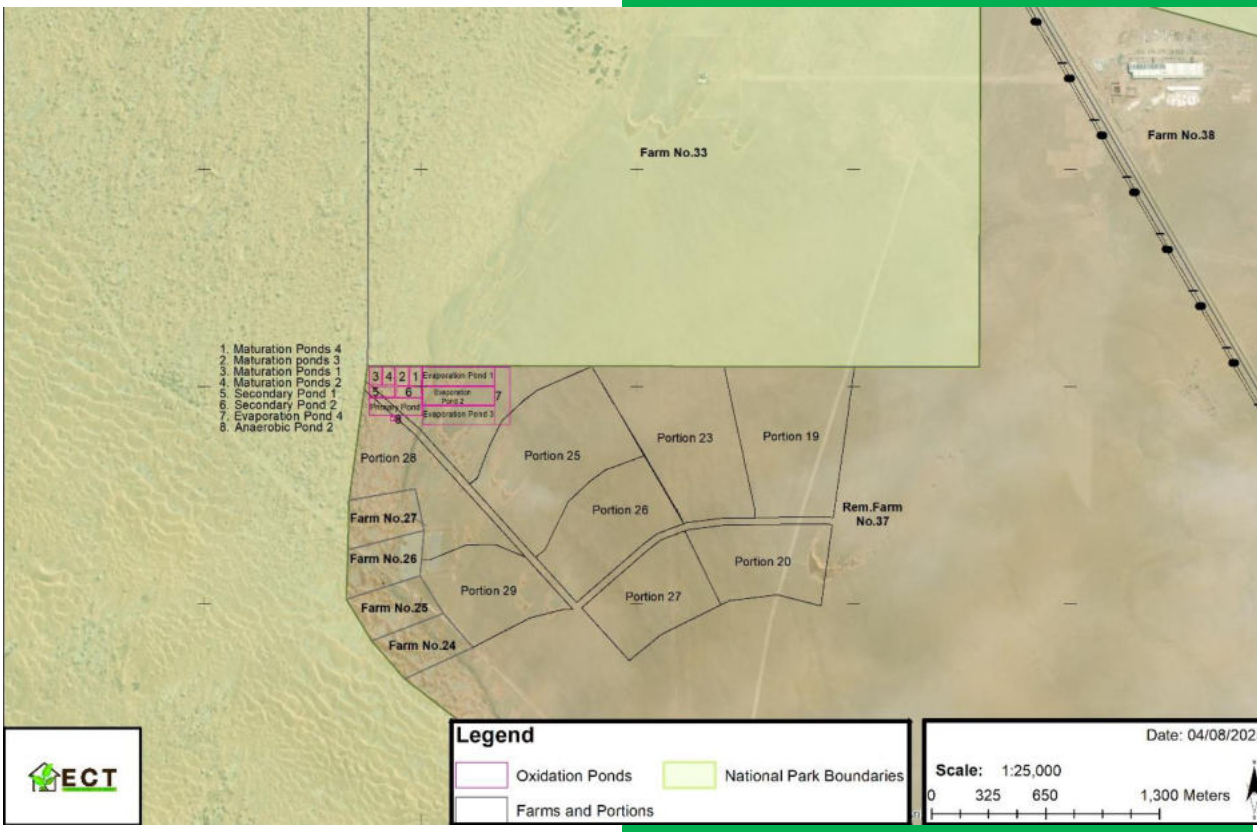


ENVIRONMENTAL SCOPING REPORT: Proposed Construction, Operation, Maintenance and Decommissioning of the Proposed Temporary Sewer Oxidation Ponds for Green Valley Proper and Green Valley Extensions 1-5 (Farm 37), Walvis Bay, Erongo Region

# PROPOSED CONSTRUCTION, OPERATION, MAINTENANCE AND DECOMMISSIONING OF THE PROPOSED TEMPORARY SEWER OXIDATION PONDS FOR GREEN VALLEY PROPER AND GREEN VALLEY EXTENSIONS 1-5 (FARM 37), WALVIS BAY, ERONGO REGION

## PROPONENT:

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## REPORT DATE:

11 August 2025

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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

The Municipality of Walvis Bay aims to provide bulk and basic services; and housing for the development of Green Valley Proper and Extensions 1 – 5 (Farm 37). A minimum of 1500 erven will be constructed. The services will be done under the Decentralised Build Together Program and/or any other housing schemes applicable to various community-based organisations for the decongestion, and relocation of Otweya fire victims and backyard squatters; and Narraville residents without water. Amongst the basic services to be provided is a wastewater treatment facility. Ultimately the Municipality intends to put up an advanced treatment plant. However, the growing population and urban expansion in the Green Valley extensions have necessitated an urgent sustainable and scalable wastewater management solution.

It is on this basis that the Municipality proposes the construction of temporary sewer oxidation ponds to serve Green Valley Proper and Green Valley Extensions 1 – 5, as an emergency and interim treatment solution.

Oxygen pond systems, although expensive to construct and require considerable areas for evaporation, are simple to operate and can be incorporated easily, quickly and cost-effectively in communities.

The Proponent (Municipality of Walvis Bay) has appointed Environam Consultants Trading (ECT) to undertake the 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 situated on the western side of Farm 37 at centre coordinates lat: -23.011315, lon: 14.554326. See Figures 1 and 2 below for the locality maps of Walvis Bay and the development site.


**Figure 1:** Locality map of Walvis Bay

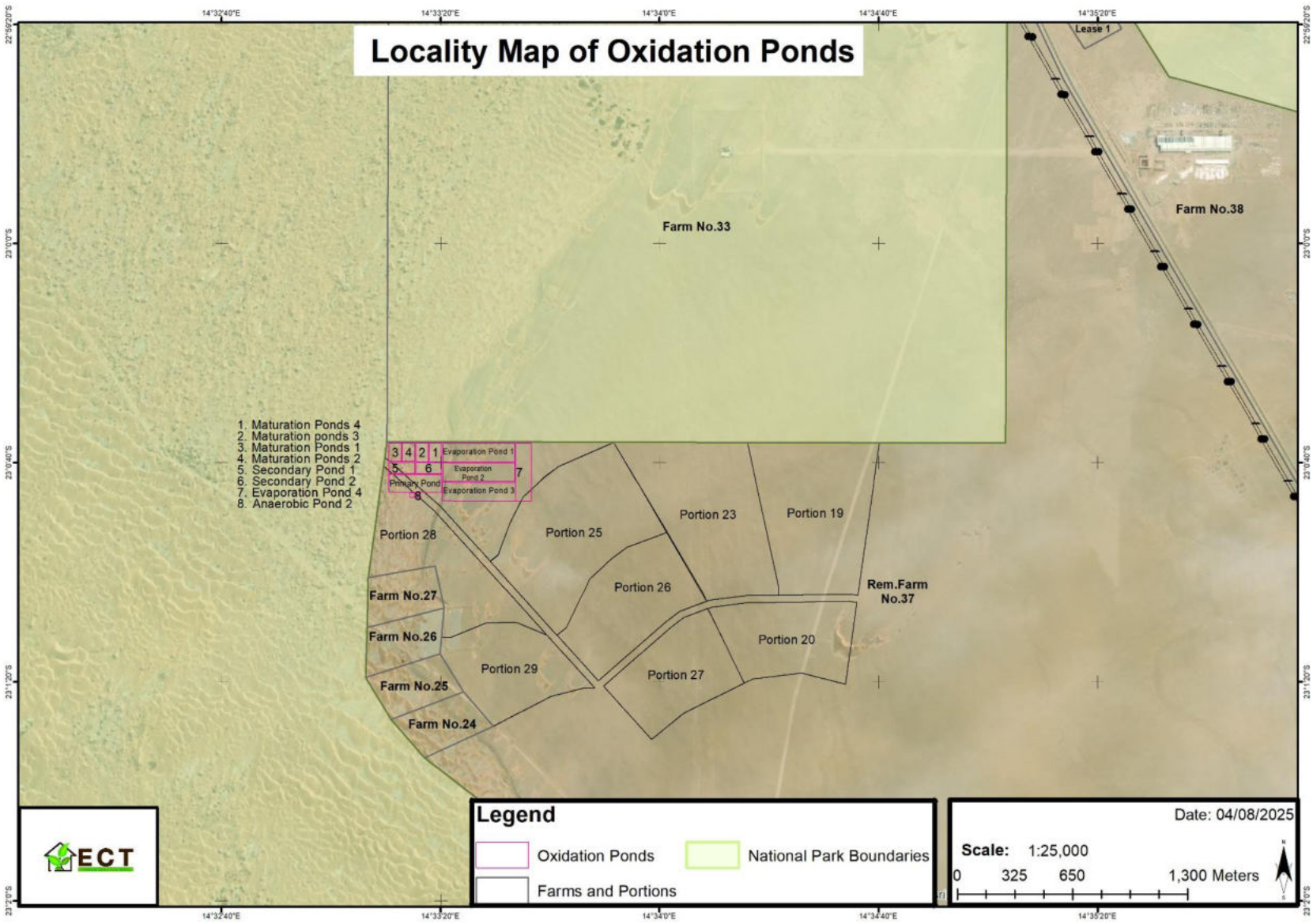



**Figure 2:** Locality map of the proposed development

## 1.3 Terms of Reference and Scope of Project

The Municipality of Walvis Bay has commissioned an Environmental Impact Assessment (EIA) for the proposed construction of temporary sewer oxidation ponds to serve Green Valley Proper and Green Valley Extensions 1 – 5.

Environam Consultants Trading was appointed to undertake the Environmental Impact Assessment of the proposed project. 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 oxidation ponds, including the associated infrastructure in Walvis Bay. 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 F** |
| 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 **Annexure C** |
| | (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 C** |
| | (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 C** |
| 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 A** |

## 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."<br><br>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.<br>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.<br>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.<br><br>**Activity 8.6** Construction of industrial and domestic wastewater treatment plants and related pipeline systems.<br><br>**Activity 8.9** Construction and other activities within a catchment area.<br><br>**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.<br><br>**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.<br><br>No final effluent will be produced by the system for discharge into the environment. All effluent will be evaporated. |
| 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. |
| Local Authorities Act No. 23 of 1992 | The Local Authorities Act prescribes the manner in which a town or municipality should be managed by the Town or Municipal Council. Sections 34-47 make provision for the aspects of water and sewerage. | The development has to comply with the provisions of the Local Authorities Act. |
| Regional Councils Act No. 22 of 1992 | The Regional Councils Act legislates the establishment of Regional Councils that are responsible for the planning and coordination of regional policies and development. The main objective of this Act is to initiate, supervise, manage and evaluate development at regional level. | The area is in the jurisdiction of Erongo Regional Council. All relevant laws must be abided to. |
| Labour Act no 11 of 2007 | Chapter 2 details the fundamental rights and protections.<br>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 | The construction of infrastructure will take place across publicly accessible premises. The proponent |

| LEGISLATION/POLICIES | RELEVANT PROVISIONS | RELEVANCE TO PROJECT |
|---|---|---|
| | 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. | 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. |
| 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.

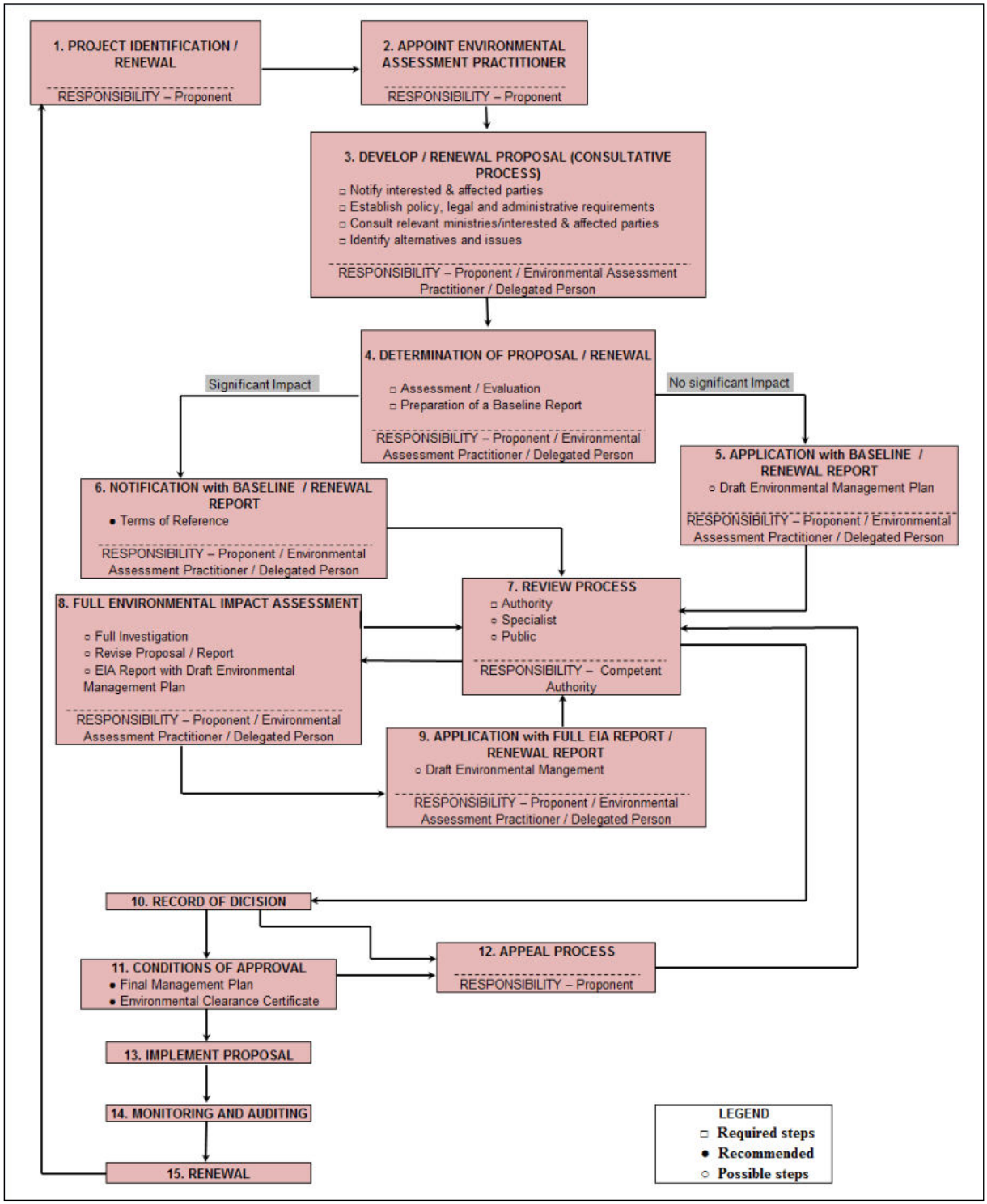



**Figure 3:** EA Flowchart for Namibia (Environmental Assessment Policy of 1995)

# 3. ENVIRONMENTAL BASELINE DESCRIPTION

## 3.1. Social Environment

### 3.1.1. Socio-Economic Context

The statistics shown in **Table 3** below are derived from the preliminary results of the 2023 Namibia Population and Housing Census (NSA, 2023):

Table 3: Statistics of Walvis Bay Urban Constituency

| WALVIS BAY URBAN CONSTITUENCY | |
|---|---|
| **Population** | 51,618 |
| **Females** | 26,212 |
| **Males** | 25,406 |
| **Population density** | 2730.8 persons per km$^2$ |
| **Average household size** | 3.1 |

### 3.1.2. Archaeological and Heritage Context

The discovery of Walvis Bay by Europeans dates back to the exploration of Bartholomeus Diaz in 1487, although indigenous peoples traversed the coast including Walvis Bay for thousands of years before this (Kinahan 2011). The British claimed Walvis Bay in the 1800s, centuries after Diaz claimed it. At this time, Walvis Bay mainly served as a harbour and trading post for seafarers. The harbour was frequented by fishing ships for its rich offshore resources. In the whaling season, which lasted almost two years, American whalers often surrounded the bay and harvested whale oil, exchanging European goods for livestock. Hence, this assessment takes into consideration potential sightings of whale bones from the precolonial era within the surveyed coastal area (Mowa, 2022). If any heritage or culturally significant artefacts are found during the construction, construction must stop and the chance find procedure must be implemented.

## 3.2. Bio-Physical Environment

### 3.2.1. Climate

Walvis Bay is considered to have a desert climate. During the year, there is virtually no rainfall. The Köppen-Geiger climate classification is BWk. In Walvis Bay, the average annual temperature is 16.6 °C. In a year, the average rainfall is 11 mm. The least amount of rainfall occurs in May. Most precipitation falls in March, with an average of 5 mm. The temperatures are highest on average in February, at around 19.2 °C. In September, the average temperature is 13.7 °C. It is the lowest average temperature of the whole year (Climate-data, 2024). See **Figure 4** for an average temperature graph and **Figure 5** for an average rainfall data for Walvis Bay.

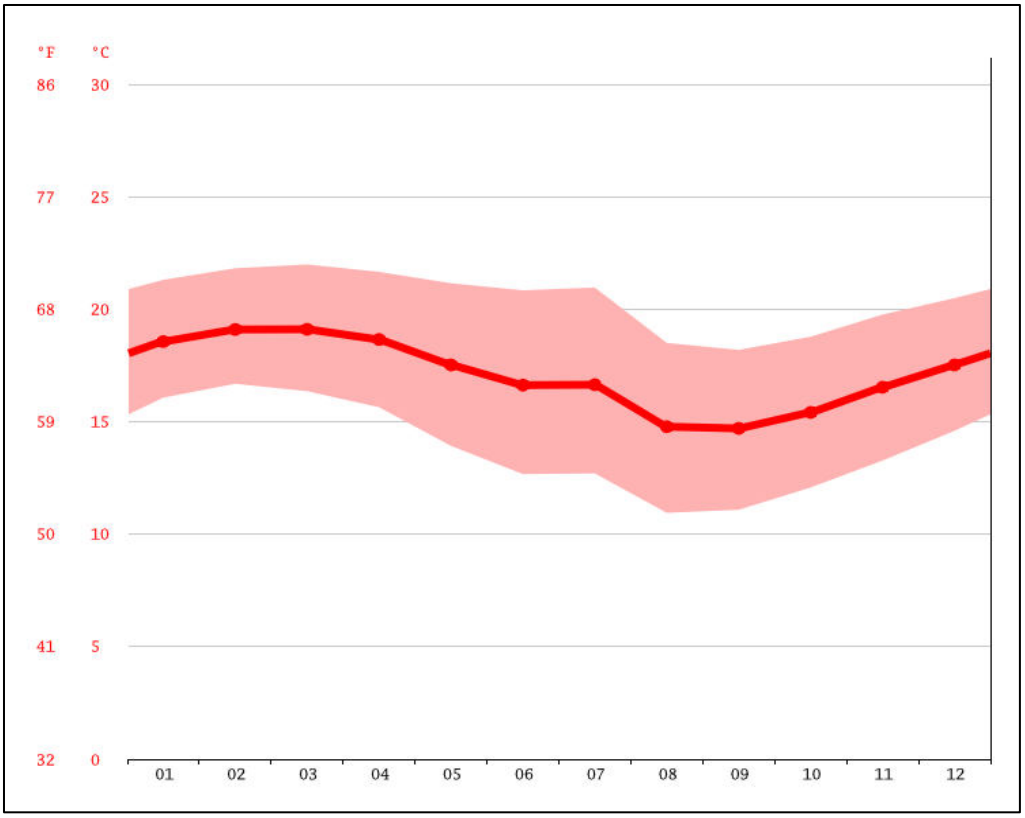



Figure 4: Average temperature graph for Walvis Bay (Climate-data, 2025a)

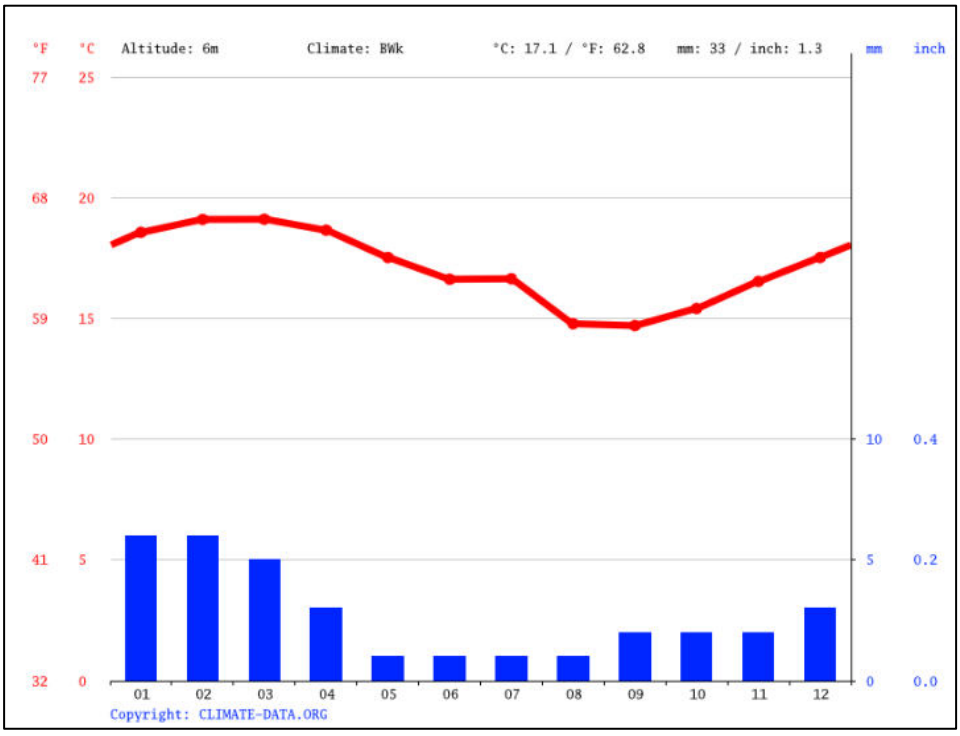
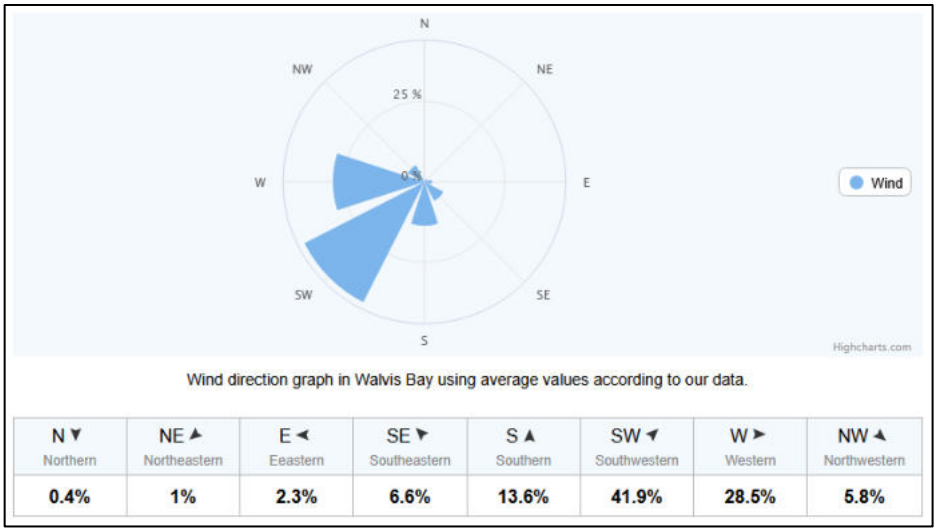



**Figure 5:** Average monthly rainfall graph for Walvis Bay (Climate-data, 2025b)




Wind direction graph in Walvis Bay using average values according to our data.

| N ▼ Northern | NE ▲ Northeastern | E ◄ Eeastern | SE ► Southeastern | S ▲ Southern | SW ◄ Southwestern | W ► Western | NW ▲ Northwestern |
|---|---|---|---|---|---|---|---|
| 0.4% | 1% | 2.3% | 6.6% | 13.6% | 41.9% | 28.5% | 5.8% |

Figure 6: Wind Rose for Walvis Bay (Worldweather, 2025)

### 3.2.2. Topography, Geology and Hydrogeology

The Erongo Region, stretches from the Central Plateau westwards across the Central-Western Plains and Escarpment to the Central Namibian coast roughly over a distance between 200 and 350 km, and Northwards from the Ugab River in the north to the Kuiseb river in the south over a distance of up to 300 km, covers an area of 63,586 km2, which is 7.7 per cent of Namibia's total area of about 823,680 km2. On the Western side it is flanked by the Atlantic Ocean. Erosion cutting eastwards into the higher ground led to the formation of the Central-Western Plains, leading to the formation of the catchment area of several major ephemeral rivers such as the Khan, Omaruru, Swakop and Ugab, the waters of these rivers reach the sea when in full flood during a good rainy season (ERC, 2024).

The Southern boundary of the Kuiseb River distinctively divides the gravel plains to the North and the large sea of dunes to the South, however this river does not reach the sea during times of flood but the water instead disappears into the sand at the Kuiseb Delta, from which the town of Walvis Bay extracts underground water for its supplies.

In the Erongo Region, the land rises steadily from sea level to about 1,000 m across the breadth of the Namib. The Namib land surface is mostly flat to undulating gravel plains, punctuated with occasional ridges and isolated 'inselberg' hills and mountains. The eastern edge of the Namib is marked by the base of the escarpment in the southern part of the region. In the northern part, the escarpment is mostly absent and there is a gradual rise in altitude to over 1,500 m (SAIEA, 2011). The proposed site on which the development will be undertaken can be described as relatively flat.

The desert geology consists of sand seas near the coast, while further inland there is an occurrence of gravel plains and scattered mountain outcrops. Some of the highest sand dunes, up to around 300 m high, can be found here (ERC, 2024). Water for domestic and industrial use in Walvis Bay comes mainly from the Kuiseb aquifer in the lower Kuiseb River. These aquifers

are recharged by runoff from the central highlands in central Namibia where rainfall is more reliable and more significant than at the coast (Nacoma, 2010).

### 3.2.3. Terrestrial Ecology

The central coastal region, and the Swakopmund/Walvis Bay area in particular, is regarded as "relatively low" in overall (all terrestrial species) diversity. Overall terrestrial endemism in the area on the other hand is "moderate to high". The overall diversity and abundance of large herbivorous mammals (big game) is viewed as "low to medium" with 1-2 species while overall diversity of large carnivorous mammals (large predators) is determined at 4 species with brown hyena being the most important with "medium" densities expected in the area (Cunningham, 2024).

Some endemic coastal invertebrates and reptiles inhabit a narrow belt of dune hummocks within the Namibian coastal strip. This zone also supports marine life and surf zone species. Damara terns, which are near endemic to Namibia and near threatened, are found in concentrated numbers along the coastline stretching from south of Walvis Bay to about the Ugab river, where they nest on gravel plains within 3 – 5 km of the shore and forage over the shallow Bay water, over reefs or in salt ponds (Nacoma, 2010). There are artificially high densities of jackals and gulls due to the increase in numbers of seal colonies and line fishermen which apply heavy predator pressure on the nesting terns. The central Namib coast is also home to the two vulnerable flamingo species, the greater and the lesser (Nacoma, 2010).

The overall plant diversity (all species) in the general Walvis Bay/Swakopmund area is estimated as <50 species. These estimates are limited to "higher" plants as information regarding "lower" plants is sparse. It is estimated that over 400 species – 10% of the flora of Namibia – occur in the central Namib and although it has not been identified as a centre of endemism, it is dominated by endemics such as *Arthraerua leubnitziae*. The greatest variants affecting the diversity of plants are habitat and climate with the highest plant diversity generally associated with high rainfall areas (Cunningham, 2024).

The bare gravel plains within an area of about 40 km of the coast, receive frequent fog moisture providing an ideal home to rich growths of lichens, many of which are endemic to Namibia. Lichen helps to bind the soil rendering it less vulnerable to wind erosion, they do this by forming a "carpet" on the surface pavement of small stones and gravel, or by creating a surface crust on the soil (Nacoma, 2010).

## 3.3. Surrounding Land Use

The Oxidation Ponds would be located approximately 3 km west of the D1983 on Farm 37, with Farm 38 to be found eastwards. The site measures a land size of approximately 21.25Ha. The area is generally undeveloped but a number of plots have been earmarked for housing developments where a number of them have already been allocated to saving schemes. There

are two prominent informal settlements that are occupied by relocated communities as well as former backyard squatters to be found east of the proposed projects site. The government has already started with formal housing developments just off the D1983 east of the oxidation ponds location. The oxidation ponds will enable this communities to have access to wastewater treatment facilities. The Walvis Bay water reservoirs and wind turbine can also be found approximately 3km southwest from the proposed project site. See Figure 7 for pictures of the general area.

Figure 7: General area

### 3.4. Physical Environment

The infrastructure needs of the proposed project include the following:

- Anaerobic Ponds
- Primary Pond
- Secondary Ponds
- Maturation Ponds

## 4. PROJECT DESCRIPTION

### 4.1. Project Activities

The Municipality of Walvis Bay aims to provide bulk and basic services; and housing for the development of Green Valley Proper and Extensions 1 – 5 (Farm 37). 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 10,000 people. The complete pond system for sewage treatment at Walvis Bay consists of the following setup.

### 4.2. Design Parameters

In accordance with the design principles in DWA, the following design recommendations were applied:

| | | |
|---|---|---|
| BOD contribution | 50.00 | g/c/d |
| COD contribution | 110.00 | g/c/d |
| COD contribution | 1100.00 | kg/d |
| Hydraulic Loading | 125.00 | l/c/d |
| Population | 10000 | c |
| Anaerobic Pond Depth | 3.00 | m |
| Primary Pond Depth | 1.50 | m |
| Secondary Pond 1 Depth | 1.50 | m |
| Secondary Pond 2 Depth | 1.30 | m |
| Maturation Ponds Depth | 1.20 | m |

### 4.3. Pond Designs

Applying the formulae recommended in DWA, the results are summarized below:

#### 4.3.1 Anaerobic pond

| Anaerobic Pond | | |
|---|---|---|
| Vol. Organic Loading (VOLR) | 150.00 | g/m3.d |
| Influent BOD Concentration | 400.00 | mg/l |
| Design Flow | 125.00 | m3/d |
| Daily organic Load (DOL) | 500,000.00 | g/day |
| Pond Volume | 3,333.33 | m3 |
| Pond Area | 1,111.11 | m2 |

| Anaerobic Pond | | |
|---|---|---|
| Retention time | 2.67 | days |

### 4.3.2 Primary Pond

| Primary Pond | | |
|---|---|---|
| Surface Loading | 150.00 | kg/ha/day |
| Pond Area | 27,500.00 | m2 |
| Pond Volume | 41,250.00 | m3 |

### 4.3.3 Secondary Pond 1

| Secondary Pond 1 | | |
|---|---|---|
| Retention Time | 10 | days |
| Pond Area | 8,333.33 | m2 |
| Pond Volume | 12,500.00 | m3 |

### 4.3.4 Secondary Pond 2

| Secondary Pond 2 | | |
|---|---|---|
| Retention Time | 5 | days |
| Pond Area | 4,166.67 | m2 |
| Pond Volume | 6,250.00 | m3 |

### 4.3.5 Maturation Ponds

| Maturation Ponds | | |
|---|---|---|
| Retention Time | 6.50 | days |
| Pond Area | 6,770.83 | m2 |

| Maturation Ponds | | |
|---|---|---|
| Pond Volume | 8,125.00 | m3 |

### 4.3.6 Evaporation Pond

| Evaporation Pond | | |
|---|---|---|
| Q (Total Volumetric Daily Inflow) | 714.29 | m3/day |
| E (Annual Evaporation Rate) | 2,600.00 | mm/a |
| P (Annual Precipitation Rate) | 13.00 | mm/a |
| Nett E = | 1,807.00 | mm/a |
| Aev = 365.Q/(Nett E/1000) | 144,280.18 | m2 |

### 4.3.7 Summary of Pond Dimensions

| **Pond** | **Depth (m)** | **Width (m)** | **Length (m)** | **Pond area ($m^2$)** | **Minimum Area ($m^2$)** | **Volume ($m^3$)** |
|---|---|---|---|---|---|---|
| | | | | | | |
| Anaerobic Pond | 3 | 50 | 25 | 1,250.00 | 1,111.11 | 3,750.00 |
| Primary Pond | 1.5 | 100 | 275 | 27,500.00 | 27,500.00 | 41,250.00 |
| Secondary Pond 1 | 1.5 | 135 | 62 | 8,370.00 | 8,333.33 | 12,555.00 |
| Secondary Pond 2 | 1.3 | 135 | 62 | 8,370.00 | 4,166.67 | 10,881.00 |
| Maturation Pond 1 | 1.2 | 65 | 105 | 6,825.00 | 6,770.83 | 8,190.00 |

| Pond | Depth (m) | Width (m) | Length (m) | Pond area ($m^2$) | Minimum Area ($m^2$) | Volume ($m^3$) |
|---|---|---|---|---|---|---|
| Maturation Pond 2 | 1.2 | 65 | 105 | 6,825.00 | 6,770.83 | 8,190.00 |
| Maturation Pond 3 | 1.2 | 65 | 105 | 6,825.00 | 6,770.83 | 8,190.00 |
| Maturation Pond 4 | 1.2 | 65 | 105 | 6,825.00 | 6,770.83 | 8,190.00 |
| Evaporation Pond 1 | 0.8 | 375 | 105 | 39,375.00 | 36,070.05 | 31,500.00 |
| Evaporation Pond 2 | 0.8 | 375 | 105 | 39,375.00 | 36,070.05 | 31,500.00 |
| Evaporation Pond 3 | 0.8 | 375 | 105 | 39,375.00 | 36,070.05 | 31,500.00 |
| Evaporation Pond 4 | 0.8 | 82 | 325 | 26,650.00 | 36,070.05 | 21,320.00 |

### 4.3.8 The process flow

- Inlet Works flows into Anaerobic Ponds
- Anaerobic ponds flow 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.

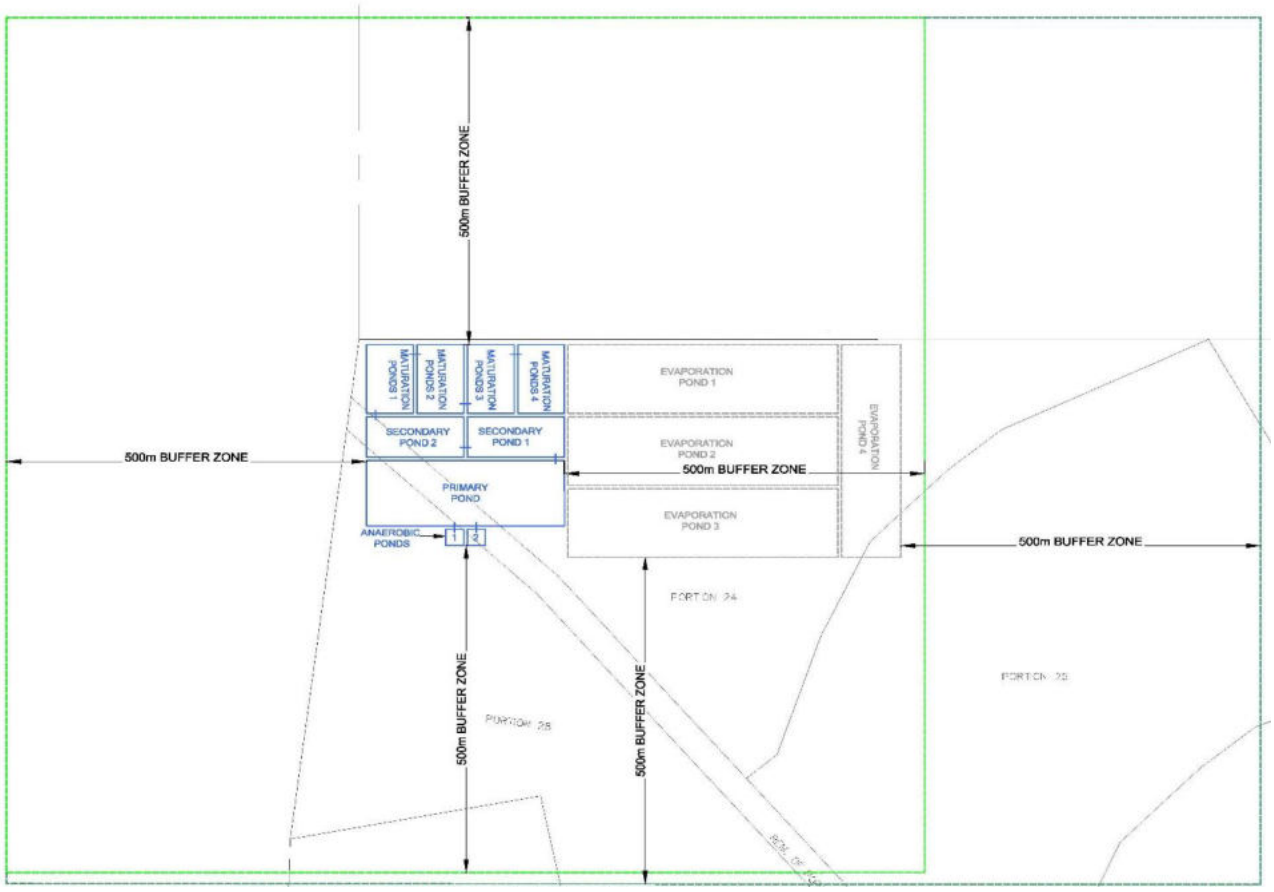




**Figure 8:** Layout of development site

### 4.2. Decision Factors

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

- DWAF Code of Practice.
- Walvis Bay development plan.
- Character of the general area.
- Comparative advantage and strategic value of Walvis Bay 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 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. 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 4 below for the activities undertaken as part of the statutory public participation process.

**Table 4:** Table of Public Consultation Activities

| ACTIVITY | REMARKS |
|---|---|
| Placement of site notices/posters in Walvis Bay | See **Annexure C** |
| Placing advertisements in two newspapers for two consecutive weeks, namely The Windhoek Observer and Confidente | See **Annexure C** |
| Written notice to Interested and Affected Parties via Email | See **Annexure C** |
| Public meeting in Walvis Bay | 09 August 2025 |

A public meeting was held on 09 August 2025, at Farm 37 in Walvis Bay, Erongo Region. The public meeting was attended by over 100 local residents, who provided input to the proposed development. Background information was provided to all interested and affected parties in attendance, and those that requested the information. The comment period of the public participation process commenced on 01 August 2025 and ended on 14 August 2025.

A summary of the issues and comments raised during the initial consultation phase is found below (See i). Minutes of the meeting are attached in Annexure C of this report.

**i. Summary and Issues from the Interested and Affected Parties**

1. Who will fund the development?
2. Commencement and duration of the project.
3. Responsibility for sewer connections
4. Scope of the project.

### 5.2. Public Consultation Process Phase 2

The second phase of the Public Consultation Process involved the lodging of the Draft Environmental Scoping Report (DESR) to all registered I&AP for comment. Registered and potential I&APs were informed of the availability of the DESR for public comment. No further comments and inputs were received from the I&APs during this phase.

## 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 5.

**Table 5:** Impact Assessment Criteria

| CRITERIA | CATEGORY |
|---|---|
| **Impact** | Description of the expected impact |
| **Nature**<br>Describe type of effect | **Positive**: The activity will have a social / economical / environmental benefit.<br>**Neutral**: The activity will have no effect<br>**Negative**: The activity will have a social / economical / environmental harmful effect |
| **Extent**<br>Describe the scale of the impact | **Site Specific:** Expanding only as far as the activity itself (onsite)<br>**Small:** restricted to the site's immediate environment within 1 km of the site (limited)<br>**Medium:** Within 5 km of the site (local)<br>**Large:** Beyond 5 km of the site (regional) |
| **Duration**<br>Predicts the lifetime of the impact. | **Temporary:** < 1 year (not including construction)<br>**Short-term:** 1 – 5 years<br>**Medium term:** 5 – 15 years<br>**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)<br>**Permanent:** Impact will be where mitigation or moderation by natural course or by human interference will not occur in a particular means or in a particular time period that the impact can be considered temporary |
| **Intensity**<br>Describe the magnitude (scale/size) of the Impact | **Zero:** Social and/or natural functions and/ or processes remain unaltered<br>**Very low:** Affects the environment in such a way that natural and/or social functions/processes are not affected<br>**Low:** Natural and/or social functions/processes are slightly altered<br>**Medium:** Natural and/or social functions/processes are notably altered in a modified way<br>**High:** Natural and/or social functions/processes are severely altered and may temporarily or permanently cease |
| **Probability of occurrence**<br>Describe the probability of the Impact <u>actually</u> occurring | **Improbable:** Not at all likely<br>**Probable:** Distinctive possibility<br>**Highly probable:** Most likely to happen<br>**Definite:** Impact will occur regardless of any prevention measures |
| **Degree of Confidence in predictions**<br>State the degree of confidence in predictions based on availability of information and specialist knowledge | **Unsure/Low:** Little confidence regarding information available (<40%)<br>**Probable/Med:** Moderate confidence regarding information available (40-80%)<br>**Definite/High:** Great confidence regarding information available (>80%) |
| **Significance Rating**<br>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<br>**Very low:** Impacts will be site specific and temporary with no mitigation necessary. |

| CRITERIA | CATEGORY |
|---|---|
| | **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<br>**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.<br>**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 9) 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.

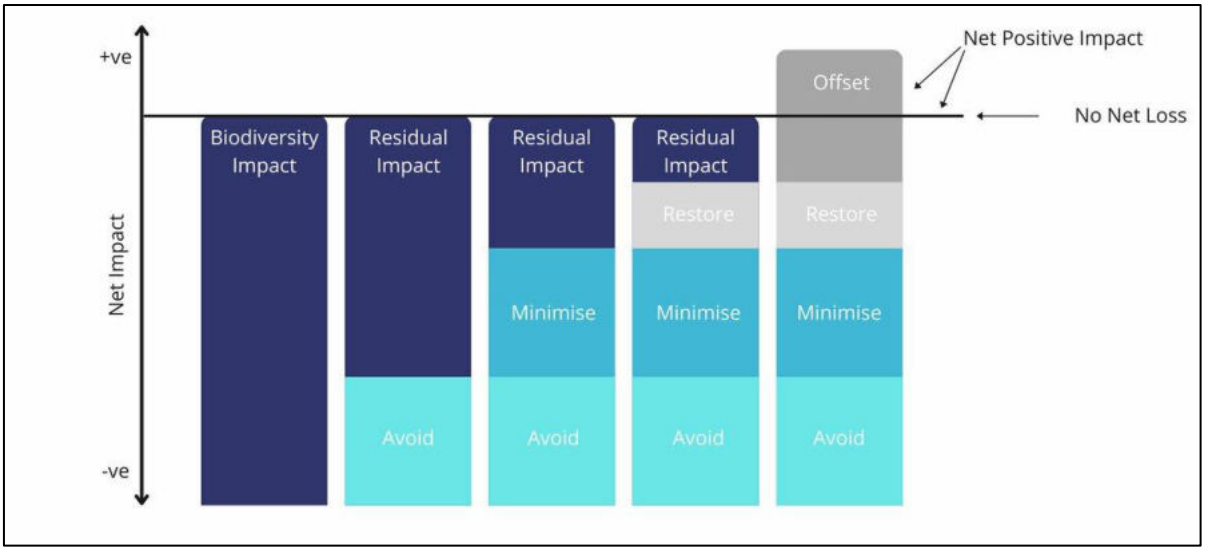



**Figure 9:** Mitigation Hierarchy

### 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; 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 legislation. 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. 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.

### 8.1.3. 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.

### 8.1.4. 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 HIV/AIDS 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

There are no protected or red data listed plants or animal species found on the site however care should be taken that no risk is posed to the adjacent marine ecosystem, including seabirds, that may be found in the area during the construction phase.

### 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.

### 8.3.1 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 Walvis Bay 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.

### 8.3.1 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 D1983 road in the area (approximately 4 km), traffic on this road 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.

### 8.3.1 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.

#### 8.3.1 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 D1983 road, if not well managed.

#### 8.3.1 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 Walvis Bay, as approved by the local authority.

#### 8.3.1 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.

#### 8.3.1 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 town. This can boost the local economic development of the town 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 6 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 6:** 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 Odour

Oxidation pond systems rely on natural processes involving bacteria, algae, and sunlight to break down organic matter. One of the most significant drawbacks of oxidation ponds is the potential for odour emissions. Foul smells can lead to public complaints, regulatory scrutiny, and health concerns. Causes of foul smell can arise from:

a) Anaerobic Decomposition

Under low-oxygen (anaerobic) conditions, microorganisms break down organic matter incompletely, producing malodorous gases such as Hydrogen sulfide, Ammonia, Volatile fatty acids (VFAs) and mercaptans.

b) Algal Activity and Decay

Algae play a crucial role in oxidation ponds by producing oxygen through photosynthesis. However, excessive algal blooms can lead to odour problems when the algae die and decompose anaerobically, releasing Geosmin and 2-methylisoborneol (MIB) – These compounds produce an earthy or musty smell, often associated with stagnant water.

c) Overloading and Poor Maintenance

When oxidation ponds receive more organic waste than they can handle, the system becomes overloaded, leading to:

- Increased sludge accumulation, which promotes anaerobic conditions.
- Reduced treatment efficiency, resulting in stronger odours.

d) Seasonal and Environmental Factors

- Temperature: Higher temperatures accelerate microbial activity, increasing odour production.
- Stagnation: Lack of wind or water movement allows odorous gases to accumulate.

The primary causes of odour emissions can be addressed through proper aeration, pond design, sludge management, and chemical treatments. Implementing these mitigation strategies ensures that oxidation ponds remain environmentally sustainable while minimizing their impact on surrounding communities.

### 8.3.4 Health, Safety and Security Impacts

Stagnant water in poorly maintained ponds can breed mosquitoes (malaria), flies, and other disease vectors. Anaerobic conditions can produce foul-smelling gases (e.g., hydrogen sulfide, ammonia, methane), causing respiratory irritation and discomfort for nearby communities. If improperly designed or maintained, ponds may release inadequately treated effluent, contaminating water sources and increasing risks of waterborne diseases (cholera, dysentery, hepatitis). Excessive nutrient loading can cause algal blooms, some of which release harmful toxins (e.g., cyanobacteria) affecting human and animal health. Anaerobic decomposition releases hazardous gases (e.g., methane, which can be flammable; hydrogen sulfide, which is toxic at high concentrations).

Open ponds pose drowning hazards, especially for children and animals, if not properly fenced or guarded. Slippery banks and unstable surfaces near ponds can lead to accidents. Another 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.

Oxidation ponds are beneficial for wastewater treatment but require careful management to mitigate health, safety, and security risks. Proper design, maintenance, and community engagement are essential to ensure they function safely and effectively.

### 8.3.5 Waste Management

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

### 8.3.6 Social Impact

The development will have a positive impact on the socio-economic status of Walvis Bay in general and the Farm 37 residents in particular. This is due to the job opportunities that will be created both directly related to the operations and indirectly from supporting services. During the operation phase a number of jobs will be created. 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 the Green Valley extensions.

### 8.3.5 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 7**. The **Tables 8 – 11** provide a summary of the mitigation measures proposed for the impacts.

**Table 7:** 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. Public Consultation | | | | X | |
| 3. Environmental Awareness | | | | X | |
| 4. Health and Safety Aspects | | | | X | |
| **Construction Phase** | | | | | |
| 5. Fauna and Flora | X | | | | |
| 6. Surface and Ground Water Impacts | X | | | | |
| 7. Health, Safety and Security Impacts | X | | | | |
| 8. Air Quality | X | | | | |
| 9. Noise Impacts | X | | | | |
| 10. Traffic Impacts | X | | | | |
| 11. Solid Waste Management | X | | | | |
| 12. Storage and Utilisation of Hazardous Substances | X | | | | |
| 13. Social Impacts | X | | | | |
| 14. Fauna and Flora | X | | | | |
| **Operational Phase** | | | | | |
| 15. Environmental Monitoring and Evaluation | | | | X | |

| | | | | | |
|---|---|---|---|---|---|
| 16. Noise Impacts | X | | | | |
| 17. Odour | | 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 8:** 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.<br>• Develop and implement an efficient maintenance plan for the development.<br>• No dumping of waste products of any kind in or in close proximity to any water bodies.<br>• Ensure that surface water accumulating on-site are channelled away from site, though proper drainage systems.<br>• Wastewater should not be discharged directly into the environment.<br>• The oxidation pond walls and floors must be properly lined with impenetrable material, to ensure no seepage to the ground.<br>• Frequent monitoring to establish the level of wastewater in the ponds.<br>• Ensure frequent removal of sludge to prevent overflow.<br>• Removal and disposal of waste sludge from the oxidation ponds should be properly managed. |
| Fauna and Flora | • Explore the planting of indigenous trees around the development.<br>• 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.<br>• Adhere to the provisions of wastewater management, water resources conservation and protection guidelines in terms of The Water Resource Management Act.<br>• Adhere to the design guidelines of the Department of Water Affairs.<br>• Implement robust containment measures for wastewater to prevent leaks from the oxidation ponds.<br>• Install barriers, fencing or protective structures around the project site to prevent unauthorized access and minimize the risk of accidents.<br>• Ensure professional design and construction of the infrastructure from qualified and registered engineers. |
| Traffic | • Implement traffic control measures (where necessary).<br>• 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 9:** Proposed mitigation measures for the construction phase

| CONSTRUCTION PHASE IMPACTS | |
|---|---|
| **Impact** | **Mitigation Measures** |
| Erosion and Sedimentation | • Avoid unnecessary removal of topsoil cover during construction.<br>• Ensure stockpiles are located within the boundary of the site and are protected from erosion.<br>• Stabilize cleared areas as soon as possible to prevent and control surface erosion.<br>• Limit clearing of vegetation to those areas within the footprint of construction.<br>• Minimise open areas and reduce the frequency of disturbance. |
| Fauna and flora | • Prevent contractors from collecting wood, veld food, etc. during the construction phase.<br>• Disturbance of areas outside the designated working zone is not allowed.<br>• 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 is observed on construction vehicles or equipment.<br>• Remove leaking vehicles from project location immediately.<br>• No servicing and maintenance of vehicles and/or equipment should be conducted on site.<br>• 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.<br>• Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons into water sources.<br>• Properly secure all temporary / portable toilets (if any) to the ground to prevent them toppling due to wind or any other cause.<br>• Maintain toilets in a hygienic state and remove waste to a licensed disposal facility.<br>• Ensure that no spillages occur when the toilets are cleaned or emptied.<br>• Prohibit urination on site, other than at designated facilities.<br>• Contain contaminated water from batching operations and allow sediments to settle before being disposed of as waste water.<br>• Stabilize cleared areas as soon as possible to prevent and control surface erosion.<br>• Proper environmental awareness and remedial response training of operators must be conducted on a regular basis.<br>• An emergency plan should be in place on how to deal with spillages and leakages during this phase. |

| CONSTRUCTION PHASE IMPACTS | |
|---|---|
| **Impact** | **Mitigation Measures** |
| 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.<br>• 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 languages.<br>• Enforce the use of appropriate Personal Protective Equipment (PPE) for the right task or duties at all times.<br>• Prevent illegal access to the construction site by implementing appropriate security measures. These security measures must not pose a threat to surrounding communities.<br>• Should a construction camp be necessary, it should be located in such a way that it does not pose a risk to the public.<br>• Equipment housed on site must be placed in a way that does not encourage criminal activities.<br>• 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.<br>• Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles or machinery not being used.<br>• 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.<br>• Proper barricading and/or fencing around the work sites should be erected to avoid entrance of animals and/or unauthorized persons.<br>• 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.<br>• Ensure measures are in place to minimise dust generated during the construction phase.<br>• Use appropriate dust suppression measures when dust generation is unavoidable, e.g. dampening with water, particularly during prolonged periods of dry weather.<br>• Avoid excavation, handling and transport of materials which may generate dust under high wind conditions.<br>• Locate stockpiles of construction materials in sheltered areas where they are not exposed to erosive effects of the wind.<br>• Ensure all vehicle, plant and equipment are in good condition.<br>• Encourage reduction of engine idling. |

| CONSTRUCTION PHASE IMPACTS | |
|---|---|
| **Impact** | **Mitigation Measures** |
| Noise | • Inform neighbouring communities of construction activities to commence and provide for continuous communication between them and contractor.<br>• Limit construction times to acceptable daylight hours.<br>• Install technology such as silencers on construction machinery.<br>• Do not allow the use of horns/hooters as a general communication tool, but use it only where necessary as a safety measure.<br>• 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.<br>• Ensure that road junctions have good sightlines.<br>• Construction vehicles need to be in a road worthy condition and maintained throughout the construction phase.<br>• Transport the materials in the least number of trips as possible.<br>• Construction vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents.<br>• Adhere to the speed limit.<br>• Implement traffic control measures where necessary.<br>• 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.<br>• A sufficient number of waste bins should be placed around the site for the soft refuse.<br>• A sufficient number of skip containers for the heavy waste and rubble should be provided for around the site.<br>• The waste containers should be able to be closed to prevent birds and other animals from scavenging.<br>• Solid waste will be collected and disposed of at an appropriate local landfill in Walvis Bay, in consultation with the local authority. |
| 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.<br>• 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. |

| CONSTRUCTION PHASE IMPACTS | |
|---|---|
| **Impact** | **Mitigation Measures** |
| | • 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 sites envisaged in the area; however the contractor might come across archaeological features or objects that possess cultural values during construction activities.<br>• 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<br>• 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.<br>• Ensure local procurement where commodities are available locally. |

**Table 10:** 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.<br>• The Environmental Practitioner should inspect the site on a regular basis (preferably monthly or bi-monthly).<br>• Biannual reports are to be submitted to the Environmental Commissioner. |
| Surface and Ground Water | • Use impermeable materials to line the ponds to prevent groundwater contamination. Proper containment mechanisms installed should be able to contain any leakages that might occur during the operation of the facility.<br>• Any leaks of the oxidation ponds and sewer pipes should be fixed immediately and areas rehabilitated as needed. |

| OPERATIONAL PHASE IMPACTS | |
|---|---|
| **Impact** | **Mitigation Measures** |
| | • Ensure that ponds are designed and operated to effectively remove pollutants and prevent overflows and spills.<br>• Proper monitoring of the oxidation pond levels must take place to eliminate overfilling.<br>• Regularly remove sludge from the ponds to prevent the accumulation of pollutants.<br>• Maintaining the installation in good operating order is of paramount importance in preventing ponds and equipment failure. The condition of the sewage reticulation systems must be checked regularly and repaired to prevent leakages.<br>• During maintenance operations, remove leaking vehicles and/or equipment from project location immediately.<br>• The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently.<br>• 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.<br>• Develop and implement a groundwater monitoring system and programme, with the aim of monitoring possible contamination from the ponds.<br>• 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.<br>• Staff must be properly trained and made aware of safety and hazardous nature of the ponds and wastewater.<br>• Firefighting equipment and first aid kit should be made available at the project site and serviced regularly.<br>• Display contact details of emergency services in the area at strategic locations of the facility.<br>• Demarcate and place signage on any areas which may pose a safety risk (including trenches, excavations etc).<br>• The project personnel are advised to ensure that proper personal protective gear and first aid kits are available, at all times.<br>• Staff should be properly trained in first aid and safety awareness.<br>• Ensure no unauthorised entry to the ponds.<br>• Regularly inspect the perimeter security fence and repair immediately if there is any breach. |

| OPERATIONAL PHASE IMPACTS | |
|---|---|
| **Impact** | **Mitigation Measures** |
| 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.<br>• The use of low frequency white noise or flashing lights should be considered instead of audible high frequency warning signals for moving maintenance vehicles.<br>• Placement of noise producing equipment, e.g. compressors, in such a way that noise is directed away from receptors and / or are attenuated.<br>• Where possible, use infrastructure to act as noise barriers to sensitive environments.<br>• Provide hearing protectors as standard PPE for workers in situations with elevated noise levels.<br>• 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. |
| Odour | • Mechanical aerators or diffused air systems can maintain dissolved oxygen levels, preventing anaerobic conditions.<br>• Surface aerators enhance oxygen transfer while promoting mixing.<br>• Constructing ponds in series (primary, secondary, and maturation ponds) improves treatment efficiency.<br>• Ensuring appropriate depth and hydraulic retention time (HRT) prevents stagnation.<br>• Regular desludging prevents excessive buildup of anaerobic sediments.<br>• Dredging or sludge removal reduces sulfide and methane production.<br>• Nitrate addition suppresses sulfate-reducing bacteria, reducing $H_2S$ formation.<br>• Bioaugmentation introduces specialized bacteria to enhance organic breakdown.<br>• Odour-neutralizing agents (e.g., enzymatic sprays) can mask or break down foul smells.<br>• Vegetative buffers (trees, shrubs) help disperse odours and absorb volatile compounds.<br>• Floating covers (straw, geomembranes) can trap odours.<br>• Regular odour monitoring (using olfactometry or electronic noses) helps identify problem areas.<br>• Transparent communication with residents can reduce complaints and improve public acceptance. |

| OPERATIONAL PHASE IMPACTS | |
|---|---|
| **Impact** | **Mitigation Measures** |
| Waste management | • Regularly remove sludge from the ponds to prevent the accumulation of pollutants.<br>• Ensure the use of proper equipment, containers and/or vehicles, and then dispose of the collected solids at an approved dumpsite.<br>• Ensure all project maintenance personnel wear proper personal protective equipment.<br>• Any waste generated must be contained and disposed of accordingly.<br>• Waste bins / containers must be readily available at the project site at all times.<br>• Any leaks from oxidation ponds and sewer lines should be fixed immediately and areas rehabilitated as needed |
| Social | • Employment creation should be targeted at the residence of Walvis Bay, or nearby communities.<br>• Maintenance contractors should be sourced from Walvis Bay, or nearby communities.<br>• Locally source services required during the operational process, such as securities, plant hire, etc. |
| Air quality | • Ensure frequent removal of waste solids from the Town ponds.<br>• Introduce aeration methods to increase decomposition when odours become unbearable.<br>• Regular air quality monitoring should be conducted at the site.<br>• Keep 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.<br>• Mosquitos breeding habits can be prevented by cutting, pruning and removing the vegetation that grows in the pond.<br>• 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.<br>• Introduce larvivorous fish or use eco-friendly larvicides to reduce mosquito breeding.<br>• Removal of mosquitos and flies can be achieved by spraying the scum on the surface with clean water.<br>• Removal of any accumulated solids in the ponds' inlets and outlets.<br>• Rodents or other animals can cause damage to the embankments, so it's necessary to repair them when they are located. |

Table 11: 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.<br>• No vegetation should be removed outside the designated project area.<br>• 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 is observed on construction vehicles or equipment.<br>• Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons in close proximity to the nearby river.<br>• Decommissioning activities should be planned outside of the rainy season in order to limit the risk of ground and surface water pollution.<br>• Contaminated runoff from the project site should be prevented from entering the nearby river.<br>• Waste disposal from the site should be properly managed and taken to the local disposal site.<br>• 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.<br>• An emergency plan should be in place on how to deal with spillages and leakages during this phase.<br>• 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.<br>• Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles or machinery not being used.<br>• Enforce the use of appropriate Personal Protective Equipment (PPE) for the right task or duties at all times.<br>• Provide for first aid kit and properly trained personnel to apply first aid when necessary.<br>• A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases and Covid-19.<br>• Provide free condoms in the workplace throughout the decommissioning phase.<br>• Facilitate access to antiretroviral medication for construction personnel.<br>• Conform to the stipulated protocols related to Covid-19.<br>• Restrict unauthorized access to the site and implement access control measures.<br>• Clearly demarcate the decommissioning site boundaries along with signage of no unauthorized access.<br>• Clearly demarcate dangerous areas and no-go areas on site. |

| DECOMMISSIONING PHASE IMPACTS | |
|---|---|
| **Impact** | **Mitigation Measures** |
| | • Adequate lighting within and around the decommissioned location should be erected, when visibility becomes an issue.<br>• Staff and visitors to the site must be fully aware of all health and safety measures and emergency procedures.<br>• 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.<br>• Construction vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents.<br>• Construction vehicles need to be in a road worthy condition and maintained throughout the decommissioning phase.<br>• Transport materials in the least number of trips as possible.<br>• Adhere to the speed limit.<br>• Implement traffic control measures where necessary.<br>• Construction vehicles should not be allowed to obstruct the D1983 road, or any other prominent roads, hence no 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.<br>• Inform neighbouring communities of decommissioning activities to commence and provide for continuous communication between them and contractor.<br>• Limit decommissioning times to acceptable daylight hours.<br>• Install technology such as silencers on machinery utilised during decommissioning activities.<br>• Do not allow the use of horns/hooters as a general communication tool, but use it only where necessary as a safety measure.<br>• 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.<br>• It is recommended that dust suppressants such as Dustex be applied to all the decommissioning clearing activities to minimise dust.<br>• Construction vehicles to only use designated roads.<br>• During high wind conditions the contractor must make the decision to cease works until the wind has calmed down.<br>• Cover any stockpiles with plastic to minimise windblown dust.<br>• Ensure construction vehicles are well maintained to prevent excessive emission of smoke. |

| DECOMMISSIONING PHASE IMPACTS | |
|---|---|
| **Impact** | **Mitigation Measures** |
| Waste management | • A sufficient number of waste bins should be placed around the site for the soft refuse.<br>• A sufficient number of skip containers for the heavy waste and rubble should be provided for around the site.<br>• The waste containers should be able to be closed to prevent birds and other animals from scavenging.<br>• Solid waste will be collected and disposed of at an appropriate local disposal site in Walvis Bay, 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.<br>• 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.

# 11 REFERENCES


1. Climate-data, 2025a, b. Walvis Bay Climate. Walvis Bay Average Temperature. https://en.climate-data.org/africa/namibia/erongo-region/walvis-bay-835/
2. Erongo Regional Council (ERC), 2025. Erongo regional Council Website. Available at: www.erc.com.na.
3. Nacoma, 2010. Environmental Management Plan for Henties Bay.
4. Namibia Statistics Agency (NSA), 2023. Namibia 2023 Population and Housing Census Main Report.
5. Raison, 2016. People of the coast. Available at: http://www.raison.com.na/Pages%20110%20to%20133.pdf
6. SADC Environmental Legislation Handbook (SELH), 2012. Environmental Legislation. EIA process flowchart for Namibia. Available at: www.saiea.com/dbsa_handbook_update2012/pdf/chapter11.pdf.
7. Sosiak A., and Dixon J., 2006. Impacts on water quality in the upper Elbow River. Water Science & Technology. 53:10. Pp 309-316.
8. Southern African Institute for Environmental Assessment (SAIEA), 2011. SEA for the Central Namib Uranium Rush. Available at: www.saiea.com.
9. World Health Organisation (WHO), 1999. Guidelines to Community Noise.
10. IFC, 2007. General Environmental, Health and Safety Guidelines.
11. SANS 10103, 2008. The measurement and rating of environmental noise with respect to annoyance and to speech communication. Pretoria: Standards South Africa.
12. Worldweather, 2025. https://world-weather.info/archive/namibia/walvis_bay/