

DRAFT

**ENVIRONMENTAL IMPACT ASSESSMENT
REPORT**

**CONSTRUCTION OF THE PURIFIED EFFLUENT PIPELINE FOR
THE PROPOSED HOUSING DEVELOPMENT ON ERF 5748
WALVIS BAY, NEXT TO THE DUNES MALL, WALVIS BAY,
ERONGO REGION, NAMIBIA**



Submitted March 2023

EAP / Consultant:



Proponent:



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- Soil and groundwater investigations and remediation/site solutions related services;
- Project execution which involves data collection and interpretation, site reconnaissance/inspections, report preparations, etc.;
- Project management and client and project team liaison;
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EXECUTIVE SUMMARY

Introduction

IHS Fund Two (Namibia GP) (Pty) Ltd, the applicant, plans to develop a new housing scheme consisting of 427 sectional title dwelling units adjacent to Dunes Mall on Erf 5748 Walvis Bay. The site's location and potential for pest infestation, including mosquitoes, flies, and odour, have prompted the applicant to engage Erongo Consulting Group to prepare the Environmental Impact Assessment Scoping Report and Draft Environmental Management Plan for the proposed 2km 315mm closed purified effluent pipeline. This pipeline is conditional upon the occupation of the buildings for residential development and will discharge semi-purified effluent into the bird sanctuary wetland instead of the dunes surrounding the sewage plant, which will help address concerns from the Municipality and neighbouring residential areas.

The proposed mitigation measure involves laying a 2km 315mm closed pipeline from the source of the Sewage Plant's semi-purified water overflow outlet to the bird sanctuary wetland, utilizing the existing water channel. Once the pipeline is installed and excess semi-purified water is diverted further into the dunes, the odour issue will subside, reducing the resultant fly issue significantly. The engineers advise that the whole dune area between the sewage plant and Dunes Mall will eventually dry out, leaving the area relatively odour, fly, and mosquito-free over time.

In summary, IHS Fund Two proposes laying a pipeline to divert semi-purified effluent from the sewage plant to the bird sanctuary wetland as an off-site mitigation measure to address the potential for odour, flies, and mosquitoes associated with the proposed housing scheme.

The objective of the ESIA Study

The objective of the Environmental and Social Impact Assessment (ESIA) is to identify and assess all potentially significant environmental and social impacts of the proposed project and recommend appropriate mitigation and enhancement measures. Additionally, the ESIA also evaluated the potential impacts of engineering and design activities during site preparation, construction and operational phases of the project and verified compliance of the project with stipulated national and international environmental standards and regulations.

Legal and Administrative Framework

The ESIA describes the applicable international standards and relevant Liberia regulatory framework that set the context within which the Project will operate. The Department of Environmental Affairs: Ministry of Environment, Forestry and Tourism (MEFT) is the environmental regulatory authority in charge of issuing environmental guidelines and reviewing the ESIA process and is ultimately responsible for issuing the environmental permit.

Project Description

The project will be located on Erf 5748, Walvis Bay, next to the Dunes Mall, Walvis Bay it will consist of the installation of approximately 2km 315mm closed pipeline; which includes space for the temporary access road, construction equipment, and trench widths / overland support system.

Public consultation and participation

Public and stakeholder consultations have been held starting early 2022, by Stewart Planning followed by Erongo Consulting Group, who successfully submitted the Draft, Scoping Report - Development of Approximately 427 Sectional Title Dwelling Units With Ancillary Outbuildings On Erf 5748, Walvis Bay. The report has since been shared with the Department of Environmental Affairs: Ministry of Environment, Forestry and Tourism.

Process:

- A Background Information Document (BID) containing descriptive information about the proposed development activities was compiled and sent out to all identified and registered I&APs;
- A site notice was fixed at the site, briefly explaining the activity and its locality, inviting members of the public to register as I&APs;
- Newspaper adverts informing the public, interested and affected stakeholders, and regulatory authorities about the proposed project, its potential impacts on the environment and the measures proposed to mitigate those impacts.

Consent Use Application

Stewart Planning posted an advertisement for the consent use application, and there were no objections or comments received except for the concerns raised by the Walvis Bay Municipality. The concerns raised by the Municipality necessitated an extensive EIA process with an EMP, which is being conducted by Erongo Consulting Group as an EAP. The EIA/EMP aims to manage the identified impacts for the purpose of sound development.

Study Methodology

The methodology of the study covers field assessments, document review and discussion with Walvis Bay Municipality officials and project team members such as the Engineer, and Town Planner. The project team provided the proposed project details. Discussions with the Walvis Bay Municipality officials involved an explanation of the proposed project and soliciting their views on environmental and social aspects that need to be considered during the design and implementation of the project. The data collection was carried out through the use of checklists, observations and photography, site visits, consultation with stakeholders and desktop environmental studies, where necessary.

This assessment examines the baseline environmental, socio-economic and cultural characteristics of the proposed project area. The essence was to describe the potentially affected environment prior to the commencement of the project; and includes specific information necessary for identifying and assessing the environmental effect of the proposed project activities as well as information on the existing environmental conditions including sensitive areas that will be potentially impacted. Environmental baseline data collected during the assessment was in relation to ecological data, social data of the project area, soil quality, noise quality and water quality among other. The importance of gathering these data is to understand the physical, biological and socioeconomic characteristics of the project's environment. Such information sets the ground for analysis of the potential impacts of the project's activities on the existing environment.

Potential Impacts and Mitigation Measure

The ESIA study employed an impact assessment methodology to identify and rank the positive and negative impacts of the Pipeline construction and operation phases. The methodology allowed for the prioritization of impacts and assessment of proposed mitigation measures while providing a scale to indicate impact levels. Negative impacts were mainly associated with construction activities and were mostly confined to the construction site and its immediate surroundings. These impacts can be effectively mitigated by sound engineering practices, and their severity is deemed to be small to medium and of short duration.

The primary environmental impacts of concern are associated with the Pipeline's structures, which are expected to affect land use, flora and fauna, and local communities. Appropriate measures have been proposed to mitigate these impacts and minimize their severity.

Environmental and Social Management Plan (ESMP)

To achieve optimal environmental management practices during the construction phase, a comprehensive Environmental and Social Management Plan (ESMP) will be implemented by the proponent, in conjunction with Erongo Consulting Group. This plan encompasses all necessary measures to mitigate any negative environmental impacts, including erosion and sediment control, prevention of water and soil contamination, dust suppression, and occupational safety of workers.

Ongoing environmental and social monitoring during both the construction and operational phases will enable timely detection and response to any unforeseen impacts, allowing for effective measures to be developed and implemented. Maintenance of infrastructure will also be prioritized to contribute towards the conservation of the environment.

Additionally, monitoring will be conducted to ensure that all proposed mitigation measures for negative impacts and enhancement measures for positive impacts are fully implemented. This will enable the project team to assess the effectiveness of measures put in place and identify any areas that require further improvement.

Closure and Decommissioning

The decommissioning of the pipeline will ultimately depend on various factors, including the intended future use of the site, environmental sensitivities, and project-specific considerations. There are typically three main options for decommissioning pipelines, namely suspension, abandonment in place, and removal. Leaving the decommissioned pipeline in place is generally regarded as the safest and least disruptive option. This approach eliminates the need for excavation and removal, which reduces the potential for soil and slope instability in the future.

Conclusion and recommendation

Upon completion of the pipeline installation and diversion of excess semi-purified water, the issue of odour is expected to significantly diminish, leading to a reduction in the resultant fly and mosquito issues. The potential environmental impacts resulting from the implementation activities are expected to be limited to the construction site and period and can be effectively managed through the application of good engineering practices. However, the potential displacement of people and loss of properties and crops within the pipeline transmission route may present a significant negative socio-economic impact. Despite this, the small footprint of the project means that the number of directly affected people is limited and the economic losses can be compensated.

In conclusion, the benefits of the project far outweigh the limited negative impacts. Moreover, the long-term positive impacts of the project include assisting in addressing the odour, fly, and mosquito challenges, thereby promoting improved environmental and public health outcomes.

1. INTRODUCTION

IHS Fund Two (Namibia GP) (Pty) Ltd is planning to construct a housing scheme consisting of approximately 427 sectional title dwelling units near the Dunes Mall on Erf 5748 Walvis Bay. However, due to the Walvis Bay Municipality concerns about mosquitoes, flies, and odour on the subject area, the proponent has contracted the services of the Erongo Consulting Group (ECG), to prepare an Environmental Impact Assessment Scoping report and a Draft Environmental Management Plan for a proposed 2km 315mm closed purified effluent pipeline. This pipeline will only be conditional upon the occupation of the residential buildings.

The proposed mitigation measures include laying a closed pipeline from the sewage plant's semi-purified water overflow outlet to the bird sanctuary wetland, diverting excess water further into the dunes, and reducing the odor and fly issues. The project triggers listed activities in accordance with the Environmental Management Act 2007, and an application for Environmental Clearance will be submitted in the form of an Environmental Impact Assessment to the relevant competent authorities and the Ministry of Environment, Forestry, and Tourism in accordance with the Act. The proponent, IHS Fund Two (Namibia GP) (Pty) Ltd, has hired the services of the Erongo Consulting Group to prepare the Environmental and Social Impact Assessment Report (ESIA) for the proposed project.

1.1 The Need for an Environmental Assessment (EA)

The proponent has consulted with its project engineers and determined that extending the sewage plant's semi-purified effluent pipe approximately two kilometres to discharge into the bird sanctuary wetland instead of the surrounding dunes will address the Municipality's concerns and complaints received from neighbouring residential areas. According to the engineers' advice, the area between the sewage plant and Dunes Mall will eventually dry out, resulting in a relatively odour, fly, and mosquito-free environment once the proposed pipeline is constructed. It should be noted that pipeline construction is classified as a listed activity under the EMA (Environmental Management Act)¹, a legislation that was passed in 2007.

¹ The EMA (Environmental Management Act) is a legislation in Namibia that was passed in 2007. Its main objective is to promote the sustainable management of the country's natural resources and the protection of the environment. The act establishes the Environmental Commissioner as the regulatory authority responsible for implementing and enforcing the act. The EMA also requires that environmental impact assessments be conducted for certain activities that may have significant impacts on the environment and that environmental management plans be developed and implemented to mitigate any adverse impacts.

1.2 Need and Desirability of the Project

The need and desirability of the project is based on the demand for housing in the Walvis Bay area. The proposed project aims to provide approximately 427 sectional title dwelling units to meet this demand. The project will contribute to the economic growth of the area by creating jobs during the construction phase and providing housing for residents. Additionally, the project will increase the tax base for the Walvis Bay Municipality, which can be used for public services and infrastructure development.

1.3 Scope of Work

This scoping study adheres to the Environmental Management Act (EMA) (7 of 2007) and its 2012 EIA Regulations (GG No. 4878 GN No. 30) and includes the following information:

- Adherence to EMA (7 of 2007) and its 2012 EIA Regulations (GG No. 4878 GN No. 30)
- Justification and benefits of the proposed project
- Description of the project and its necessity
- Evaluation of alternatives considered for the project including the no-go option and services infrastructure
- Analysis of the relevant legal and regulatory frameworks applicable to the project
- Analysis of the existing environmental conditions in the project area
- Details of the public consultation process
- Identification of potential environmental impacts
- Description of the impacts and their assessment
- Recommended mitigation measures to minimize the impacts
- Overall recommendations and conclusions.

1.4 Ownership

Erf 5748 Walvis Bay was created through the subdivision of Erf 5433 Walvis Bay (previously known as Portion 213) into Erven 5747, 5748 and 5749 and the Remainder of Erf 5433 Walvis Bay. The survey was approved by the Surveyor General but has not been registered at the Deeds Office.

In terms of Deed of Transfer No.7670/2016, Erf 5433 Walvis Bay is registered in the name of Dunes Mall (Pty) Ltd (previously known as Greenstone Resorts (Pty) Ltd). Therefore, ownership of Erf 5748 Walvis Bay vests with Dunes Mall (Pty) Ltd.

Dunes Mall (Pty) Ltd is in the process of selling Erf 5748 Walvis Bay to the applicant, IHS Fund Two (Namibia GP) (Pty) Ltd.

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1.5 Detailed description of the project/development

Table 1: Detailed description of the project / development

Registered Name	Erf 5748 (a portion of Erf 5433) Walvis Bay (not registered)
Size	76,955m ² or 7.6955 hectares
Street Address	C14/M36 Road
Location	GPS Co-ordinates: 22°57'38.5"S 14°31'23.5"E
Current Zoning	General Business
Density	Not applicable
Bulk Factor	Bulk 2.0 (Floor Area Ratio)
Land Use	Undeveloped land with dune hammocks and sewage ponds.
Registered Owner	Dunes Mall (Pty) Ltd
Local Authority Area	Municipality of Walvis Bay

2 PROJECT DESCRIPTION

The project involves the construction of a purified effluent pipeline to serve a proposed housing development located on Erf 5748 in Walvis Bay, Namibia. The pipeline will run from the existing sewage treatment plant, which is located adjacent to the Dunes Mall, to the proposed housing development site. The pipeline will extend approximately two kilometers and will discharge into the bird sanctuary wetland instead of the dunes surrounding the sewage plant, which will reduce the potential for pests and associated issues. The pipeline will be designed to handle semi-purified effluent from the sewage plant and will be constructed in compliance with applicable laws and regulations.

2.1 Description of Activity

2.1.1 Site Location

The proposed project involves the construction of a 2.2-kilometre-long purified effluent pipeline using pipe laying and backfilling to serve the housing development on Erf 5748 Walvis Bay. The pipeline will transport water from the existing sewage treatment plant to the bird sanctuary wetland, which is approximately two kilometers away from the current discharge point. The pipeline will be made of high-density polyethylene (HDPE) material with a diameter of 315mm. The construction will take around six months and involve the use of heavy machinery and equipment. Commissioning and testing will be conducted before the pipeline is operational. The pipeline will help mitigate against mosquitoes, flies, and odors on the housing development by diverting the semi-purified water further into the dunes, reducing the odor and fly issues.

Picture 1: The proposed 2.2-kilometre-long purified effluent pipeline route (in red)



2.1.2 Proposed Development

The proposed development is a housing development on Erf 5748 Walvis Bay, which is located next to the Dunes Mall in the Erongo Region of Namibia. The housing development will consist of residential units, including houses, apartments, and townhouses, as well as amenities such as roads, sidewalks, street lighting, and landscaping. The housing development is designed to meet the growing demand for affordable housing in the area and to provide a safe and comfortable living environment for residents. The purified effluent pipeline will serve the housing development by drawing water from wetlands and discharging it into the bird sanctuary wetland, which is approximately two kilometers away from the current discharge point. This will help to mitigate against mosquitoes, flies, and odors on the housing development.

Figure 2: Location of Erf 5748 Walvis Bay in relation to the municipal treatment works, Dunes Mall and Bird Sanctuary.



Figure 1: The north-eastern portion of Erf 5748 Walvis Bay contains a 25-metre-wide right-of-way servitude which was taken into account as part of the concept design.



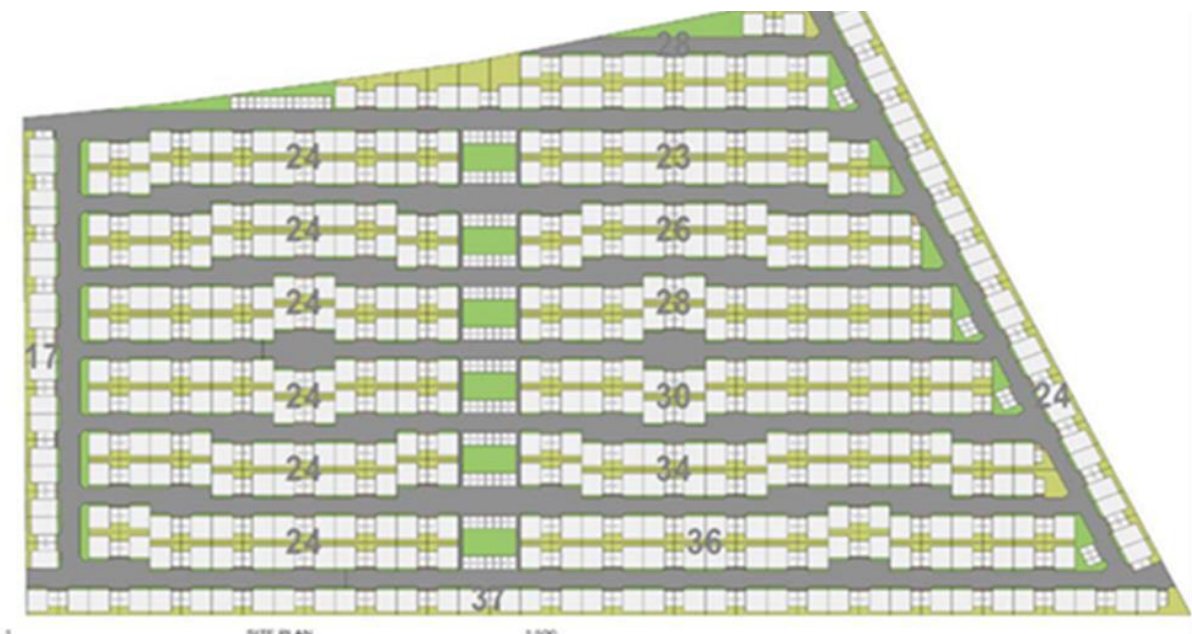
Figure 3: Concept for Two Residential Units (Credit: Howard Krogh Architects)



GROUND FLOOR

The total floor area created by the proposed development is, let's say, $36,000\text{m}^2 + 1500\text{m}^2 = 37,500\text{m}^2$. Thus, the proposed development generates an actual bulk factor of 0.49 and covers roughly 49%.

Figure 4: Concept for Two Residential Units (Credit: Howard Krogh Architects).



The proposed development on Erf 5748 Walvis Bay consists of a townhouse complex with dwelling units that will be sold under a sectional title scheme. The site plan shows the

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proposed location of the units, their access points, and associated open spaces. The complex will have privately owned and maintained streets and parks through the body corporate.

The development also includes a small playground in the middle for recreational purposes, and approximately 2500m² of green open space, which makes up 3.2% of the total erf area of 76,955m². Landscaping will be done on the streets to improve the overall visual appeal of the development.

Figure 5: Locality Map (Credit: Stewart Planning)



2.1.3 Site Access

According to the scoping study, there are only two ways to access the proposed housing development on Erf 5748 Walvis Bay: the Dunes Mall access road or the C14 road adjacent to the site.

2.2 Detailed Description of the Construction of The Purified Effluent Pipeline

The proposed housing development on Erf 5748 in Walvis Bay, Namibia, requires the construction of a purified effluent pipeline to transport treated wastewater from the development site to a discharge point. The pipeline will be laid underground and will consist of various engineering works and backfilling.

Figure 6: Pipeline Construction Activities

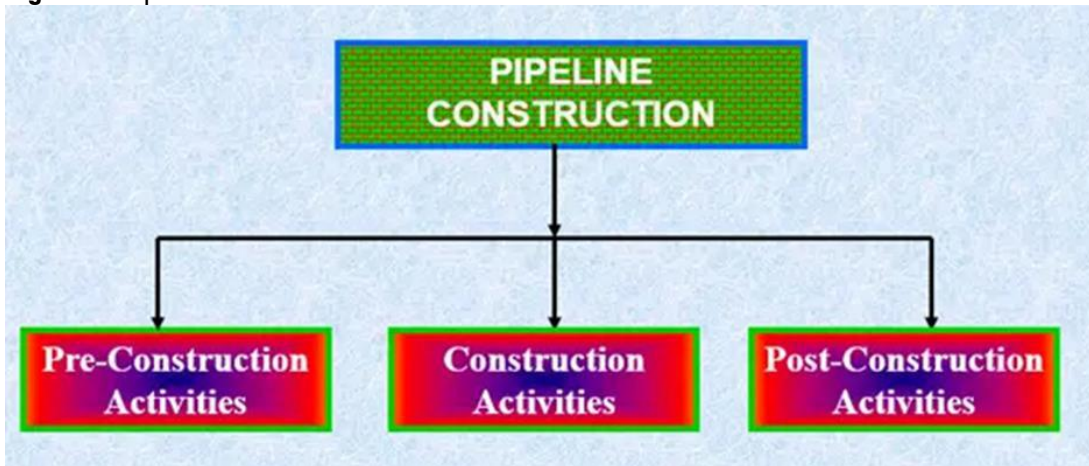


Table 2: The above ground pipeline Construction steps

STEP	DESCRIPTION
Surveying and Planning	A team of surveyors will first visit the site to assess the terrain and take accurate measurements of the area. This will help them to plan the pipeline route and determine the amount of excavation and backfilling needed.
Clearing and Grading	The area where the pipeline will be laid needs to be cleared of any vegetation or debris. The ground is then graded to create a level surface for the pipeline.
Trenching	Trenches are dug along the planned route of the pipeline to accommodate the pipe. The depth and width of the trench depend on the size of the pipeline. <i>(Generally, above ground pipelines do not require trenching as they are installed above the ground surface. However, they may still require excavation of small trenches or holes for the placement of support structures such as concrete pads, pipe supports, and anchors)</i>
Anchor placement:	Before the pipeline is laid, anchors are placed at intervals along the route to help support and stabilize the pipeline.
Pipe Laying	The pipeline is then laid above the ground, ensuring that it is securely supported and aligned properly. This is typically done using heavy equipment like cranes and forklifts
Support installation:	Supports are then installed to help secure the pipeline in place, such as concrete foundations or metal frames.
Welding	Sections of the pipeline are welded together to create a continuous pipeline.
Backfilling	The trench is then backfilled with soil and compacted to ensure that the pipeline is securely in place.
Hydrostatic Testing of Pipeline during Pipeline construction	Once the pipeline is in place, it is tested to ensure that it can withstand the required pressure and that there are no leaks. Objectives for Hydrotesting

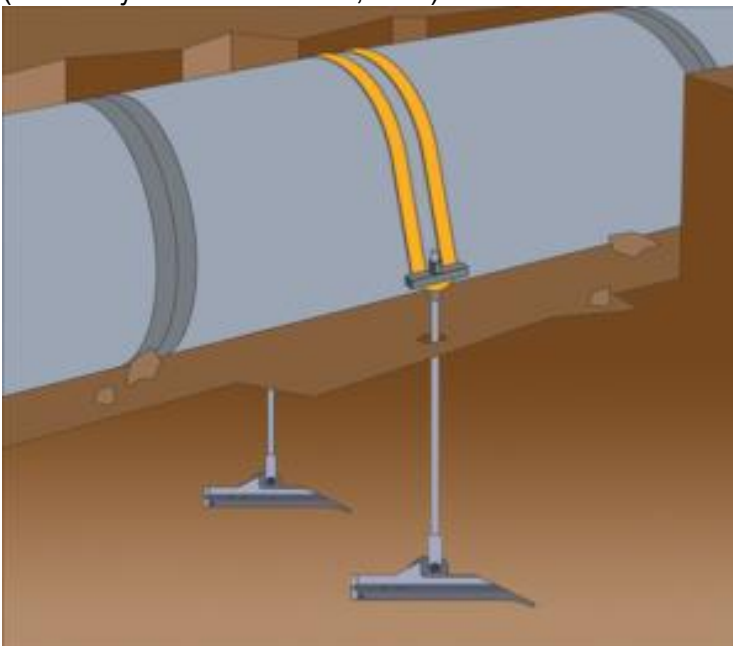
	<ul style="list-style-type: none"> — To establish that the pipeline has the required strength for which it has been designed. — To demonstrate leak tightness of the pipeline. <p>Parameters for choosing test sections</p> <ul style="list-style-type: none"> — Availability of water — Suitable place for disposal — Ground profile — Logistics <p>Pipeline Hydro-Test procedure:</p> <ul style="list-style-type: none"> — Air cleaning the pipeline to clear all debris and muck — Gauging — Water filling with corrosion inhibitor — Thermal stabilization — Pressurization — Evaluation and acceptance <p>Pipeline Valve Installation</p> <ul style="list-style-type: none"> — Block valves are either Hand operated or Motor operated. — Mainline isolation valves are provided at an approximate interval 1km. depending upon the size of the line. — Tapings for the pig signaler and pressure transmitters are provided at the valve locations for monitoring the pressure, temperature, and moment of the pig.
<p>Final clean-up, Restoration, and Installation of Markers</p>	<ul style="list-style-type: none"> — After construction, ROW is levelled and restored to the entire satisfaction of the landowners/ authorities. — (All drains, utility lines, and water lines damaged during construction are restored to their original position – Not any). — Pipeline markers such as kilometre posts, turning points/ direction markers, warning signs, and boundary pillars are provided.
<p>Documentation of Pipeline Construction Activities</p>	<p>All pipeline construction activities must be documented for future reference purposes. The following should be maintained:</p> <ul style="list-style-type: none"> — Daily logbook — Separate register for each activity — Pipe Book — Welding inspection report — Radiographic inspection report — Tie-in charts — Pipe damage register — Deviation/ NCR register — Equipment & manpower mobilization report — Hydrostatic testing register — Claims register <ul style="list-style-type: none"> ▪ Due to deviations ▪ Due to a change in the work plan ▪ Damage to pipes etc.

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Picture 2: Image illustrating pipeline site preparation and construction (Hidenis Group LLC, 2020)



Picture 3: illustration of a Pipeline anchored down using Vulcan Earth Anchors and webbing straps (Anchor Systems International, 2023)



3 PROJECT ALTERNATIVES CONSIDERED

During the project planning phase, multiple alternatives were evaluated for their technical feasibility and environmental impact. The first option considered was a "no-go" scenario, which involved not implementing the proposed project, but was discarded due to the growing population in Walvis Bay and the demand for affordable housing.

The second alternative evaluated was alternative routes for the purified effluent pipeline, which was dismissed due to the significant additional cost of construction and the impact on the surrounding environment. The proposed route for the pipeline was deemed to be the most practical and environmentally friendly option.

Alternative methods for drying the wetlands, such as planting water-loving plants or dredging, were also evaluated. However, these methods were found to be less effective and more costly than constructing the purified effluent pipeline, and thus were not selected.

An alternative location for the housing development was also considered, but the proposed location was chosen due to its proximity to existing infrastructure and the availability of services, such as water and electricity.

After careful evaluation of the alternatives, the construction of the purified effluent pipeline and the housing development on Erf 5748 were deemed to be the most practical and environmentally friendly option.

4 LEGAL FRAMEWORK

In Namibia, the Environmental Management Act of 2007 and the Environmental Impact Assessment Regulations of 2012 are two key legal instruments that regulate the environmental impacts of development activities. These laws require developers to undertake an Environmental Impact Assessment (EIA) prior to carrying out any significant development activities in order to identify potential environmental impacts and to propose measures to mitigate or manage them.

Table 3: Summary of legislative framework relevant to the proposed development

LEGISLATION/ GUIDELINE	RELEVANT PROVISIONS	IMPLICATIONS FOR THIS PROJECT
Namibian Constitution First Amendment Act 34 of 1998	<ul style="list-style-type: none"> - "The State shall actively promote... maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future" (Article 95(l)). 	<ul style="list-style-type: none"> - Ecological sustainability should inform and guide this EA and the proposed development.
Environmental Management Act EMA (No 7 of 2007)	<ul style="list-style-type: none"> - Requires that projects with significant environmental impact are subject to an environmental assessment process (Section 27). - Details principles that are to guide all EAs. 	<ul style="list-style-type: none"> - The EMA and its regulations should inform and guide this EA process.
Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878)	<ul style="list-style-type: none"> - Details requirements for public consultation within a given environmental assessment process (GN 30 S21). - Details the requirements for what should be included in a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15). 	
Forestry Act 12 of 2001 Nature Conservation Ordinance 4 of 1975	<ul style="list-style-type: none"> - Prohibits the removal of any vegetation within 100 m from a watercourse (Forestry Act S22(1)). - Prohibits the removal of and transport of various protected plant species. 	<ul style="list-style-type: none"> - Even though the Directorate of Forestry has no jurisdiction within townlands, these provisions will be used as a guideline for the conservation of vegetation.

Labour Act 11 of 2007	- Details requirements regarding minimum wage and working conditions (S39-47).	- The Walvis Bay Municipality and Proponent should ensure that all contractors involved during the construction, operation and maintenance of the proposed project comply with the provisions of these legal instruments.
Health and Safety Regulations GN 156/1997 (GG 1617)	Details various requirements regarding health and safety of labourers.	
Public Health Act 36 of 1919	Section 119 states that “no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.”	
National Heritage Act 27 of 2004	Section 48(1) states that “A person may apply to the [National Heritage] Council [NHC] for a permit to carry out works or activities in relation to a protected place or protected object”.	Any heritage resources (e.g., human remains etc.) discovered during construction requires a permit from the NHC for relocation.
Burial Place Ordinance 27 of 1966	Prohibits the desecration or disturbance of graves and regulates how bodies may be unearthed or dug up.	Regulates the exhumation of graves.
Water Resources Management Act 11 of 2013.	To provide for the management, protection, development, use and conservation of water resources; to provide for the regulation and monitoring of water services and to provide for incidental matters.	The protection of ground and surface water resources should be a priority. The main threats will most likely be concrete and hydrocarbon spills during construction and hydrocarbon spills during operation and maintenance.
Namibia Water Corporation Act 12 of 1997	To establish the Namibia Water Corporation Limited; to regulate its powers, duties and functions; to provide for a more efficient use and control of water resources; and to provide for incidental matters.	
Urban and Regional Planning Act (No. 5 of 2018).	- Subdivision of land situated in any area to which an approved Town Planning Scheme applies must be consistent with that scheme (S31).	- The proposed use of the project site must be consistent with the Walvis Bay Town Planning Scheme
Road Ordinance 1972 (Ordinance 17 Of 1972)	- Width of proclaimed roads and road reserve boundaries (S3.1) - Control of traffic on urban trunk and main roads (S27.1)	- The limitations applicable on RA proclaimed roads should inform the proposed layout and zonings where applicable.

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	<ul style="list-style-type: none"> - Rails, tracks, bridges, wires, cables, subways or culverts across or under proclaimed roads (S36.1) - Infringements and obstructions on and interference with proclaimed roads. (S37.1) - Distance from proclaimed roads at which fences are erected (S38) 	
Walvis Bay Zoning Scheme.	This statutory document provides land use regulations and development.	Land uses and developments should be in accordance with the Walvis Bay Zoning Scheme
Integrated Urban Spatial Development Framework (IUSDF) of Walvis Bay	Provides future land use planning within the Walvis Bay district.	The IUSDF was utilized to see if the proposed activity is in accordance with the future planning of Walvis Bay.
Walvis Bay Climate Strategic Action Plan	Provides action plans on how Town Planning can help mitigate climate change	To promote two-storey developments, reduce urban sprawl and land competition. Encourage EIA studies with regards to rezoning.
Walvis Bay Biodiversity Report of 2008. (WBBR:2008)	Provides a comprehensive summary and map of sensitive Biodiversity Areas and Zoning in the Walvis Bay district.	To ensure that the proposed activity is not located close to any Biodiversity Area or Zoning.
Sustainable Urban Energy Planning: A handbook for cities and towns in developing countries (SUEP:2004)	Provides a comprehensive list and case studies to implement energy saving measures.	Implementing energy-efficiency and carbon mitigation measures. Conserve natural resources with city planning.
Walvis Bay Public Open Space Policy	Sets criteria of parameters for development of parks (POS) in Walvis Bay	

5 ENVIRONMENTAL AND SOCIAL BASELINE

The proposed project will take place in an area that has specific environmental and social conditions. It is essential to have a clear understanding of the pre-project/development situation before carrying out any activities in the area. This is a crucial aspect of the environmental assessment process that helps establish a baseline for environmental and social conditions in the area. The baseline information was used to identify potential impacts of the proposed activities and to develop appropriate mitigation measures.

In the case of Walvis Bay, the environmental baseline includes information on the physical and biological environment, such as the soil, water resources, vegetation, and wildlife in the area. Social baseline data includes demographic information, such as the population size and distribution, health status, and educational levels.

The environmental and social baseline information was collected through various methods, including site visits, surveys, and consultations with stakeholders. The baseline data was used to identify potential impacts of the proposed project and to develop appropriate mitigation measures. It is important to note that the baseline information has been updated throughout the project to reflect any changes in the environmental and social conditions of the area.

5.1 Biophysical Environment

5.1.1 Climate

The Erongo Region, where Walvis Bay is located, has a desert climate characterized by low and highly variable rainfall, high temperatures, and low humidity. The region experiences hot summers and mild winters, with average temperatures ranging from 15°C to 25°C. The annual rainfall in the region ranges from 15mm to 100mm, with the majority of the precipitation occurring between January and April. The area is also prone to strong coastal winds, especially during the winter months, which can lead to erosion and sand movement.

5.1.2 Topography, Soils and Geology

The Erongo Region, where Walvis Bay is located, is characterized by a diverse topography that includes a coastal plain, inland valleys, and rugged mountains. The geology of the region is dominated by sedimentary rocks such as sandstones, siltstones, and shale, which were deposited in ancient river and marine environments.

The soils of the region are generally sandy and have low nutrient content, which can limit their ability to support vegetation growth. The area around Walvis Bay is dominated by sand dunes, which can be stabilized with vegetation and used for agriculture.

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The region is also known for its mineral deposits, including uranium, copper, and lead. Mining activities have the potential to impact the environment and must be carefully managed to minimize negative effects on the surrounding ecosystems.

The proposed development area exhibits a heterogeneous landscape, characterized by the presence of wetlands and sporadic elevation changes due to the deposition of sands through aeolian processes. The underlying geology is primarily composed of Precambrian basement rocks, including granite, gneiss, and shale, which form the foundation of the Namib Desert. The Tsondab-Sandstone-Formation, consisting of the oldest Tertiary rocks, predominates the central Namib region south of the Kuiseb River. A flat gravel plain, underlain by crystalline basement, is observed to the north of the Kuiseb River. Additionally, the bedrock in the area is composed of metamorphic rocks, including granite, calcareous, and gypsum formations.

The proposed development area is dotted with wetlands and has sporadic elevation

5.1.3 Landscape

The Erongo Region's land rises steadily from sea level to around 1000 meters across the Namib. Brandberg (2,579 m), Namibia's highest peak, is located in the far northern Erongo Region (Geological Survey of Namibia, 2012).

3D Google Map - Disturbed area, wetlands associated with the proposed site for development.

Picture 4: 3D Google Map - Disturbed area, wetlands associated with the proposed site for development.



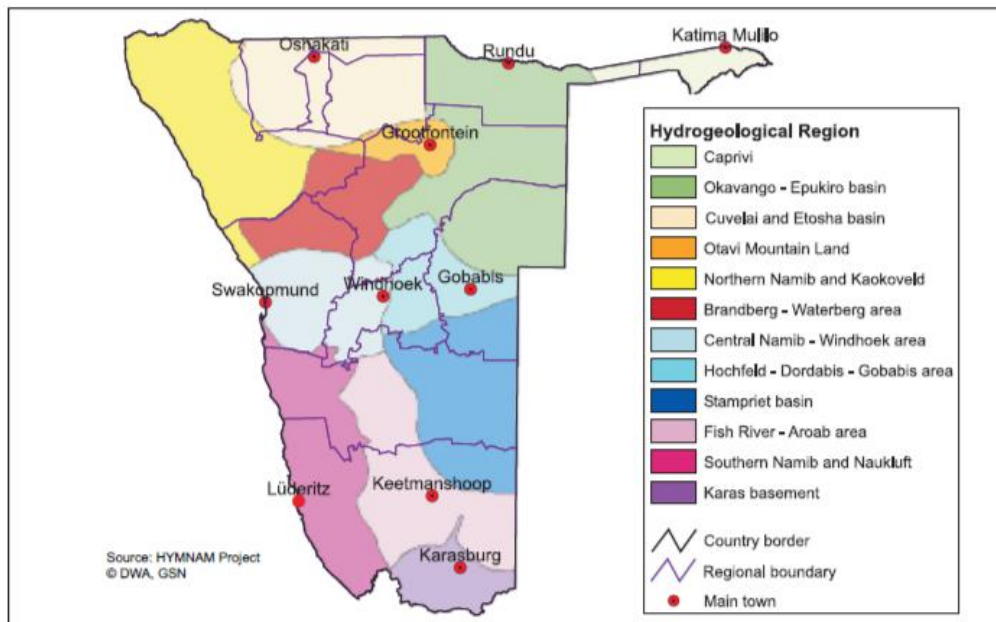
5.1.4 Water Resources: Surface and Groundwater

Walvis Bay is situated in an arid region and experiences a low average annual rainfall of approximately 24 mm. The town relies mainly on groundwater for its water supply, with the two main aquifers being the Kuiseb and Walvis Bay aquifers. The Kuiseb aquifer is situated approximately 100 km east of Walvis Bay and is recharged by the Kuiseb River. The Walvis Bay aquifer is situated beneath the town and is recharged by local rainfall and river water that infiltrates the ground.

The surface water resources in the area are limited, with the Kuiseb River being the only permanent river in the vicinity. The river's flow is highly variable and mainly occurs during periods of heavy rainfall. The ephemeral Swakop and Khan rivers also pass through the area, but their flow is highly unpredictable.

The wetlands in the proposed development area are an essential component of the local hydrological system, as they act as natural filters, cleaning the water that flows through them. They also provide a habitat for a variety of plant and animal species. As such, it is essential that any development in the area takes into account the potential impacts on the wetlands and the hydrological system as a whole (Ministry of Environment, Forestry and Tourism 2016; Ministry of Agriculture, Water and Land Reform, 2020).

Figure 7: Groundwater basins and hydrogeological regions in Namibia (Ministry of Agriculture Water and Rural Development, 2011)



5.1.5 Fauna and Flora

The proposed development area in Walvis Bay is home to a variety of plant and animal species. The region has a unique desert environment that supports several endemic species, including the Namib Desert beetle, Namaqua chameleon, and Welwitschia plant. The coastal region of the proposed development area is home to the Benguela ecosystem, which supports a diverse range of marine life, including fish, dolphins, and seals.

The area is also a critical breeding and foraging ground for several bird species, including flamingos, pelicans, and gulls. The wetlands in the proposed development area are important

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habitats for a variety of bird species, such as the black-necked grebe, the African marsh harrier, and the African spoonbill.

It is essential to note that the proposed development area is located within a global biodiversity hotspot, with a high level of endemism and diversity of species. Therefore, any development activity must consider the potential impact on the local flora and fauna, and appropriate measures should be taken to minimize any adverse effects (Jürgens, N., & Bürger, B. 2015).

5.1.6 Archaeological and Anthropological Resources

Based on available information, there are no identified archaeological or heritage sites present in the area where the proposed development will take place.

5.2 Social Environment

5.2.1 Social Demographics

The population of Walvis Bay has been increasing steadily over the years, with a current estimated population of over 100,000 people. The majority of the population is of working age, with a relatively small proportion being elderly. The Erongo region, where Walvis Bay is located, is home to diverse ethnic groups, including Damara, Herero, Nama, and Ovambo. There is also a significant immigrant population, mostly from neighboring countries such as Angola and Zimbabwe. The region has a relatively low population density, with a majority of the population living in urban centers such as Walvis Bay and Swakopmund (Namibia Statistics Agency, 2020).

5.2.2 Economy

The economy of Walvis Bay and the Erongo Region is heavily reliant on the fishing industry, with the port of Walvis Bay serving as a crucial hub for fish exports. In recent years, there has also been growth in the mining and tourism sectors. The uranium and diamond mining industries, in particular, have contributed significantly to the region's economy. The tourism sector is also growing, with attractions such as the Namib Desert, Skeleton Coast, and marine wildlife drawing in visitors. The region is also home to several manufacturing and service industries, including logistics and transportation. Overall, the economy of Walvis Bay and the Erongo Region is diverse, with multiple industries driving growth and development.

5.2.3 Land Use

The proposed development site is situated in close proximity to Dunes Mall and is surrounded by various industries, the Bird Sanctuary, and the Municipal Waste Treatment Plant. The area is easily accessible through the C14/M36 road network and is linked to existing service infrastructure. The proposed development will increase the housing capacity in the immediate area and will leverage the existing services infrastructure, thus reducing the costs and environmental impact associated with constructing a standalone development in an area where the surrounding land uses are incompatible with the proposed project's nature. The study area

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falls within the Walvis Bay townlands, as per the Municipality's Integrated Urban Spatial Development Framework (IUSDF). With the exception of wetlands and the Purification Works, which are visible from a distance, there are no physical features that would hinder the site's development.

5.2.3.1 Compatibility With the Surrounding Area

The proposed development site is adjacent to the Dunes Mall and other industrial properties, offering convenient accessibility and the opportunity to connect with the existing infrastructure. This compatibility with the surrounding area will result in reduced costs and environmental impacts, as there will be no need to construct a standalone development in a location where the land uses are incompatible with the nature of the project.

6 PUBLIC CONSULTATION

6.1 Objective:

Public consultation is an integral part of the Environmental Assessment (EA) process, which involves the identification and evaluation of the potential environmental impacts of a proposed project or development. The objective of public consultation in the EA process is to provide an opportunity for Interested and Affected Parties (I&APs), including community members, stakeholders, and experts, to express their concerns, provide feedback, and contribute to the decision-making process.

The importance of public consultation in the EA process cannot be overstated, as it enables project proponents to identify and address potential environmental and social impacts, as well as community concerns and expectations, early on in the development process. Public consultation also promotes transparency, accountability, and participation, which are essential for building trust and ensuring that decisions are fair, reasonable, and informed.

6.2 Approach:

There are various approaches to public consultation, and the choice of approach used by the EAP depended on the nature of the project, the number and diversity of stakeholders, and the resources available. Some common approaches to public consultation include:

6.2.1 Meetings / Onsite Meetings:

Face-to-face meetings and workshops were used since June 2022 to engage the Walvis Bay Municipality officials and I&APs. These meetings provided an opportunity for Walvis Bay Municipality officials, Project Team and the proponent to voice their concerns and opinions, ask questions, and engage in dialogue with project proponents and other stakeholders.

6.2.2 Surveys and Questionnaires:

Surveys and questionnaires were used to gather information and feedback from stakeholders who couldn't attend public meetings. Surveys were distributed online or in print form and were designed to capture quantitative and qualitative data.

6.2.3 Social Media and Online Platforms:

social media and online platforms such as EAP website, were used to engage with stakeholders and provide them with information about the project. This platform can be used to answer questions, respond to concerns, and gather feedback.

6.2.4 Focus Groups:

the proponent set up a focus Group made up of Town Planner, Architecture, Engineering and the EAP who were directly engaging with the Walvis Bay Municipality. Focus groups are a small group of stakeholders who are selected to provide feedback and input on specific aspects of the project. Focus groups are often used when there are specific issues or concerns that need to be addressed.

6.2.5 Newspaper adverts:

The EAP made use of newspaper adverts as an effective way to reach a wide audience and inform the public about a proposed development and the public consultation process. This method involved placing an advertisement in a local/national newspaper – New Era, Namib Times, outlining the proposed development and inviting interested and affected parties to submit their comments or concerns.

The advantage of newspaper adverts is that they can reach a large and diverse audience, including those who may not have access to online or digital platforms. However, it may not reach specific target groups or individuals who do not regularly read the newspaper. Additionally, newspaper adverts can be costly, and the response rate may be low.

It is important to note that newspaper adverts should be used in conjunction with other public consultation approaches to ensure that all interested and affected parties are reached and given an opportunity to provide their input.

7 IMPACTS IDENTIFICATION, DESCRIPTION AND ASSESSMENT

7.1 Impact Assessment Methodology

In impact assessment, a methodology is used to identify and describe potential impacts that a proposed project may have on the environment, society, and the economy. The methodology also involves assessing the significance of these impacts and identifying appropriate measures to mitigate any adverse effects.

The impact assessment methodology included the following steps:

7.1.1 Scoping:

The scope of the impact assessment is defined by identifying the potential impacts that are relevant to the project, the area of study, and the concerns of the stakeholders.

7.1.2 Baseline data collection:

The baseline data is collected to describe the current state of the environment, society, and economy in the study area.

7.1.3 Impact identification:

The potential impacts of the project on the environment, society, and economy are identified, considering both positive and negative impacts.

7.1.4 Impact prediction:

The potential magnitude, duration, and spatial extent of the identified impacts are predicted.

7.1.5 Impact significance assessment:

The predicted impacts are assessed in terms of their significance, considering their nature, magnitude, duration, and spatial extent, as well as the sensitivity of the affected environment, society, and economy.

7.1.6 Mitigation measures:

Appropriate measures are identified to avoid, minimize, or mitigate any adverse impacts of the project.

7.1.7 Residual impacts:

The residual impacts of the project, after implementing the mitigation measures, are assessed.

7.1.8 Impact management and monitoring:

An impact management plan is developed to ensure that the identified impacts are managed and monitored during the project's construction and operation phases.

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the impact assessment methodology provides a structured approach to identify, describe, and assess the potential impacts of a proposed project and to develop appropriate measures to manage and mitigate these impacts.

This impact assessment used the following criteria:

7.2 Extent (spatial scale)

Extent is an indication of the physical and spatial scale of the impact.

Table 4: Extent or spatial impact rating

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Impact is localized within the site boundary: Site only	Impact is beyond The site boundary: Local	Impacts felt within adjacent biophysical and social environments: Regional	Impact widespread far beyond site boundary: Regional	Impact extent National or over international boundaries

7.3 Duration

Duration, in the context of impact assessment, refers to the length of time during which the impact is anticipated to take place and is measured in relation to the project's lifespan.

Table 5: Duration impact rating

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Immediate mitigating measures, immediate progress	Impact is quickly reversible, short-term impacts (0-5 years)	Reversible over time; medium term (5-15 years)	Impact is long-term	Long term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources

7.4 Intensity, Magnitude / severity

Intensity, also referred to as magnitude or severity, describes the extent to which an impact affects the environment. This impact can either be positive or negative, and the degree of alteration was considered in the assessment of severity. Both intensity and severity are important factors in evaluating the potential impacts of a project on the environment (IFC, 2012).

Table 6: Intensity, magnitude or severity impact rating

Type of criteria	Negative				
	H- (10)	M/H- (8)	M- (6)	M/L- (4)	L- (2)
Qualitative	Very high deterioration, high quantity of deaths, injury of illness / total loss of habitat, total alteration of ecological processes, extinction of rare species	Substantial deterioration, death, illness or injury, loss of habitat / diversity or resource, severe alteration or disturbance of important processes	Moderate deterioration, discomfort, partial loss of habitat / biodiversity or resource, moderate alteration	Low deterioration, slight noticeable alteration in habitat and biodiversity. Little loss in Species numbers	Minor deterioration, nuisance or irritation, minor change in species / habitat / diversity or resource, no or very little quality deterioration.

7.5 Probability of occurrence

Probability describes the likelihood of the impacts occurring. This determination is based on previous experience with similar projects and/or based on professional judgment (CEAA, 2013).

Table 7: Probability of occurrence impact rating

Low (1)	Medium/Low (2)	Medium (3)	Medium/High (4)	High (5)
Improbable; low likelihood; seldom. No known risk or vulnerability to natural or induced hazards.	Likely to occur from time to time. Low risk or vulnerability to natural or induced hazards	Possible, distinct possibility, frequent. Low to medium risk or vulnerability to natural or induced hazards.	Probable if mitigating measures are not implemented. Medium risk of vulnerability to natural or induced hazards.	Definite (regardless of preventative measures), highly likely, continuous. High risk or vulnerability to natural or induced hazards.

7.6 Significance

Impact significance is determined by combining the various impact characteristics, including intensity/magnitude, duration, probability of occurrence, and scale. The significance of an impact "without mitigation" is used to determine the level of mitigation required. The impact significance for each potential impact is calculated using the formula: $SP = (\text{magnitude} + \text{duration} + \text{scale}) \times \text{probability}$, with a maximum value of 100 significance points (SP). The significance of each potential impact is then rated as high, moderate, or low based on a significance rating scale. This methodology allows for a comprehensive and standardized assessment of the impacts of a project.

Table 8: Significance rating scale

<i>SIGNIFICANCE</i>	<i>ENVIRONMENTAL SIGNIFICANCE POINTS</i>	<i>COLOUR CODE</i>
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	>-60	H

When an impact is identified as having a high significance rating, it is recommended to implement mitigation measures to reduce it to a low or medium rating, as long as the medium impact can be effectively controlled with the suggested mitigation measures. To ensure that the impact remains at a low or medium rating, it is recommended to conduct monitoring for a specific time period to confirm that the impact remains under control and at an acceptable level (World Bank, 2007; Ministry of Environment and Tourism, 2011; International Association for Impact Assessment, 2018).

7.7 Pre-operational Phase Impact Assessment

During the pre-operational phase, the primary focus is on site preparation, which involves activities such as laying pipelines and road installations. This phase may result in potential impacts on the environment, specifically related to biodiversity.

7.7.1 Impact Assessment of Biodiversity Loss

During the pre-operational phase, certain areas on the site for the proposed development will be cleared, which may affect the existing biodiversity in the area. The construction of access roads within the development may also impact the biodiversity in the area. However, since the subject site is not heavily vegetated, the expected impact on biodiversity is not significant enough to cause irreversible damage to the biodiversity and endemism of the area and Namibia in general.

Table 9: Assessment of the impacts of the proposed activities on biodiversity loss

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	M - 2	M - 6	M - 3	M - 30
Post-mitigation	L - 1	L - 1	M/L - 4	M/L - 2	L - 16

7.7.1.1 Mitigations and recommendation to mitigate biodiversity loss

To mitigate potential biodiversity loss during the pre-operational phase, the following measures are recommended:

- Vegetation should only be cleared where necessary, and any removal of protected, endemic, and near-endemic species should be recorded.
- Trees with a trunk size of 150mm or larger should be identified, marked with visible paint, and protected.
- Trees and plants protected under the Forest Act No 12 of 2001 should not be removed without a valid permit from the local Department of Forestry.

7.8 Construction Phase Impact Assessment

The construction phase mainly deals with the potential impacts on the physical and socio-economic environment that are expected to occur during the development's construction phase. Although these impacts are typically temporary, they may have long-lasting effects.

7.8.1 Impact Assessment of Biodiversity Loss

The construction phase of the project has the potential to impact the existing biodiversity at the site. The construction of access roads and installation of services may lead to further disturbances to the biodiversity. However, since the project site has sparse vegetation, the expected impact on biodiversity is not expected to have significant or irreversible impacts on the biodiversity and endemism of the area and the country as a whole.

Table 10: Assessment of the impacts of the proposed activities on biodiversity loss

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L/M - 2	M - 6	M - 3	M - 30
Post-mitigation	L - 1	L - 1	M/L - 4	M/L - 2	L - 12

7.8.1.1 Mitigations and recommendations to address biodiversity loss

The following mitigation measures are recommended to address the potential loss of biodiversity during the construction phase:

- Only clear vegetation where it is deemed absolutely necessary, and if cleared, record the number of protected, endemic, and near-endemic species that are removed.

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- Conduct surveys to identify trees with a trunk size of 150 mm or larger, mark them with visible paint, and protect them.
- Do not remove trees or plants protected under the Forest Act No 12 of 2001 without a valid permit from the local Department of Forestry.

7.8.2 Impact Assessment of Surface and Groundwater Impacts

Improper management of hydrocarbon products and hazardous materials during the construction phase may result in soil and groundwater contamination due to spills and leaks. The resulting impact without any mitigation measures can be classified as having a moderate significance. However, implementing the recommended mitigations will significantly reduce the impact to a low significance rating.

Table 11: Assessment of the impacts of the proposed activities on surface and groundwater

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 3	M - 2	M - 6	M - 4	M - 44
Post-mitigation	L - 1	L - 1	L - 2	M/L - 1	L - 4

7.8.2.1 Mitigations and Recommendations to address surface and groundwater impacts

To prevent soil and groundwater contamination resulting from improper handling, storage, and disposal of hydrocarbon products and hazardous materials during site operations, certain measures must be taken. These include:

- adequate training of personnel responsible for handling and storage, as well as spill prevention and management procedures, such as the use of drip trays.
- Any potential contaminants, such as wastewater, should be properly contained on-site and disposed of in accordance with established standards to prevent contamination of the surrounding soil and groundwater.
- Hydrocarbons and other contaminants should be stored, handled, and managed appropriately, with proper disposal at licensed facilities and documentation of waste manifest.
- Additionally, an emergency plan for major or minor spills during site operations and transportation must be in place, taking into account the potential impacts on air, groundwater, soil, and surface water.
- With these mitigation measures in place, the impact of groundwater contamination can be significantly reduced from a medium to low significance rating.

7.8.3 Impact Assessment of Soil Erosion Impacts

Given the sparse vegetation and other characteristics of the site, there is a high likelihood of soil erosion occurring during the construction phase. If no mitigation measures are implemented, the impact of soil erosion will be of medium significance. However, with the implementation of mitigations, the impact can be significantly reduced to a low rating.

Table 12: Assessment of the impacts of the proposed activities on soil erosion

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	M - 2	M - 6	M - 3	M - 30
Post-mitigation	L - 1	L - 1	M/L - 4	M/L - 2	L - 12

7.8.3.1 Mitigations and recommendations to address soil erosion impacts

To address soil erosion impacts during the construction phase, the following measures should be implemented:

- erosion control methods must be put in place to prevent topsoil loss;
- regular checks should be conducted to detect erosion-prone areas; and
- suitable remedial measures must be carried out wherever soil erosion is observed.

7.8.4 Impact Assessment of Archaeological and Heritage Impacts

The construction activity is not planned in an area with significant archaeological or heritage resources, but if any such resources are found during the rehabilitation process, measures must be taken to protect them. If no mitigation measures are taken, the impact could have a moderate level of significance, but implementing appropriate measures will reduce the impact to a low level.

Table 13: Assessment of the impacts of the proposed activities on Archaeological and Heritage Impacts

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 1	L/M - 4	M - 6	M - 1	M - 11
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L - 4

7.8.4.1 Mitigations and recommendations to address Archaeological and Heritage Impacts

- If any archaeological or heritage resources are found during the rehabilitation activities, work in the affected area must stop immediately.
- The National Heritage Council of Namibia (NHCN) should be consulted for advice on how to remove, package, and transfer the resource.
- Without these mitigation measures, the impact could be rated as "medium" significance, but their implementation will significantly reduce the impact to a "low" rating.
- While the proposed activity is not expected to affect any significant archaeological or heritage resources, precautions must be taken in case any are discovered during the rehabilitation works.
- If this happens, work in the affected area must stop, and the NHCN should be involved in the process of removing, packaging, and transporting the resource.

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— By implementing these measures, the impact on archaeological and heritage resources can be reduced from a "medium" to a "low" significance level

7.8.5 Impact Assessment of Health and Safety

The construction activities carry inherent health and safety risks to the workers present on the site. In the absence of mitigation measures, the impact of these risks can be considered moderately significant. However, after implementing the recommended mitigations, the impact will be reduced to a low rating.

Table 14: Assessment of the impacts of the proposed activities on health and safety

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 1	L/M - 4	M - 6	M - 1	L - 11
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L - 4

7.8.5.1 Mitigations and recommendations to address health and safety impacts

- Construction workers should be provided with awareness training about the risks associated with the proposed construction work such as hydrocarbon handling and storage, the handling of heavy machinery etc.
- During the works conducted, workers should be properly equipped with personal protective equipment (PPE) such as coveralls, gloves, safety boots, safety glasses etc.
- The contractors should comply with the provisions with regards to health and safety as outlined in the Labour Act (No. 6 of 1992).

7.8.6 Impact Assessment of Noise Generation Impacts

Construction activities and the use of vehicles at the site may generate noise that can have negative effects on nearby residents if not properly managed. This may cause disturbance to the local community. Without appropriate mitigation measures, the impact could be considered of moderate significance, but after the implementation of mitigations, it can be significantly reduced to a low rating.

Table 15: Assessment of the impacts of the proposed activities on noise generation

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 1	M - 2	M - 6	M - 3	L - 27
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L - 4

7.8.6.1 Mitigations and recommendations to address noise generation impacts

To address the potential noise generation impacts, several mitigations are recommended. Construction activities should only occur during daytime hours, unless otherwise agreed upon with nearby community members and businesses. Amplified music should not be

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permitted on the site, and noise-reducing technology, such as silencers, should be installed on construction machinery. The use of horns should be limited to necessary safety measures and not used as a general communication tool.

7.8.7 Impact Assessment of Dust Generation Impacts

The presence of construction vehicles and activities can generate dust, which can have negative impacts on local residents and businesses if not managed properly. If no measures are taken to mitigate this impact, it could have a "medium" level of significance. However, with appropriate measures in place, the impact can be significantly reduced to a "low" rating.

Table 16: Assessment of the impacts of the proposed activities on dust generation

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 1	L/M - 2	M - 6	M - 3	L - 27
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L - 4

7.8.7.1 Mitigations and recommendations to address dust generation impacts

The construction activities and the presence of construction vehicles are likely to generate dust, which could negatively affect the local residents and businesses if not adequately managed. If left unmitigated, the impact can be rated as "medium" in terms of significance. However, implementing dust management measures can significantly reduce the impact to a "low" rating.

To address the potential impact, dust abatement techniques such as spraying water on site should be implemented. Continuous consultation with the local community and businesses should be carried out to ensure that the dust levels remain acceptable. Before construction commences, residents and businesses should be informed of the planned activities. During periods of high wind, the contractor should decide to halt construction until conditions improve. To prevent windblown dust, sand stockpiles and transport should be covered with plastic. Workers should be provided with dust masks for personal protection.

7.8.8 Impact Assessment of Waste Generation Impacts

Construction activities typically create waste, which can cause environmental pollution if not appropriately managed. This may lead to water pipelines becoming blocked if waste is blown into them, animals may suffer harm if they ingest waste, and there may be a negative visual impact on the surrounding environment. If no mitigation measures are taken, the impact can be considered moderately significant. However, after implementing the suggested measures, the impact can be greatly reduced to a low rating.

Table 17: Assessment of the impacts of the proposed activities on waste generation

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L - 1	L/M - 2	M/L - 4	M - 4	L - 28
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L - 4

7.8.8.1 Mitigations and recommendations to address waste generation impacts

Construction activities generate waste which can negatively impact the environment if not properly managed. This can result in blocked waterways, visual pollution, and harm to animals. Without mitigation measures, the impact can be considered of medium significance, but implementing mitigations can reduce it to a low rating.

Recommended actions include keeping the site tidy, containing waste and not burying or burning it, providing separate containers for hazardous and general waste, regularly emptying containers and removing waste from site, sensitizing laborers on responsible waste disposal, and considering recycling options. No waste should be left on site after project completion.

7.8.9 Impact Assessment of Temporary Employment Creation

The proposed project could potentially create job opportunities for local people during the construction phase, resulting in a positive impact, albeit of low significance.

Table 18: Assessment of the impacts of the proposed activities on temporary employment creation

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M + 1	L/M + 2	M + 2	M + 3	M + 15
Post-mitigation	L + 4	L + 3	L + 2	L + 3	L + 27

7.8.9.1 Mitigations and recommendations to address temporary employment creation

— Local residents should be given priority for any available job opportunities resulting from the construction project, wherever feasible.

7.9 Operational Phase Impact Assessment

This section of the report evaluates the potential effects that may arise during the operational phase of the project. The main impacts identified include traffic, surface and groundwater, noise, and waste. Additionally, temporary impacts such as dust and noise are also considered.

7.9.1 Impact Assessment of Traffic Impacts

Table 19: Assessment of the impacts of the activities on traffic

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	M - 3	M - 3	M - 6	M - 3	M - 36
Post-mitigation	L/M - 2	L/M - 2	L/M - 4	L/M - 2	L - 16

7.9.1.1 Mitigations and recommendation to traffic

- Mitigations and recommendations to address traffic impacts include measures such as improving sightlines at road junctions, installing formal road crossings, and using speed-reducing interventions like speed bumps at specific road sections.
- To mitigate the potential traffic impacts of the development, recommended measures include improving visibility at road junctions, installing designated road crossings, and implementing speed-reducing methods like speed humps in certain areas.

7.9.2 Impact Assessment of Soil, Surface and Groundwater

This subchapter assesses the potential impacts on surface and groundwater during the operational phase, which may occur especially during the rainy season. The operational activities should be carried out in a way that prevents the contamination of surface and groundwater. The impact without mitigation is considered to be moderately significant, while with mitigation it is expected to be of low significance.

Table 20: Assessment of the impacts of the activities on soil, surface, and groundwater

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	M/H - 4	M/H - 4	M/H - 8	M - 3	M - 48
Post-mitigation	M - 3	L/M - 2	M - 6	L/M - 2	L - 22

7.9.2.1 Mitigations and recommendations to address soil, surface, and groundwater impacts

- Prevent contaminated runoff from entering surface and ground water bodies during operational activities.
- Manage surface water accumulation on site through a suitable storm water management system and treat it appropriately before disposing into the environment.
- Properly manage waste disposal from the activities.

7.9.3 Impact Assessment of Noise

During the operational phase, noise impacts may occur depending on the activities carried out on the properties. However, since the proposed land use is mainly residential, it is expected that noise levels will not be significant if they are properly managed. If no mitigation measures are implemented, the impact is considered to be of medium

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significance, but after implementing the mitigations, the impact will be greatly reduced to a low rating.

Table 21: Assessment of the impacts of the activities on noise

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	M/H - 4	M/H - 4	M/H - 8	M - 3	M - 48
Post-mitigation	M - 3	L/M - 2	M - 6	L/M - 2	L - 22

7.9.3.1 Mitigations and recommendations to address noise impacts

- To address potential noise impacts, the following mitigations and recommendations have been proposed:
- Commercial activities that generate excessive noise levels should not be permitted.
- Activities with a potential noise impact should not operate after 6:00 PM if possible.

7.9.4 Impact Assessment of Waste

Inadequate waste management during the operation phase of the development could result in pollution of the surrounding area, which could lead to environmental degradation. The impact assessment rates the potential impact as "low" before implementing any mitigation measures, and after mitigation, the impact is expected to remain "low."

Table 22: Assessment of the impacts of the activities on waste

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	M/L - 2	M/L - 2	M/L - 4	M - 3	L - 24
Post-mitigation	L - 1	L - 1	L - 2	M/L - 2	L - 8

7.9.4.1 Mitigations and recommendations to address waste impacts

- To mitigate waste impacts, all waste generated on site must be collected and transported to the nearest authorized landfill on a weekly basis.
- Households must comply with the local regulations governing waste disposal.
- Burning or burying of waste material is prohibited on the development site or anywhere else.

7.9.5 Impact Assessment of Hazardous Waste

Improper disposal of hazardous waste at the development site could result in environmental degradation, pollution of the soils, surface and groundwater resources. However, the impact is considered low before mitigation measures are implemented and is expected to remain low after proper mitigation.

Table 23: Assessment of the impacts of the activities on hazardous waste

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L/M - 2	M/H - 8	M - 3	M - 36
Post-mitigation	L - 1	L - 1	M- 6	M/L - 2	L - 16

7.9.5.1 Mitigations and recommendation to hazardous waste

To mitigate the impact of hazardous waste, the following measures should be taken:

- prevent the uncontrolled release of hazardous materials into the environment, implement engineering management controls to minimize the risk, establish prevention and control measures for the use, handling, and storage of hazardous materials, and ensure that employees on-site use appropriate personal protective equipment (PPE).

7.9.6 Impact Assessment of Dust

During the operational activities, there may be a potential for dust generation. The impact is assessed as having a medium significance level before mitigation measures are implemented, and a low significance level after mitigation measures are put in place.

Table 24: Assessment of the impacts of the activities on dust generation

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L/M - 2	M/H - 8	M - 3	M - 36
Post-mitigation	L - 1	L - 1	M- 6	M/L - 2	L - 16

7.9.6.1 Mitigations and recommendation to dust generation

The following are measures to mitigate dust generation:

- Use dust suppression techniques such as water spraying when dust levels become excessive, but waterless methods should be considered during water shortages.

7.9.7 Impact Assessment of Emissions

The activities carried out on the development site may lead to emissions that could affect the air quality in the surrounding area. The significance of the impact before mitigation is evaluated to be "medium," and after mitigation, it is expected to reduce to a "low" rating.

Table 25: Assessment of the impacts of the activities on emissions

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L/M - 2	M/H - 8	M - 3	M - 36
Post-mitigation	L - 1	L - 1	M- 6	M/L - 2	L - 16

7.9.8 Visual Impacts on the loss (and/or relocation) of the wetlands?

The current state of the subject site is mainly undeveloped, but some areas are being developed. Developing the site will cause changes in the visual characteristics of the area, affecting individuals who regularly or occasionally visit the area, especially those who go to the nearby Dunes Mall shopping center and Walvis Bay airport. The impact of the change will depend on how much the individuals valued the initial aesthetic quality of the area. The impact will mostly affect the neighboring property owners and frequent visitors of the area. The pre-mitigation impact is considered "medium" in significance, but it can be reduced to "low" after applying mitigation measures.

The pro proposed pipeline can negatively affect wetlands by decreasing the water table and reducing the availability of water, which can harm plants and animals that rely on the wetland ecosystem. Discharge of water can also be problematic if it introduces pollutants or disrupts the natural flow of water in the wetland. Wetlands are highly sensitive environments, and any alterations to the natural water balance can have significant impacts on the plants and animals that inhabit them. It's important to manage water use and discharge carefully to minimize negative impacts on wetlands.

Table 26: Assessment of the impacts of the activities on visual

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L/M - 2	M/H - 8	M - 3	M - 36
Post-mitigation	L - 1	L - 1	M - 6	M/L - 2	L - 16

7.9.8.1 Mitigations and recommendation to visual

- To reduce the visual impact of the development on the surrounding area, it is recommended to incorporate "green" technologies, such as natural colors, building materials like wood and stone, and indigenous vegetation.
- The use of unpainted structures and minimizing large advertising billboards can also help to prevent visual pollution.
- The aim is to create a more natural and aesthetically pleasing environment within the development while minimizing its visual prominence in the surrounding landscape.

7.9.9 Impact Assessment of Social Environment

Some activities within the proposed development may provide employment opportunities for the local people.

Table 27: Assessment of the impacts of the activities on social environment

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L - 1	L/M - 2	L - 2	M - 3	L - 15
Post-mitigation	L - 2	M- 3	M- 6	M/H - 4	M - 44

7.9.9.1 Mitigations and recommendation to social environment

— Should any job opportunities result it should be made available to the local people in the area.

7.10 Decommissioning Phase

The nature of the proposed activities suggests that they are intended to be permanent and there are no plans for decommissioning in the future. Therefore, there is no discussion of decommissioning impacts for the proposed activity.

8 RECOMMENDATIONS AND CONCLUSION

The most significant potential biophysical effects of the proposed project's pre-operational, construction, operational, maintenance, and decommissioning phases were identified and evaluated. When necessary and practical, appropriate mitigation measures were advised, and the following impacts can be summed up:

8.1 Impacts on biodiversity loss (during pre-operational phase and construction):

There is the possibility of loss of vegetation during the site clearing and construction for the proposed activity. However, the site is sparsely vegetated and thus the impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.2 Impacts on soil, surface and groundwater (during construction and operational phases):

Improper handling, storage and disposal of hydrocarbon products and hazardous materials at the site may lead to soil and groundwater contamination, in case of spills and leakages. The impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.3 Impacts of erosion (during construction phase):

Soil erosion is likely to occur on site given the characteristics of the site and the fact that the site is sparsely vegetated. The impact can be adequately addressed by the recommendations given by the EAP and management actions given in the EMP.

8.4 Impacts on archeological and heritage resources (during construction phase):

The proposed activity is not taking place in an area that has significant archaeological or heritage resources. However, should these be encountered during the rehabilitation

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activities, mitigation measures need to be in place to ensure that these resources are not harmed. The impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.5 Impacts on health and safety (during construction phase):

Construction activities may cause health and safety risks to people operating on the site. The impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.6 Impacts on dust and noise (during construction phase):

Construction activities may increase dust and noise generated around the site area. The impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.7 Impacts on waste (during construction and operation phase):

Improper disposal of waste materials at the site may lead to pollution of the site and resultant environmental degradation. The impact can be adequately addressed by the recommendations and management actions given in the EMP.

8.8 Impact on social environment (during construction and operational phase):

The proposed activity may provide employment opportunities for the local people. The impact can be adequately addressed by the recommendations given and management actions given in the EMP.

8.9 Impact on traffic (during operational phase):

The intended development may have an impact on traffic in the subject area. Traffic is expected to increase within the area, as the area will become increasingly developed. The impact can be adequately addressed by the recommendations given in this Report and management actions given in the EMP.

8.10 visual impact on the loss (and/or relocation) of the wetlands (during operational phase):

During the operational phase of the proposed project, there may be a visual impact due to the loss or relocation of the wetlands. As the current site is mostly undeveloped, the construction of the 2km long pipeline and other facilities will result in a change in the area's visual characteristics. People who visit the area regularly or occasionally, particularly those who frequent the nearby Dunes Mall and transit to Walvis Bay Airport, will notice a change in the sense of place of the area. The extent of this impact will depend on how much they valued the initial aesthetic quality of the area. This impact will mainly affect the surrounding property owners and people who frequently visit the area. The recommendations provided in the report and the management actions suggested in the EMP can effectively address this impact.

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Erongo Consulting Group is confident that the potential risks associated with the proposed development can be mitigated to acceptable levels through the implementation and effective monitoring of the measures recommended in the EMP. Therefore, it is recommended that the project be granted Environmental Clearance on the condition that the EMP is fully implemented.

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9 REFERENCES

Environmental Impact Assessment Report for the Walvis Bay Waterfront Redevelopment Project, Aurecon Namibia (Pty) Ltd, July 2014.

Geological Survey of Namibia. (2011). Geology of Namibia. Windhoek, Namibia: Ministry of Mines and Energy.

Jürgens, N., & Bürger, B. (2015). Namibia's top 100 red data species: A celebration of biodiversity. Windhoek, Namibia: Gondwana Collection Namibia.

Ministry of Agriculture, Water and Forestry Namibia. (2010). Overview of Namibia's water resources management: Policies, practices and challenges. Windhoek, Namibia: Ministry of Agriculture, Water and Forestry.

Ministry of Agriculture, Water and Land Reform. (2020). National Water Resources Status Report 2020. Windhoek, Namibia: Directorate of Water Resources Management.

Ministry of Environment and Tourism Namibia. (2012). National ambient air quality management plan. Windhoek, Namibia: Ministry of Environment and Tourism.

Ministry of Environment, Forestry and Tourism. (2016). State of the Environment Report for Namibia 2016. Windhoek, Namibia: Directorate of Environmental Affairs.

Namibia Meteorological Service. (2014). Climate normals and extremes for Walvis Bay Airport. Windhoek, Namibia: Ministry of Works and Transport.

ONLINE RESOURCES CONSULTED

Walvis Bay Municipal Council. (2018). Integrated Urban Spatial Development Framework (IUSDF) for Walvis Bay. <http://www.walvisbaycc.org.na/sites/default/files/2018-03/Walvis%20Bay%20Integrated%20Urban%20Spatial%20Development%20Framework%202018.pdf>

Namibia Statistics Agency. (2019). Namibia 2011 Population and Housing Census Main Report. <https://cms.my.na/assets/documents/p19dptss1q4tjg9sm9jnj0s1s1nv.pdf>

MEFT Reference: #230212000987

Walvis Bay Corridor Group. (2020). Erongo Regional Profile.
<http://www.wbcg.com.na/assets/uploads/Erongo-Regional-Profile-2020.pdf>

Namibia Chamber of Commerce and Industry. (2019). Investment Opportunities in the Erongo Region of Namibia. <https://www.ncci.org.na/wp-content/uploads/2019/02/Investment-Opportunities-in-the-Erongo-Region.pdf>

EPA, 2016. Guidelines for Preparing Economic Analyses.
<https://www.epa.gov/environmental-economics/guidelines-preparing-economic-analyses>)

IFC, 2012. Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts.
https://www.ifc.org/wps/wcm/connect/8800e400485c11bb9b5effeb281bff1d/PS1_0.pdf?MOD=AJPERES&CVID=mM0k6mi)

CEAA, 2013. Practitioner's Guide to the Canadian Environmental Assessment Act.
<https://www.ceaa-acee.gc.ca/050/documents/p63924/87931E.pdf>)

Namibia Statistics Agency. (2020). Erongo Region Profile 2018/2019. Retrieved from
https://www.nsa.org.na/files/downloads/e84_ERONGO_Region_Profile_2018_19.pdf

The Namibian. (2018, December 4). Erongo regional economy booming. Retrieved from
<https://www.namibian.com.na/74555/read/Erongo-regional-economy-booming>

United Nations Environment Programme. (2002). Environmental Impact Assessment Training Resource Manual.
Link: https://wedocs.unep.org/bitstream/handle/20.500.11822/7762/EIA_Training_Resource_Manual.pdf?sequence=1&isAllowed=y

International Association for Impact Assessment. (2018). IAIA 19 Conference Proceedings.
Link: <https://conferences.iaia.org/2018/proceedings/IAIA%2019%20Proceedings.pdf>

Ministry of Environment and Tourism. (2011). Guidelines for Environmental Impact Assessment in Namibia.
Link: https://www.mme.gov.na/files/downloads/fe51_guidelines_for_environmental_impact_assessment_in_namibia.pdf

World Bank. (2007). Good Practice Note: Public Consultation and Disclosure for Environmental Assessments.
Link: <https://siteresources.worldbank.org/INTPSIA/Resources/490023-1205330693272/GPNPublicConsultationandDisclosureFINAL.pdf>

