Environmental Impact Assessment for Halliburton's proposed Liquid Mud Treatment and Completion Fluid Plant

Final Scoping Report

HALLIBURTON

Prepared by:

SLR Environmental Consulting (Namibia) (Pty) Ltd

SLR Project No.: 733.023082.00001

August 2, 2024

Revision: 00
Report No.: 03

Name of applicant: Halliburton Industries Limited
Tel no: +264 813 671 756
Postal address: 7th Floor, Metje Behnsen Building, Windhoek
Physical address: 7th Floor, Metje Behnsen Building, Windhoek
MEFT reference number: 20240508003558

Title	Environmental Impact Assessment for Halliburton's proposed Liquid Mud Treatment and Completion Fluid Plant
Project Manager	Ndomupei Masawi
Project Manager Email	nmasawi@slrconsulting.com
Author	Ndomupei Masawi and Njabulo Mzilikazi
Reviewer	Sue Reuther and Jeremy Blood
Keywords	Environmental Clearance Certificate, Environmental Impact Assessment, Environmental Management Plan, Liquid Mud Treatment and Completion Fluid
Status	Final
Report No.	03
SLR Company	SLR Environmental Consulting (Namibia) (Pty) Ltd

Revision Record

Revision	Date	Prepared By	Checked By	Authorized By
00	2 August 2024	Njabulo Mzilikazi and Ndomupei Masawi	Jeremy Blood	Ndomupei Masawi

Report Sign Off and Approvals

Ndomupei Masawi **Sue Reuther**

Basis of Report

This document has been prepared by an SLR Group company with reasonable skill, care, and diligence, and taking account of the timescales and resources devoted to it by agreement with Halliburton Industries Limited (the Client) as part or all of the services, it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

SLR shall not be liable for the use of or reliance on any information, advice, recommendations, and opinions in this document for any purpose by any person other than the Client. Reliance may be granted to a third party only in the event that SLR and the third party have executed a reliance agreement or collateral warranty.

Information reported herein may be based on the interpretation of public domain data collected by SLR, and/or information supplied by the Client and/or its other advisors and associates. These data have been accepted in good faith as being accurate and valid.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

The copyright and intellectual property in all drawings, reports, specifications, bills of quantities, calculations, and other information set out in this report remain vested in SLR unless the terms of appointment state otherwise.

This document may contain information of a specialised and/or highly technical nature and the Client is advised to seek clarification on any elements which may be unclear to it.

Information, advice, recommendations, and opinions in this document should only be relied upon in the context of the whole document and any documents referenced explicitly herein and should then only be used within the context of the appointment.

Executive Summary

This Executive Summary provides a synopsis of the Scoping Report compiled as part of the Environmental Impact Assessment process (EIA) that is being undertaken for an Environmental Clearance Certificate (ECC) application process for a proposed Liquid Mud Treatment and Completion Fluid Plant (LMTP) Project.

Project Background

Halliburton Industries Limited (Halliburton) provides a range of products and services to the energy industry, specialising in oil and gas exploration, drilling, and production, as well as engineering and construction services. Halliburton is proposing to construct and operate a LMTP at Berth 8 in the Port of Walvis Bay, Namibia (hereafter referred to as the proposed Project). See Figure ES-1-1 and Figure ES-1-2. The LMTP will provide drilling and completion fluids to operators currently exploring for oil and gas offshore southern Namibia.

Motivation for the proposed Project

The Proposed LMTP will provide drilling and completion fluids to the operators currently exploring for oil and gas offshore southern Namibia. Drilling fluid is a complex mixture of fluids, solids and chemicals that are carefully tailored to provide the correct physical and chemical characteristics required to safely drill the well. Thus, the proposed Project directly supports the current exploration operations off southern Namibia and potentially future production well drilling. At the national level, the motivation for the proposed Project is economic and strategic in nature as it will contribute to the government's efforts of exploring for oil and gas and potentially meeting its the oil and gas needs. The potential national and regional level socio-economic benefits of the proposed Project include:

- Investment: The capital costs for the proposed Project are approximately USD10.5 million.
- Taxes: The proposed Project will contribute to Namibia's economy through taxes and royalties.
- Employment: At the local level, the proposed Project is expected to have a positive socio-economic benefit through employment of locals, particularly for unskilled and semi-skilled labour (up to 22 people during peak operation). Although specialist and skilled labour may be recruited outside the local boundaries due to the skills scarcity, local communities will benefit through on-the-job training leading to skills development and transfer. Skills development is a requisite for human resource development and will have a lasting impact on the local economy. The proposed Project will support local development through:
- Hiring nationals from local communities, schools / universities;
- Skill training for the local people;
- Support local businesses:
    - Purchase of products and equipment when available locally; and
    - Use of local contractors on project (e.g. WESCO) and support the development of their skills/portfolio if possible.

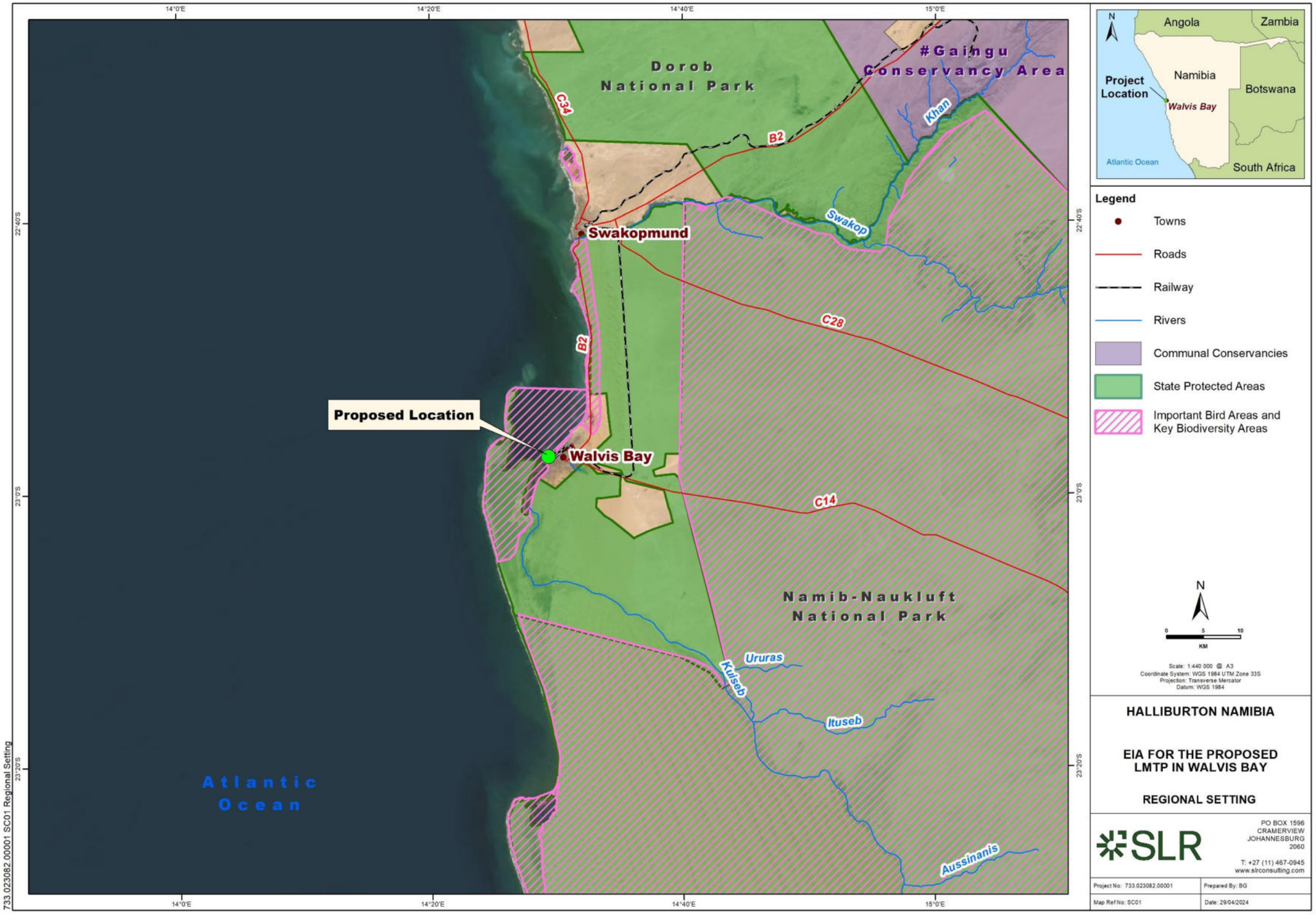


Figure ES-1-1: Regional Setting

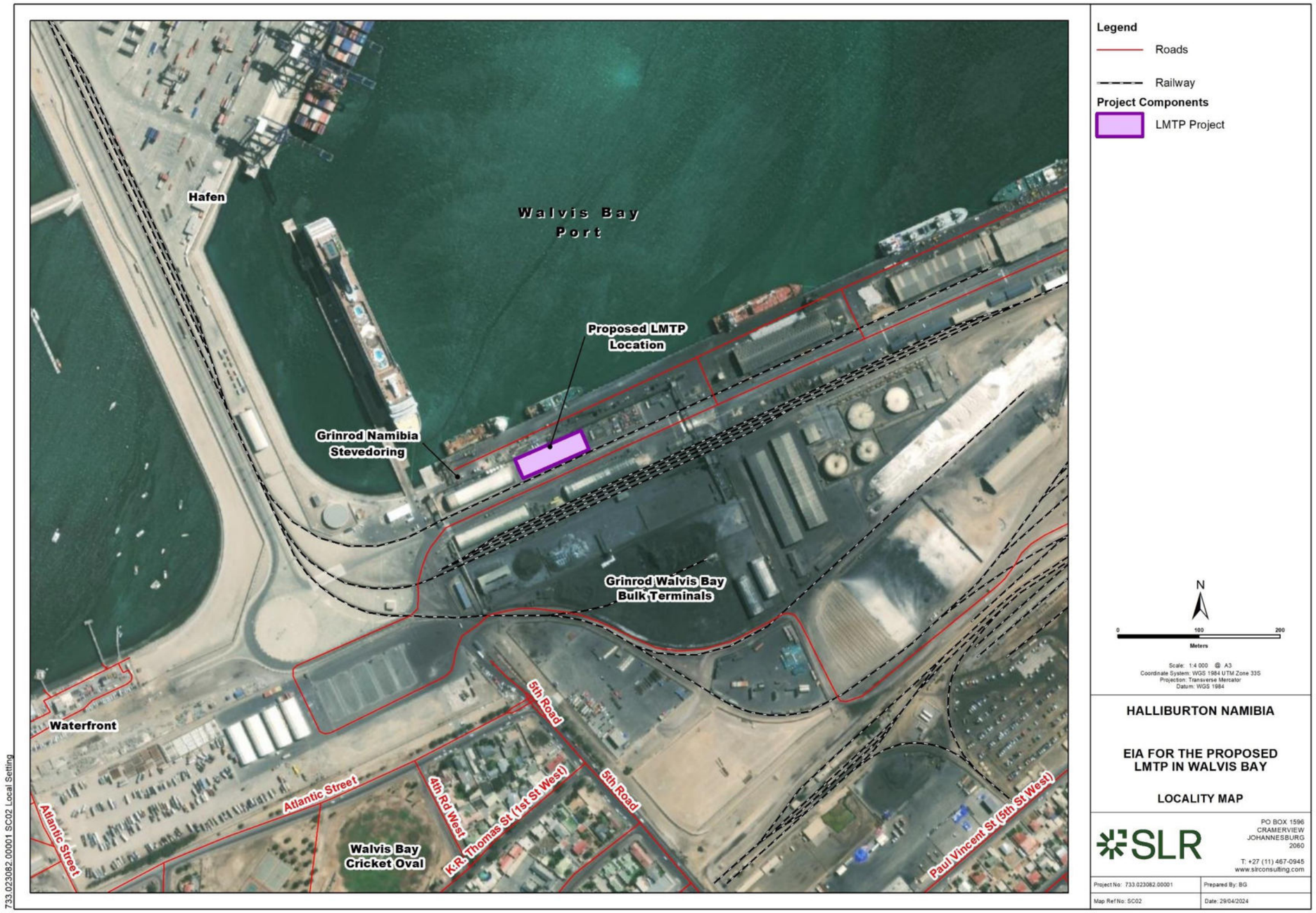


Figure ES-1-2: Local Setting

Project Description Overview

The LMTP and associated components will occupy an area of approximately 2 000 m^2 and will be comprised of the following four components which are also shown in Figure ES-1-3:

- A warehouse, where inputs required in the processes (fluid mixing, reconditioning and bulking operations) and resulting products will be stored. Figure ES-1-4 shows an example of a typical warehouse structure with storage areas.
- A liquid bulk area, which will be for mixing new drilling fluids (or drilling muds) and reconditioning used fluids (treatment of "waste"), where these fluids will be stored in horizontal tanks. The types of fluids housed include synthetic and water-based drilling fluids, brine completion and base fluids. An example of fluid mixing tanks typically used is shown in Figure ES-1-5. The liquid bulk area will consist of 38 horizontal stackable tanks and two mixing fluid tanks.
- A dry bulk area, where the bulking of raw materials (chemicals), such as barite, bentonite, and calcium carbonate, will be undertaken. These raw materials will be stored in large bags and then emptied into vertical bulk storage silos from where they will be transferred into supply vessel storage tanks (see Figure ES-1-6) through hoses. The products are then transferred from supply vessel storage tanks to the drilling unit's bulk tanks for offshore mixing of drilling fluids. The dry bulk area will consist of four Dry Bulk Silos with a capacity of approximately 12 600 ft^3 (approximately 357m^3).
- A laboratory unit, where the fluids mixed at the LMTP and those received back from the drilling unit are analysed and quality controlled. The laboratory also provides engineering and support to operations offshore. The laboratory will be in a form of a dedicated lab container with a footprint of approximately 40 m^2.

It is estimated that the LMTP will require approximately 3.8 mega litres of water and 115 000 litres of diesel on a quarterly basis (every three months). It must be noted that the utility requirements at the LMTP are highly dependent on the activity levels and the types of fluids being produced for a particular customer (drilling contractor). These utility requirements will, therefore, fluctuate depending on the varying output from the LMTP. Diesel and electricity usage will depend on access to the local grid or whether onsite generation through the two dedicated LMTP generators is required. It is currently estimated that 45 000 kilowatt hours (kWh) of electricity will be required. Hazardous and non-hazardous waste will be managed by a separate and accredited company.

Project Alternatives

The site was identified by NAMPORT as the only suitable site due to its short distance from the jetty, where the product from the LMTP will be loaded onto vessels. The LMTP products will be pumped from the LMTP to the jetty, and pumping fluids over a longer distance would be a challenge. If the LMTP is installed far from the jetty, the pressure loss will be high and result in unsafe working conditions. Furthermore, operations will be unfeasible due to the additional costs of pipelines and civil work. The "no project" option, which represents the option not to proceed with the proposed Project leaving the Project area in its current state (i.e. a working port) is also considered. If the proposed Project does not proceed, the residual impacts (i.e., impacts after implementation of mitigation measures) of the activities will not occur. Even if the proposed Project does not proceed, the site is likely to be used for other port-related or industrial activities, leaving the Project area subject these potential activities and associated impacts, which are likely to be no less significant than that associated with the proposed Project.

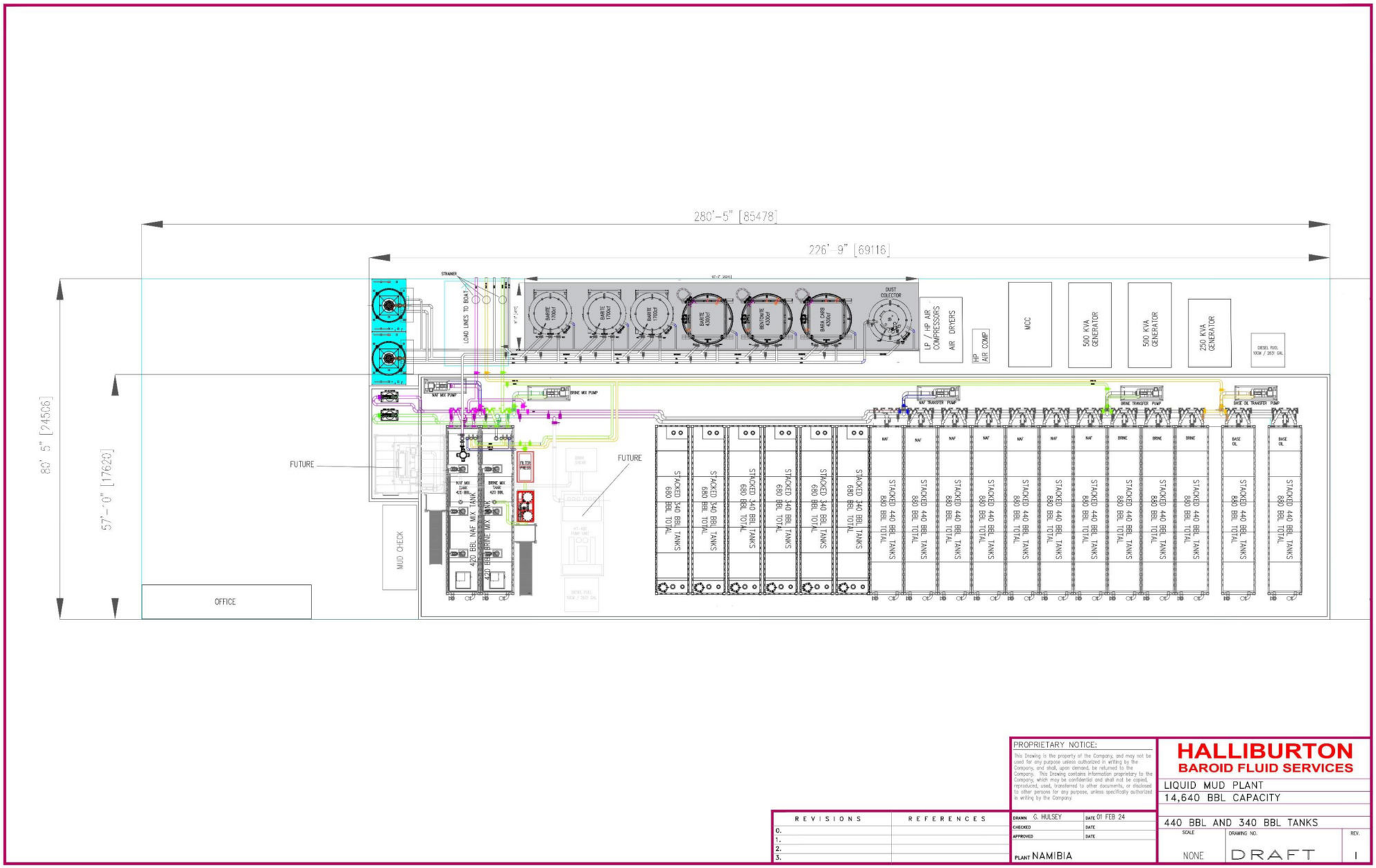


Figure ES-1-3: Site Layout

Figure ES-1-4: Example of a warehouse (Source: Halliburton, 2024)

Figure ES-1-5: Example of fluid mixing tanks (Source: Halliburton, 2024)

Figure ES-1-6: Example of horizontal storage tanks (Source: Halliburton, 2024)

EIA and Public Consultation Process

The proposed Project triggers activities listed in Government Notice (GN) No. 29 of the EIA Regulations of 2012, promulgated in terms of Section 56 of the Environmental Management Act, 2007 (GN No. 30 of 2007) (EMA), and, therefore, requires an Environmental Clearance Certificate (ECC) from the Ministry of Environment, Forestry and Tourism (MEFT) (regulatory authority) and subject to a recommendation from the Ministry of Mines and Energy (MME) (competent authority).

The EIA process being undertaken is aligned with that specified by MEFT in its environmental screening notice. In this regard. A Scoping Report, with an Environmental Management Plan (EMP), is being prepared as part of the ECC application for the proposed Project.

The application and granting of the ECC process thus consists primarily of two phases: (1) Project Initiation Phase, and (2) the Scoping and Impact Assessment Phase. Figure ES-1-7 provides an illustration of the EIA process followed.

During the Project Initiation Phase the following key tasks were undertaken:

- Pre-application authority consultation was held with the MEFT.
- An initial stakeholder database was compiled based on previous projects undertaken in the area. This database will be continuously maintained throughout the EIA process.
- Notification of the proposed Project and EIA process were advertised (in English and Afrikaans) and site notices were placed around the project site.
- A Background Information Document (BID) was prepared and released for a 21-day review and comment period between May and June 2024. No comments were received during the project initiation phase other than requests to be registered as an interested and affected party (I&AP) and receive Project information.

Based on the findings of the screening process, three specialist studies were commissioned, and a Draft Scoping Report (with EMP) was compiled for the proposed Project. The Draft Scoping Report (including an EMP) was distributed for a 14-day comment period from **17 to 31 July 2024**.

No comments were received from interested and affected parties (I&APs). This Final Scoping Report (with EMP) has been submitted to MME for consideration and review. The MME is then required to make a recommendation on the acceptance or rejection of the report to the MEFT, who will make the final decision on the ECC application. All registered I&APs will be notified of MEFT's decision.

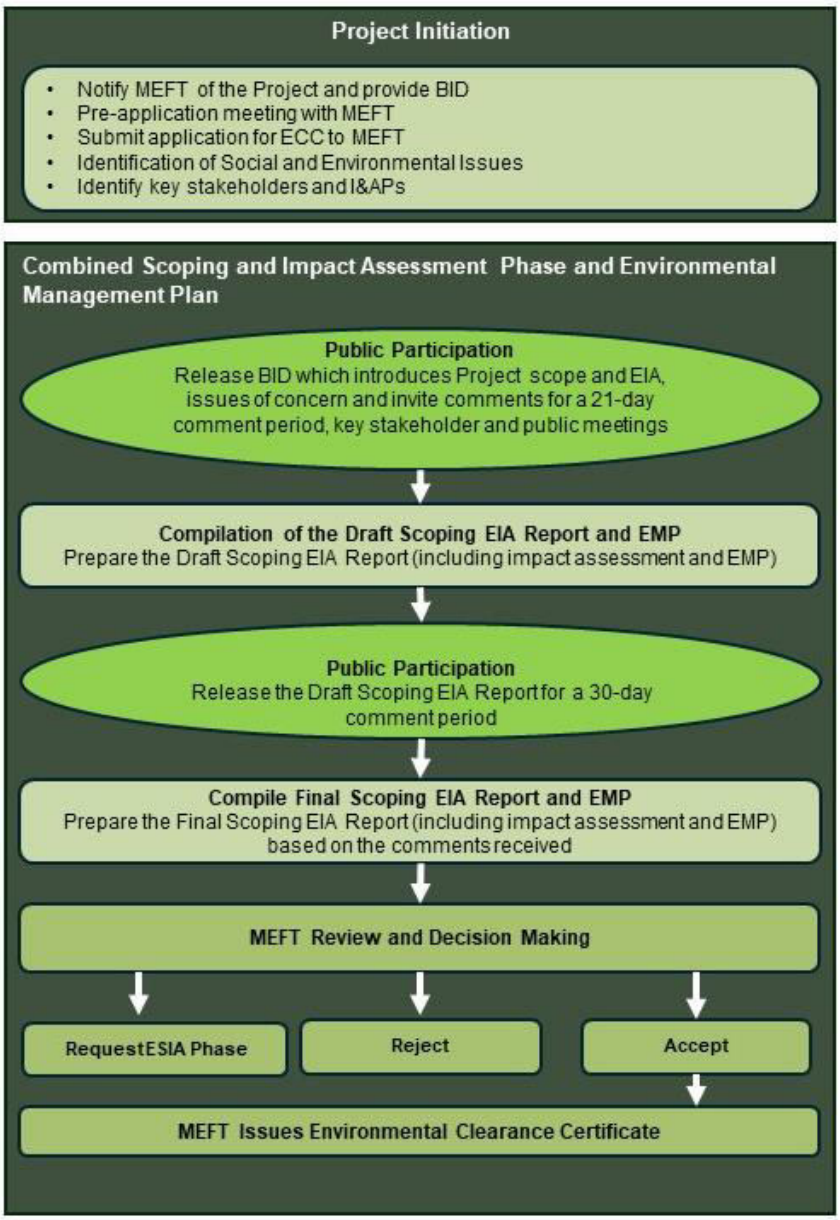


Figure ES-1-7: EIA Process Followed

Profile of the Receiving Environment

Baseline information for this Scoping Report was sourced through desktop analysis, information contained in the Namport EMP, assessments undertaken for other similar projects in the area, as well as from the three specialist impact assessments conducted as part of the current EIA process.

A general description of the status quo of the receiving environment in the project area serves to set the scene and provide context to the area within which the impact assessment was conducted. A summary of the main baseline aspects is included in Table ES 1-1, with more detail included in Section 7.0 of the report.

It is noted that the proposed Project site is located in an area that has been completely transformed and heavily impacted by anthropogenic activities associated with the Namport.

The area is entirely artificial comprising concrete walls (berths) and protective rock armour.

Table ES 1-1: Summary of the Profile of the Receiving Environment

Aspect	Description
Climate	The Erongo Region, located in the western part of Namibia, falls within the west coast arid zone of southern Africa, and is characterised by low rainfall, extreme temperatures. The climate of the area is characterised by: • The average yearly temperatures around 18 °C to 19 °C, with the highest temperature rarely exceeding 30 °C and the lowest seldom falling below 5 °C. • The average annual rainfall is less than 50 mm, with a 100% fluctuation in yearly rainfall.
Topography	The proposed Project is located in an existing port, which was originally characterised by flat coastal plains. Walvis Bay has a unique topography in that some portions of the town lie below sea level and the town is protected from flooding by a dyke. The elevation in the study area increases from 5 metres below sea level to approximately 30 metres above mean sea level (mamsl). Slopes across the study area are flat and gentle.
Surface water	The port is subjected to tides, sea level, waves, ocean current and tidal current. Understanding the surface water resources enables planning for water management during all phases of the Proposed Project. The cold Benguela Current flows in a north-westerly direction along the coastline of Namibia. This environment is known for being a corrosive environment, given the salt-laden fog, episodic winds and aggressive salts abundant in the soil. The presence of high moisture and salt content in the surface soil can result in the fast deterioration of metal and concrete structures. As such, the harsh nature of the seafront and the proximity of the proposed Project to this environment requires planning in terms of building materials and maintenance so as to prevent degradation and safety hazards in the construction and operations. The water and sediment quality in the vicinity of the Walvis Bay is generally poor due to: • fish factories and processing plants in Walvis Bay which are discharging contaminated effluent; • the use of antifouling paints containing Tributyltin (TBT); • ships anchored at port limits (illegally) disposing of litter and solid waste; • dredging activities (maintenance and capital) through temporary increases in suspended sediment concentrations and possibly remobilising toxins from anaerobic sediments; and • loading operations leading to spillages of bulk ores, discharges from ships and dusts and particulates from ship repair and maintenance.
Biodiversity	The proposed Project area is associated with the following: • Ecosystems: The coastline around Walvis Bay is characterised by wind-induced upwelling characterising the Benguela ecosystem, which is characterised by the presence of cold surface water, high biological productivity, and highly variable physical, chemical, and biological conditions.

Aspect	Description
	• Marine habitats: The proposed Project area lies within the Kuiseb Lagoon Coast habitat, which is classified as endangered. It must be emphasized that the intertidal habitat within the Walvis Bay harbour, and in the immediate vicinity of the proposed LMTP, are entirely artificial comprising concrete walls (berths) and protective rock armour. • Fauna: The fauna associated with the proposed Project area includes benthic communities, nearshore fish communities, pelagic communities including seals dolphins, whales and turtles, as well as avifauna associated with the Walvis Bay Important Bird Area (IBA). • Conservation Areas and Marine Protected Areas (MPAs) associated with the proposed Project area include the Walvis Bay wetland, the Namib Flyway Ecologically or Biologically Significant Area (EBSA), and the Walvis Bay Wetlands IBA.
Noise	The Port of Walvis Bay is an Industrial area with no restrictions on operational hours. Noise-generation activities and equipment contributing to noise pollution include industrial and manufacturing machinery, heavy vehicles, loading and offloading of containers, construction, forklifts and other plant.
Air Quality	Port-affiliated activities are a key source of air pollution in Walvis Bay with dust from the handling of dry bulk cargos (e.g. manganese) and grit blasting from shipyards, identified by Namport (2023) as the major contributor to air pollution. The proposed LMTP site is adjacent to the cruise passenger terminal but between the Grindrod Bulk Terminal and the berth. Exhaust emissions from ocean-going vessels visiting the port (during manoeuvring and hoteling) and the unloading and loading of petroleum products are also recognised as key emission sources for port operations. Air quality sensitive receptors identified around the project site include medical facilities, recreational facilities, schools, and a nature reserve.
Visual	The port has an existing industrial visual character, with tenants of different industries and commercial activities situated within the port. The predominant land use in the area (industrial land use) has significantly transformed the Namib Desert's and the wetland area's natural visual landscape. The industrial development and the surrounding urban built form in Walvis Bay have resulted in a high degree of visual degradation. The industrial character of the landscape is an important factor in this context, as the introduction of the proposed LMTP would result in less visual contrast where other similar industrial activities are already present, especially where the scale of those activities is similar to that of the proposed development. The visual absorption capacity in the study area is rated as High. Fifteen visual sensitive receptors were identified and included residences and leisure-based tourist facilities and the gathering area where passengers assemble prior to boarding cruise liners cruise line gathering area.
Socio-economic	The proposed Project falls within the Erongo Region of Namibia. The Erongo Regional Council's strategic development plan for the period 2017/18 - 2021/22 highlights several socio-economic activities in Walvis Bay, including: • Port Operations;

Aspect	Description
	• Fishing industry; • Industrial zone; and • Tourism. In 2011, of the 62 096 people living in Walvis Bay, approximately 70% of persons over the age of 15 years (economically active) were employed. The average household size in the Erongo Region is 3.3 persons, with 72.8% of those households relying on wages and salaries as a main source of income. In 2018, the Labour Force survey found that the Erongo Region had the lowest unemployment rate (30%) compared to other regions. Manufacturing is the main industry (13.8%) in Erongo Region, followed by mining and quarrying (11.7%), and agriculture, forestry, and fishing (11.5%). The private sector provides work for the largest proportion of employees (68.1%) in Erongo Region, followed by Government (8.9%) and parastatals (8.3%). The Erongo Regional Council's Strategic Plan identifies several key issues in the region, including: • Infrastructure: Addressing infrastructure gaps to support economic growth and development. • Housing: Ensuring affordable housing for residents. • Disaster Management: Strengthening emergency and disaster management. • Human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS): Mitigating the impacts of HIV and AIDS. The plan proposes strategies such as investment in infrastructure, housing development projects, disaster preparedness, and healthcare programs to tackle these issues.
Traffic	Traffic generated by the LMTP has the potential to affect the capacity of existing road networks, as well as result in public road safety issues. To understand the basis of these potential impacts in the context of the project activities, a baseline situational analysis is described below. Walvis Bay is accessible from central Namibia by two Roads, the tarred B2 main road and the M36. There are access roads provided for within the Namport area that Halliburton will make use of.

Aspect	Description
Land use	The proposed Project area is situated within the Port of Walvis Bay, which houses a commercial harbour, centrally located on the west coast of Namibia. The port handles fuel and vehicle imports, and passenger traffic from cruise liners, and offers support and logistics services that range from ship repair and maintenance, various storage facilities, small craft harbour, to fishing operations and mariculture. The expansion of the Walvis Bay port has led to an increase in cruise liners visiting the area. A new container terminal was constructed, complete with a dedicated berth for cruise vessels. This berth can accommodate ships up to 300 m in length, with a draft of 11 m. This enhances the port's capacity for handling passenger traffic and allows Namport to divert passenger activity away from the central hub of the port, specifically berths one to eight. Ultimately, Berth 8 of the Port of Walvis Bay, identified by Namport as an ideal location for the LMTP, is a suitable location aligned with the activities of the designated area

Specialist Studies

The following site-specific specialist studies were undertaken during the impact assessment phase to address the impacts of significant relevance:

- Marine Ecology Impact Assessment;
- Air Quality Impact Assessment; and
- Visual Impact Assessment;

The full specialist studies are attached in Appendix H of this Scoping Report.

Quantification of Impacts

The anticipated impacts associated with the proposed Project were assessed according to SLR's standardised impact assessment methodology which is presented in Section 2.2.2.4 of the main report. The impact assessment methodology enables the assessment of biophysical, cultural, and socio-economic impacts including cumulative impacts and impact significance through the consideration of intensity, extent, duration, and the probability of the impact occurring. Consideration is also given to the degree to which impacts may cause irreplaceable loss of resources, be avoided, reversibility of impacts and the degree to which the impacts can be mitigated.

The impact assessment found that all the potential impacts can be mitigated to be within **low, very low and insignificant significance** rating. A summary of the EIA is provided in Table ES 1-2.

Table ES 1-2: Summary of the Findings of the Environmental Impact Assessment

Environmental Aspect	Issue/Benefit	Relevant Project Phase			Significance Rating Impact Assessment	
		Construction	Operation	Decommissioning and Closure	Unmitigated Scenario	Mitigated Scenario
BIOPHYSICAL	Coastal and underwater noise and vibration levels impacting marine communities	X	X	X	Very low	Insignificant
	Contamination of marine waters	X	X	X	Medium	Very low
	The smothering of macrofauna by barite and bentonite		X		Very low	Insignificant
	Biochemical impacts of accidental spillage of drilling muds on benthic communities		X		Very low	Insignificant
	Impacts of increased turbidity on marine ecology	X	X	X	Insignificant	Insignificant
	Indirect biochemical impacts in the sediments		X		Low	Insignificant
	Increase in ambient air concentrations affecting sensitive receptors	X			Medium	Low
			X		Medium	Low
				X	Low	Very low
	Increase in disturbing noise levels affecting sensitive receptors	X	X	X	Low	Insignificant
SOCIO-ECONOMIC	Alteration of the visual environment affecting sense of place	X			Very low	Very low
			X		Low	Very low
				X	Very low	Insignificant
	Contribution to the national, regional, and local economy	X	X	X	Medium	Medium
	Job creation and skills development and transfer	X	X	X	Medium	Medium
	Impacts relating to traffic	X	X	X	Low	Very low

Environmental Aspect	Issue/Benefit	Relevant Project Phase			Significance Rating Impact Assessment	
		Construction	Operation	Decommissioning and Closure	Unmitigated Scenario	Mitigated Scenario
	Impacts relating to improper waste management				**Medium**	**Very low**
	Impacts relating to decommissioning and closure	X	X	X	**Low**	**Very low**

Mitigation

All negative environmental and social impacts identified will be managed and mitigated to acceptable levels, whilst the positive impact will be enhanced to realise the potential positive impacts through the implementation of the commitments stipulated in the EMP. Halliburton will be responsible for ensuring that all environmental and social obligations pertinent to the proposed Project are met. The implementation of the EMP and meeting of the environmental objectives and targets are also the responsibility of Halliburton.

An EMP specific to the Halliburton LMTP Project has been prepared and attached in Appendix I. The EMP contains specific management measures recommended by the specialists that should be implemented.

Way Forward

The following activities will be undertaken:

- The Final Scoping Report, inclusive of all stakeholder cmments and responses) is submitted to MEFT for final decision making; and
- Following the approval of the Scoping Report, an ECC will be issued allowing the Halliburton LMTP Project to proceed.

Environmental Statement and Conclusion

SLR has managed the ECC application process and undertaken the associated EIA for the proposed LMTP in accordance with the requirements of the EMA and the EIA Regulations 2012. This has included a public participation process which has sought to identify stakeholders, provide these parties with an adequate opportunity to participate in and comment on the EIA documents prepared for the proposed Project.

It is anticipated that it will be possible to successfully mitigate all of the environmental impacts to acceptable levels and the implementation will be monitored and audited to determine the effectiveness of the measures implemented.

No fatal flaws/aspects or red flags have been identified that could render this proposed project unfeasible and impractical. Therefore, it is SLR's opinion that, based on the findings of the EIA process, **there is no reason why the proposed development may not continue subject to the recommended mitigation measures being implemented.** The proposed Project should be allowed to proceed, given the relatively small potential contribution of the project to cumulative impacts (given the implementation of the appropriate recommended environmental management measures) and also considering the positive social and economic benefits associated with the project.

Table of Contents

Tables in Text

Figures in Text

Photos in Text

List of Appendices

Acronyms and Abbreviations

AIDS	acquired immunodeficiency syndrome
AQMP	air quality management plan
BAT	Best Available Techniques
BID	Background Information Document
BTEX	benzene, toluene, ethylbenzene and xylene
CO	carbon monoxide
COD	chemical oxygen demand
CVs	Curricula Vitae
DEA	Department of Environmental Affairs
DEM	Digital Elevation Model
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Associated of South Africa
EBSA	Ecologically or Biologically Significant Area
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMA	Environmental Management Act, 2007 (No. 7 of 2007)
EMP	Environmental Management Plan
GIS	Geographic Information System
GN	Government Notice
GNR	Government Notice Regulation
HDPE	high-density polyethylene
HIV	Human immunodeficiency virus
IAIAsa	International Association for Impact Assessment South Africa
IBA	Important Bird Areas
IBCs	intermediate bulk containers
ITCZ	Intertropical Convergence Zone
LMTP	Liquid Mud Treatment and Completion Fluid Plant
MBL	Marine Boundary Layer
MEFT	Ministry of Environment, Forestry and Tourism
MME	Ministry of Mines and Energy
MPA	Marine Protected Areas
NADFs	Non-aqueous drilling fluids
NAMPORT	Namibian Ports Authority

NDP	National Development Plan
PCP	Public Consultation Process
PM	Particulate Matter
PoS	Plan of Study
Ro-Ro	roll-on/roll-off
SACNASP	South African Council for Natural Scientific Professions
SAH	South Atlantic High
Scoping Report	This report and its Appendices A-I
SLR	SLR Environmental Consulting (Namibia) (Pty) Ltd
SMME	Small, Medium, and Micro-sized Enterprises
TBT	Tributyltin
ToR	Terms of Reference
USD	United States Dollar
VOCs	Volatile Organic Compounds
WBMs	Water-Based Muds

1.0 Introduction

This section provides a brief description of the proposed Project background, purpose of the report and describes the structure of the report.

1.1 Project Background

Halliburton Industries Limited (Halliburton) provides a range of products and services to the energy industry, specialising in oil and gas exploration, drilling, and production, as well as engineering and construction services. Halliburton is proposing to construct and operate a Liquid Mud Treatment and Completion Fluid Plant (LMTP) at Berth 8 in the Port of Walvis Bay, Namibia (hereafter referred to as the proposed Project). The LMTP will provide drilling and completion fluids to operators currently exploring for oil and gas offshore southern Namibia. Figure 1-1 and Figure 1-2 provide the locality maps for the proposed Project.

The proposed Project triggers activities listed in Government Notice (GN) No. 29 of the Environmental Impact Assessment (EIA) Regulations 2012, promulgated in terms of Section 56 of the Environmental Management Act, 2007 (GN No. 30 of 2007) (EMA) and, therefore, requires an environmental clearance certificate (ECC) from the Ministry of Environment, Forestry and Tourism (MEFT) (regulatory authority) before these activities can commence. An EIA process must be undertaken in order for MEFT, and the Ministry of Mines and Energy (MME) (as the competent authority), to consider an ECC application.

Halliburton has appointed SLR Environmental Consulting (Namibia) (Pty) Ltd (SLR) to manage the ECC application and undertake the associated EIA process for the proposed Project.

1.2 Purpose of this Report

This Draft Scoping Report has been prepared in compliance with Section 8 and 15(2) of the EIA Regulations 2012 as part of the EIA that is being undertaken for the proposed Project.

This Final Scoping Report has been submitted to the MME for consideration and review. In terms of Section 32 of the Environmental Management Act, 2007, MME is then required to make a recommendation on the acceptance or rejection of the report to MEFT, who will make the final decision on the ECC application.

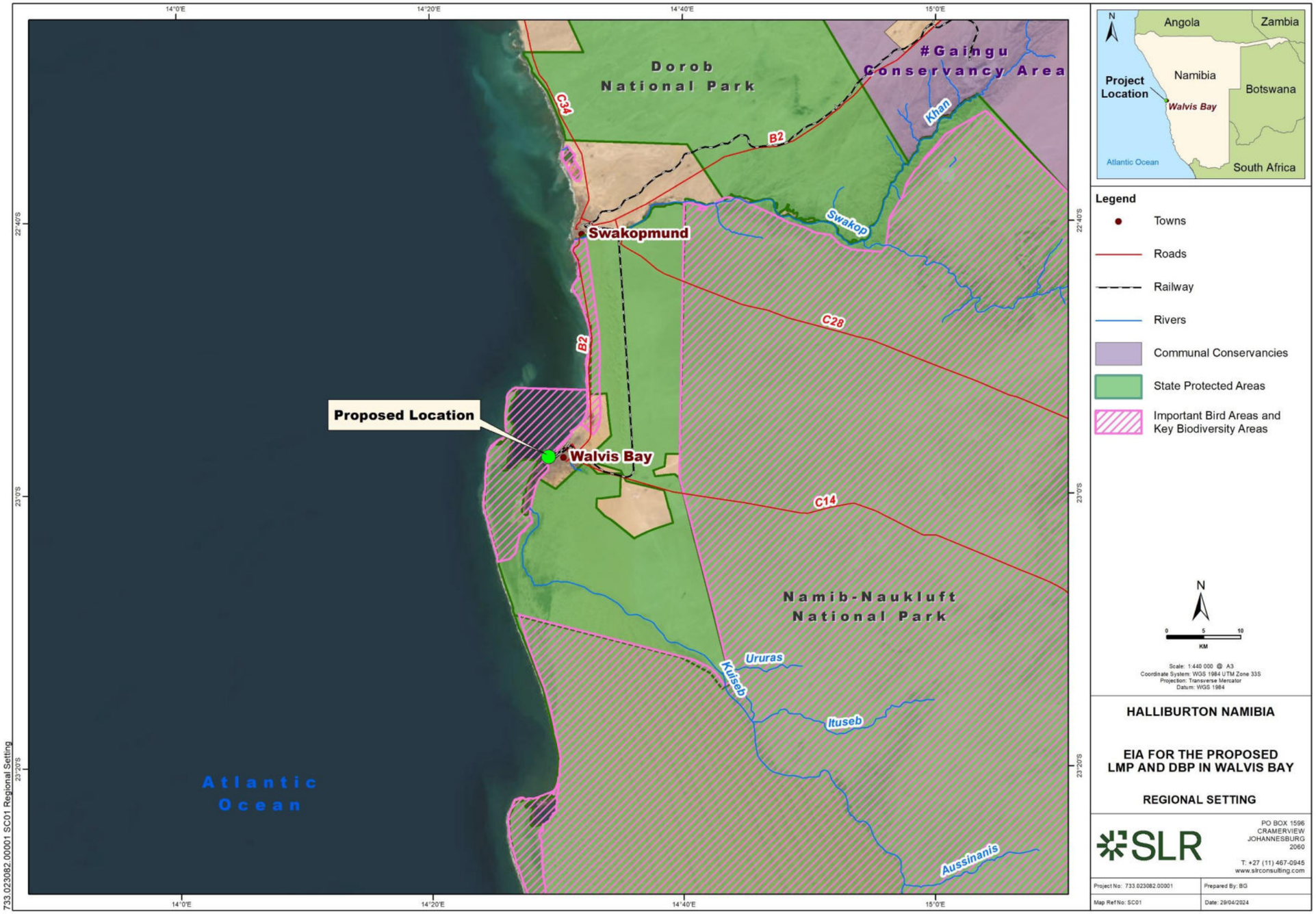


Figure 1-1: Regional Setting map of the Project location

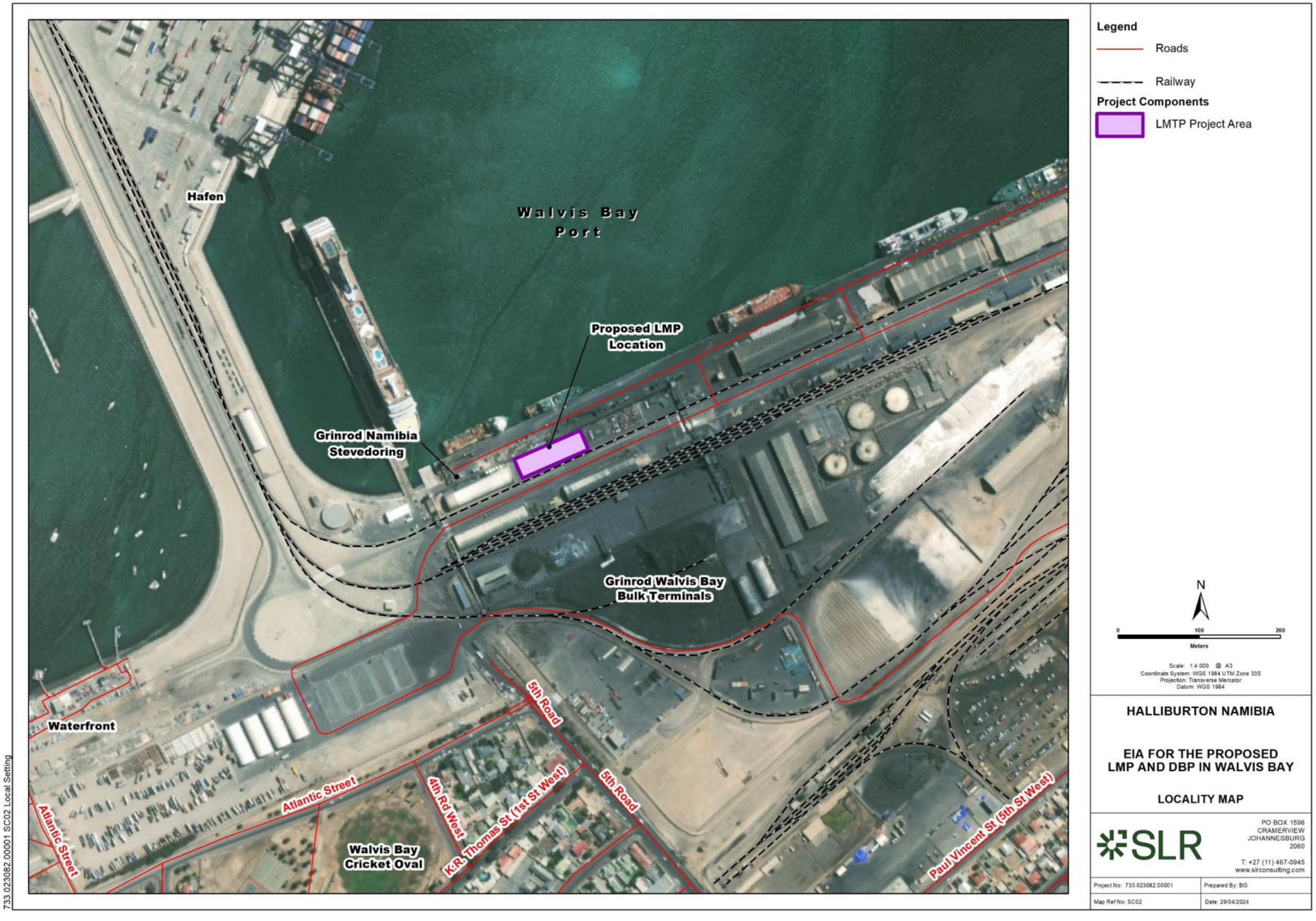


Figure 1-2: Local Setting of the proposed Project

1.3 Structure of the Scoping Report

This Scoping Report has been prepared in compliance with the EIA Regulations 2012 and is divided into various chapters and appendices, the contents of which are outlined in Table 1-1.

Table 1-1: Structure of the Scoping Report

Section	Contents
Executive Summary	Provides a synopsis of the Scoping Report.
Section 1	**Introduction** Provides a brief description of the proposed Project background, purpose of the report, and describes the structure of the report.
Section 2	**Environmental Impact Assessment process** **Provides details of the EIA team managing the Scoping process. Outlines the approach and methodology adopted for the Scoping phase and the impact assessment methodology to be used in the Impact Assessment phase.**
Section 3	**Public consultation process** Provides a description of the activities undertaken to engage with stakeholders and interested and affected parties.
Section 4	**Legislative requirements** Provides an overview of relevant Namibian policies, summarises the Namibian administrative framework, and describes the applicable Namibian legislation, international treaties, and industry standards and guidelines applicable to the proposed Project.
Section 5	**Project description** Provides an overview of the proposed Project, presents a description of the various components, and describes possible project activities.
Section 6	**Consideration of alternatives** Provides a description of the potential alternatives considered for the proposed Project.
Section 7	**Description of the affected environment** Describes the existing biophysical and social environment that could potentially be affected by the proposed Project, at a high level and using currently available information.

Section	Contents
Section 8	**Key environmental and social impacts** Provides a description and assessment of environmental impacts (physical, biological, social, and economic) potentially associated with the construction, operation and decommissioning of the proposed Project.
Section 9	**Need and desirability** **Provides an overview of the need and desirability for the proposed Project by considering how the proposed Project is aligned with the strategic context of national development policy and planning, broader societal needs, and regional and local planning, as appropriate.**
Section 10	**Environmental statement and conclusion** **Provides a concluding statement and makes a recommendation regarding the issuing of an ECC for the proposed Project.**
Section 11	**References** Lists the literature sources referenced in this report.
Appendices	Appendix A: Environmental Assessment Practitioner Qualifications Appendix B: Authority Consultation Appendix C: ECC Application Appendix D: Impact Assessment Methodology Appendix E: Public Participation Record Appendix F: Legislative Framework Appendix G: Technical Drawings Appendix H: Specialist Studies H.1: Marine Ecology H.2: Air Quality H.3: Visual Impact Assessment Appendix I: Environmental Management Plan

2.0 Environmental Impact Assessment Process

This chapter provides the details of the EIA Project Team, outlines the EIA methodology and describes the EIA process.

2.1 Environmental Impact Assessment Team

2.1.1 Project Proponent and Environmental Consultants

SLR is the independent firm of consultants that has been appointed by Halliburton to undertake the EIA for the proposed Project. The details of the SLR team undertaking the EIA process, and the proponent's team providing the technical inputs, are provided in Table 2-1. The Curricula Vitae (CVs) of the SLR team are provided in Appendix A.

Table 2-1: Environmental and Proponent Project Team

Team	Name	Designation	Tasks and roles	Company
Halliburton Project Team	Thibaut Toussaint	Project Manager	Responsible for the interface between Halliburton and the environmental team, and for ensuring the implementation of the EIA outcomes.	Halliburton
	Michelle Ngaujake	Sr. Government Relations Representative		
	Thibaut Toussaint	Technical Support		
	Stefan Pulak	Technical Support		
SLR Environmental Project Team	Stephanie Strauss	Project Technical Assistant	Report and process review, technical assistance	SLR
	Ndomupei Masawi	Project Manager	Management of the process, team members, and other stakeholders. Report compilation and process review.	
	Sue Reuther	Project Director	Report review and approval (Quality Control and Assurance)	
	Njabulo Mzilikazi	Project Technical Assistant	Report compilation and process review.	
	Jeremy Blood	Project Technical Assistant	Report review and approval (Quality Control and Assurance)	

Stephanie Strauss has 8 years of experience in environmental consulting. Stephanie has conducted several EIAs for projects in various sectors. She has conducted numerous public participation and stakeholder engagement activities relevant to urban development projects, waste management, and infrastructure development to mining and exploration. Stephanie has also undertaken environmental compliance monitoring and auditing for projects.

Ndomupei Masawi has more than 15 years of Integrated Environmental Management and project management experience. Her experience includes compiling Environmental Management Plans, undertaking Public Participation Processes, providing Geographic Information System (GIS) Services, and undertaking the processes and assessments to support applications for Environmental Authorisations, Water Use Authorisation/Permitting,

Waste Management Licences and Air Emission Licences, for steel galvanizing, roads, railway lines, power stations, airports, dams, housing developments, schools in South Africa, Tanzania, Botswana, Lesotho, Zimbabwe, and Uganda. She is a member of the International Association for Impact Assessment South Africa (IAIAsa).

Sue Reuther has more than 20 years of experience in the environmental assessment sector. Her core expertise includes EIAs, including International Finance Corporation Performance Standards compliant processes, strategic assessments, and spatial planning. She has managed complex projects in Namibia, South Africa, southern and west Africa, South America, the Middle East, and Asia for a range of sectors, including mining, infrastructure, industrial and coastal developments, renewable and conventional power generation, aquaculture, and oil and gas. Sue has expertise in Environmental and Social Due Diligence reviews against Good International Industry Practice and acting as the Independent Environmental and Social Consultant for Lenders on projects in Africa and the Middle East. Sue also undertakes economic and socio-economic impact assessments since 2006 for a range of projects, including renewable energy, infrastructure, and mine (closure) projects in South Africa, Africa, South America and Asia. Sue undertakes and reviews visual impact assessments since 2006 for a range of developments, including infrastructure, mining, and alternative energy projects in South Africa and Africa.

Njabulo Mzilikazi has seven years of experience working as an environmental consultant. Njabulo leads multi-disciplinary EIA Projects from the screening and application phase to the impact assessment and submission to authorities for decision. Her experience spans across the mining and built environment industries in both public and private sectors. Njabulo has worked on gap assessments in which she identifies the client's need for compliance with Project-specific, local, and international environmental legislation, regulations and standards.

Jeremy Blood has been working as an Environmental Assessment Practitioner, with more than 25 years of experience. Jeremy has expertise in a wide range of projects relating to oil/gas and mining (heavy mineral mining and borrow pits), housing/industrial developments, renewables (solar PV), and infrastructure projects (e.g. roads, railway lines, power lines, and pipelines). He has been project manager over 12 offshore oil and gas ESIAs in Namibia. He has project managed a number of large-scale projects covering a range of environmental disciplines, including EIAs, Stakeholder Engagement, Environmental Compliance and Monitoring, and Environmental Control Officer. He has worked in South Africa, Namibia, Mozambique and Kenya.

2.1.2 Specialist Team

The SLR team was supported by a team of suitably qualified specialists, as provided in Table 2-2. The CVs of the specialist team are provided in Appendix A.

Table 2-2: Project Specialist Team

Team	Name	Designation	Tasks and roles	Company
Specialist Investigations	Loren Dyer	Air Quality Specialist	Air quality assessment	SLR
	Lisa Ramsey			
	Kerry Lianne Schwartz	Visual Specialist	Visual survey and impact assessment	
	Kamogelo Rakale			
	Andrea Pulfrich	Marine Ecology	Marine ecological assessment	Pisces Environmental Services

2.2 Environmental Impact Assessment

EIAs are regulated by the MEFT in terms of the EMA and the EIA Regulations 2012. In order to ensure compliance with the objectives of EMA and the EIA Regulations 2012, the EIA process seeks to identify the environmental consequences (or impacts) of the proposed Project and to ensure that the proposed Project, over its life cycle, will be environmentally acceptable, and integrated into the surrounding environment in a sustainable way. It further seeks to provide the decision-making authorities with sufficient and accurate information to make a sound decision on the proposed Project and set conditions that must be adhered to.

Due to the scope of the proposed Project, MEFT advised that a consolidated Scoping (with Assessment) Process, with a project-specific Environmental Management Plan (EMP) is required (Appendix B).

After submitting the ECC application and Final Scoping Report (with EMP) to the MME, the MME is then required to make a recommendation on the acceptance or rejection of the report to MEFT, who will make the final decision on the ECC application.

Sections 2.2.1 to 2.2.2.4 provide a summary of the EIA approach taken, as well as the key steps and corresponding activities.

Figure 2-1 provides an overview of the EIA process being followed, including the PCP followed.

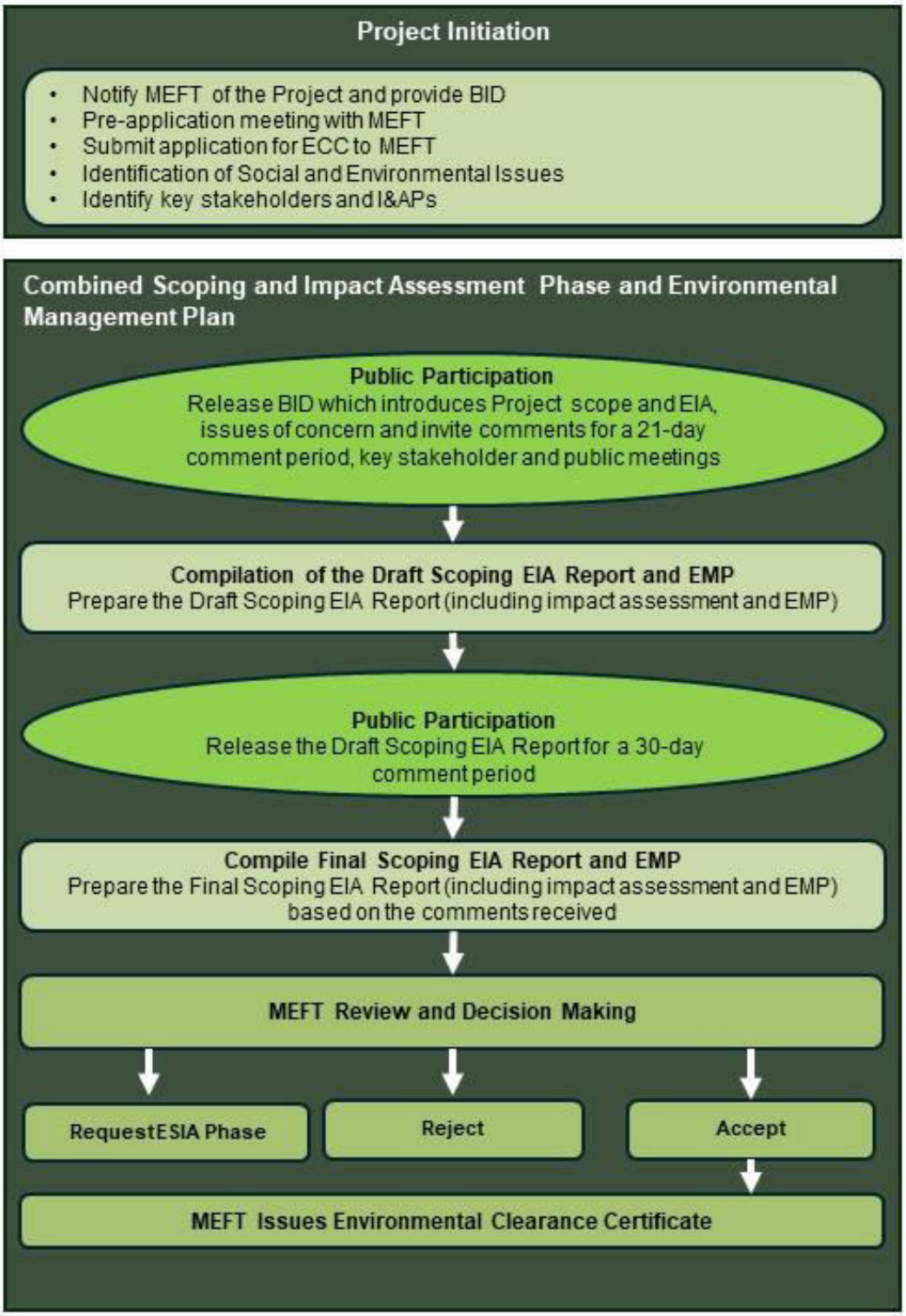


Figure 2-1: EIA Process and associated PCP

2.2.1 Project Initiation Phase

The project initiation phase has been completed and included the following tasks:

- Desktop review of the available information to become familiar with the proposed Project, the geographical area, other projects in the area and any other information that may assist in the execution of the EIA process;
- Scoping of key environmental risks/potential impacts, and confirming the need for specialist studies;
- Identification of key stakeholders that need to be involved in the process, and develop and update the stakeholder database;
- Confirmation of the list of activities, according to the EMA, that are associated with the proposed Project, and which may not commence without an ECC; and
- Confirmation of the public consultation approach. A pre-application consultation meeting was held with the MEFT on 26 April 2024 as part of the project initiation phase. The purpose of the meeting was to:
    - Notify the MEFT of the intent to submit the ECC application.
    - Provide an overview of the proposed Project.
    - Confirm the EIA process to be followed and timing including:
        - EMA listed activities that are triggered by the proposed Project.
        - The Public Consultation Process (PCP) required.
        - Confirm specialist studies that must be undertaken as part of the EIA process.
        - Obtain clarity on / confirm the Competent Authority (which is MME).
        - Identify any issues or impacts of concern.
        - Establishing any other MEFT requirements.

The minutes of the pre-application meeting with the MEFT are included in Appendix B.

- Registration of the proposed Project and EIA process with the MME and MEFT. This was done through the submission of an electronic copy of the ECC application, together with a Background Information Document (BID), through the MEFT portal as well as the submission of a hard copy of the ECC application to MME and MEFT on 10 May 2024.

The MEFT reviewed the ECC application, BID and project layout plan and issued an environmental screening notice, requesting that a Scoping Report and EMP be compiled and submitted to the MEFT for final decision making. A copy of the environmental screening notice is attached in Appendix B.

2.2.2 Scoping and Impact Assessment

2.2.2.1 Objectives

The objectives of the Scoping and Impact Assessment phase is to:

- Provide a description of the proposed Project and its location.
- Provide a description of project alternatives assessed (if any).
- Provide an overview of the legal requirements relevant to the proposed Project (Section 4.0 and Appendix F).
- Provide baseline environmental and social information on the proposed Project area (Section 7.0).

- Outline the approach and impact assessment methodology used in the process e.g. the impact rating methodology.
- Identify and assess the environmental (biophysical and socio-economic) impacts, including cumulative impacts, of the construction, operation, and decommissioning impacts of the proposed Project.
- Identify and evaluate potential management and mitigation measures that will reduce the negative impacts of the proposed Project and enhance the positive impacts;
- Compile monitoring, management, mitigation, and training needs in the EMP;
- Undertake the required PCP.
- Provide the decision-making authorities with sufficient and accurate information in order to make a decision on the proposed Project.

2.2.2.2 Alternatives

In accordance with Section 8(g) of the EIA Regulations 2012, feasible alternatives need to be considered and assessed during the Scoping Phase of the project. Details on the assessment of project alternatives are provided in Section 6.0.

2.2.2.3 Specialist Studies

Based on the findings of the scoping process, three specialist studies were undertaken in order to provide the information and expert opinion necessary to address the key issues identified. The following specialist assessments were undertaken as part of the EIA process:

- Marine Ecology Impact Assessment;
- Air Quality Impact Assessment; and
- Visual Impact Assessment.

Specific ToRs were given for each of the specialist studies (Table 2-3). The generic ToR for each specialist study were to:

- Describe the existing baseline characteristics of the study area and place this in a regional context;
- Identify and assess potential impacts resulting from the project (including impacts associated with the construction and operation of the project), using SLR's prescribed impact rating methodology;
- Identify and describe potential cumulative impacts resulting from the proposed project in relation to proposed and existing developments in the surrounding area;
- Recommend mitigation measures to avoid or minimise impacts and/or optimise benefits associated with the proposed project; and
- Recommend and draft a monitoring plan, if applicable.

Certain impacts that are anticipated to be of limited or lower significance, either by virtue of the scale of the impacts, their short duration (e.g., construction phase only), disturbed nature of the receiving environment and/or distance to communities, were assessed by SLR and reported directly into the Scoping Report.

Copies of the full specialist assessment reports are included in Appendix H1 to H3.

Table 2-3: Specialist Terms of Reference

Specialist Assessment	Specialists Terms of Reference
Marine Ecology	The marine ecology assessment included the following: • High level description of harbour environment and identification of sensitive receptors. • Identification and assessment of impacts in the event of a spill of products/mud during ship-to-shore transfer or from the storage facilities. • Impact assessment based on the SLR standard assessment methodology. • Recommendation to mitigate impacts (if required) for inclusion in the plant's EMP. **A copy of the Marine Ecology Specialist Report is attached in Appendix H - H.1**
Air Quality	The air quality assessment included: • Review of the project description and identification of key emission sources • Undertaking an air quality impact assessment based on the SLR standard impact assessment methodology. • Recommendation to mitigate impacts (if required) for inclusion in the plant's EMP. **A copy of the Air Quality Specialist Report is attached in Appendix H - H.2**
Visual Impact Assessment (VIA)	The VIA was undertaken in accordance with all relevant national and international legislation and guidelines. The main aim of the VIA was to identify potential visual issues associated with the proposed facilities as well as to rate the significance of the visual impacts on visual receptors and key vantage points. The assessment methodology followed focused on the identification of these issues, as outlined below. • Identification of visual character and sensitive receptor locations; • Visual Baseline Assessment; and • Impact Assessment, including cumulative impact assessment. • Identification of mitigation measures for inclusion in the EMP. • **A copy of the Visual Impact Assessment Specialist Report is attached in Appendix H - H.3**

2.2.2.4 Impact Assessment

The specialist findings and other relevant information have been integrated into the impact assessment (Section 8.0).

A quantitative impact assessment was undertaken for the proposed Project. The impact assessment methodology has been included as Appendix D.

Cumulative Impacts

Activities undertaken by different industries can result in several complex effects on the natural biophysical and social environment. These impacts are mainly identified as direct and immediate effects on the environment by a single entity affecting a variable of the environment. These direct impacts have the potential to combine and interact with other activities, depending on the surrounding environmental state and land use. These impacts may aggregate or interact with other impacts to cause additional effects, not easily quantified when assessing an individual entity.

The EIA Regulation 2012 specifically requires that cumulative impacts be assessed. A description and analysis of the potential cumulative effects of the proposed Project is assessed in Section 8.4, and considers the effects of any changes on the:

- Biophysical; and
- Socio-economic conditions.

The following cumulative impacts have been identified and assessed based on the proposed Project description and current operations at the Port of Walvis Bay:

- Positive socio-economic impacts as a result of temporary and permanent employment, skills development, etc.;
- Emissions due to construction and operational equipment and machinery, adding to overall ambient air quality impact;
- Influx of job seekers to the general area as a result of the construction activities of the proposed Project; and
- The construction period may cause traffic-related impacts on the local road network.

Measures to Avoid, Reverse, Mitigate, or Manage Identified Impacts

A key component of an EIA process is to explore practical ways of avoiding or reducing potentially significant impacts. These are commonly referred to as mitigation measures and are included in the EMP. Mitigation is aimed at preventing, minimising, or managing significant negative impacts to as low as reasonably practicable and optimising and maximising any potential benefits.

As part of developing the EMP, consideration was given to the mitigation hierarchy (see Figure 2-2) in terms of managing risks. This is aimed at ensuring that wherever possible potential impacts are mitigated at source rather than mitigated through restoration after the impact has occurred. Any remaining significant or residual impacts are then highlighted, and additional actions are proposed. The mitigation measures for the proposed Project have been established through the consideration of legal requirements, best practice industry standards and specialist input. The identified mitigation measures to avoid, reduce, restore, and compensate/offset the potential impact identified are included in Section 8.0 and have been incorporated into the EMP (Appendix I).

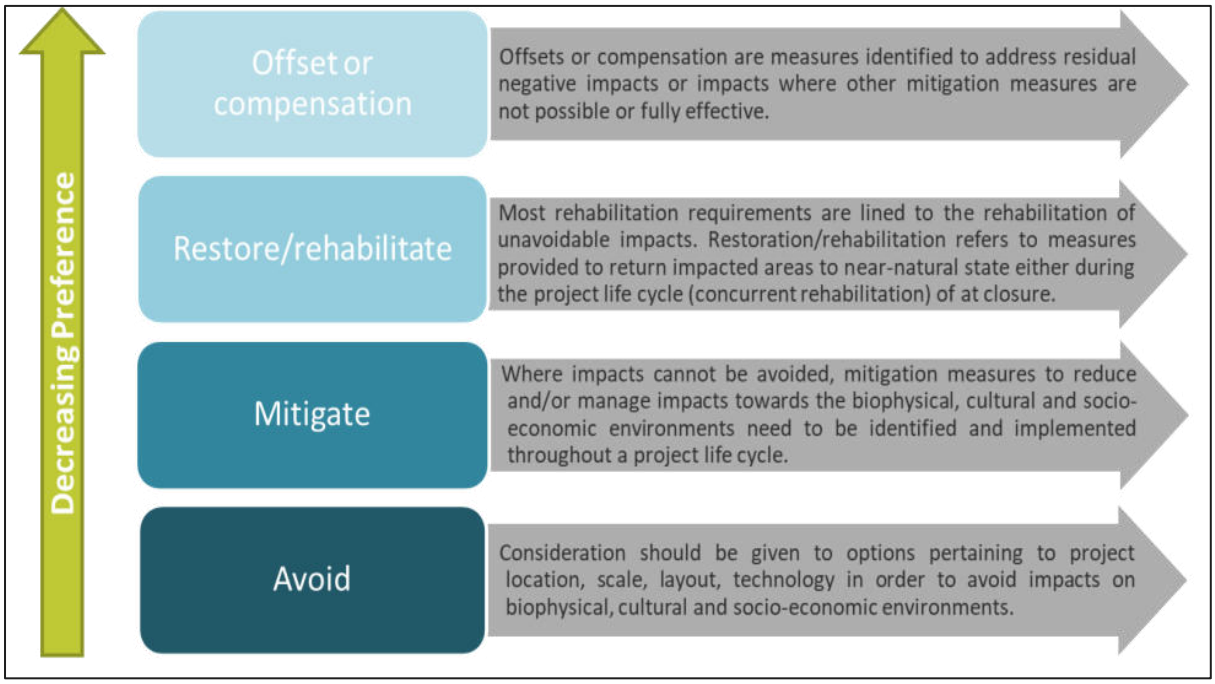


Figure 2-2: Mitigation hierarchy considered in the impact assessment

2.2.2.5 Compilation of the Scoping Report and EMP

Section 8 of the EIA Regulations 2012 stipulates the minimum requirements and issues that need to be addressed in the Scoping Report and EMP. This report addresses all of these requirements.

In addition to the EMP prepared for this Project, it is important to note that Namport and its tenants operate within the Port of Walvis Bay under an overarching EMP. The EMP developed for the proposed Project has been aligned with the Namport EMP so as to ensure mitigation and management measures are aligned. A copy of the project EMP is attached as Appendix I.

Table 2-4 indicates requirements in the EIA Regulations 2012 and where they have been addressed in the Scoping Report.

Table 2-4: Requirements of Regulation 8 of the EIA Regulations

Section of the EIA Regulations, 2012	Description of EIA Regulations Requirements for Scoping Reports	Completed	Section
Regulation 8	A scoping report must include –		
Regulation 8 (a)	The curriculum vitae of the EAP who prepared the report.	Yes	Section 2.1 Appendix A
Regulation 8 (b)	A description of the proposed activity.	Yes	Section 5.0
Regulation 8 (c)	A description of the site on which the activity is to be undertaken and the location of the activity on the site.	Yes	Section 5.0
Regulation 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.	Yes	Section 7.0

Section of the EIA Regulations, 2012	Description of EIA Regulations Requirements for Scoping Reports	Completed	Section
Regulation 8 (e)	An identification of laws and guidelines that have been considered in the preparation of the scoping report.	Yes	Section 4.0
Regulation 8 (f)	Details of the public consultation process conducted in terms of regulation 7(1) in connection with the application, including –		
Regulation 8 (f) (i)	The steps that were taken to notify potentially interested and affected parties of the proposed application;	Yes	Appendix E
Regulation 8 (f) (ii)	Proof that notice boards, advertisements, and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed, or given;	Yes	Appendix E
Regulation 8 (f) (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; and	Yes	Appendix E
Regulation 8 (f) (iv)	A summary of the issues raised by interested and affected parties, the date of receipt and the response of the EAP to those issues.	Yes	Appendix E
Regulation 8 (g)	A description of the need and desirability of the proposed listed activity and any identified alternatives to the proposed activity that are 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.	Yes	Section 9.0
Regulation 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.	Yes	Section 8.0
Regulation 8 (i)	Terms of reference for the detailed assessment.	Yes	Appendix H
Regulation 8 (j) A draft management plan, which includes-			
Regulation 8 (j) (aa)	Information on any proposed management, mitigation, protection, and remedial measures to be undertaken to address the effects on the environment that have been identified including objectives in respect of the rehabilitation of the environment and closure;	Yes	Appendix I
Regulation 8 (j) (bb)	As far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of the activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and	Yes	Appendix I
Regulation 8 (j) (cc)	A description of the manner in which the applicant intends to modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation remedy the cause of pollution or degradation and mitigation of pollutants.	Yes	Appendix I

Section of the EIA Regulations, 2012	Description of EIA Regulations Requirements for Scoping Reports	Completed	Section
Regulation 9	The terms of reference for an assessment must set out the approach that the proponent intends to follow in undertaking an assessment in accordance with the Act, these regulations and guidelines must include -	Yes	Appendix H
Regulation 9 (a)	A description of all tasks to be undertaken as part of the assessment process, including any specialist to be included if needed;	Yes	Section2.2 and Appendix H
Regulation 9 (b)	An indication of the stages at which the Environmental Commissioner is to be consulted;	Yes	Section 3.0
Regulation 9 (c)	A description of the proposed method of assessing the environmental issues and alternatives	Yes	Appendix D
Regulation 9 (d)	The nature and extent of the public consultation processes to be conducted during the assessment process	Yes	Section 3.0 and Appendix E

2.3 Assumptions and Limitations

While every effort has been made to compile a robust assessment of the environmental and social impacts associated with the proposed Project, there remain certain assumptions, uncertainties, and limitations that are applicable to the assessment in general as well as those applicable to each of the individual specialist assessments.

2.3.1 General

The following assumptions and limitations are applicable to the Scoping and EMP:

- SLR assumes that all relevant project information has been provided by Halliburton and that it was correct and valid at the time it was provided;
- No significant changes to the project description or surrounding environment will occur between the submission of the Final Scoping Report and EMP, and implementation of the proposed project that could substantially influence findings and recommendations with respect to mitigation and management measures;
- SLR assumes that Halliburton will comply with all legislation pertaining to the activities of this proposed Project and that all permits and licenses that may be required will be identified and applied for prior to the commencement of project; and
- SLR assumes that Halliburton will implement the measures contained in the EMP (as well as Namport's EMP) and will adhere to any monitoring procedures developed for the project. A monitoring and evaluation system, including auditing, will be established, and operationalised to track the implementation of the EMP, ensuring that management measures are effective to avoid, minimise and mitigate impacts and that corrective action is being undertaken to address shortcomings and/or non-conformances.

These assumptions and limitations, however, are not considered to have any negative implications in terms of the credibility of the results of the EIA process.

2.3.2 Specialist Studies Specific Assumptions and Limitations

2.3.2.1 Visual Impact Assessment

The following are the assumptions and limitations of the VIA:

- Given the nature of the receiving environment and the height of the proposed LMTP, the study area of visual assessment zone was assumed to encompass an area of 1 km from the proposed development. This limit on the visual assessment zone relates to the fact that visual impact decreases exponentially over distance and that the proposed LMTP surface infrastructure will blend in with the industrial infrastructure and activities already in existence in the study area. Thus, although the proposed development may still be visible beyond 1 km, the degree of visual impact will diminish considerably. As such, the need to assess the impact on potential receptors beyond this distance would not be warranted.
- The identification of visual receptors involved a desktop assessment, supported by a site visit, where Google Earth imagery was used to identify potential receptors within the study area. Due to the Project site being located in an urban area, it was not possible to visit all potentially sensitive visual receptor locations. As such, several broad assumptions have been made in terms of the likely sensitivity of the receptors to the proposed development.
- From a visual perspective, sensitive receptor locations typically include sites such as tourism or recreational facilities and scenic locations within natural settings which are likely to be adversely affected by the visual intrusion of the proposed development. It should be noted, however, that not all receptor locations would necessarily perceive the proposed development in a negative way. This is usually dependent on the use of the facility and the economic dependency of the occupants on the scenic quality of views from the facility. Thus, the presence of a receptor in an area potentially affected by the proposed development does not necessarily mean that any visual impact will be experienced.
- Based on information provided by Halliburton, all analysis for this VIA is based on a worst-case scenario where infrastructure heights are assumed to be up to 16.734 m in height.
- In the absence of reliable contour data for the study area, terrain data was generated using spot heights derived from Google Earth. This data is not highly accurate and as such, localised topographic variations in the landscape may not be reflected in the Digital Elevation Model (DEM) used to generate the viewshed(s) or in the visibility analysis conducted in respect of the proposed development.
- In addition, the viewshed/visibility analysis does not take into account any existing vegetation cover or built infrastructure which may screen views of the proposed development. This analysis should therefore be seen as a conceptual representation or a worst-case scenario.
- At the time of undertaking the VIS no information was available regarding the type and intensity of lighting that will be required for the proposed LMTP and, therefore, the potential impact of lighting at night has not been assessed at a detailed level. However, lighting requirements are relatively similar for all port related infrastructure and as such, general measures to mitigate the impact of additional light sources on the ambience of the nightscape have been provided.

2.3.2.2 Marine Ecology

The following are the assumptions and limitations of the Marine Ecological Assessment:

- The study is based on the project description made available to the specialist at the time of the commencement of the study.
- Potential changes in the marine environment such as sea level rise and/or increases in the severity and frequency of storms related to climate change are not dealt with in this report. Such scenarios are difficult to assess due to the uncertainties surrounding climate change.

3.0 Public Consultation Process

The PCP is being undertaken per the requirements of Regulation/Part 21 of the EMA. Regulation 21 requires that a person (proponent, specialist, EAP, or other professional) who undertakes public participation as part of an environmental impact assessment process to obtain an ECC, must do the public consultation process in compliance with the following:

"*(2) The person conducting a public consultation process must give notice to all potential I&APs of the application which is subjected to public consultation by –*

a) fixing a notice board at a place conspicuous to the public at the boundary or on the fence of the site where the activity to which the application relates is or is to be undertaken;

b) giving written notice to -

i. the owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site;

ii. the local authority council, regional council, and traditional authority, as the case may be, in which the site or alternative site is situated;

iii. any other organ of state having jurisdiction in respect of any aspect of the activity; and

iv. advertising the application once a week for two consecutive weeks in at least two newspapers circulated widely in Namibia.

(3) A notice*, notice board, or advertisement referred to in sub-regulation (2) must -*

a) give details of the application which is subjected to public consultation; and

b) state -

i. that the application is to be submitted to the Environmental Commissioner in terms of these regulations;

ii. the nature and location of the activity to which the application relates;

iii. where further information on the application or activity can be obtained: and the manner in which and the person to whom representations in respect of the application may be made.

(4) A notice board referred to in sub-regulation (2) must be of a size at least 60cm by 42cm.

(5) If a deviation from sub-regulation (2) is appropriate the person conducting the public participation process may deviate from the requirements of that sub-regulation to the extent and in the manner agreed by the Environmental Commissioner after consultation with the competent authority.

(6) When complying with this regulation, the person conducting the public consultation process must ensure that -

a) information containing all relevant facts in respect of the application is made available to potential I&APs; and

b) consultation by potential I&APs is facilitated in such a manner that all potential I&APs are provided with a reasonable opportunity to comment on the application.

(7) The public consultation process -

a) in respect of an application for an environmental clearance certificate in terms of regulation 6(1); and the notification of an application and an assessment report in terms of regulation 16(1)(h),

b) must be completed within 21 days."

The PCP is aligned with Regulation 21 of the EIA Regulations 2012. The PCP was conducted as follows:

- Project Initiation Phase;
- Scoping/EMP Phase; and
- Authority Decision Phase.

Table 3-1 details the PCP tasks undertaken for the entire Project.

3.1 Project Initiation Phase

A pre-application meeting with the MEFT was held to provide the process that needs to be followed for the ECC application. Refer to Appendix B for details of authority consultation.

I&APs were notified of the proposed Project and application process and invited to provide initial comments during this phase. Correspondence received can be found in Appendix B. No issues were raised by I&APs during the project initiation phase. Verbatim stakeholder communications and commenting authority correspondence are also included in Appendix E.

3.2 Scoping Phase

Ongoing consultation with the different authorities was undertaken during the EIA process. The Scoping phase only commenced after the MEFT and MME reviewed the ECC application and project BID and MEFT issued an environmental screening notice requesting that a Scoping Report and EMP be compiled and submitted to them for consideration of the ECC application.

During the Scoping phase of the proposed Project, I&APs were provided with an opportunity to review and comment on the Draft Scoping which was made available for a 14-day commenting period from 17 to 31 July 2024. Registered I&APs were notified of the availability of the draft Scoping Report through email. In addition, a public meeting and/or key stakeholder meetings was held during the comment period of the proposed Project. The purpose of this meeting was to provide an overview of the Project proposal, EIA process and findings of the impact assessment, as well as provide stakeholders with the opportunity to raise any issues, concerns, or comments. Minutes of this meeting have been documented in Appendix E.

This Final Scoping Report has been submitted to the MEFT and MME for decision making.

3.3 Authority Decision Phase

Once the MEFT has issued its decision on the ECC application based on its review of the Final Scoping Report and EMP, SLR will inform all registered I&APs of the decision and the appeals process. Consultation with MEFT, and MME if necessary, will continue until a decision is made on the ECC application.

Table 3-1: Public Participation Plan for the proposed Project

Project Phase	Task	Activities	Date
Project Initiation	**Notification of Project to Regulatory Authorities and Registered Interested and Affected Parties**		
	Pre-application authority consultation with the MEFT	A pre-application authority consultation meeting was held with the MEFT. The objectives of the meeting were to: • Notification of intent to submit ECC application. • Overview of the LMTP Project. • Confirm the EIA process to be followed and timing. • Obtain clarity on / confirm the Competent Authority. Identify any issues or impacts of concern, including the specialist studies to be undertaken as part of the EIA process. The pre-application consultation meeting presentation and the minutes of the meeting are attached in Appendix B.	26 April 2024
	Stakeholder Identification and Database Development	I&APs were identified, and contact details were obtained where possible using the database from previous projects. A stakeholder database was developed and maintained throughout the process based on responses to notification letters, attendance at meetings, comments received on public documents, etc. (Please refer to Appendix E for a copy of the Stakeholder Database).	May 2024-August 2024
	Project Announcement Letter	Project Announcement letters (Appendix E) and a BID (Appendix E) were distributed to all I&APs identified on the initial Stakeholder Database. Please refer to Appendix E for an example of the proposed Project Announcement letter sent via e-mail.	May 2024
	Background Information Document	A BID describing the proposed Project and the legal requisites associated with the authorisation process was compiled. The BID included a Reply Form (Appendix E), which provided the public an opportunity to register as I&APs, and to raise queries or concerns regarding the proposed Project. The BID was distributed electronically with the project announcement letter (where possible) to all I&APs on the initial Stakeholder Database (Please refer to Appendix E for copies of the Project Announcement Letter). Copies of the BID were also made available on request to SLR. A copy of the BID was also made available on the SLR website at:	May 2024

Project Phase	Task	Activities	Date
		https://www.slrconsulting.com/afr/public-documents/eia-for-halliburton-s-proposed-liquid-mud-treatment-and-completion-fluid-plant-in-the-port-of/	
	Newspaper Advertisements	Newspaper advertisements providing information on the proposed Project, the availability of the BID, and I&AP registration were placed in newspapers (circulated widely in Walvis Bay, Namibia) over a two-week period as follows: • English and Afrikaans advertisements in the Namibian Sun; and • English and Afrikaans advertisements in the Republikein). Please refer to Appendix E for copies of the advertisements placed.	15 May 2024 (Namibian Sun) 22 May 2023 (Republikein)
	Site Notices	English and Afrikaans site notices (Sized 60 cm x 42 cm) were placed in Walvis Bay around the project site on 15 May 2024. See Appendix E.	May 2024
	BID Review and Comment Period	All stakeholders were provided an opportunity to review and comment on the BID over a 21-day period between 15 May and 5 June 2024. Only comments from I&APs requesting to be registered onto the Project stakeholder database were received.	May - June 2024
Scoping and EMP	**Review and Comment on the Scoping and EMP and Consultation Meetings**		
	Notification of availability of the Scoping Report for review and comment	All I&APs registered on the project database (see Appendix E) were notified of the availability of the draft Scoping Report for review comment and review period through a notification letter (sent via e-mail). To facilitate the commenting process, a copy of a Non-Technical Summary (in English) was attached to a notification letter. Proof of notifications are included in Appendix E.	July 2024
	Scoping Report/EMP Review and Comment Period	All stakeholders were provided an opportunity to review and comment on the Scoping Report and EMP over a 14-day period between 17 and 31 July 2024. The report was made available at the Walvis Bay Public Library and on SLR's website. No comments have been received.	July 2024

Project Phase	Task	Activities	Date
	Consultation Meetings	During the public review period of the Draft Scoping Report, a public meeting was held in Walvis Bay to present the EIA findings and obtain comments from the stakeholders. The details of the meeting were as follows: Date: 30 July 2024 Time: 10:00 Venue: Indongo Hotel, Walvis Bay Proof of meetings and meeting minutes are included in Appendix E.	July 2024
	Comments and Responses	All correspondence received is included in Appendix E.	
Decision	I&APs notifications of MEFT and MME decision	Notifications to I&APs regarding the ECC decision (granted or refused) and appeals process will be distributed (via email) to all registered I&APS on the stakeholder database.	

4.0 Legal Framework

The EIA Regulations 2012 require that all legislation and guidelines considered in the EIA process be documented. This section provides an overview of the Namibian institutional and administrative structure and relevant Namibian legislation and policies applicable to the proposed Project.

Appendix F provides a detailed description of the legislation and guidelines considered in the EIA process.

4.1 Namibian Institutional and Administrative Structure

The management and regulation of petroleum (oil and gas) activities falls within the jurisdiction of the MME, with environmental regulations guided and implemented by the Department of Environmental Affairs (DEA) within the MEFT. Table 4-1 provides a summary of the main institutions that have jurisdiction related to the environmental performance of the proposed Project.

Table 4-1: Relevant institutions and their roles

Institution	Role
MME	The MME is responsible for promoting and regulating the development and use of Namibia's natural resources. As the proposed Project is linked to exploration off southern Namibia, MME is a Competent Authority for the proposed Project and is required to make a recommendation to MEFT on the ECC application. MEFT will make the final decision, taking into account the MME recommendations.
MEFT	The MEFT: DEA is mandated to give effect to Article 95L of the Constitution by promoting environmental sustainability. The Environmental Commissioner serves as head of the DEA. The DEA will be responsible for issuing a decision on the ECC application, based on a recommendation from MME. If approved, the DEA will issue an ECC.
Ministry of Agriculture, Water and Land Reform (MAWLR): Department of Water Affairs (DWA)	MAWLR is mandated to promote, develop, manage and utilise Agricultural and Water resources. DWA's mandate is to promote, manage and utilise water resources sustainably to ensure water supply security. The proposed Project has the potential to impact the marine water quality and ecology. A marine ecology specialist assessment, focusing on accidental spillages will be undertaken as part of the EIA. The DWA was provided with an opportunity to review and comment on the findings of the Marine Ecology specialist study and EIA.
Ministry of Works and Transport (MWT): Directorate of Transportation	MWT is responsible for infrastructure development and setting transport policy and regulation. MWT comprises the four departments, one of which is the Department of Transport. The Directorate of Transportation Infrastructure falls under the Department of Transport. This Directorate is responsible for the development of modern transport infrastructure for roads, aerodromes, harbours, and waterways; ensure optimal utilisation and management of transport infrastructure projects assigned to the Directorate.
Namibian Ports Authority (Namport)	Namport is a public entity that reports to MWT. The National Ports Authority Act, 1994 (No. 2 of 1994) gives Namport the responsibility of protecting the environment within harbour areas. Namport manages the Port of Walvis Bay. The proposed Project will be located within the Namport property in Walvis Bay. Namport were also provided with an opportunity to review and comment on the impacts of the proposed Project and provide input into the mitigation measures proposed to avoid and/or minimise the impacts of the proposed Project. In addition, Namport is responsible for issuing a construction permit (see Appendix

Institution	Role
	B) for the proposed Project on condition that Halliburton complies with all legal requirements.
Ministry of Fisheries and Marine Resources (MRMR)	MFMR is responsible for the management and development of fisheries and aquaculture in Namibia. The Ministry is comprised of four directorates; one of which is the Directorate of Resource Management. The Directorate of Resource Management is responsible for scientific research and providing advice on the state of commercially-important marine fish stocks and recommending catch quotas. It is also responsible for managing and regulating species fish size limits, dates of closed fishing seasons, declaring areas closed to fishing and determining fishing gear use. Although not directly related to the proposed Project, an unplanned event (e.g. spill) could have an impact on marine resources.

4.2 Namibian Legislation and Policies

The Republic of Namibia has five tiers of law and several policies relevant to environmental assessments and protection, which include:

- The Constitution;
- Statutory law;
- Common law;
- Customary law; and
- International law

As the main source of legislation, the Constitution of the Republic of Namibia (1990) makes provision for the creation and enforcement of applicable legislation. In this context and in accordance with its constitution, Namibia has passed numerous laws intended to protect the natural environment and mitigate against adverse environmental impacts.

The key policy and legislative requirements and guiding principles underpinning the EIA process are outlined here.

4.2.1 Environmental Management Act, 2007 (No. 7 of 2007)

The EMA was promulgated in December 2007 and came into effect on 6 February 2012. Part 1 of the EMA describes the various rights and obligations that pertain to citizens and the Government. The main objectives of the Act are to ensure that:

- Significant effects of activities on the environment are considered carefully and timeously;
- There are opportunities for timeous participation by I&APs throughout the assessment process; and
- Findings are taken into account before any decision is made in respect of activities affecting the environment.

Part 2 of the EMA sets out a number of principles of environmental management which give effect to the provisions of the Constitution for integrated environmental management. Decision-makers must take these principles into account when deciding whether or not to approve a proposed project. In terms of this legal framework, certain identified activities may not commence without an ECC (or amendment thereto) that is issued by the office of the environmental commissioner in the MEFT.

4.2.2 EIA Regulations 2102

The EIA Regulations 2012, promulgated in terms of EMA, identify certain activities which could have a substantially detrimental effect on the environment. These listed activities require an ECC clearance from MEFT (Department of Environmental Affairs) prior to commencing.

Table 4-2 provides a summary of the activities identified in the regulations that apply to the proposed Project.

Table 4-2: Listed activities triggered by the proposed Project

Listed activity	Project component
2. Waste management, treatment, handling, and disposal activities	
2.3. The import, processing, use and recycling, temporary storage, transit, or export of waste.	General and hazardous waste will be managed and stored on site for off-site disposal at appropriately licenced facilities.
3. Hazardous substance treatment, handling, and storage	
9.1 The manufacturing, storage, handling, or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974.	Various hazardous substances (chemicals) will either be stored, handled and/or processed at the proposed Project site. The chemicals required will include: • Synthetic-Based Drilling Fluid (synthetic / water / salt / chemicals); • Water-Based Drilling Fluid (water / salt / chemicals); • Brine Completion Fluid (salt / water); and • Base fluid: mineral oil. In addition, other hazardous substances include, amongst others, process reagents, hydrocarbons, wash water from tank cleaning (sludge oily water), centrifuges discharge, waste oil, oil/fuel filters, aerosol cans, etc.
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.	
9.3 The bulk transportation of dangerous goods using pipeline, funiculars, or conveyors with a throughput capacity of 50 tonnes or 50 cubic meters or more per day.	
9.4 The storage and handling of dangerous goods, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic meters at any one location.	

4.2.3 Other Relevant Legislation

Other legislation relevant to the proposed Project includes:

- Namibian Constitution First Amendment Act (Act No. 34 of 1998);
- Environmental Assessment Policy for Sustainable Development and Environmental Conservation (1995);
- Water Act, 1956 (No. 54 of 1956);
- Water Resources Management Act, 2013 (No. 11 of 2013);
- Nature Conservation Ordinance (No. 4 of 1975) – Nature Conservation Amendment Act (Act No. 5 of 1996);
- Soil Conservation Act, 1969 (No. 76 of 1969);
- Hazardous Substances Ordinance 14 of 1974; and
- Atmospheric Pollution Prevention Ordinance 11 of 1976.

A detailed analysis of the abovementioned legislation and its relevance to the proposed Project is provided in Appendix F.

4.2.4 Other permits

No other specific environmental permits are foreseen for the proposed Project.

Table 4-3: Legislation and Policies Applicable to the proposed Project

Legislation	Description and Relevance	Responsible Authority
Namibian Constitution First Amendment Act (Act No. 34 of 1998)	Article 95 (l) of the Constitution of the Republic of Namibia states that *"the State shall actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at … maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of natural resources on a sustainable basis for the benefit of all Namibians both present and future; in particular the Government shall provide measures against the dumping or recycling of foreign nuclear and toxic waste on Namibian Territory*." Article 100 states "*that the land, water and natural resources below and above the surface of the land … shall belong to the State if they are not otherwise lawfully owned*." Article 101 of the Namibian Constitution further states that the principles embodied within the constitution "*shall not of and by themselves be legally enforceable by any court but shall nevertheless guide the Government in making and applying laws. The courts are entitled to have regard to the said principles in interpreting any laws based on them*." The constitutional recognition of environmental concerns triggered widespread legislative reform relating to the management of natural resources in Namibia. The country's environmental protection effort is currently comprised of the EMA and the EIA Regulations 2012. *Environmental sustainability will inform and guide this ECC application and EIA process as well as the implementation of the proposed Project.*	Not Applicable
Environmental Assessment Policy for Sustainable Development and Environmental Conservation (1995)	The purpose of the Policy is seen as informing decision makers and promoting accountability; ensuring that options and alternatives and environmental costs and benefits are considered; striving for a high degree of public participation and involvement of all sectors; incorporating internationally accepted norms and standards; taking into account secondary and cumulative environmental impacts; promoting the user pays principle; and promoting sustainable development. The Policy requires that all listed policies, programmes, and projects, whether initiated by Government or the private sector, be subject to an EIA. The EIA Policy of 1995 promotes accountability and informed decision making through the requirement of EIAs for listed programmes and projects. As mentioned above, the EIA policy is currently enforced through the EMA and its Regulations (2012). *The Environmental Assessment Policy for Sustainable Development and Environmental Conservation is applicable to the proposed Project as listed activities in terms of the EIA*	MEFT

Legislation	Description and Relevance	Responsible Authority
	Regulations, GNR 30 of 2012 published in terms of the EMA Section 56 are triggered. Please refer to Table 4-2 for the EMA Listed Activities triggered by the proposed Project. As a result, an EIA is currently being undertaken for the proposed Project as is required by the EIA Policy of 1995, the EMA, and its Regulations (2012).	
Water Act, 1956 (No. 54 of 1956)) Water Resources Management Act, 2013 (No. 11 of 2013)	The Water Resources Management Act, 2013 (No. 11 of 2013) (WRMA) provides a framework for the management, protection, development, use, and conservation of water resources, for the regulation and monitoring of water services, and incidental matters. Part 13 of the WRMA deals with Water Pollution Control and the opening section stipulates that "*a person may not by any act or omission cause a water resource to be polluted, either directly or indirectly, unless authorised to do so by or under this Act or any other law, and in accordance with that authorisation*." *The protection of the water resources (ocean) should be a priority for the proposed Project. Possible deterioration of marine water resources as a result of accidental spillages of hazardous substances from the product storage tanks and during transfers from LMTP to vessels are the main threats to water resources associated with the proposed Project. A marine ecology assessment, focusing on accidental spillages has been undertaken as part of the EIA process (Appendix H). The specialist has assessed the significance of the potential impacts and identified mitigation measures that Halliburton will be required to implement to reduce and/or avoid severe impacts.*	Ministry of Agriculture, Water, and Rural Development
Hazardous Substances Ordinance 14 of 1974	The Hazardous Substances Ordinance 14 of 1974 provides for the control of toxic substances that may result in injury, ill health, or death of human beings. *The proposed Project will include the storage and handling of various hazardous chemicals including fuel, brines and oils in a warehouse, for which an ECC is required. The impact assessment includes an assessment of the potential biophysical and socio-economic impacts due to the storage and handling of various hazardous chemicals Mitigation measures to avoid and/or minimise the significance of the identified potential impacts has been identified and included in the EMP (Appendix I).*	Ministry of Health and Social Services
Atmospheric Pollution Prevention Ordinance 11 of 1976	The Atmospheric Pollution Prevention Ordinance, 11 of 1976 (GG 3555) came into force on 18 August 1976. This Ordinance provides for the prevention of the pollution of the atmosphere and related incidental matters. *There is potential for deterioration of air quality due to the generation and dispersion of particulate matter and nuisance dust caused by the proposed Project activities. In accordance with this, an air impact assessment was conducted as part of the specialist studies. Findings from the air quality specialist assessment are incorporated into the*	Ministry of Health and Social Services

Legislation	Description and Relevance	Responsible Authority
	baseline characterisation (Section 7.1.6) and impact assessment (Section 8.0). The mitigation measures developed for the management of air impacts were incorporated into the EMP (Appendix I).	
Labour Act (Act No. 11 of 2007)	The Labour Act, Act No 11 of 2007 (GG 3971) was enforced on 1 March 2009 and was amended by Act No 2 in 2012 (GG 4925). This Act consolidates and amends the labour law, establishes a comprehensive labour law, entrenches fundamental labour rights and protections, regulates basic employment terms and conditions, ensures the safety, health, and welfare of employees, protects employees from unfair labour practices, regulates trade union and employer organisation registrations, regulates collective labour relations, provides for systematic prevention and resolution of labour disputes, establishes the Labour Advisory Council, the Labour Court, the Wages Commission, and the labour inspectorate, provides for the appointment of the Labour Commissioner and Deputy Labour Commissioner, and provides for incidental matters. *Halliburton will ensure that all contractors involved during the construction, operation, and decommissioning phases of the proposed Project comply with the provisions of these legal instruments.*	Ministry of Labour, Industrial Relations and Employment Creation
Public and Environmental Health Act, 2015 (No. 1 of 2015)	The Public and Environmental Health Act, 2015 (No. 1 of 2015) was published in GG 5740 and brought into force on 17 September 2020. This Act provides a framework for a structured uniform public and environmental health system in Namibia. It also provides for incidental matters. *Halliburton will ensure that all contractors involved during the construction, operation, and decommissioning phases of the proposed Project comply with the provisions of these legal instruments.*	Ministry of Health and Social Services
Regulations relating to the health and safety of employees at work (GN 156 of 1997)	These Regulations establish health and safety regulations for the workplace. *Halliburton will ensure that all contractors involved during the construction, operation, and decommissioning phases of the proposed Project will comply with the provisions of these legal instruments.*	Ministry of Health and Social Services

Legislation	Description and Relevance	Responsible Authority
Urban and Regional Planning Act, 2018 (No. 5 of 2018)	The Urban and Regional Planning Act, 2018 (No. 5 of 2018) (GG 6631) came into force on 3 September 2020 and aims to consolidate laws relating to urban and regional planning, provide the legal framework for spatial planning, provide principles and standards of spatial planning, establish the regional and urban planning board, decentralise matters relating to spatial planning, prepare, approve, and review the national spatial development framework, regional structure plans, and urban structure plans, prepares, approves, reviews, and amendments zoning schemes, establish townships, alter boundaries of approved townships, disestablishment of approved townships, change names of approved townships, subdivide and consolidate land, alter, suspend, and delete conditions relating to land, and provide for incidental matters. Regulations relating to Urban and Regional Planning (GG 223) of 2020 (GG 7327) were published in terms of the Urban and Regional Planning Act Section 131. *The proposed Project area is zoned as an Industrial Area (see Section 7.3.3) and no rezoning or additional land use planning approvals are required..*	Ministry of Urban-Rural Development
Roads Ordinance, 1972 (No. 17 of 1972)	The Roads Ordinance, 17 of 1972 (OG 3268) was brought into force on 1 January 1973 and was amended in 1973 (twice), 1974, 1975, 1979, 1980, 1984, 1986, and 1993. This Ordinance consolidates and amends laws relating to roads and incidental matters: • Reserve boundaries (S3.1); • Control of traffic on the urban trunk and main roads (S27.1); • 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); and • Distance from proclaimed roads at which fences are erected (S38). *The limitations applicable to the Roads ordinance on proclaimed roads must be enforced during the implementation of the proposed Project where applicable.*	Ministry of Works and Transport

5.0 Description of the Proposed Project

This section provides context to the surrounding land uses relative to the proposed Project location and a description of the proposed Project with respect to the construction, operations, decommissioning, and closure phases.

5.1 Project Location

The proposed Project is located on Berth 8, Port of Walvis Bay, and falls within the Erongo Region of Namibia. The corner coordinates of the proposed Project site are listed in Table 5-1.

Table 5-1: Corner co-ordinates of the LMTP

Corner	Latitude	Longitude
Northeast	22°57'19.43"S	14°29'18.49"E
Southeast	22°57'20.18"S	14°29'18.83"E
Southwest	22°57'21.29"S	14°29'16.04"E
Northwest	22°57'20.57"S	14°29'15.69"E

5.2 Surrounding Land Uses

The proposed Project area is situated within the Port of Walvis Bay, which is a commercial harbour, centrally located on the coast of Namibia. The port handles fuel and vehicle imports, and passenger traffic from cruise liners, and offers support and logistics services that range from ship repair and maintenance, various storage facilities, small craft harbour, to fishing operations and mariculture.

Ultimately, Berth 8 of the Port of Walvis Bay, identified by Namport as the only location for the LMTP, is a suitable location aligned with the activities of the designated area (see Section 6.2).

5.3 Operations at the Port of Walvis Bay

This section reports specifically on the economic activities of the Port of Walvis Bay's contained in the Namport EMP (Faul & Botha, 2023).

Namport, acting as both the landlord and port operator, oversees the Port of Walvis Bay, which is Namibia's main commercial port. Several tenants operate within the port under this arrangement.

From April 2017 to March 2018, the port welcomed 866 vessels, as reported in the Namport Annual Report 2021/2022. During this same timeframe, the port handled approximately 5 500 000 freight tonnes of cargo. The port's current activities and facilities are briefly described in the following subsections, which are organized by activity.

5.3.1 Containerised, bulk, and break-bulk imports and exports

Sea ports are generally the primary channels for a country's imports and exports of containerised, bulk, and break-bulk goods. The Port of Walvis Bay handles a variety of bulk, break-bulk, and containerised cargo, including petroleum products, fish and fish products, salt, sugar, coal, charcoal, various mined resources, and mineral ores and/or concentrates, industrial chemicals like sulphuric acid, vehicles, and other items such as wood, steel, machinery, wheat, tyres, etc. Among these, salt is the chief export, while petroleum products are the main import. Bulk, break-bulk, and containerised cargo are transported to and from the port by trucks or trains.

5.3.2 Fuel imports

Fuel (diesel, unleaded petrol, Jet-A1, and heavy fuel oil) accounted for 42.2% of imports in terms of freight tonnes in the 2021/2022 period, with a total of 1 422 263 freight tonnes of fuel products imported. Fuel is offloaded at the new fuel terminal at the North Port. This jetty can host two tanker ships simultaneously, and fuel is transferred via the trestle and then through underground pipelines to the various bulk fuel storage facilities in Walvis Bay.

5.3.3 Vehicle imports

The import of vehicles plays a significant role in the services offered by the Port of Walvis Bay. Vehicles are usually transported in roll-on/roll-off (Ro-Ro) vessels. These Ro-Ro vessels enable vehicles to be driven on and off the ships using their own power or onto other self-moving platforms.

5.3.4 Passenger traffic

The expansion of the Walvis Bay port has led to an increase in cruise liners visiting the area. A new container terminal was constructed, complete with a dedicated berth for cruise vessels. This berth can accommodate ships up to 300 m in length, with a draft of 11 m. This

enhances the port's capacity for handling passenger traffic and allows Namport to divert passenger activity away from the central hub of the port, specifically berths one to eight.

5.3.5 Support and logistics services

Over and above the import and export of commodities and raw materials, Namport and its tenants also offer a variety of support services. These broadly include:

- Ship repair and maintenance: Major repairs and maintenance may include hull cleaning, grit blasting, spray painting and mechanical and electrical repairs. Minor repairs involve structural, electrical and mechanical work.
- Transshipments: The port acts as an intermediatory location for transshipments which can be in the form of sea cargo temporarily stored in the port before being re-loaded onto another vessel for further transport.
- Dry ports and storage facilities: The port has dry ports that serve the landlocked countries of Zambia, Zimbabwe, and Botswana. These ports handle a variety of cargo, including mineral ores, chemicals, vehicles, and general goods, primarily in break-bulk and containerised form. The commercial harbour also houses various privately operated storage facilities, which store everything from bulk mineral ores to goods in warehouses and rub halls.
- Fuel bunkering: Fuel bunkering at the port is carried out through three methods: 1) using underground pipelines from bulk tanks to quay areas and concrete jetties, with hose trolleys for bunkering; 2) employing road tankers when bunker points are unavailable; and 3) utilising offshore tanker vessels for fuelling when land-based fuelling is not possible.
- Cold storage facilities: A privately-run commercial cold storage facility is located within the commercial harbour. This facility offers temporary refrigeration and freezing space for the import and export of perishable items such as fruit, vegetables, meat, and fish through the port.
- Small craft harbour, yacht club and waterfront: A minor craft harbour is located in the port, functioning as a launch area for small, motorised vessels. This facility caters to various sectors, including tourism and mariculture. The yacht club and waterfront area enhance nautical leisure and maritime tourism activities. A multitude of private sightseeing cruises are conducted from the waterfront region.
- Dredging: Sedimentation and seabed scouring reduce water depth in entrance channels and near jetties and quays. To ensure safe navigation of vessels, maintenance dredging is periodically needed to deepen these areas. Capital dredging is carried out when new channels, turning areas, or berthing spaces are needed, or when existing ones need to be deepened.
- Fishing operations and mariculture: Fishing and fish processing infrastructure is located outside the commercial harbour in the industrial area of Walvis Bay but offshore activities, including jetty construction, dredging, and ship maintenance, are under the jurisdiction of Namport. Mariculture, specifically of oysters and mussels, is a growing industry within port limits.

5.4 Project Overview

The LMTP and associated components will occupy an area of approximately 2 000 m^2 and will be comprised of the following four components:

- A warehouse, where inputs required in the processes (fluid mixing, reconditioning and bulking operations) and resulting products will be stored. Figure 5-1 shows an example of a typical warehouse structure with storage areas.
- A liquid bulk area, which will be for mixing new drilling fluids (or drilling muds) and reconditioning used fluids (treatment of "waste"), where these fluids will be stored in horizontal tanks. The types of fluids housed include synthetic and water-based drilling fluids, brine completion and base fluids. An example of fluid mixing tanks typically used is shown in Figure 5-2. The liquid bulk area will consist of 38 horizontal stackable tanks and two mixing fluid tanks as summarised in Table 5-2.

Table 5-2: Tank Capacities at the liquid bulk area

Tanks	Capacity
Stackable tanks	
Synthetic Based Mud	18 x of approximately 70m^3 each
Brine	8 x tanks of 70m^3 each
Base oil	12 x tanks of 60 m^3 each
Total	**(38 tanks) 2 544m^3**
Mixing Tanks	
Synthetic base fluid	1 x 70m^3
Brine	1 x 70m^3

- A dry bulk area, where the bulking of raw materials (chemicals), such as barite, bentonite, and calcium carbonate, will be undertaken. These raw materials will be stored in large bags and then emptied into vertical bulk storage silos from where they will be transferred into supply vessel storage tanks (see Figure 5-3) through hoses. The products are then transferred from supply vessel storage tanks to the drilling unit's bulk tanks for offshore mixing of drilling fluids. The dry bulk area will consist of four Dry Bulk Silos with a combined capacity of approximately 12 600 ft^3 (approximately 357 m^3).
- A laboratory unit, where the fluids mixed at the LMTP and those received back from the drilling unit are analysed and quality controlled. The laboratory also provides engineering and support to operations offshore. The laboratory will be in a form of a dedicated lab container with a footprint of approximately 40 m^2.

Technical drawings showing the layout plan of the proposed Project are provided as Appendix G.

Table 5-3: Tank Capacities at the liquid bulk area

Tanks	Capacity
Stackable tanks	
Synthetic Based Mud	18 x of approximately 70m^3 each
Brine	8 x tanks of 70m^3 each
Base oil	12 x tanks of 60 m^3 each

Tanks	Capacity
Total	**(38 tanks) 2 544m^3**
Mixing Tanks	
Synthetic base fluid	1 x 70m^3
Brine	1 x 70m^3

Figure 5-1: Example of a warehouse (Source: Halliburton, 2024)

Figure 5-2: Example of fluid mixing tanks (Source: Halliburton, 2024)

Figure 5-3: Example of horizontal storage tanks (Source: Halliburton, 2024)

5.5 Construction Phase

It must be noted that no heavy construction will be required for the proposed LMTP as only a slab on the ground is required and the LMTP is a modular equipment and is mobile.

5.5.1 Construction Facilities

During construction, the following facilities will be required:

- Contractors site office and lay down areas, which will be loacted next to the LMTP office;
- Ablution facilities such as mobile chemical toilets near the work area;
- Handling and storage area for construction material and waste, near the work area; and
- Generators for temporary power supply, as required.

These facilities will be removed at the end of the six-month construction phase.

5.5.2 Construction Activities

The following activities are expected to take place during construction:

- Appoint contractors, labourers, etc.;
- Clearing of existing infrastructure;
- Foundation excavations and ground improvements;
- Setting up temporary contractors laydown areas;
- Delivery of materials – storage and handling of materials such as sand, rock, cement, chemical additives, etc;
- General building/construction activities including, amongst others: mixing of concrete; steel fixing, high-density polyethylene (HDPE) welding, operation of construction vehicles and machinery; refuelling of machinery; civil, mechanical, and electrical works; painting; grinding; welding; etc;
- Handling, storage, and disposal of non-hazardous and general waste:
    - Domestic waste;
    - Other construction waste; and
    - Packaging, e.g., plastic wrapping, Styrofoam.

5.5.3 Construction Workforce

All construction workers are expected to be based in Walvis Bay and no construction camp will be established on the site. However, the necessary hygiene and workplace facilities will be provided on site.

The construction phase of the project will be approximately 6 months and will result in limited employment opportunities. It is expected that Halliburton and its contractor(s) will favour employment of local people during the construction, particularly for unskilled and semi-skilled labour.

It is estimated that 6 – 10 unskilled and semi-skilled local persons will be employed for the duration of the construction activities.

5.5.4 Transport of Construction Materials

The components of the LMTP will be delivered and offloaded on site. Materials required for the construction phase will be brought to site via the existing road network that surrounds the proposed Project site.

5.5.5 Water and Power Supply

It is assumed that water required during the construction phase will be supplied through existing water supply infrastructure provided by NamWater and ultimately, Namport, to its tenants until a permanent water supply system is established. Approximately 100 m^3 of water will be required per day during the construction phase.

During the construction phase, diesel power generation will constitute the primary power source.

5.5.6 Waste Management

During construction, portable chemical toilets will be provided on site for staff. The portable toilets will be supplied by an appropriate contractor and will be serviced on a regular basis.

The types of waste that could be generated during construction include non-hazardous waste (e.g. builders' rubble) and domestic waste (such as plastic bags, tins, bottles, paper, and packaging waste will be generated during construction. These wastes will be temporarily handled and stored on site prior to removal for recycling and/or final disposal at permitted waste disposal facilities by WESCO.

5.6 Operational Phase

The Proposed LMTP will provide drilling and completion fluids to the operators currently exploring for oil and gas offshore southern Namibia. Drilling fluid is a complex mixture of fluids, solids and chemicals that are carefully tailored to provide the correct physical and chemical characteristics required to safely drill the well. The main functions of drilling fluid or drilling mud (terms used interchangeably) are to:

- Maintain a stable wellbore and preventing the open hole from collapsing;
- Provide sufficient hydrostatic pressure to control subsurface pressures and prevent kicks or blow-outs;
- Transport the cuttings to the surface;
- Cool and lubricate the drill bit and drill string (reduce friction);
- Power the mud motors / downhole tools during the drilling process;
- Regulate the chemical and physical characteristics of returned mud slurry on the drilling unit; and
- Displace cements during the cementing process.

The operational process at the LMTP is summarised below and in Figure 5-4.

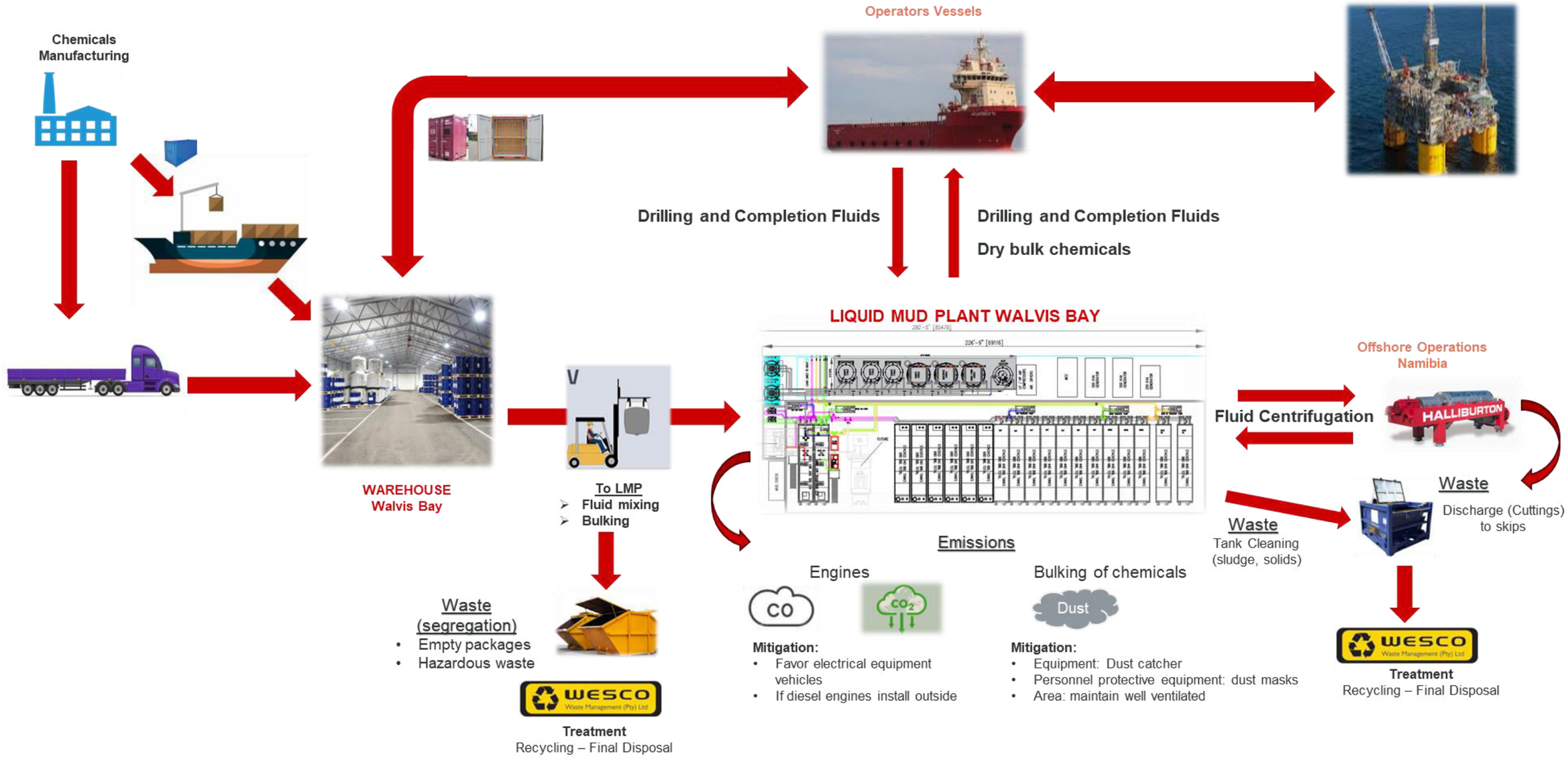


Figure 5-4: LMTP Process Flow Diagram (Source: Halliburton, 2024)

5.6.1 Delivery of Raw Materials to the Warehouse

Chemicals to be used for mixing at the LMTP will be delivered and stored in the warehouse. The chemicals will be sourced locally or where not locally available, will be imported into Namibia. The chemicals required will include:

- Synthetic-Based Drilling Fluid (synthetic / water / salt / chemicals);
- Water-Based Drilling Fluid (water / salt / chemicals);
- Brine Completion Fluid (salt / water); and
- Base fluid: mineral oil.

Liquids will generally be supplied to the warehouse in 55-gallon (208-litre) drums or 1 000-litre intermediate bulk containers (IBCs). The drums / containers will be stored in a bunded storage area of the warehouse. The dry chemicals will be supplied either in large bags (1 – 1.5 Metric Ton) or palletized sacked material (25 kg sacks). All chemicals required will be transported from the warehouse to the LMTP, as required for fluid mixing and reconditioning, and the dry bulk plant for bulking operations.

Three different types of brines (sodium chloride, calcium chloride and bromide) are used in the manufacturing of the drilling muds at the LMP. Sodium chloride will be sourced locally, close to Walvis Bay and the remaining brines which are not available locally, will be imported.

5.6.2 Fluid Mixing and Reconditioning

Fluid mixing and reconditioning will include:

- Fluid mixing: Base fluid (water, mineral oil) is transferred to the mixing tanks. The base fluids are circulated on a mixing line via the mixing hopper where chemicals are added either in sacked, drums or large bag units.
- Fluid Storage: Batches of the mixed fluid is then be transferred to the horizontal storage tanks for storage.
- Fluid Shipment: Fluids are then transferred to storage tanks on supply vessels via transfer pumps and hoses as required for offshore drilling operations.
- Fluid backload: Excess or used drilling fluids from offshore operations are sent back to shore and received at the LMTP where they are stored in onshore horizontal storage tanks.
- Fluid reconditioning: Depending on fluid conditions, chemical treatment (similar operation to mixing) and cleaning (using centrifuges) is performed to ensure the drilling fluid can be re-used and waste is reduced.

Different types of mud for different stages and depths of drilling will be produced as follows:

- Riserless Drilling Phase or Top hole drilling: water-based solutions or brines (Calcium chloride, Barite, Sodium Chloride)
- Risered Drilling Phase or Bottom hole drilling: synthetic fluids, base oil, emulsifiers, lime, brine.

5.6.3 Dry Bulking Operations

In addition to the drilling fluids, dry chemicals are required for offshore operations. These raw materials required will be stored initially in large bags at warehouse. The bags are emptied into bulk storage silos via cutting hopper using pressurised vessels. Powder is then

transferred (blown through a hose) from the LMTP bulk powder storage tanks on to supply vessel storage tanks, from where it will be transferred to the drilling unit's bulk tanks for mixing offshore.

Bentonite is mixed for initial drilling, barite and calcium carbonate are added for density and bridging. During this process, all dust emissions are collected in industry approved dust collectors engineered to minimize personnel and environmental exposure to dust emissions.

5.6.4 Dispatch of Products from the Warehouse

All drilling fluids, bulk powders and other chemicals will be stored in the warehouse from where they will be dispatched to offshore operations by the supply vessels. The fluids, bulk powders and palletized chemicals to be used on offshore drilling operations will be stored initially at the LMTP and will include bulk fluids and palletized materials (i.e. offshore treatment chemicals for maintaining fluid stability).

Bulk fluids and powders the will be supplied from the LMTP storage tanks to supply vessels include barite, BARACARB (calcium carbonate), bentonite, BaraXcel (Synthetic Fluid), Base Fluid (Mineral Oil) and Brines. Estimated quantities of bulk fluids to be supplied from the LMTP are provided in Table 5-4.

Table 5-4: Bulk fluids and powders to be suppled from the LMTP

Bulk Product Volume / Quantities		
Product	**Unit**	**Quantity (Estimated)**
Barite	Metric Ton	140 MT
BARACARB (Calcium Carbonate)	Metric Ton	140 MT
Bentonite	Metric Ton	50 MT
BaraXcel (Synthetic Fluid)	m^3	1 500 m^3
Base Fluid (Mineral Oil)	m^3	800 m^3
Brines	m^3	1 000 m^3

Palletized material, including BARAZAN / BARAZAN D, Guar Gum, PAC-RE, STARCIDE, EZ-MUL NT, Lime, ADAPTA, Baravis IE 489, RHEMOD L, and TAU MOD, will also be produced at the plant. These chemicals will be containerized at the warehouse and dispatched to the drilling unit as deck cargo on the supply vessel. Table 5-5 provides a summary of the quantities of palletised materials that will be produced at the LMTP.

Table 5-5: Palletised materials produced at the LMTP

Palletized Material		
Product	**Unit**	**Quantity (Estimated)**
BARAZAN / BARAZAN D	25 kg sack	500
Guar Gum	25 kg sack	400
PAC-RE	25 kg sack	400
STARCIDE	25 kg sack	100
EZ-MUL NT	970 kg intermediate bulk containers (IBC)	80
Lime	25 kg sack	500
ADAPTA	25 kg sack	400
Baravis IE 489	25 kg sack	800
RHEMOD L	960 kg IBC	20
TAU MOD	50 lb sack	1 500

5.6.5 Water and Power Supply

It is estimated that the LMTP will require approximately 3.8 mega litres of water and 115 000 litres of diesel on a quarterly basis (every three months). Requirements at the LMTP are highly dependent on the activity levels and the types of fluids being produced for a particular customer (drilling contractor). These utility requirements will, therefore, fluctuate depending on the varying output from the LMTP.

Diesel and electricity usage will depend on access to the local grid or whether onsite generation through the two dedicated LMTP generators is required. It is currently estimated that 45 000 kilowatt hours (kWh) of electricity will be required quarterly (every three months).

5.6.6 Waste and Waste Management

The following waste sources are anticipated:

- Empty packaging: oil drums, aerosol cans, big bags, sacks, etc.
- Wash water from cleaning the tanks (sludge oily water); and
- Synthetic contaminated waste from the centrifugal reconditioning of Synthetic-Based Mud.

Halliburton will make use of a service provider (WESCO) for waste management. WESCO will be responsible for the collection of waste (hazardous and general) and disposing of the waste at the appropriately registered waste disposal sites.

5.6.7 Operation Workforce

The standard workforce for the operation of the LMTP is estimated at 14 (skilled and unskilled). However, when the LMTP is operating at full capacity an additional 8 people will be required, resulting a total of 22 people. The following is required:

- Skilled employees
    - Plant Manager
    - Plant supervisor: trained to operate the equipment and have a technical knowledge of drilling fluids systems that will be produced in the facility.
    - Technician / Mechanic / Electrician: to provide preventative maintenance and repairs for the specialized equipment included in the plant.
    - Lab technicians
- Unskilled workers
    - Laborers who will be handling bulk hose, cutting sacks and general maintenance of the facility.

Experienced employees of Halliburton will be brought in initially to support the operations set up and train personnel.

5.7 Decommissioning and Closure

The conceptual plan at this stage is to remove surface infrastructure, and to restore the area to pre-construction state. At a conceptual level, decommissioning can be considered a reverse of the construction phase with the demolition and removal of the majority of surface infrastructure and activities similar to those described with respect to the construction phase.

The site will then open up to Namport and others for other potential uses.

5.8 Project Timelines

The project will be implemented in three phases as follows:

- Pre-construction phase (approximately 2 to 3 months), which included site selection, permitting and design. Halliburton is currently in this phase.
- Construction phase (approximately 4 months), subject to regulatory approvals.
- Operational phase (approximately 5 years per the Namport contract with Halliburton), after which the plant will be decommissioned.

6.0 Alternatives

Section 8(g) of the EIA Regulations requires that feasible alternatives be considered and assessed during the EIA.

6.1 Project Design and Technology

The LMTP design and technology was developed based on Halliburton's global experience in similar projects. As such, no project design and technology alternatives have been explored.

6.2 Project Location

The site was identified by Namport as the only suitable site due to its short distance from the jetty, where the product from the LMTP will be loaded onto vessels. The LMTP products will be pumped from the LMTP to the jetty, and pumping fluids over a longer distance would be a challenge.

If the LMTP is installed on a site further from the jetty:

- The pumping pressure loss will be higher and result in unsafe working conditions; and
- Operations will be unfeasible due to additional costs of pipelines and civil work.

As such, no site alternatives have been explored.

6.3 No-Go Option

The No-Go alternative represents the option not to proceed with the proposed Project, which leaves the Project area in its current state (i.e. a working port). It thus represents the current status quo and the baseline against which all potential Project-related impacts are assessed. In opting for the No-Go alternative, none of the impacts anticipated from the proposed Project would occur. If the proposed Project does not proceed, the residual impacts (i.e., impacts after implementation of mitigation measures) of the activities will not occur.

The 'do nothing' or 'No-Go' option would limit the support options of current offshore exploration activities in southern Namibia. The assessment of this option requires a comparison between the option of proceeding with the proposed Project with that of not proceeding with the proposed Project.

Proceeding with the proposed Project will result in some positive economic impacts such as employment, training and skill development opportunities for Namibian citizens, local investment and procurement of local goods and services (raising the local content of offshore activities) (Section 8.4), but may also result in some potential, albeit low significance, negative environmental and social impacts (Section 8.0).

Even if the proposed Project does not proceed, the site is likely to be used for other port-related or industrial activities, leaving the Project area subject these potential activities and associated impacts, which are likely to be no less significant than that associated with the proposed Project.

7.0 Description of the Current Environment

This chapter provides general information on relevant environmental (geographical, physical, biological, social, economic, heritage and cultural) aspects associated with the proposed Project. An understanding of the environmental and social context and sensitivity within which the proposed Project activities would be located is important to understanding the potential impacts.

This section was compiled utilising the following sources of information:

- Atlas of Namibia;
- Google Earth;
- Specialist assessments undertaken as part of this EIA; and
- Information from existing reports, including the Namport EMP (Faul & Botha, 2023).

The description of the current environment encompasses the proposed Project infrastructure footprint i.e., disturbance areas within the proposed Project area, as well as the general surrounding natural environment.

7.1 Biophysical Environment

7.1.1 Climate

Climate can influence the potential for environmental impacts and related project design. Key Project-specific issues are as follows:

- Rainfall could influence surface water runoff, which affects surface water and waste management planning;
- Temperature could influence air dispersion through impacts on atmospheric stability and mixing layers, which could influence the distribution of potential atmospheric emissions; and
- Wind could influence the dispersion of potential atmospheric pollutants.

Information provided in the section below was sourced from the latest Namport EMP compiled by Geo Pollution Technologies (Pty) Ltd (Faul & Botha, 2023).

7.1.1.1 Temperature

The cold Benguela current has a significant influence on the temperature at Walvis Bay, resulting in minimal fluctuations in daily and seasonal temperatures. The average yearly temperatures hover around 18°C to 19°C, with the highest temperature rarely exceeding 30°C and the lowest seldom falling below 5°C. The only instances of extreme temperatures occur during the east wind conditions in the late autumn to early winter months, when temperatures can soar to the high thirties or even low forties. Consequently, these months have an average maximum temperature ranging from 30°C to 35°C. As one ventures further inland from Walvis Bay, daytime temperatures rise rapidly, while nighttime temperatures can drop significantly in the desert surroundings.

7.1.1.2 Rainfall

The precipitation patterns in Namibia are primarily influenced by the South Atlantic High (SAH), which is a high-pressure system located to the west of Namibia in the Subtropical High-Pressure Zone. Throughout the year, the SAH shifts its position: it resides at higher latitudes during winter and lower latitudes during summer. In winter, the SAH is situated

farther north. As a result, the high-pressure cell pushes any moisture originating from the Intertropical Convergence Zone (ITCZ) northward. This movement prevents rain over Namibia during the winter months. During summer, the SAH moves further south. Its influence on the ITCZ diminishes, allowing moist air to reach Namibia. Consequently, summer rains occur in the region. In summary, the SAH's seasonal position plays a crucial role in determining whether Namibia experiences dry or wet conditions.

Consequently, Walvis Bay's average annual rainfall is less than 50 mm, with a 100% fluctuation in yearly rainfall. Occasional heavy rainfalls do happen and often lead to disorderly situations as Walvis Bay, along with other coastal towns, is not equipped to handle large amounts of storm water. Fog is a crucial water source for many plants and animals along the coast of Namibia and the Namib Desert. Walvis Bay experiences up to 900 hours of fog annually, which is caused by the cold Benguela water chilling the humid air above it to a temperature that causes the water vapor to condense into fog and low-level clouds.

7.1.1.3 Wind

The winds are at their peak from early to mid-summer (September to January) when the Subtropical Anticyclone of the South Hemisphere (SAH) is most robust and persistent, and the temperature disparity between the sea and the desert plains is at its maximum. During this summer period, the winds are typically from the south to south-west and wind speeds can occasionally surpass 32 km/hr, typically peaking from late morning to early afternoon. In winter, the SAH weakens, and the southerly to south-westerly winds diminish. Winter winds lack the strength to penetrate far inland. However, conditions from autumn to winter foster the development of east wind conditions (berg winds), which can achieve speeds exceeding 50 km/hr and carry substantial amounts of sand. East winds arise when the inland plateau is cold with a localized high-pressure cell, while a low-pressure system exists at the coast. The high-pressure cell pushes air off the escarpment, and as the air descends, it warms adiabatically and creates a low-pressure system due to the vertical expansion of the air column. This warm air flows towards the coastal low, and as it traverses the Namib plains, it heats up even more. This wind manifests as a very strong, warm, and dry wind during the mornings to early afternoons, but dissipates by late afternoon. Throughout the year, the prevailing nighttime regional wind is a weak easterly wind. This occurs when the mainland cools to below the temperature of the coastal water, resulting in a coastal low versus an onshore high-pressure system, with initially no wind in the early evening when temperatures between water and land are similar, and then weak easterly winds as the temperature difference increases. The wind within the Marine Boundary Layer (MBL) remains dominated by the Benguela Low-Level Coastal Jet, causing a localized southerly wind over Walvis Bay.

7.1.2 Topography

The proposed Project is located in an existing port, which was originally characterised by flat coastal plains. Walvis Bay has a unique topography in that some portions of the town lie below sea level and the town is protected from flooding by a dyke. The elevation in the study area increases from 5 metres below sea level to approximately 30 metres above mean sea level (mamsl) (Figure 7-1). Slopes across the study area are flat and gentle (Figure 7-2).

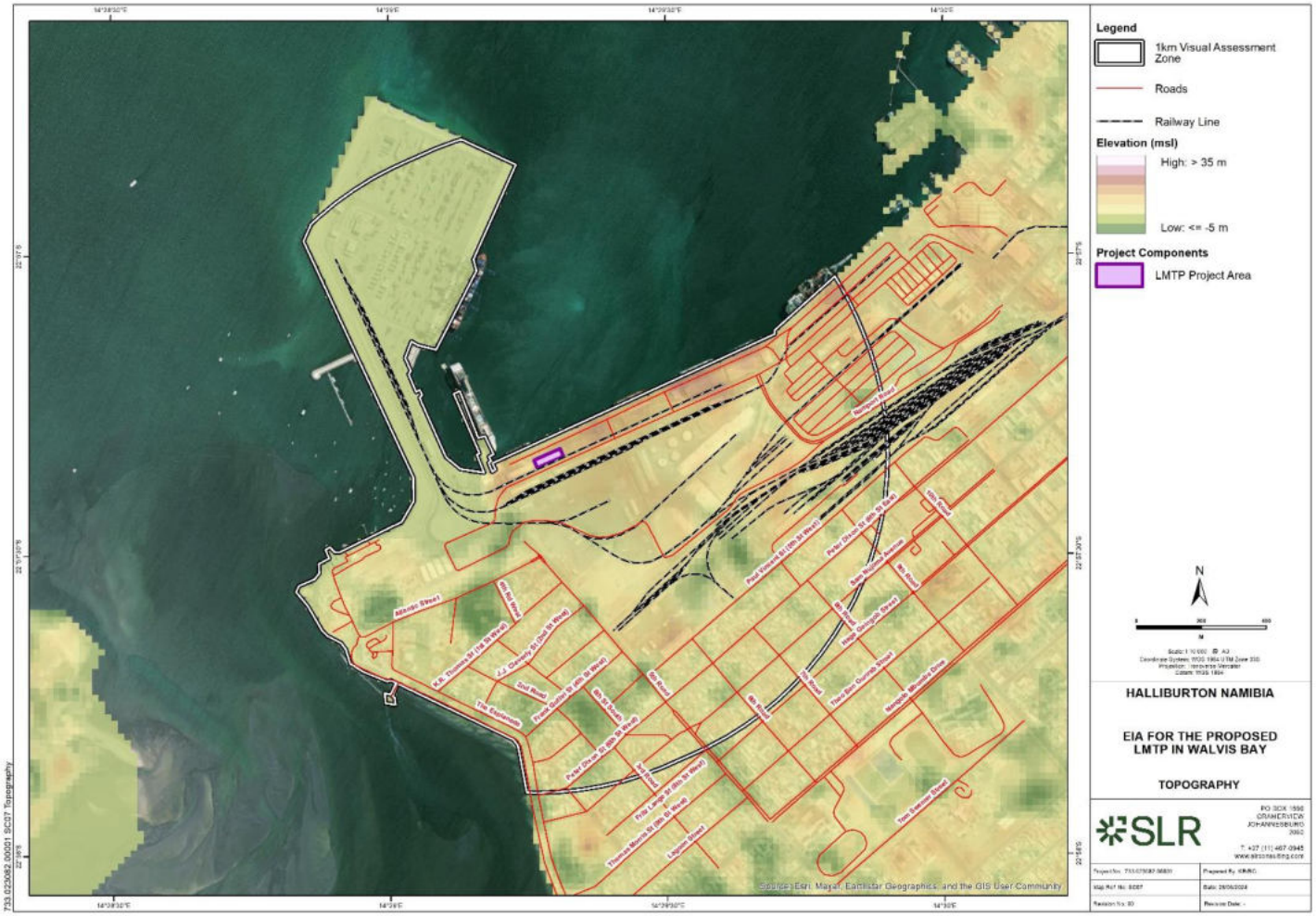


Figure 7-1: Topography

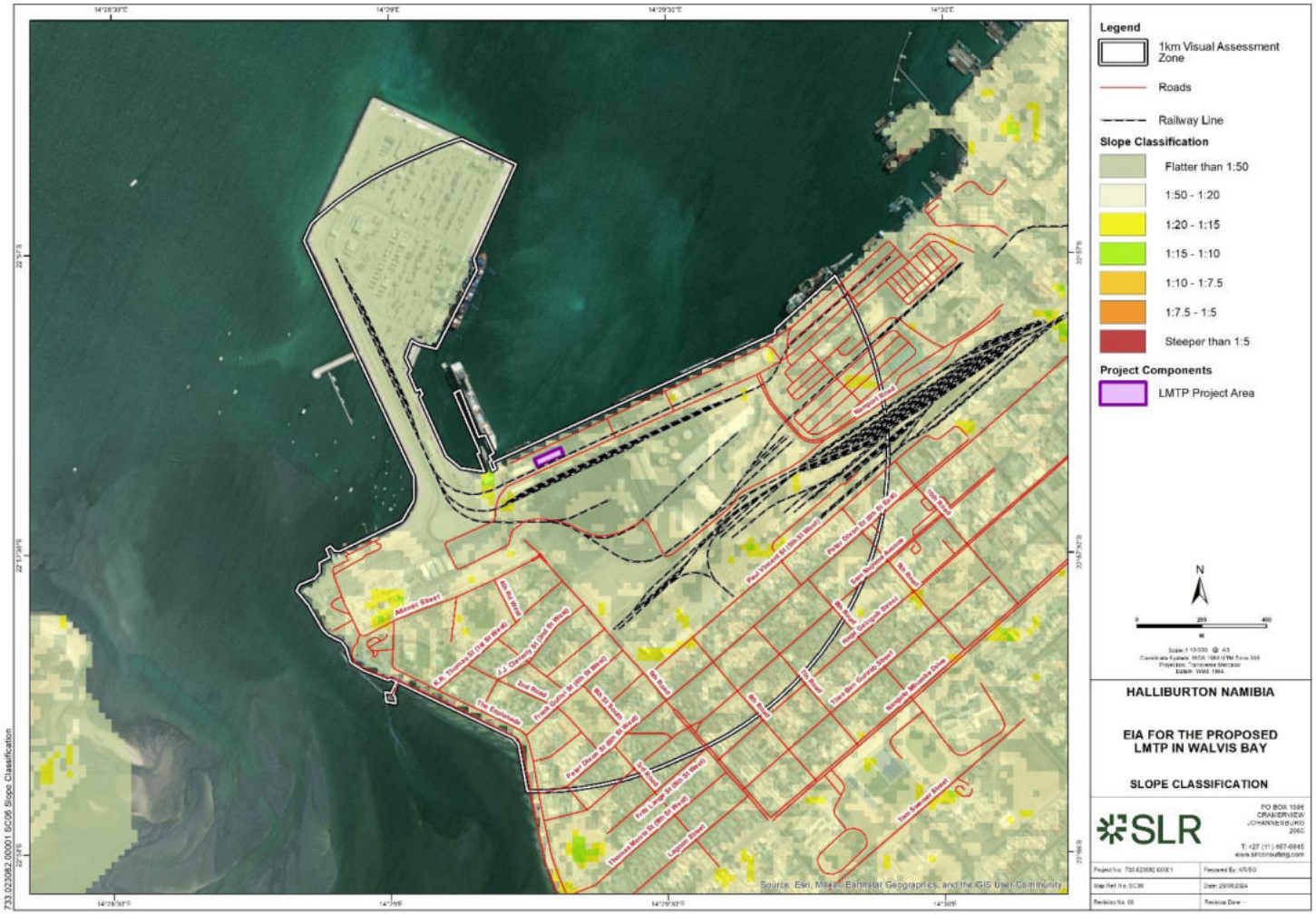


Figure 7-2: Slope Classification

7.1.3 Surface Water

Surface water resources include drainage patterns and paths of preferential flow of stormwater runoff. Water quality and quantity are key indicators of the resource value and status and can have significant effect on downstream hydrology, aquatic ecology, and suitability for use.

The port is subjected to tides, sea level, waves, ocean current and tidal current. Understanding the surface water resources enables planning for water management during all phases of the Proposed Project.

The cold Benguela Current flows in a north-westerly direction along the coastline of Namibia. This environment is known for being a corrosive environment, given the salt-laden fog, episodic winds and aggressive salts abundant in the soil. The presence of high moisture and salt content in the surface soil can result in the fast deterioration of metal and concrete structures.

As such, the harsh nature of the seafront and the proximity of the proposed Project to this environment requires planning in terms of building materials and maintenance so as to prevent degradation and safety hazards in the construction and operations.

7.1.3.1 Water Quality

The water and sediment quality in the vicinity of the Lüderitz and Walvis Bay urban centres is generally poor, as these are located in sheltered bays where flushing rates are reduced. With the proposed expansion of the Port of Walvis Bay, the risks of increased pollution in the marine environment from these sources are expected to increase[1].

The sewerage systems in Walvis Bay are in good condition, and are all on land, with no outfalls that discharge to the lagoon or into the port. However, there are approximately 15 fish factories and processing plants in Walvis Bay, which process ~60% of the Namibian hake catch, most of the other demersal fish landings and all of the pelagic (sardine, anchovy) and midwater (horse mackerel) catch. The processing plants draw water from the bay and discharge effluent back into the bay. The effluents include fish scales, oil/grease and offal, and dissolved/fine particulate organic loads that require oxygen during decomposition. The increased organic loads associated with these effluents can thus exacerbate the already naturally oxygen-stressed condition of the bay, particularly along its eastern shore.

The water quality of Walvis Bay harbour changes seasonally due to these organically enriched discharges. The chemical oxygen demand (COD) levels in the fishing harbour are between 1 000 – 1 500 mg/l. Discharge of effluent from fish processing plants increases the COD in the fishing harbour by on average 1.7 times. High COD results in hypoxic waters, which when near the seabed, can cause mass mortality of mobile and sessile fauna and contribute to hydrogen sulphide production by the anaerobic microbial communities.

In addition to the fish factory effluents, water quality in the Port of Walvis Bay and surrounding areas is compromised by:

- the use of antifouling paints containing Tributyltin (TBT);
- ships anchored at port limits (illegally) disposing litter and solid waste;

[1] www.nacoma.org.na/Our_Coast/Threats.htm

- dredging activities (maintenance and capital) through temporary increases in suspended sediment concentrations and possibly remobilising toxins from anaerobic sediments; and
- loading operations leading to spillages of bulk ores, discharges from ships and dusts and particulates from ship repair and maintenance.

7.1.4 Biodiversity

In the broadest sense, biodiversity provides value for ecosystem functionality, aesthetic, spiritual, cultural, and recreational benefits.

Information and maps in this section has been sourced from the Marine Ecology Specialist Assessment (Appendix H1)) undertaken by Pisces Environmental Services and the Namport EMP (Faul & Botha, 2023).

7.1.4.1 Ecosystems

The coastline around Walvis Bay is characterised by wind-induced upwelling characterising the Benguela ecosystem, which is the principal physical process that shapes the marine ecology of the study area. The Benguela system is characterised by the presence of cold surface water, high biological productivity, and highly variable physical, chemical, and biological conditions.

7.1.4.2 Marine Habitats

The Port of Walvis Bay lies within the Kuiseb Lagoon Coast habitat (Figure 7-3), which covers a total area of approximately 162 ha of which more than 50% are considered in a poor ecological condition primarily due to coastal developments as part of Walvis Bay town, and the development of the port. Although the Kuiseb Lagoon Coast habitat is considered well protected with as much as 154 ha (95%) being included either in a protected or partially protected area, the habitat has been assigned a threat status of 'endangered' as shown in Figure 7-4.

However, it must be emphasized that the intertidal habitat within Walvis Bay harbour, and in the immediate vicinity of the proposed LMTP, are entirely artificial comprising concrete walls (berths) and protective rock armour. The rocky intertidal 'shore' is therefore extremely steep, and the intertidal zones narrow. Nonetheless, the biota present is typical of relatively sheltered shores, being dominated by algae, the alien invasive mussels *Mytilus galloprovincialis* and *Semimytilus patagonicus* and the barnacle *Chthamalus dentatus*. Sandy beaches are absent, with the nearest beaches occurring to the north of the naval harbour and along the Pelican Point peninsula in the west of the bay.

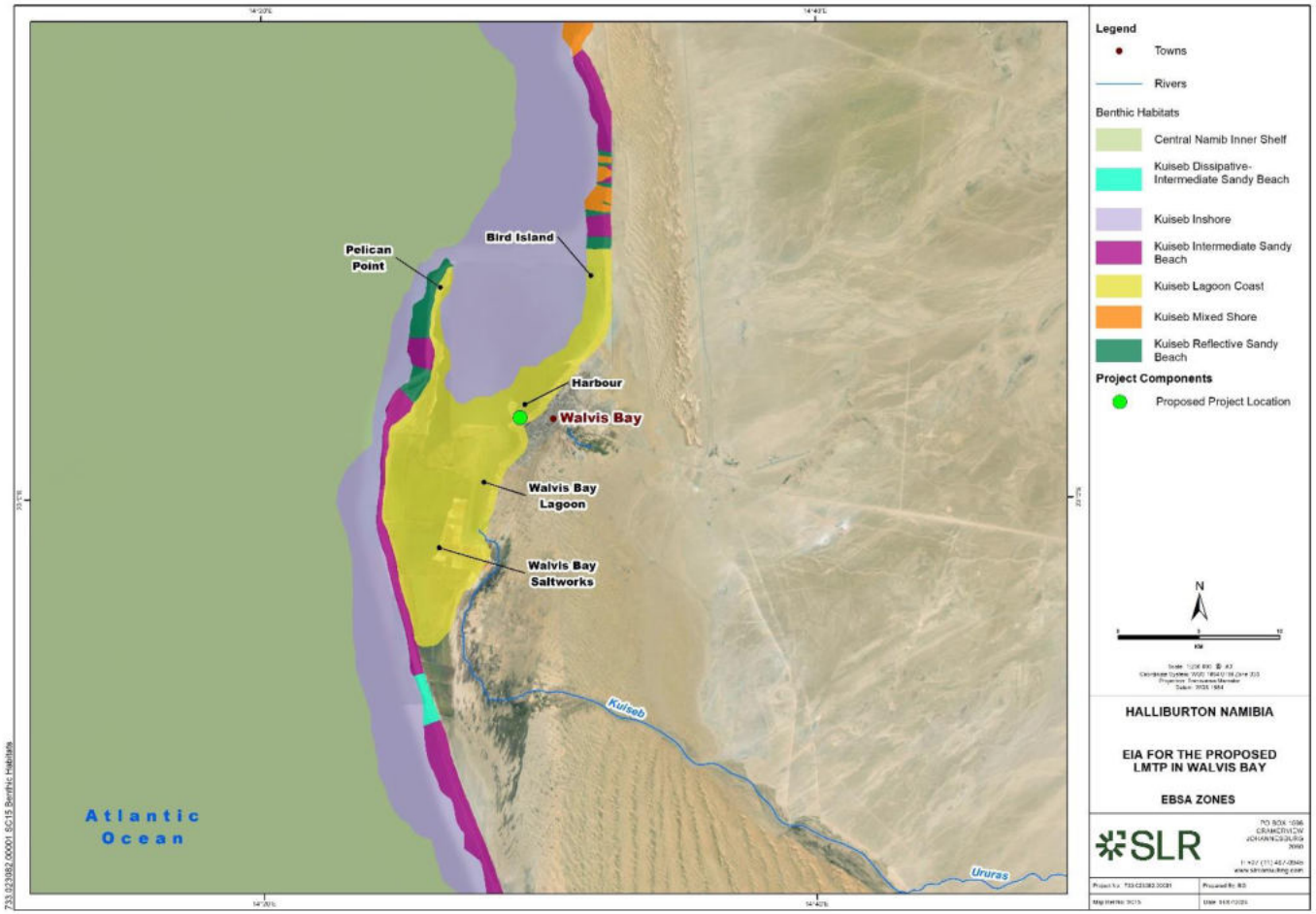


Figure 7-3: Benthic habitats associated with the project area

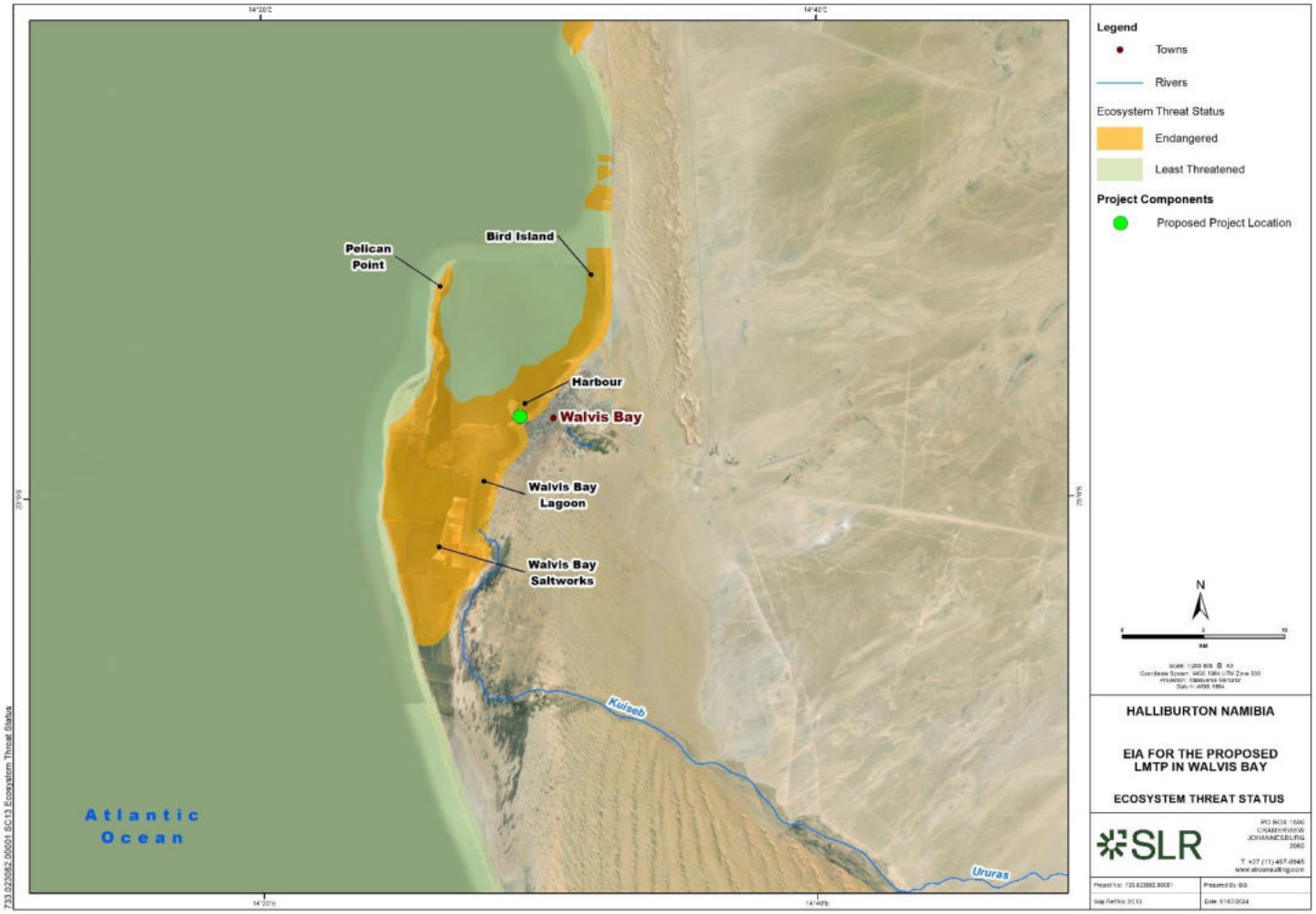


Figure 7-4: Threat status of the habitats associated with the project area

7.1.4.3 Fauna

Benthic Communities

In Walvis Bay, subtidal benthic communities are represented by a diversity of polychaetes and bivalves, with ophiuroids, ostracods, amphipods and cumaceans also being present. (Hooks & Duvenhage, 2013) recorded a total of 21 species, with abundance increasing along an offshore-onshore gradient from ~20 m to ~5 m. At the time of the study, the benthos was dominated by cumaceans (mainly *Iphinoe africana*) and polychaetes (mainly *Prionospio sexucolata*), with meiofaunal diversity being rich in nematodes. In contrast, (Laird, et al., n.d.)recorded only nine species, four of which were segmented polychaete worms. **The abundance and biomass of biota was on average extremely low. The dramatic drop in macrofaunal diversity and abundance could be attributed to dredge events that have occurred between the two sampling periods, although low oxygen events and sulphur eruption may also have contributed to the decline.**

Nearshore Fish Communities

Available data suggest that that there have not been major changes in the fish community composition utilizing the nearshore surf zone nursery areas in Walvis Bay. However, ongoing overexploitation of fish stocks could have played a role in reducing the spawner biomass and reproductive output of inshore Namibian fish stocks. Sulphur eruptions/low oxygen events (e.g. February and March 2018) also resulted in large fish kills in the study area and may have contributed to reduced catches during some surveys. If such events occur after the spring-summer spawning season, the abundance of juvenile fish in the nearshore habitats of Walvis Bay would be substantially reduced.

Pelagic Communities

Walvis Bay hosts a variety of marine mammals, turtles and seabirds. Marine mammals that have been recorded around the Walvis Bay include:

- Turtles: The Leatherback Turtle (*Dermochelys coriacea*) is the most commonly sighted turtle, with observations of Green (*Chelonia mydas*), Loggerhead (*Caretta caretta*), Hawksbill (*Eretmochelys imbricata*) and Olive Ridley (*Lepidochelys olivacea*) turtles being rare.
- Migratory baleen whales which include the southern right whales and humpback. Humpback whales are likely to be the most frequently encountered baleen whale in the Walvis Bay areas, ranging from the coast out beyond the shelf, with year-round presence but numbers peaking in June – July (northern migration) and a smaller peak with the southern breeding migration around September – October.
- Dolphin species associated with the Walis Bay include:
    - Heaviside's dolphins are resident year-round and the size of the population utilising Walvis Bay in 2009 was estimated at 505.
    - The bottlenose dolphin is found in the extreme nearshore region between Lüderitz and Cape Cross, as well as offshore of the 200 m isobath along the Namibian coastline. The population in 2008 was estimated at 77 individuals, with a 6-8% annual reduction in the number of animals identified in Walvis Bay since then.
    - The dusky dolphin has been occasionally sighted around Walvis Bay.

- Cape Fur Seals (*Arctocephalus pusillus pusillus*) have been observed at Cape Cross north of Walvis Bay as well as at Pelican Point. Following the precipitous decline of the Namibian seal populations during the warm events of 1993/94, the population is now considered to be healthy and stable in size.

Avifauna

Walvis Bay lies within the Important Bird Areas (IBAs) NA014 and NA013. This area serves as a crucial overwintering habitat for Palaearctic migrant wader species, as well as African species like the Greater and Lesser Flamingos, Great White Pelican, and Chestnut-Banded Plovers.

- IBA NA013 comprises the coastal stretch between Walvis Bay and Swakopmund, spanning approximately 30 km in length and 700 m in width. This area records over 13 000 shorebirds of roughly 31 species, the majority of which are Palearctic migrants.
- IBA NAO13 is not only the most densely populated shoreline in terms of shorebird density in southern Africa, but it also hosts the densest colony of breeding Damara Terns known. A significant feature of this area is the guano platform, or bird island, which offers roosting and breeding sites for a large number of birds.

Located about 3 km southeast of the proposed Project area, the Walvis Bay sewerage ponds are considered a sensitive artificial wetland. Despite being a manmade freshwater source, it attracts pelicans and flamingos. This artificial wetland supports 53% of the duck and geese population in the area. The wetland, formed by the continuous inflow of semi-purified water, sustains extensive reed beds. Birds use flight paths between the sewerage ponds, the lagoon, and the offshore bird breeding platform (Ghwano Island) located north-northeast of the harbour.

7.1.4.4 Ecosystem Services/ Beneficial Uses

Ecosystem services are the benefits that people, including businesses, derive from ecosystems. Ecosystem services are organized into four types: (i) provisioning services, which are the products people obtain from ecosystems; (ii) regulating services, which are the benefits people obtain from the regulation of ecosystem processes; (iii) cultural services, which are the nonmaterial benefits people obtain from ecosystems; and (iv) supporting services, which are the natural processes that maintain the other services.

This section describes the various ecosystem services associated with Walvis Bay.

Port Facilities

The port is the largest commercial port, receiving average 1 370 vessel visits annually and approximately five million tonnes of cargo is handled.

Mariculture

Several companies are currently engaged in the cultivation of Pacific oyster (*Crassostrea gigas*) and European flat oyster (*Ostrea edulis*) in the lee of Pelican Point, using suspended baskets on long lines in deeper areas and platforms in shallower depths. An Aqua Park for oyster farming has been proposed for the shallow areas in the lee of Pelican Point. The ~1 200 ha area, which is under the jurisdiction of Namport, is located within the boundaries of the (proposed) Walvis Bay Nature Reserve and has been zoned for aquaculture. The Aqua Park is a large development and may accommodate 10-20 oyster farms. Two further Aquaparks have been proposed for the area between Walvis Bay and Swakopmund to

produce shrimp, finfish and abalone (Figure 7-5). Oyster cultivation is also conducted in the feed-water ponds of the Walvis Bay salt works.

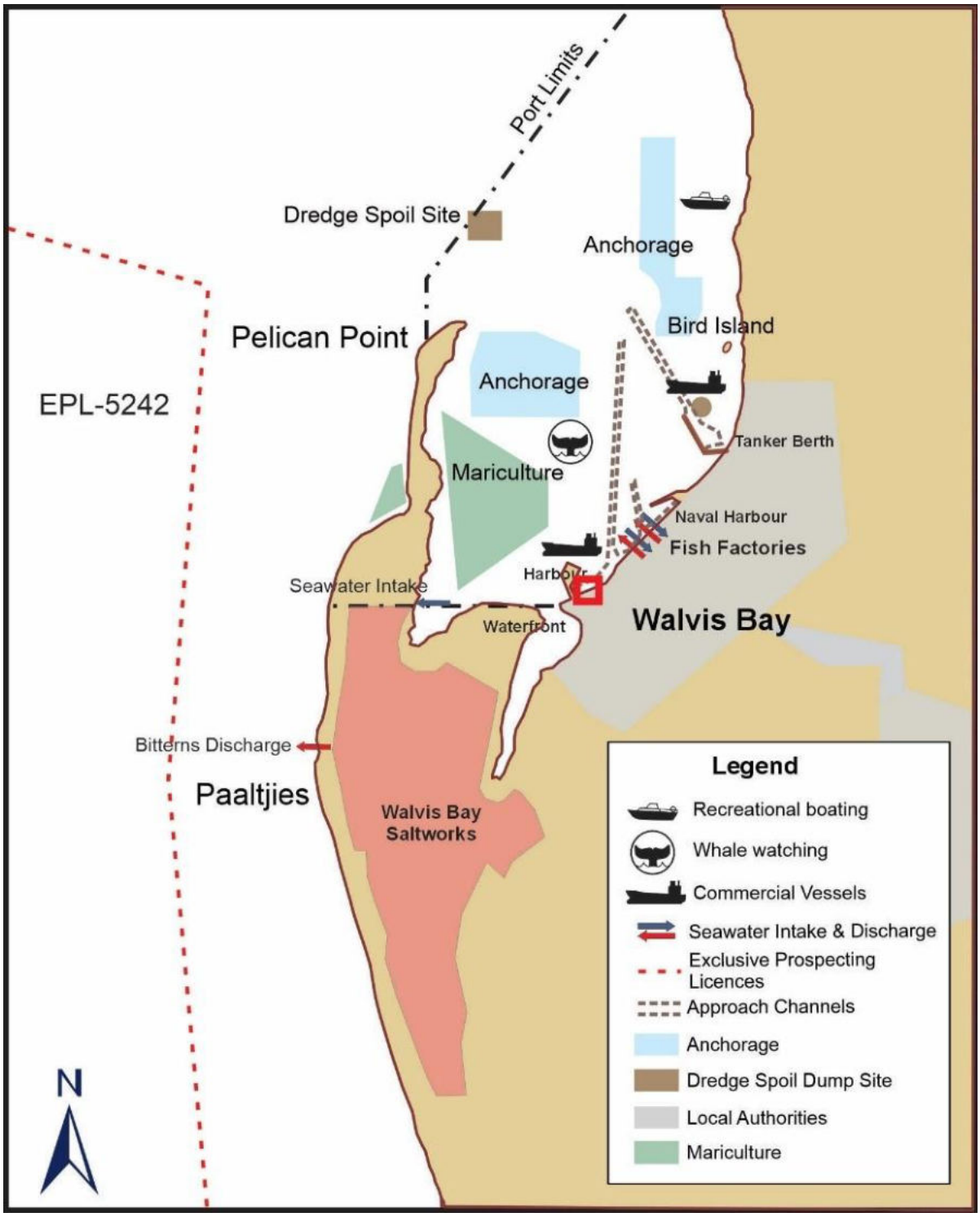


Figure 7-5: Project Area (red square) in relation to other users (Source: Pulfrich, 2024)

Artisanal and recreational fishing

Artisanal subsistence fishing within Walvis Bay is not well developed, being limited to the areas between Walvis Bay and Sandwich Harbour, especially in summer. The most popular angling fish are cob, steenbras, dassie, barbel and galjoen, with annual landings of cob alone exceeding 500 tonnes. Shore angling is conducted by low-income residents to informally harvest fish for home consumption and for sale. The formally recognized artisanal beach-seine fishery in Walvis Bay, targets mullet in the sheltered waters of the bay. Less than 150 individuals are involved in the artisanal fishery. Thus, although targeting the same resource, the artisanal sector is extremely small relative to the recreational angling sector, which has been estimated at 8 800 recreational anglers making an annual landing of ~500 tons.

7.1.4.5 Conservation Areas and Other Sensitive Areas

Walvis Bay Wetland

The **Walvis Bay wetland** is one of the most important coastal wetlands in Southern Africa. As the largest single area of shallow sheltered water along the Namibian coastline, it encompasses the lagoon and mudflats, Paaltjies beach on the Pelican Point peninsula, the salt works, and sand dunes and gravel fields extending to the boundary of the Namib-Naukluft Park[2] (Figure 7-6). The estimated total area for these wetlands is 35 to 40 km^2. It was proclaimed a Ramsar site in 1995, supporting up to 250 000 birds at peak times. The wetland serves primarily as a dry-season and drought refuge for intra-African migrants and as a non-breeding area for Palaearctic migrants. Eleven endangered bird species are regularly observed[3].

Ecologically and Biologically Significant Areas (EBSAs)

The proposed Project area falls within the impact management zone of the Namib Flyway Ecologically or Biologically Significant Area[4] (EBSA) (Figure 7-7). The **Namib Flyway** is a highly productive area in the Benguela system that attracts large numbers of sea- and shorebirds, marine mammals, sea turtles and other fauna. It contains two marine Ramsar sites, six terrestrial IBAs, two proposed marine IBAs, and key spawning and nursery areas for some fish species. As the upwelling cell off Lüderitz has its effect further north with the longshore drift and predominant onshore winds, primary production of the Benguela current is highest in the central regions of the Namibian coast, driven by delayed blooming. This area is thus highly relevant in terms of its importance for the life-history stages of species, threatened, endangered or declining species and/or habitats, and biological productivity.

Important Bird Areas (IBAs)

The project area falls within the Walvis Bay Wetlands IBA (Figure 7-8). Various marine IBAs have also been proposed in Namibian territorial waters. Walvis Bay falls within the proposed 10 829 km^2 Walvis Bay/Cape Cross Lagoon/30-kilometre Beach: Walvis Bay – Swakopmund Marine IBA.

At 40 km^2 in extent, the Walvis Bay Wetland IBA is the most important coastal wetland in southern Africa in terms of numbers and species of birds and is probably one of the three

[2] www.nacoma.org.na

[3] http://www.ramsar.org/ profile/ profiles_namibia. htm

[4] ESBAs are marine areas that provide important services to an ecosystem or to one or more species/populations within an ecosystem.

most important coastal wetlands in Africa. The area regularly supports between 50 000 and 100 000 birds. The area is important for Palearctic waders and flamingos, which make up the majority of the numbers. Between 80–90% of the subregion's flamingos winter at the Walvis Bay IBA, utilising the evaporation ponds of the saltworks, or at Sandwich Harbour further south. As many as 16 species occur in numbers exceeding 1% of the relevant biogeographical population.

The 30-Kilometer Beach IBA, which lies to the north of the project area is 21 km^2 in extent and is the richest shoreline in terms of shorebird density anywhere in southern Africa and supports the densest colony of breeding Damara Terns known.

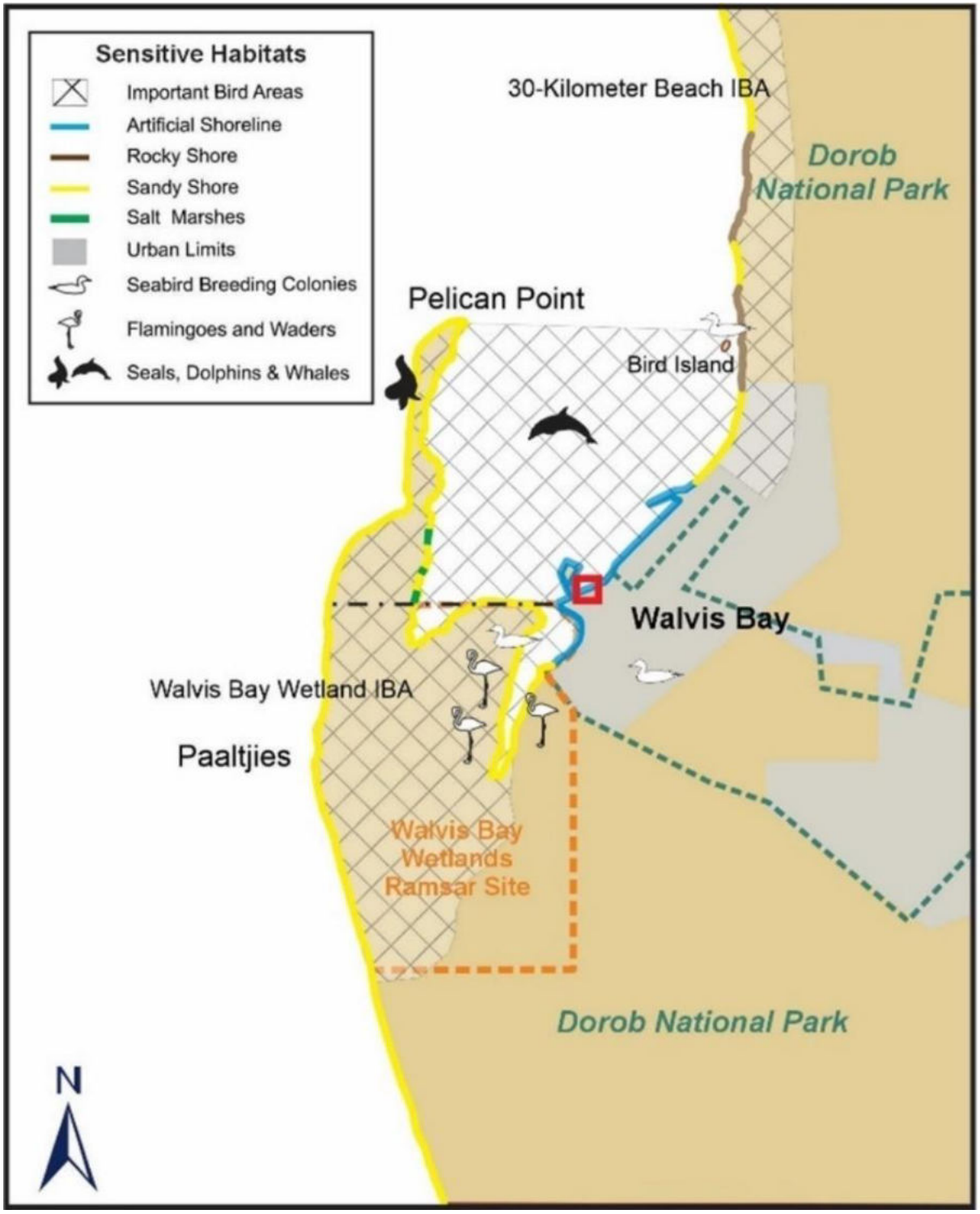


Figure 7-6: Project Area (red square) in relation to sensitive habitats

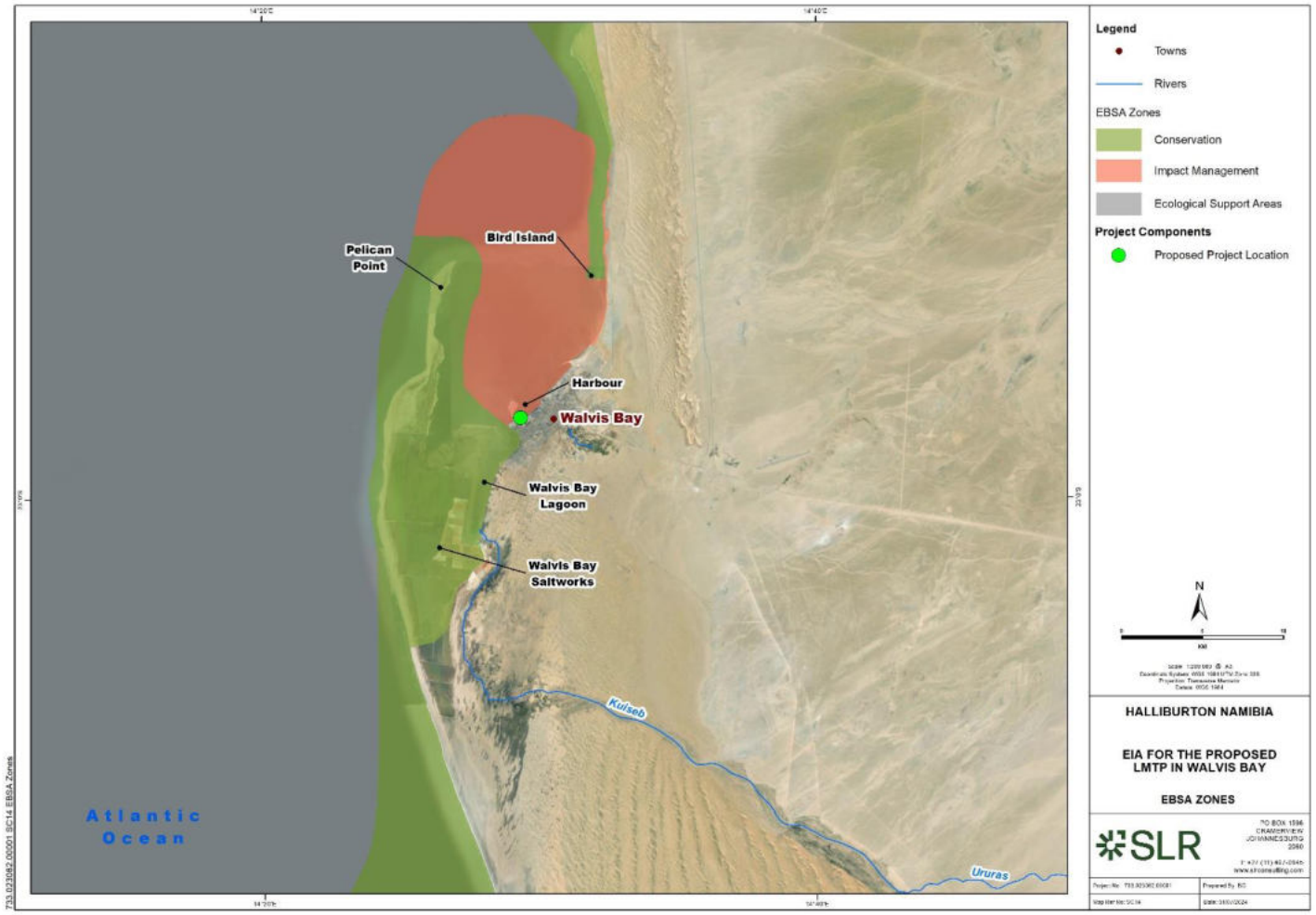


Figure 7-7: Project area in relation to the proposed biodiversity conservation zones within the EBSAs

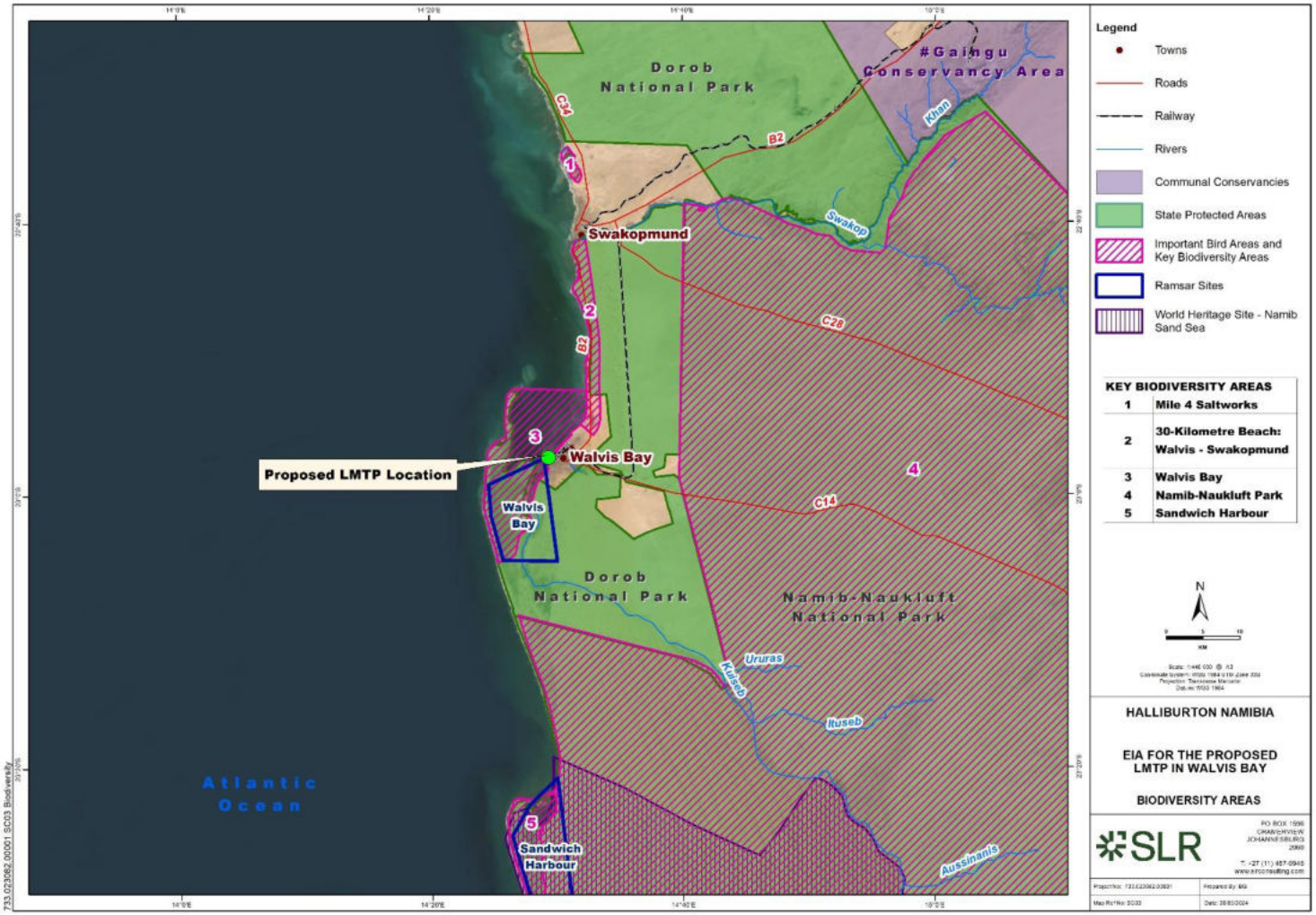


Figure 7-8: Key Biodiversity Areas

7.1.5 Noise

The Port of Walvis Bay is an Industrial area with no restrictions on operational hours. Noise-generation activities and equipment contributing to noise pollution include industrial and manufacturing machinery, heavy vehicles, loading and offloading of containers, construction, forklifts and other plant.

7.1.6 Air Quality

Existing sources of emissions in the region and the characterisation of existing ambient pollution concentrations is fundamental to the assessment of cumulative air impacts. A change in ambient air quality can result in a range of impacts which in turn may cause a disturbance and/or health impacts to nearby receptors.

Information provided in the section below was sourced from the Air Quality Impact Assessment undertaken by SLR (Appendix H).

7.1.6.1 Key Sources of Air Pollution in the area

Port-affiliated activities are a key source of air pollution in Walvis Bay with dust from the handling of dry bulk cargos (e.g. manganese) and grit blasting from shipyards, identified by Namport (2023)[5] as the major contributor to air pollution. The proposed LMTP site is adjacent to the cruise passenger terminal, but between the Grindrod Bulk Terminal and the berth. Exhaust emissions from ocean-going vessels visiting the port (during manoeuvring and hotelling) and the unloading and loading of petroleum products are also recognised as key emission sources for port operations[6].

7.1.6.2 Sensitive Receptors

Sensitive receptors are places where sensitive individuals or habitats may be impacted, such as residences, schools, medical facilities, and natural reserves. Natural reserves in the Walvis Bay area include a 126 km^2 Ramsar[7] site and the Dorob National Park (extending from the Kuiseb Delta, immediately south of Walvis Bay, to the Ugab River, 1 600 km north along the Namibian coastline). The proximity of nearby sensitive receptors to the proposed Project location are shown in Figure 7-9.

Wind circulations in the region are dominated by the Benguela low-level coastal jet causing localised southerly and south-south-westerly winds to prevail over Walvis Bay[8], transporting air pollutants generated by port activities offshore and away from sensitive receptors located onshore. Also refer to Section 7.1.1.3 for further detail on winds.

[5] Ibid

[6] Vaccaro (2000): *Environmental impact of port activities*, in Maritime Engineering and Ports II (ISBN 1-85312-829-5)

[7] a wetland site designated to be of international importance under the Ramsar Convention.

[8] Ibid

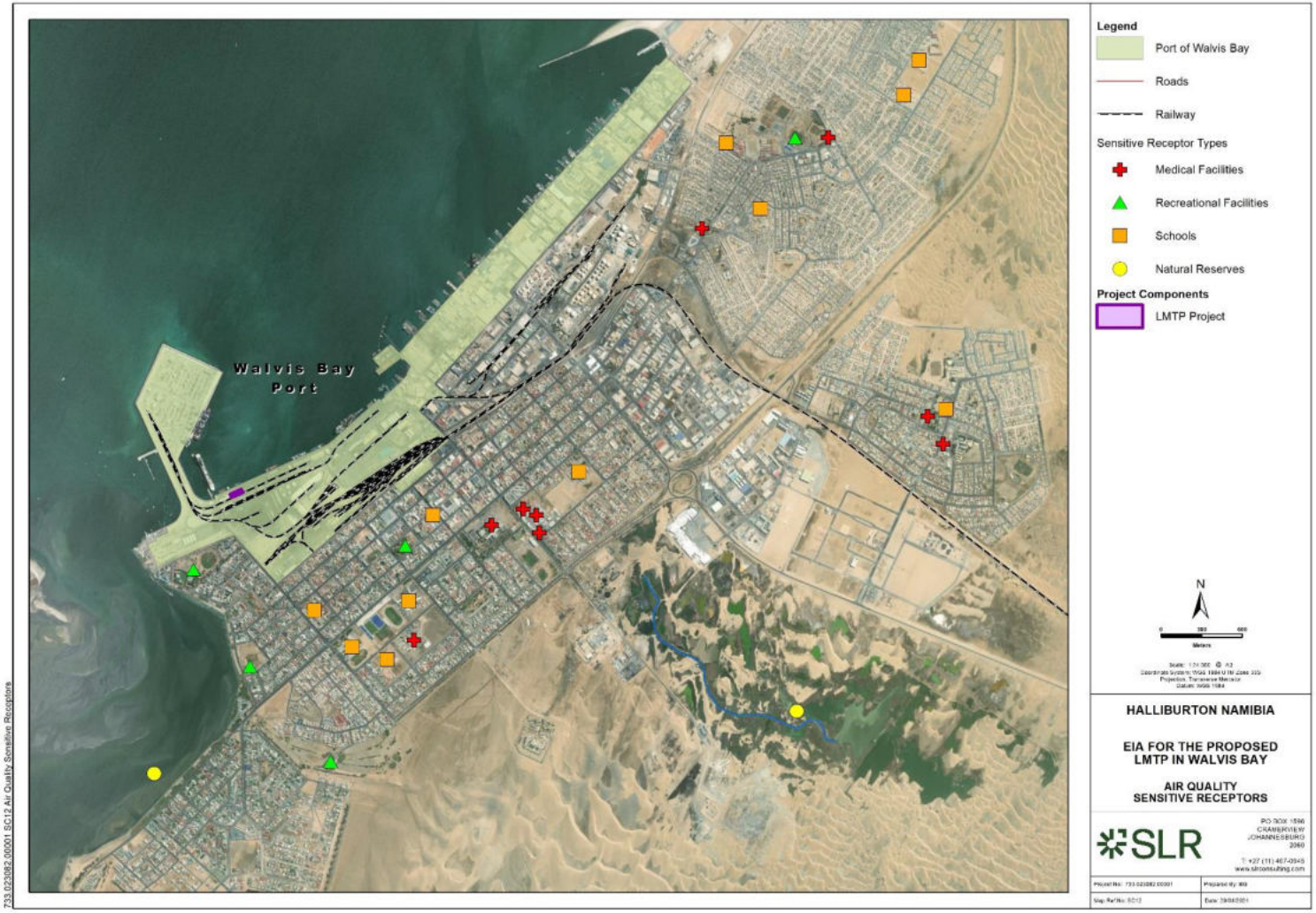


Figure 7-9: Air Quality Sensitive Receptors

7.2 Cultural Environment

The proposed Project is located in a built-up industrial area, and as such, it is not anticipated that there are features of sensitive archaeological, cultural, and palaeontological nature on the project site or directly affected areas. The proposed Project will not result in the disturbance of the seabed; thus, although in an area that is regularly dredged, is unlikely to impact any underwater heritage (wrecks).

7.3 Socio-Economic Environment

7.3.1 Visual Baseline

The visual character of an area is determined by considering landscape character, scenic quality, sensitivity of the visual resource, sense of place and visual receptors. Information provided in the section below was sourced from the VIA undertaken by SLR (Appendix H3).

7.3.1.1 Visual character

The physical and land use-related characteristics of the study area as described above contribute to its overall visual character. Visual character largely depends on the level of change or transformation from a natural baseline in which there is little evidence of human transformation of the landscape.

The port has an existing industrial visual character, with tenants of different industries and commercial activities situated within the port. The predominant land use in the area (industrial land use) has significantly transformed the Namib Desert's and the wetland area's natural visual landscape. **The industrial development and the surrounding urban built form in Walvis Bay have resulted in a high degree of visual degradation. The industrial character of the landscape is an important factor in this context, as the introduction of the proposed LMTP would result in less visual contrast where other similar industrial activities are already present, especially where the scale of those activities is similar to that of the proposed development.**

7.3.1.2 Visual sensitivity

Visual sensitivity can be defined as the inherent sensitivity of an area to potential visual impacts associated with a proposed development. It is based on the physical characteristics of the area (i.e., topography, landform, and land cover), the spatial distribution of potential receptors, and the likely value judgements of these receptors towards a new development

The table below outlines the factors used to rate the visual sensitivity of the study area. The ratings, where 1 is low and 10 denotes high levels of visual sensitivity, are specific to the visual context of the receiving environment within the study area.

Table 7-1: Environmental factors used to define visual sensitivity of the study area

FACTORS	DESCRIPTION	RATING									
		1	2	3	4	5	6	7	8	9	10
Pristine / natural / scenic character of the environment	Study area is largely disturbed and characterised by an industrial and urban built-up landscape. Although the Lagoon and Pelican Point does offer some levels of scenic value.										
Presence of sensitive visual receptors	Some sensitive receptors have been identified in the study area.										
Aesthetic sense of place / visual character	Visual character is typical of a mostly industrial and urban built-up landscape.										
Irreplaceability / uniqueness / scarcity value	There are areas of ecological importance within the broader study area.										
Cultural or symbolic meaning	The area is typical of an industrial and urban built-up landscape.										
Protected / conservation areas in the study area	Protected and conservation areas are identified in broader the study area.										
Sites of special interest present in the study area	Sites of special interest were identified in the study area.										
Economic dependency on scenic quality	There are tourism / leisure-based facilities in the study area.										
International / regional / local status of the environment	The area attracts a number of tourists to the birdlife and marine wildlife associated with the IBAs and KBAs in the area.										
**Scenic quality under threat / at risk of change	Introduction of the LMTP will not alter the visual character and sense of place due to existing industrial activities occurring in the area. In addition, the development of other industrial facilities in the broader area will be congruent to the existing industrial character and will not give rise to significant cumulative impacts.										
**Any rating above '5' for this specific aspect will trigger the need to undertake an assessment of cumulative visual impacts.											

Low				Moderate					High
10	20	30	40	50	60	70	80	90	100

The total score for the study area is 42 (**moderate visual sensitivity**). It should be stressed however that the concept of visual sensitivity has been utilised indicatively to provide a broad-scale indication of whether the landscape is likely to be sensitive to visual impacts and is based on the physical characteristics of the study area, economic activities and land use that predominates. An important factor contributing to the visual sensitivity of an area is the presence, or absence, of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs.

7.3.1.3 Visual Absorption Capacity

Visual absorption capacity is the ability of the landscape to absorb a new development without any significant change in the visual character and quality of the landscape. The level of absorption capacity is largely based on the physical characteristics of the landscape (topography and vegetation cover) and the level of transformation present in the landscape.

The flat, low coastal plains in the study area and the minimal screening provided by palm and other tall trees would collectively not increase the visual absorption capacity of the study area. However, this would be completely offset by the existing industrial visual character that will prevent the proposed LMTP from contrasting with other industrial activities presently dominating the area. Moreover, due to the heights of the cranes and other port-related infrastructure, the proposed LMTP would be well screened except for possibly the tops of the dry bulk tanks.

Visual absorption capacity in the study area is therefore rated as High.

7.3.1.4 Visual Sensitive Receptors

A total of 15 receptor locations, which include residences and leisure-based tourist facilities, have been identified as being sensitive to the proposed Project as these facilities are dependent on the tourism activities of the study area. A summary of the identified sensitive receptors is provided in Table 7-2.

Table 7-2: Visual Sensitive Receptors

Type	Sensitive Receptors
Residences and leisure-based tourist facilities	Protea Hotel (SR1), Walvis Inn (SR2), Oyster Box Guesthouse (SR3), Möwen Blick Self Catering (SR4), Kleines Nest Bed and Breakfast (SR5), de Baken Self-Catering Accommodation (SR6), Coastwave Guesthouse (SR7), The Courtyard Hotel (SR8), Desert Pearl Self-catering & Accommodation (SR9), Loubser's B&B/Backpackers (SR10), The Langholm Hotel (SR11), Stay Cleverly Self-Catering Apartments (SR12), Meransha Self Catering (SR13), and Anas Inn (SR14).
Jetty	The gathering area where passengers assemble prior to boarding cruise liners Cruise Line Gathering Area (SR15)

The identified potentially sensitive visual receptor locations for the proposed LMTP are indicated in Figure 7-10.

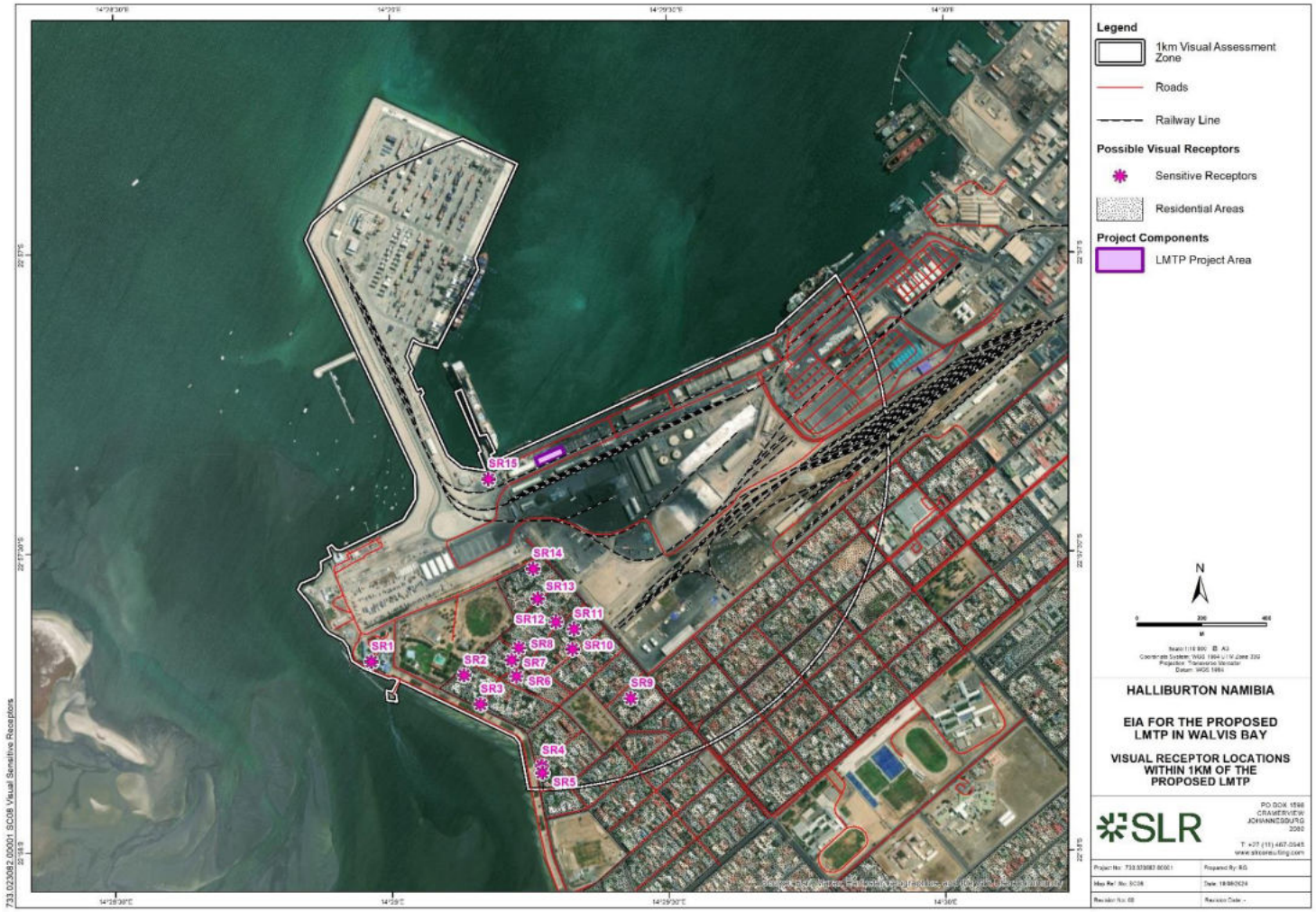


Figure 7-10: Receptor Locations within 1 km of the proposed LMTP

7.3.2 Socio-Economic Structure/Profile

Available 2023 Census data, e.g. population numbers, was used in the compiling this report. Other data, such as education and employment at a regional level, were not available, and the 2011 Census data was thus used.

7.3.2.1 Erongo Region

The Erongo Region spans over 63 586 km^2 and makes up approximately 7.7% of Namibia's total surface area. The Erongo Regional Council's strategic development plan for the period 2017/18 - 2021/22 highlights several socio-economic activities in Walvis Bay, including:

- Port Operations;
- Fishing industry;
- Industrial zone; and
- Tourism.

The Erongo Regional Council's Strategic Plan identifies several key issues in the region, including:

- Infrastructure: Addressing infrastructure gaps to support economic growth and development.
- Housing: Ensuring affordable housing for residents.
- Disaster Management: Strengthening emergency and disaster management.
- Human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS): Mitigating the impacts of HIV and AIDS.

The plan proposes strategies such as investment in infrastructure, housing development projects, disaster preparedness, and healthcare programs to tackle these issues.

7.3.2.2 Population

The most recent population census was undertaken in 2023. Walvis Bay is the most populated town in the Erongo Region, with a population of 102 704 people, up from 62 096 in 2011. This comprises both the rural and urban areas of Walvis Bay, with the former having a population density of 5.6 per km^2 and the latter, 91.6 persons per km^2. The population growth is attributed to the presence of the harbour and related industries in Walvis Bay, which generate job and economic opportunities.

7.3.2.3 Employment

In 2011, of the 62 096 people living in Walvis Bay, approximately 70% of persons over the age of 15 years (economically active) were employed. The average household size in the Erongo Region is 3.3 persons, with 72.8% of those households relying on wages and salaries as a main source of income. In 2018, the Labour Force survey found that the Erongo Region had the lowest unemployment rate (30%) compared to other regions.

Manufacturing is the main industry (13.8%) in Erongo Region, followed by mining and quarrying (11.7%), and agriculture, forestry, and fishing (11.5%). The private sector provides work for the largest proportion of employees (68.1%) in Erongo Region, followed by Government (8.9%) and parastatals (8.3%).

7.3.2.4 Education

According to the 2011 census data for the Erongo Region in Namibia, 89% of girls and 86% of boys between the ages of 6 -15 were attending school. For those older than 15, 79% had left school, 9% were currently at school, and 8% had never attended. Literacy was at 97% for persons 15 years and older.

7.3.2.5 Basic infrastructure

In the Erongo Region, 96% of households had access to safe drinking water and 81% had electricity for lighting. Only 11% of households had no toilet facility. Fifteen % of households relied on wood or charcoal for cooking. These statistics indicate a relatively elevated level of basic infrastructure services.

7.3.2.6 Health

The majority of health services are located in city regions, while rural areas have less access to facilities. The public sector typically faces a lack of medical staff, particularly in areas that are isolated or difficult to access. Walvis Bay has a range of healthcare facilities including the Welwitschia Hospital, Walvis Bay State Hospital and several other private clinics which offer several healthcare services. All health facilities offer HIV counselling and testing centres.

According to records from the Ministry of Health and Social Services, the ratio of state doctors per population in the Erongo Region has improved from one doctor per 1 920 people to one doctor per 1 837 people, while the ratio for nurses per population also improved from one nurse per 223 people to one nurse per 220 people, and for pharmacists from one pharmacist per 3 536 people to one pharmacist per 2 922 people at the end of financial year 2019/20.

7.3.2.7 Economic Sectors

The Erongo Region comprises the following economic sectors:

- Mining;
- Tourism and conservation;
- Fisheries and marine resources;
- Trade and industrial development; and
- Agriculture.

7.3.3 Traffic

Traffic generated by the LMTP has the potential, although unlikely, to affect the capacity of existing road networks, as well as result in public road safety issues. To understand the basis of these potential impacts in the context of the project activities, a baseline situational analysis is described below.

Walvis Bay is accessible from central Namibia by two Roads, the tarred B2 main road and the M36. There are access roads provided for within the Namport area that Halliburton will make use of.

The road network associated with the project area is shown in Figure 7-11.

Figure 7-11: Road Network around the Project Site

7.3.4 Land Use

The majority of the study area is classified as "Built-up", representing the urban development of the Walvis Bay town, surrounded by an undisturbed, bare and arid Namib desert (Figure 7-12). Small tracts of grasslands and shrublands can also be found scattered in the town and in the wetlands of the Walvis Bay Bird Sanctuary and the Lagoon.

The proposed LMTP is situated within the Port of Walvis Bay which is Namibia's largest commercial port. The port handles imports and exports of containerised (Photo 1), as well as bulk and break-bulk goods and it has dry ports and storage facilities which store bulk mineral ores (Photo 2) and various other goods and commodities in warehouses and rubb halls (Photo 3).

The port is essential to supporting the local commercial fishing industry through exporting of fish and fishing products to the rest of the world and contributes towards mariculture tourism activities, which is an intrinsic part of Walvis Bay's character. The Port of Walvis Bay also facilitates passenger traffic from cruise liners, and the site for the proposed LMTP is located in close proximity to the jetty where passengers board and disembark from cruise liners (Photo 4).

The site for the proposed LMTP is zoned as an industrial area and as such, it is surrounded by industrial activities of a similar nature in the port. Other surrounding land uses include light industry, residential and commercial land uses (see section 5.2 and Figure 7-13).

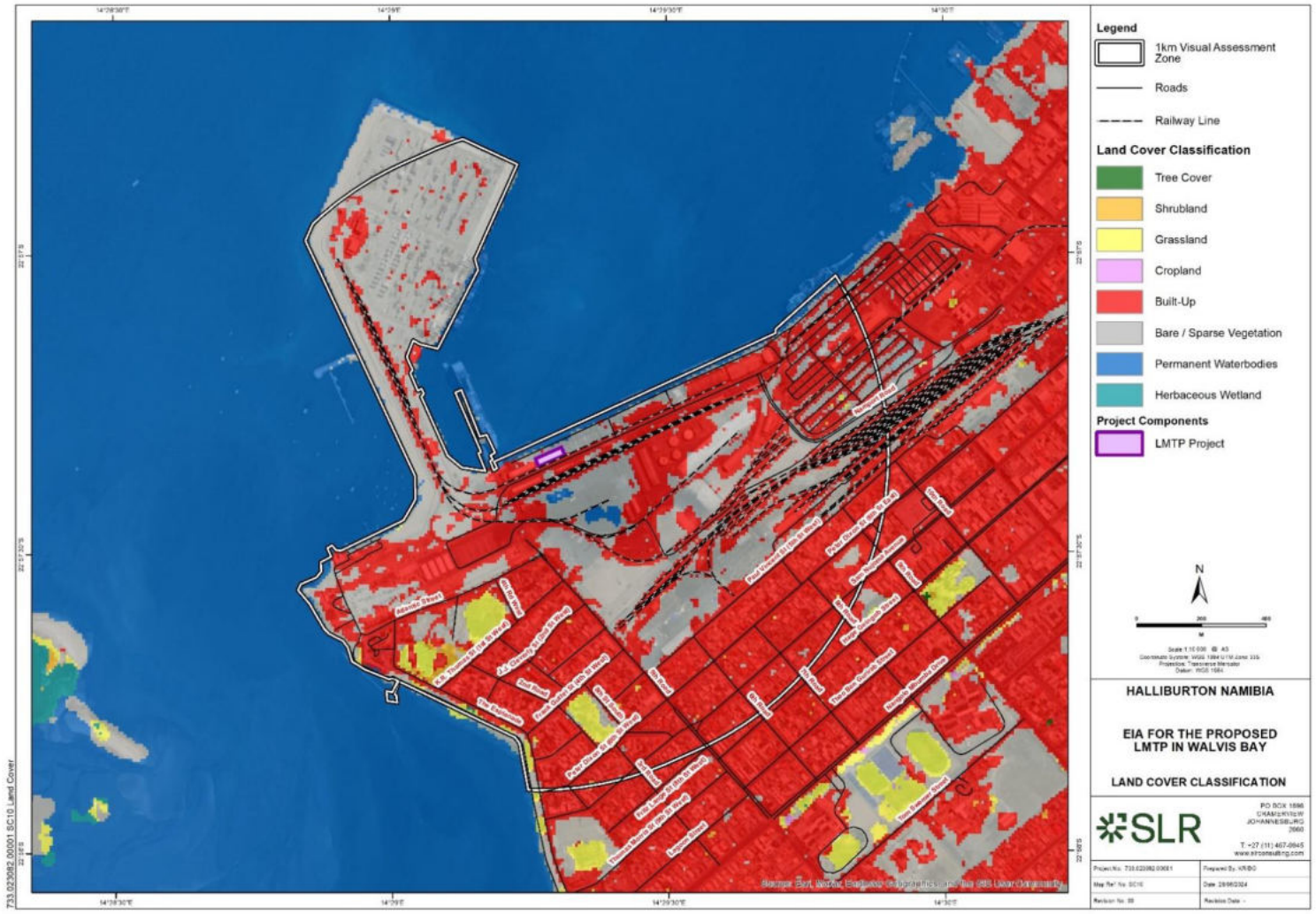


Figure 7-12: Land Cover Classification

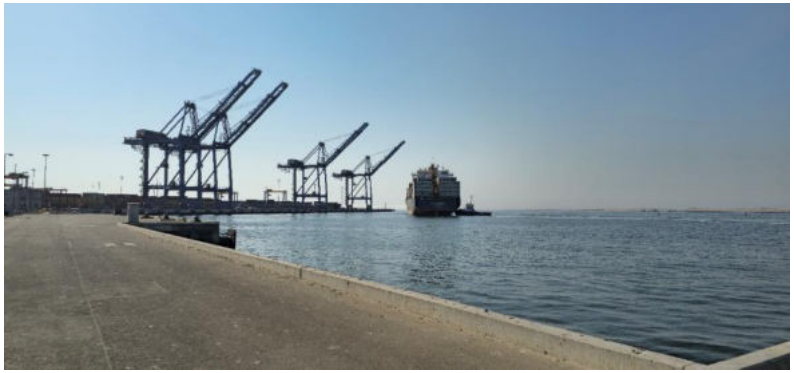


Photo 1: Container ship leaving the port With Containerised Cargo

Photo 2: Coal stockpile at the Grindrod Walvis Bay Bulk Terminals located directly opposite the proposed LMTP

Photo 3: Industrial storage/warehouse tents in the port

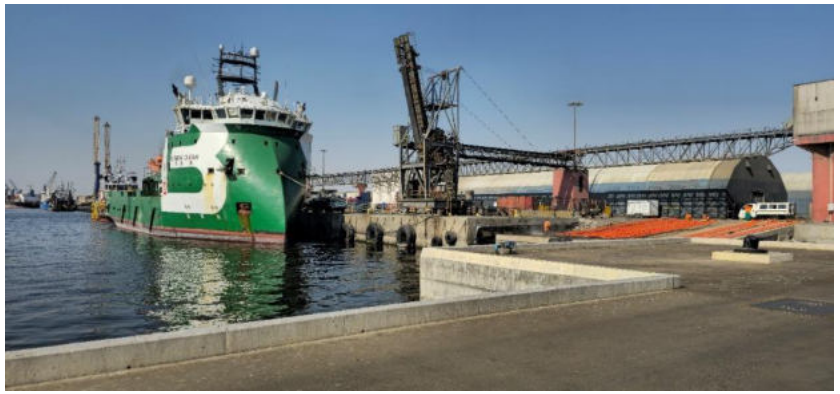


Photo 4: View of the harbour activities from the jetty where passengers board and disembark cruise liners

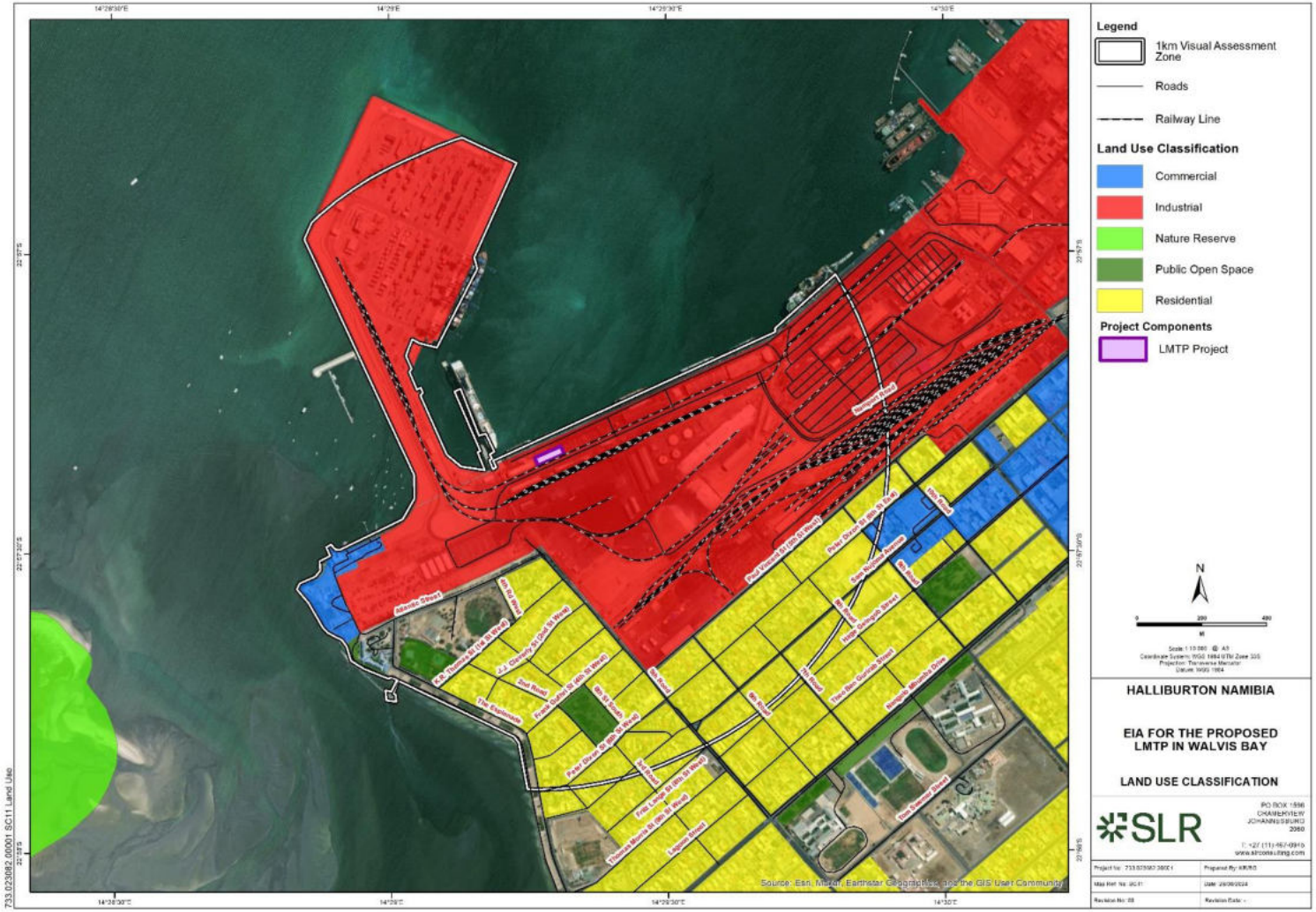


Figure 7-13: Land Use Classification

8.0 Impact Assessment

This section identifies and discusses the potential biophysical, cultural/heritage, and socio-economic impacts of the Project. The impact assessment discussion below takes into consideration all the proposed Project phases (construction, operations, decommissioning, and closure) and where required, have been informed by specialist assessments.

8.1 Project Controls Incorporated into the LMTP Design

Project Controls are the physical or procedural measures that are built into the design or operation of a Project and required by law or standard for good international industry practice and which serves to mitigate potential consequences on the environment (e.g., spill prevention measures and installation of dust collectors). These measures are typically incorporated into the project description and should not be considered additional mitigation measures in the evaluation of post-mitigation impact significance.

8.1.1 Spill Prevention Measures

Halliburton has global standards with regards to LMTP operations including spill prevention and control that will be implemented at the Walvis Bay LMTP site during operation. These include:

- All installed tanks will be leak tested prior to use.
- All storage areas containing liquids shall conform with the global industry standard of bunding.
- All bunding will have the capacity to hold as a minimum, 110% of the largest storage vessel capacity.

Although Halliburton is not permitted to build permanent bunding structures on the quayside, moveable concrete bunding slabs (Photo 5) will be install around each liquid storage area covered by impermeable leak proof membranes.

Photo 5: Moveable concrete bunding slabs

Daily inspections will be conducted to identify any damage potentially reducing efficiency and spill kits and personnel trained to use them efficiently and safely will be present to clear up any spillage. Spill kits will include absorbent pads, squeegees, brushes and shovels. The operations at the LMTP do not, however, constitute a high risks of spills and no tanks will be filled before the plant is completed together with bund wall, which by itself represent effective spill prevention measure.

Drilling fluids and bulk powders will be transferred from the bulk storage areas to the offshore supply vessels via bulk transfer hoses. Bulk transfer hose management will comply with global industry standards, namely:

- All hoses will be certified thorough visual inspection and pressure testing on a yearly basis and this certification will be documented and/or held within a site hose certification tracker.
- All hoses will be visually reinspected prior to every transfer in order to check for signs of wall damage of wear.
- All transfers will be preceded by hose pressure test between the LMTP and supply vessel to 50 PSI for 5 minutes prior to any transfer commencing.
- In the event of minor fluid leak within the bunded area, spill kits will be present to safely clear up any spillage.

8.1.2 Air Quality Impact Controls

In terms of emission sources, the following are anticipated:

- Exhaust fumes from diesel generators, compressors, and transfer pumps. All diesel driven units will conform to global industry standards in relation to diesel fume emissions.
- Dust from bulking of barite and bentonite powders, which will be controlled through the presence of dust collector vessels installed within the bulk powder system.
- Minor fumes while mixing sacks and fluids. Minor dust/fume emissions will be minimised through the venturing mixing systems. All personnel within the vicinity are required to wear FFP-3 masks as a minimum.

8.2 Potential Biophysical Impacts

Biophysical environmental impacts identified during the scoping process are listed below and described in detail in the following sub-sections:

- Normal operations
  - Increase in ambient air concentrations affecting sensitive receptors;
  - Increase in disturbing noise levels affecting sensitive receptors.
  - Traffic and congestion;
  - Socio-economic impacts;
- Unplanned event
  - Accidental spills affecting marine ecology and third parties; and
  - Pollution of surface water affecting third parties.

8.2.1 Marine Biodiversity

8.2.1.1 Coastal and underwater noise and vibrations levels impacting marine communities

Impact Description

Human activity, together with the generation of construction noise and vibrations, could impact the onshore coastal environment, as well as have an impact on marine fauna and shore birds in the area. The potential effects of anthropogenic sounds on marine fauna include disturbance of normal behaviour resulting in possible displacement from areas, restricted detection of natural sounds (auditory "masking"), and temporary or permanent reductions in hearing sensitivity. Exposure to intense sounds, although unlikely for the proposed project, for even a short period of time may result in permanent hearing loss, while lower sound levels may result in temporary or transient loss of hearing that may last for minutes, hours, or even days. Hearing, however, ultimately returns to the pre-exposure level.

The Project activities/infrastructure likely to cause an increase in noise and vibration levels that would impact marine communities:

Project phase	Activity/infrastructure
Construction	• Vehicle movement • General construction activities • Drilling • Placement of temporary infrastructure • Presence and interactions of construction personnel
Operational	• Vehicle movement • Operation of LMTP equipment (e.g. mixing tanks) • Vessel movement and loading and offloading
Decommissioning and closure	• Vehicle movement • Stripping of buildings and equipment

Impact Discussion

The received level of noise (and risk of physiological injury or behavioural changes) would depend on the animal's proximity to the sound source. However, the noise and vibrations generated during construction are unlikely to be injurious or reach lethal amplitudes, even at close range, as noise levels during construction are generally at a frequency much lower than that used by marine mammals for communication (Findlay, 1996), and construction activities will be confined to above sea level on the berth. In addition, the area is an existing port that is already experiencing elevated noise and vibration levels. Thus, any animals remaining in the area would likely be used to such levels of disturbance. Marine mammals are, therefore, unlikely to be significantly affected. Additionally, the maximum radius over which the noise may influence biota is very small compared to the population distribution ranges of nearshore fish species, cetaceans, and the Cape fur seal. These fauna species are all highly mobile and will likely move out of a noise-affected area (Findlay, 1996). Similarly, shorebirds and terrestrial biota are typically highly mobile and are expected to avoid the construction area once activities commence, thereby moving away from the sound source before trauma could occur. The noise and vibrations from general construction activities may, however, induce localised behavioural changes or masking of biologically relevant sounds in some marine fauna, but there is no evidence of significant behavioural

changes that may impact the wider ecosystem (Perry, 2005). Given the proposed construction approach and the nature of the site, which lies within a busy port area with already elevated noise and vibration levels, the expected contribution of these very short-term and very low intensity impacts to existing noise and vibration impacts is expected to be negligible. Any large biota (marine mammals and sea birds) frequenting the development area will be habituated to this type of activity and disturbance, and no cumulative impact is expected.

Sensitive receptors typically include residential areas and public places in proximity to the port. These residential and public areas are found immediately beyond the port's boundary and include small businesses, supermarkets, and residences. In addition, there are neighbouring port tenants that are also sensitive receptors. Excessive noise could also impact negatively on marine mammals.

The general noise associated with construction and demobilisation activities is deemed to be of low intensity but would remain confined to the whole site and would persist over the very short-term only (5-year life of the project) resulting in a **VERY LOW** consequence.

Although noise disturbance effects due to construction, operation and demobilisation are unlikely to be any more significant than current levels generated by the port, the noise will be a stationary source with likely habituation by affected groups. The significance of general construction noise is deemed to be **INSIGNIFICANT.**

Table 8-1: Impact Significance Summary – Noise levels and vibrations disturbing marine communities

Description of Impact		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	All	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Minor change (Low)	Minor change (Low)
Duration	Very Short-term (< 1 year)	Very Short-term (< 1 year)
Extent	Whole site and nearby surroundings	Whole site and nearby surroundings
Consequence	Very low	Very low
Probability	Possible / frequent (Medium)	Conceivable (Low)
Significance	**Very low -**	Insignificant -
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	Low	
Degree to which impact can be avoided	High	
Degree to which impact can be mitigated	High	

Mitigation Measures

No mitigation measures are deemed necessary

8.2.1.2 Contamination of Marine Waters

Impact Description

The establishment of the proposed Project in proximity to the sensitive coastline of Walvis Bay has the potential to contaminate seawater during all phases of the proposed Project including cement mixing during construction, contaminated stormwater runoff from the site, uncontrolled loss of LMTP products, fuel and lubricant Leaks and improper waste management resulting in marine litter.

The proposed Project activities/infrastructure that may result in accidental spills that can potentially affect marine ecology include:

Project phase	Activity/infrastructure
Construction	• Uncontained runoff water from cement mixing • Contaminated stormwater runoff • Fuel and lubricant leaks from vehicles and plant • Accidental spills during storage and handling of materials and chemicals • Inappropriate waste management resulting in marine litter
Operational	• Uncontained runoff water from cement mixing • Contaminated stormwater runoff • Fuel and lubricant leaks from vehicles and plant • Accidental spills during storage and handling of materials and chemicals • Accidental loss of liquid, powder and paletted products during transfer to/from vessels • Accidental loss of liquid and powder product due to overflow/rupture of storage tanks and silos • Inappropriate waste management resulting in marine litter
Decommissioning and closure	• Contaminated stormwater runoff • Fuel and lubricant leaks from vehicles and plant • Accidental spills during storage and handling of materials and chemicals • Inappropriate waste management resulting in marine litter

Impact Discussion

- Cement Mixing

The runoff of cement water or excessive spillage of cement into the port where turbidity levels are likely to be elevated above ambient levels in the bay is deemed to be of low intensity and would remain confined to the site due to the low current speeds (<0.05 m/s) in the lee of the new container terminal, persisting over the very short-term only due to short constriction duration and rapid dilution, thereby resulting in a **VERY LOW** consequence. Although the runoff of cement water and spillage of excess cement is conceivable, good housekeeping practices during construction would limit runoff into the port. The significance of the impact is thus deemed to be **INSIGNIFICANT** both without and with mitigation.

- Stormwater Runoff

Stormwater runoff containing hydrocarbons and chemicals is deemed to be of moderate intensity and would remain confined to the whole site, persisting over the very short-term only due to rapid dilution and evaporation (even though operation extends up to 5 years, this will be an ad hoc occurrence), thereby resulting in a **LOW** consequence. Although

uncontained runoff water from spills during storage and handling of materials and chemicals is conceivable, the site will be bunded thereby further reducing the risk of runoff the significance of the impact is deemed to be of **VERY LOW** significance both without and with mitigation. Compared to current operations in the port, the project will likely only add very limited additional contaminants to port waters.

- Uncontrolled Loss of LMTP Products

The intensity of the impact of the uncontrolled loss of liquid, dry and paletted product during loading onto the vessels would depend on the volumes lost, ranging from low to high intensity, but would persist only over the very short term but could potentially extend beyond site affecting neighbours. Assuming the worst-case scenario the impact would thus be of **MEDIUM** consequence. Assuming that no project controls are in place and the probability of the impact occurring is conceivable, the significance of the impact would be **LOW**, without mitigation reducing to **INSIGNIFICANT** with the implementation of strict project controls.

- Fuel and Lubricant Leaks

Loss of fuel and lubricants by vehicles and plant associated with the project is probable but as the site will be bunded, spillages are highly unlikely to reach the port waters. Should it reach port waters, the impacts associated with spilled fuels and lubricants are deemed to be of moderate intensity but would remain confined to the whole site due to the low current speeds (<0.05 m/s) in the lee of the new container terminal, persisting over the very short-term only due to rapid dilution and evaporation, thereby resulting in a low consequence. The impact would therefore be of **LOW** significance without mitigation reducing to **INSIGNIFICANT** with mitigation.

- Marine Litter

The generation of marine litter during construction, operation and demolition is highly likely and is deemed to be of medium intensity potentially persist only over the short term and potentially extend beyond the site resulting in a medium consequence. The impact is therefore considered to be of **MEDIUM** significance without mitigation reducing to **VERY LOW** with mitigation.

Table 8-2: Impact Significance Summary (worst-case) – Contamination of Marine Waters

Description of Impact		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	All	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Prominent change (High)	Minor change (Low)
Duration	Short-term (1 to 5 years)	Short-term (1 to 5 years)
Extent	Beyond site	Whole site and nearby surroundings
Consequence	Medium	Low
Probability	Probable (High)	Possible / frequent (Medium)
Significance	**Medium -**	**Very Low -**
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause	Low	

irreplaceable loss of resources	
Degree to which impact can be avoided	High
Degree to which impact can be mitigated	High

Mitigation measures

Vehicle traffic associated with the development must be kept to a minimum and be restricted to clearly demarcated access routes and parking areas only. All construction, operational and demolition activities in the coastal zone must be managed according to strictly enforced Environmental and Waste Management Plans. Good housekeeping must form an integral part of all operations from start-up, including, but not limited to:

Phase	Mitigation Measures
Construction and Decommissioning Phase	• mixing of concrete in contained areas only; • regularly clean up concrete spilled during construction; • no dumping of excess concrete or mortar into the sea; • drip trays under all vehicles parked on the site; • maintain vehicles and equipment to ensure that no oils, diesel, fuel or hydraulic fluids are spilled; • vehicle maintenance and refuelling must occur under controlled conditions only; • bunding of all fuel storage areas; • oil spill contingency plan for accidental oil spills; • vehicles should have a spill kit (peatsorb/ drip trays) onboard in the event of a spill; • accidental diesel and hydrocarbon spills to be cleaned up accordingly; • provision and management of appropriate, wind proof waste disposal facilities; • ensure regular collection and removal of refuse and litter from the construction site; • ensure that the contracted waste management company is accredited by law to handle all construction wastes; • ensure appropriate stormwater management measures are in place to divert and collect dirty water from within the construction and demolition areas.

Phase	Mitigation Measures
Operational Phase	• drip trays under all vehicles parked on the site; • maintain vehicles and equipment to ensure that no oils, diesel, fuel or hydraulic fluids are spilled; • vehicle maintenance and refuelling must occur under controlled conditions only; • bunding of all fuel storage areas; • oil spill contingency plan for accidental oil spills; • vehicles should have a spill kit (peatsorb/ drip trays) onboard in the event of a spill; • accidental diesel and hydrocarbon spills to be cleaned up accordingly; • provision and management of appropriate, wind proof waste disposal facilities; • ensure appropriate stormwater management measures are in place to divert and collect dirty water from within the operational area; • ensure that the contracted waste management company is accredited by law to handle all wastes from the LMTP; • ensure that all project controls are strictly complied with. In addition, install laser volume indicators on tanks and maximum fill level alarms to accurately track fluid volumes on all tanks and silos; and • have an emergency preparedness and response plan in place for all phases of the development

8.2.1.3 Smothering of macrofauna by barite and bentonite

Impact Description

In the unlikely event of the uncontrolled loss of liquid, powder and paletted products during transfer to/from vessels or the overflow/rupture of storage tanks and silos, many of the drilling mud constituents would be diluted in the water column contributing to reductions in water quality (see Section 8.2.1.2 above). The muds, however, also contain solid ingredients that cannot dissolve, and these would create a plume of suspended particulate matter, which would eventually settle onto the seabed potentially resulting in smothering effects on the affected invertebrate benthic communities.

The proposed Project activities/infrastructure that may result in accidental spills that can potentially affect marine ecology include:

Project phase	Activity/infrastructure
Construction	• N/A
Operational	• Accidental loss of liquid, powder and paletted products during transfer to/from vessels. • Accidental loss of liquid and powder product due to overflow/rupture of storage tanks and silos

Project phase	Activity/infrastructure
Decommissioning and closure	• N/A

Impact Discussion

The deposition of bentonite and barite during the unlikely uncontrolled loss of liquid, powder and paletted products during transfer to/from vessels or following overflow/rupturing of storage tanks and silos would be of low intensity considering that the receiving communities have already been severely impacted by port development and dredging. Nonetheless, the impact would affect the whole site and probably persist over the short term (in the unlikely event of a spill/loss) resulting in a low consequence. While it is conceivable that the impact may occur, the impact would be of **VERY LOW** significance without mitigation, reducing to **INSIGNIFICANT** with the strict implementation of project controls.

The quantitative impact assessment results are provided in Table 8-3.

Table 8-3: Impact Significance Summary – Smothering of macrofauna by barite and bentonite

Description of Impact		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Operation	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Minor change (Low)	Negligible change (Very low)
Duration	Short-term (1 to 5 years)	Very Short-term (< 1 year)
Extent	Whole site and nearby surroundings	Whole site and nearby surroundings
Consequence	Low	Very low
Probability	Conceivable (Low)	Unlikely/improbable (Very low)
Significance	**Very low -**	**Insignificant -**
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	Low	
Degree to which impact can be avoided	High	
Degree to which impact can be mitigated	High	

Mitigation Measures

- ensure that all project controls are strictly complied with. In addition, install laser volume indicators on tanks and maximum fill level alarms to accurately track fluid volumes on all tanks and silos; and
- ensure an emergency preparedness and response plan is in place for the potential loss of products (see Section 8.1.1 and Appendix I).

8.2.1.4 Biochemical impacts of accidental spillage of drilling muds on benthic communities

Impact Description

The establishment of the proposed Project in proximity to the sensitive coastline of Walvis Bay has the potential to impact birds and sea life in the area.

In the unlikely event of the uncontrolled loss of liquid, powder and paletted products during transfer to/from vessels or the overflow/rupture of storage tanks and silos, many of the drilling mud constituents would be diluted in the water column contributing to reductions in water quality (see Section 8.2.1.2 above). Various constituents of the drilling muds, however, do not readily dissolve and adhere to the particulate components of the drilling fluid. These would eventually settle onto the seabed with the inert particles potentially resulting in biochemical effects on the affected invertebrate benthic communities and contamination of the receiving sediments.

The proposed Project activities/infrastructure that may result in accidental spillage of drilling muds that can potentially affect benthic communities include:

Project phase	Activity/infrastructure
Construction	• N/A
Operational	• Accidental loss of liquid, powder and paletted products during transfer to/from vessels. • Accidental loss of liquid and powder products due to overflow/rupture of storage tanks and silos
Decommissioning and closure	• N/A

Impact Discussion

The toxicity testing for Water-Based Muds (WBMs) has indicated that they constitute a low risk of chemical toxicity to marine communities. The most abundant ingredient in WBMs, barite is insoluble and non-biodegradable and would therefore have a smothering effect. Other additives are only mildly toxic to marine life but are present in such low concentrations that evidence of long-lasting ecological impacts is lacking. The most toxic additives include diesel fuel (in some Non-aqueous drilling fluids (NADFs), corrosion inhibitors, detergents, defoamers, and emulsion breakers, but are usually not present in concentrations high enough to contribute significantly to whole mud toxicity.

The potential toxic effects of drilling muds, in the unlikely event of a spill/loss, on marine benthic communities and the associated food chain, or the potential for bioaccumulation of mud constituents is considered of low intensity for WBMs) and medium intensity for NADFs, considering that the receiving communities have already been severely impacted by port development, pollution and dredging. Most of the chemical constituents are biodegradable or would be rapidly diluted in the receiving water. Nonetheless, the impact would affect the whole site and persist over the short-term resulting in a low consequence. While it is conceivable that the uncontrolled loss of products from the LMTP may occur, the impact would be of **VERY LOW** significance without mitigation, reducing to **INSIGNIFICANT** with the strict implementation of project controls.

The quantitative impact assessment results are provided in Table 8-4.

Table 8-4: Impact Significance Summary - accidental biochemical spills affecting benthic communities

Description of Impact		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Operation	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Moderate change (Medium)	Negligible change (Very low)
Duration	Short-term (1 to 5 years)	Very Short-term (< 1 year)
Extent	Whole site and nearby surroundings	Whole site and nearby surroundings
Consequence	Low	Very low
Probability	Conceivable (Low)	Unlikely / improbable (Very low)
Significance	**Very low -**	Insignificant -
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	Low	
Degree to which impact can be avoided	High	
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	Low	
Degree to which impact can be avoided	High	
Degree to which impact can be mitigated	High	

Mitigation Measures

The following mitigation measures are proposed:

- ensure that all project controls are strictly complied with. In addition, install laser volume indicators on tanks and maximum fill level alarms to accurately track fluid volumes on all tanks and silos; and
- ensure an emergency preparedness and response plan is in place for the potential loss of products.

8.2.1.5 Increased Turbidity

Impact Description

The establishment of the proposed Project in proximity to the sensitive coastline of Walvis Bay has the potential to result in spillages that can pose a threat to marine life.

In the unlikely event of the uncontrolled loss of liquid, powder and paletted products during transfer to/from vessels or the overflow/rupture of storage tanks and silos, many of the drilling mud constituents would be diluted in the water column contributing to reductions in water quality (see section 8.2.1.2 above). The muds, however, also contain solid ingredients that cannot dissolve, and these would create a plume of suspended particulate matter in the water column at the spill site. Similarly, stormwater runoff from dirty areas or containing product spilt during handling and storage could contribute to increased turbidity at the development site.

The proposed Project activities/infrastructure that may result in increased turbidity include:

Project phase	Activity/infrastructure
Construction	• Stormwater runoff of dirty water • Uncontained runoff water from spills during storage and handling of materials and chemicals.
Operational	• Stormwater runoff of dirty water • Uncontained runoff water from spills during storage and handling of materials and chemicals • Uncontrolled loss of liquid, powder and paletted products during transfer to/from vessels • Uncontrolled loss of liquid and powder product due to overflow/rupture of storage tanks and silos
Decommissioning and closure	• Stormwater runoff of dirty water • Uncontained runoff water from spills during storage and handling of materials and chemicals.

Impact Discussion

Any silts and clays in the spilled material will remain in suspension longer and disperse further. The suspended sediment concentrations, the extent and area over which plumes disperse, and their duration, depend largely on the proportions of silts, muds and clays (<63 µm), as well as local sea conditions.

Suspended sediments load the water with inorganic particles, which may have biological effects such as:

- A reduction of invertebrate egg and larval survival (thereby potentially affecting the recovery rate of the impacted area) and diminish the filter-feeding efficiency of suspension feeders. However, in most cases sub-lethal or lethal responses occur only at concentrations well above those of sediment plumes expected from resuspension of dumped beach sands.
- Direct long-term impacts for fish are, however, unlikely to occur as they are mobile and can actively avoid any area affected by increased sediment loadings. Short-term impacts may occur by reducing the ability to find prey by visual and the loss of potential food items due to smothering. Fish eggs and larvae are generally more susceptible to elevated concentrations of suspended sediments; hatching can be delayed and feeding of larvae may be impaired.
- Clogging of gills of filter feeders from heavy sedimentation.
- Increased suspended material in the water column will diminish the light penetration with potential adverse effects on the photosynthetic capability of phytoplankton and other aquatic plants, or reduced feeding in zooplankton.
- The presence of suspended sediment plumes has the potential to reduce the ability of visually-feeding marine mammals (e.g. seals and dolphins) and diving seabirds (e.g. Damara terns, Cape Cormorants, African Penguins) to locate their prey, thereby diminishing their feeding success and potentially negatively affecting reproductive success. This could potentially trigger cascade effects through the marine food web through emigration of higher order consumers from the area in search of food.

- Turbidity is likely to affect local feeding efficiency of seabirds either by obscuring their vision or by reducing prey availability through avoidance responses of prey species to turbid water areas.

In general, however, the concentrations of suspended sediments that stimulate avoidance responses or result in mortality are orders of magnitude higher than would be expected from stormwater runoff or loss of liquid, powder and paletted products during transfer to/from vessels or overflow/rupture of storage tanks and silos. Being mobile, fish are also able to move away from areas of elevated turbidity, and thus less likely to suffer long-term or lethal effects. It is difficult to assess the significance of the potential impacts of construction-induced turbidity on seabird populations, as it will depend largely on the extent and duration of the sediment plumes. If the plumes are highly localised and disperse quickly, as would be the case during pipeline installation, then the consequences are likely to be negligible.

Furthermore, as marine communities in the Benguela are frequently exposed to naturally elevated suspended-sediment levels, they can be expected to have behavioural and physiological mechanisms for coping with this feature of their habitat. While turbidity at the spill site is likely to exceed levels attained naturally during turn-over of nearshore sediments by wave action or seasonal inputs in the form of river discharges, it must be kept in mind that the biota within the Port of Walvis Bay are highly altered due to existing high vessel and land-based activities.

Considering the ranges over which marine mammals and seabirds feed, and that prey abundance is likely to be lower both within the port area and in areas affected by plumes, the feeding ability or efficiency of pelagic mammals and seabirds is unlikely to be adversely affected by the highly localised turbidity plumes generated during upset conditions

Elevated suspended sediment concentrations and increased turbidity due to the uncontrolled loss of product into the harbour waters, or through stormwater runoff are deemed of very low intensity as fauna would be adapted to the elevated turbidity levels in the harbour. Impacts would be limited to within the immediate vicinity of the spill site (whole site) due to the low current speeds (<0.05 m/s) in the lee of the new container terminal, with impacts persisting over the very short-term only as plumes will rapidly disperse and be diluted. The impact is assessed to be of **VERY LOW** consequence and due to low likelihood can be considered **INSIGNIFICANT.**

The quantitative impact assessment results are provided in Table 8-5.

Table 8-5: Impact Significance Summary – Increased turbidity

Description of Impact		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Operational	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Negligible change (Very low)	Negligible change (Very low)
Duration	Very Short-term (< 1 year)	Very Short-term (< 1 year)
Extent	Whole site and nearby surroundings	Whole site and nearby surroundings
Consequence	Very low	Very low
Probability	Conceivable (Low)	Unlikely / improbable (Very low)
Significance	Insignificant -	Insignificant -
Degree to which impact can be reversed	Fully reversible	

Degree to which impact may cause irreplaceable loss of resources	Low
Degree to which impact can be avoided	High
Degree to which impact can be mitigated	High

Mitigation measures

No direct mitigation for this indirect impact is possible other than the no-project alternative.

8.2.1.6 Indirect Biochemical effects in the sediments

Impact Description

An indirect impact associated with the disposal of drill cutting and residual drilling fluids is the potential development of hypoxic conditions in the near-surface sediment layers through bacterial decomposition of organic matter.

The proposed Project activities/infrastructure that may result in indirect biochemical effect in the sediments include:

Project phase	Activity/infrastructure
Construction	• N/A
Operational	• Accidental loss of liquid, powder and paletted products during transfer to/from vessels • Accidental loss of liquid and powder product due to overflow/rupture of storage tanks and silos
Decommissioning and closure	• N/A

Impact Discussion

An indirect impact associated with the disposal of drill cutting and residual drilling fluids is the potential development of hypoxic conditions in the near-surface sediment layers through bacterial decomposition of organic matter. As most of the organic chemicals in WBMs are biodegradable under aerobic conditions, sediments containing WBM cuttings show only slight and short-term reductions in redox potential. Some WBMs, particularly those containing glycols or organic long chain screen binding polymers, have been found to cause temporary organic enrichment of sediments, which could similarly lead to the development of anoxic conditions in the sediments. The rapid biodegradation of drilling solids (particularly those containing NADFs) may thus lead indirectly yet rapidly to localised hypoxia in underlying sediments, particularly in fine-grained sediments. Organically enriched sediments (such as those in Walvis Bay) are often already hypoxic or anoxic, and under such conditions, anaerobic decomposition can prevail, resulting in the formation of hydrogen sulphide (H_2S) which is detrimental to marine organisms. High organic loading typically leads to eutrophication, which may bring about a number of community responses amongst the benthic macrofauna. Hypoxic and anoxic sediments consequently harbour markedly different benthic communities to oxygenated sediments. The community composition of benthic macrofauna is also likely to be impacted by increased levels of other contaminants such as heavy metals and hydrocarbons found in the sediments. Furthermore, areas that are frequently disturbed by mechanical means (e.g. through dredging) are likely to be inhabited by a greater proportion of opportunistic pioneer species.

Marine organisms respond to hypoxia by first attempting to maintain oxygen delivery (e.g. increases in respiration rate, number of red blood cells, or oxygen binding capacity of haemoglobin), then by conserving energy (e.g. metabolic depression, down regulation of protein synthesis and down regulation/modification of certain regulatory enzymes), and upon exposure to prolonged hypoxia, organisms eventually resort to anaerobic respiration. Hypoxia reduces growth and feeding, which may eventually affect individual fitness. The effects of hypoxia on reproduction and development of marine animals remains almost unknown. Many fish and marine organisms can detect, and actively avoid hypoxia. Some macrobenthos may leave their burrows and move to the sediment surface during hypoxic conditions, rendering them more vulnerable to predation. Hypoxia may eliminate sensitive species, thereby causing changes in species composition of benthic, fish and phytoplankton communities. Decreases in species diversity and species richness are well documented, and changes in trophodynamics and functional groups have also been reported. Under hypoxic conditions, there is a general tendency for suspension feeders to be replaced by deposit feeders, demersal fish by pelagic fish and macrobenthos by meiobenthos. Further anaerobic degradation of organic matter by sulphate-reducing bacteria may additionally result in the production of hydrogen sulphide,

Development of anoxic conditions beneath spilt drilling muds over the very short to short term is likely due to the relatively high deposition at the spill site and the use of chemicals with low biodegradation rate.

Should they develop, anoxic conditions in the harbour sediments would be limited to a portion of the site only, with the impact being of medium intensity persisting over the very short to short term (depending on the volumes lost). The impact is assessed to be of **LOW** consequence and due to likelihood of anoxic conditions developing under the spilled product on the seabed, can be considered of **VERY LOW** significance.

The quantitative impact assessment results are provided in Table 8-6.

Table 8-6: Impact Significance Summary – Biochemical Effects in the sediments

Description of Impact		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Operational	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Moderate change (Medium)	Negligible change (Very low)
Duration	Very Short-term (< 1 year)	Very Short-term (< 1 year)
Extent	Whole site and nearby surroundings	Whole site and nearby surroundings
Consequence	Low	Very low
Probability	Conceivable (Low)	Unlikely/improbable (Very low)
Significance	**Very low -**	**Insignificant -**
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	Low	
Degree to which impact can be avoided	High	

Degree to which impact can be mitigated	High

Mitigation measures

No direct mitigation for this indirect impact is possible other than the no-project alternative.

8.3 Potential Socio-economic Impacts

Typically, projects have the potential to result in both positive and negative socio-economic impacts. The positive impacts are usually economic in nature with projects contributing directly towards employment, procurement, skills development, and taxes on a local, regional, and national scale. In addition, projects indirectly contribute to economic growth in the national, local, and regional economies. The negative impacts can be both social and economic in nature and related to the influx of people seeking job opportunities (with related social ills and pressures on existing services) and a change to existing land uses (with related changes to social structures and way of life).

The socio-economic impacts include the below and are detailed in the following subsections:

- Alteration of the visual environment affecting sense of place;
- Contribution to the national, regional, and local economy;
- Job creation and skills development and transfer;
- Increase in traffic and congestion; and
- Impacts relating to decommissioning and closure.

8.3.1 Increase in Noise Levels Disturbing Sensitive Receptors

8.3.1.1 Impact Description

Two types of noise are distinguished: noise disturbance and noise nuisance. The former is noise that can be registered as a discernible reading on a sound level meter and the latter, although it may not register as a discernible reading on a sound level meter, may cause nuisance because of its tonal character (e.g., distant humming noises).

Noise-generating activities associated with the proposed Project could cause an increase in ambient noise levels and nuisance in and around the proposed Project area. This may cause a disturbance to nearby receptors.

The Project activities/infrastructure likely to cause an increase in disturbing levels affecting potential human receptors include:

Project phase	Activity/infrastructure
Construction	• Vehicle movement • General construction activities • Drilling • Placement of temporary infrastructure • Presence and interactions of construction personnel
Operational	• Vehicle movement • Operation of LMTP equipment (e.g. mixing tanks) • Vessel movement and loading and offloading

Project phase	Activity/infrastructure
Decommissioning and closure	• Vehicle movement • Stripping of buildings and equipment

8.3.1.2 Impact Discussion

Sensitive receptors typically include residential areas and public places in proximity to the port. These residential and public areas are found immediately beyond the port's boundary and include small businesses, supermarkets and residences. In addition, there are neighbouring port tenants that are also sensitive receptors. Excessive noise could also impact negatively on marine mammals (which is assessed in Section 8.2.1.1).

These noise levels are especially heightened during construction and decommissioning activities such as drilling, infrastructure erection and demolishing, vehicle movement, etc. They will also prevail throughout the operation phase during delivery, transportation, loading and offloading of bulk chemicals and products and operation of equipment and machinery in the LMTP.

The port is an industrial area facilitating various activities which contribute to the ambient noise levels. The noise-generating Project activities are expected to be similar to existing port activities and can impact the immediate neighbours at Berth 8. The nearest residential area is located ~300 m from the Project site, and several other operators, such as the Grindrod Walvis Bay Bulk Terminal and Grindrod Namibia Stevedoring, are located between the Project site and residential areas. These are expected to partly mask or block noise from the Project site.

These noise levels are especially heightened during construction and decommissioning activities such as drilling, infrastructure erection and demolishing, vehicle movement etc. They will also prevail throughout the operation phase during delivery, transportation, loading and offloading of bulk chemicals and products and operation of equipment and machinery in the LMTP.

The project noise can also add to the cumulative noise levels affecting nearby residential areas; however, the contribution is unlikely to be isolated, and if Project noise is not considerably higher than existing port noise, it will not further raise the cumulative port noise levels.

The significance of the impacts is **LOW** in an unmitigated scenario, which can be reduced to **INSIGNIFICANT** with the implementation of noise control measures such as housing generators or compressors inside the enclosure/s, minimisation of drop heights, no unnecessary revving of engines, ensuring that vehicles, equipment and machinery on site should are in optimum working condition and ensuring that engine exhausts are fitted with appropriate quality silencers.

Table 8-7 provides the results of the quantitative impact assessment results.

Table 8-7: Impact Significance Summary – Noise levels disturbing sensitive receptors

Description of Impact		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction, Operational And Decommissioning	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Moderate change (Medium)	Minor change (Low)
Duration	Short-term (1 to 5 years)	Very Short-term (< 1 year)
Extent	Whole site and nearby surroundings	Whole site and nearby surroundings

Consequence	Low	Very low
Probability	Probable (High)	Conceivable (Low)
Significance	**Low -**	**Insignificant -**
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	Low	
Degree to which impact can be avoided	High	
Degree to which impact can be mitigated	High	

8.3.1.3 Mitigation Measures

Applicable mitigation measures to minimise noise impacts are summarised in Table 8-8 below:

Table 8-8: Mitigation measures for noise levels disturbing sensitive receptors

General measures	• Following a noise-related community complaint / grievance procedure, undertake observational monitoring and noise checks of the identified noise source, to assess the effectiveness of control measures. • Engage communities around upcoming potential noisy activities associated with future works to inform them of control measures to minimise adverse impacts.
Site power	• Temporary screens or mobile acoustic shelters must be used to screen generators and other noisy equipment where existing structures do not provide any benefit[9].Screens should be free from gaps and provide a combined surface density of at least 15 kg/m2 • During planning and maintenance upgrades, select equipment / plant with lower sound power levels where possible. • Install silencers for fans where possible or for new fans install lower sound power. This is achieved by design of system including airflow velocities, fan and blade types, and equipment selected appropriately for system duty. • Install suitable mufflers at points where compressed air is intentionally discharged. • Improve the acoustic performance of constructed buildings, apply sound insulation, where possible.
Transportation of Material	• Enforce strict speed limits for vehicles travelling along haulage roads. • Materials to be handled in a manner that minimises noise, e.g., minimisation of drop heights, and no unnecessary revving of engines.

[9] This will only be effective to an extent for receptors at a similar or lower elevation to the source, depending on the distance from the source

Use of machinery / equipment	• Vehicles, equipment and machinery on site should be in optimum working condition. This includes compressed air and hydraulic systems. A preventative maintenance program involving regular inspections must be implemented. • The use of broadband "buzzer", not tonal "beeper", reversing alarms on all new plant equipment should be considered. • Operate equipment within specification and capacity, i.e., ensure machines are not overloaded. • Equipment must be used as intended. The operators should be trained and certified by external or internal program to qualify. • Engine exhausts should be fitted with appropriate quality silencers. Silencers as supplied by original equipment manufacturers are generally deemed acceptable. Consider retrofitting existing equipment / plant with additional acoustic measures (e.g., silencers on exhausts). • Engine or radiator maintenance access panels should be kept closed during operation. • Avoid, as far as reasonably practicable, night-time activities, particularly those involving power tools or highly impulsive noise-generating activities such as hammering. • Locate noisy equipment behind structures that act as barriers, or at the greatest distance from the noise-sensitive area/s as possible. • Orient equipment so that noise emissions are directed away from any sensitive areas, to achieve the maximum attenuation of noise, preferably using site obstacles to enable shielding of the source/s. • Any equipment idling or not in use should be turned off. • Withdraw equipment from service immediately for maintenance if a change in noise emission characteristics is noticeable. • Shutdown equipment when not in use.

8.3.2 Increase in Ambient Air Concentrations of Pollutants Affecting Sensitive Receptors

8.3.2.1 Impact Description

There are a number of activities in all phases that have the potential to pollute the ambient air. During the construction and decommissioning phases these activities are temporary in nature. The operational phase will present more medium-term activities that may have the potential to pollute the air.

The Project activities/infrastructure that may cause an increase in ambient air concentrations of pollutants that could affect sensitive receptors include:

Project phase	Activity/infrastructure
Construction	• General construction activities • Storage and handling of new and used materials and chemicals (including cement) • Use of vehicles and equipment that emit exhaust fumes
Operational	• Movement of vehicles to and from site (dust) • Storage and handling of materials and chemicals (including hydrocarbons and chemicals required for the process)

Project phase	Activity/infrastructure
	• Exhaust fumes from diesel generators, diesel Compressors and Diesel transfer pumps • Use of vehicles and equipment that emit exhaust fumes • Dust/fume Emissions while mixing/reconditioning fluids • Dust emissions from the process of bulking powders (Barite / Bentonite)
Decommissioning and closure	• General demolition activities • Removal of mobile LMTP • Use of vehicles and equipment that emit exhaust fumes

8.3.2.2 Impact Discussion

According to the air quality impact assessment, the pollutants of concern associated with the proposed Project include:

- Particulate Matter (PM) with particles less than 10 microns in size, PM_{10} and with particles than 2.5 microns in size, $PM_{2.5}$.
- Volatile Organic Compounds (VOCs) from storage tanks and loading/offloading of Volatile Liquids.
- Products of Combustion including Total Volatile Organic Compounds (TVOC,) carbon monoxide (CO), nitrogen oxides (NO_X), PM_{10}, $PM_{2.5}$ and sulphur dioxide (SO_2). Other substances are emitted in trace amounts as products of incomplete combustion, while ash and metallic additives in the fuel contribute to the particulate content of the exhaust stream[10].

The PM emissions associated with the construction and decommissioning will be temporary (i.e. six months). Emissions will vary from day to day depending on the phase of construction, the level of activity, and the prevailing meteorological conditions.

The following possible sources of PM emissions have been identified for the construction phase:

- Preparation of the surface area prior to development; and
- The removal of construction equipment from site after the set-up of new infrastructure.

Combustion engines (i.e. vehicles and equipment operating on the site) will emit PM and gases, such as CO and NO_2. Based on the construction footprint and the associated equipment/vehicle requirements, this **will not result in any significant impact on local air quality beyond the direct vicinity of the development site**.

During the operational phase, assuming the ventilation and dust collection system installed at the dry bulk warehouse will be efficient at mitigating the release of dust to atmosphere, **impacts from PM will likely be low if not negligible with mitigation.** Upset conditions (e.g. sack/bag spills outside the warehouse and subsequent wind entrainment, or the failure of the warehouse ventilation system) will result in dust emissions, however these will be temporary until emergency/spill response procedures are initiated.

[10] NPI (2008): Emission Estimation Technique Manual for Combustion Engines (v 3.0)

Examples of synthetic/oil-based mud mixtures provided by Halliburton for this specialist opinion include BaraXcel[11] and BaraECD[12] products. The base fluids listed for these mixtures, namely, EDC 170SE[13] and Saraline185V[14] respectively, are both liquid hydrocarbon mixtures, however, vary in their chemical properties. Vapour pressures are low (~0.015 to <0.5 kPa at 20°C) and would not trigger any special storage conditions instituted internationally[15]. **Neither of Halliburton's base-oil examples are cited as having any known significant effects or critical hazards when inhaled under normal conditions of use**. In terms of odour, these substances are described as smelling 'paraffinic' (Saraline) or odourless (EDC). As such, **air quality impacts from VOC emissions during the operational phase, including the potential for odour nuisance are also expected to be low to negligible with mitigation.**

The collective storage and mixing capacity for the site will be ~2 461 m^3 (estimated capacity for NADF and base oils will be ~1 695 m^3).

The impacts associated with the decommissioning phase will be similar to construction related impacts.

The results from the impact assessment are provided in Table 8-9.

Table 8-9: Impact Significance Summary - Increase in ambient air concentrations of pollutants affecting sensitive receptors

Description of Impact						
Type of Impact	Direct		Direct		Direct	
Nature of Impact	Negative		Negative		Negative	
Phases	Construction		Operational		Decommissioning	
Criteria	**Without Mitigation**	**With Mitigation**	**Without Mitigation**	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Intensity	Low (Minor)	Very low (Negligible)	Medium (Moderate)	Low (Minor)	Low (Minor)	Very low (Negligible)
Duration	Very Short-term (< 1 year)	Very Short-term (< 1 year)	Short-term (1 to 5 years)	Short-term (1 to 5 years)	Very Short-term (< 1 year)	Very Short-term (< 1 year)
Extent	Beyond (nearby) site	Beyond (nearby) site	Beyond (nearby) site	Beyond (nearby) site	Beyond (nearby) site	Beyond (nearby) site
Consequence	**Medium**	**Low**	**Medium**	**Low**	**Low**	**Very Low**
Probability	Highly likely/definite/continuous	Probable/likely	Highly likely/definite/continuous	Highly likely/definite/continuous	Probable/likely	Probable/likely
Significance	**Medium -**	**Low -**	**Medium -**	**Low -**	**Low -**	**Very Low -**
Degree to which impact can be reversed	Reversible (impact will cease at the end of the operational life of the activity) and irreversible (health impacts associated with pollutant exposure can be permanent)					
Degree to which impact may cause	Low					

[11] Halliburton Manufacturing Services (2024): Material Safety Data Sheet – BaraXcel 3 AO Drilling Fluid

[12] Halliburton Manufacturing Services (2023): Material Safety Data Sheet – Bara ECD 3.2 Liquid Mun

[13] TotalEnergies (2022): Material Safety Data Sheet – EDC 170 SE

[14] Shell Chemicals (2023): Material Safety Data Sheet – Saraline 185V

[15] In the Netherlands and Germany, substances exceeding 1 kPa and 1.3 kPa (at at 20°C) respectively, require storage in floating roof tanks or a vapour treatment/recovery system (IFC, 2006). In South Africa, such conditions are only triggered for substances with vapour pressures above 14 kPa at operating temperature (DEA, 2013).

irreplaceable loss of resources			
Degree to which impact can be avoided	Low		
Degree to which impact can be mitigated	High	Medium	High

8.3.2.3 Mitigation Measures

Best available techniques (BAT) is defined as the most effective and practical activities and methods to prevent and reduce emissions and the potential impact on the environment. "Techniques" includes both the technology and the way in which the facility is designed, built, maintained and operated. "Available techniques" are economically and technically viable techniques allowing for implementation in the relevant industrial sector. "Best" means the most effective in achieving a high level of protection for the environment. As good industry practice for the upstream hydrocarbon exploration and production industry, the pre-mixing and preparation of drilling muds in a centralised mud fluid facility (such as the proposed LMTP) is considered BAT to reduce the risk of unintended chemical releases at the well site[16].

The mitigation and data management measures recommended in Table 8-10 should be considered for the LMTP to reduce impacts and facilitate impact assessment and environmental stewardship going forward.

Table 8-10: Recommended mitigation and data management measures

General	• Maintain appropriate operational controls and adhere to repair and maintenance requirements for all equipment (including vehicles and emission abatement). • Conduct training of the workforce at all levels (i.e. workers, foremen, managers) in awareness of air emissions. This can be included in site induction courses and should focus on promoting understanding as to why operational controls are in place and should be adhered to. • Complaints and any actions arising from a complaint must be recorded in the complaints register maintained by site management. The investigation of complaints and the outcomes thereof must be recorded for reporting at the relevant authority's request. • Develop and implement standard operating procedures, accident prevention policies and emergency response plans to prevent and efficiently manage emergency situations that could result in emission incidents (e.g. product spills, fires, ventilation/abatement equipment failure, etc.).
Fugitive dust	• General housekeeping, including the regular maintenance and sweeping of roads, machinery, and their surrounding areas to remove deposited dust and minimise the load available for entrainment during high wind speed events. • Ensure the ventilation and dust collector/filtering system installed at the dry bulk warehouse is suitably designed with adequate control efficiency. • Keep warehouse doors and windows closed as far as practicable.

[16] European Union (2019): Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (ISBN: 978-92-76-01443-0)

Storage tanks	• Maintain appropriate operational controls (e.g. appropriate temperature and pressure settings for storage vessels and loading operations). • Develop risk-based inspection schedules requiring regular equipment inspections for visible/audible/odorous leaks. • Develop a proactive maintenance plan requiring regular checks and periodic replacement of components including pump seals, compressor seals, pipeline valves, open-ended valves, flanges, and other connections (as applicable). At a minimum, this must align with manufacturer specifications. • Ensure tanks storing volatile substances are suitably coloured (i.e. 70% reflectivity for thermal or light radiation) or are fitted with a solar shield. • Fit tanks storing base oils and NADF with pressure vacuum relief valves set at the highest possible value consistent with the tank design. • Maintain meticulous record keeping of all inputs, throughputs, and production rates, including loading and dispatch quantities for each tank to allow for an accurate accounting of evaporative losses should this be required for future impact assessment.
Monitoring	• Once the site is operational, undertake an air quality screening survey to measure benzene, toluene, ethylbenzene and xylene (BTEX) along the facility fence line to confirm that offsite impacts are within internationally accepted ambient limits. Should the findings of this survey indicate that concentrations beyond the LMTP boundary are cause for concern, a full air quality impact assessment (including dispersion modelling) and the development of an air quality management plan (AQMP) will be necessary. • Undertake a leak detection and repair (LDAR) survey on an annual basis to guide repair and maintenance (over and above the minimum manufacturer specifications) and prevent leaks. • The installation of an onsite weather station will provide site specific meteorological data that can assist with the interpretation of monitoring results and source identification for investigating air quality complaints.

8.3.3 Alteration of the Visual Environment Affecting Sense of Place

8.3.3.1 Impact Description

Industrial activities and infrastructure have the potential to alter the visual environment and aesthetics of an area. Visual impacts on the receiving environment may be caused by activities and infrastructure associated with the LMTP activities, as well as night-time illumination at this site. Visual/aesthetic value is the emotional response derived from the experience of the environment with its natural attributes. People who have been accustomed to a place being a certain way can also perceive impacts brought about by change as negative.

The Project activities/infrastructure likely to cause an alteration of the visual environment affecting sense of place include:

Project phase	Activity/infrastructure
Construction	• Large construction vehicles, equipment and construction material stockpiles will expose visual receptors to impacts associated with construction. • Construction activities may be perceived as an unwelcome visual intrusion.

Project phase	Activity/infrastructure
	• Dust generation from surface disturbance during construction may result in visual pollution. • Litter on the construction site may result in visual pollution
Operational	• Storage tanks • Large machinery and equipment • Lighting • Litter on the site may result in visual pollution
Decommissioning and closure	• Vehicles and equipment required for decommissioning will alter the visual character of the study area and expose visual receptors to visual impacts. • Decommissioning activities may be perceived as an unwelcome visual intrusion. • Temporary stockpiling of waste during decommissioning may be an unwelcome intrusion. • Potential visual pollution resulting from littering on the decommissioning site.

8.3.3.2 Impact Discussion

Visual impacts may be caused by activities and infrastructure in all phases of the Project. The proposed Project is located in an industrial area of the port and is surrounded by various activities (see Section 5.2 and 5.3). During the construction phase, the potential visual impacts associated with the project include:

- Potential alteration of the visual character and sense of place.
- Potential visual impact on receptors in the study area and passengers boarding and disembarking from cruise ships.

The impacts associated with the construction and decommissioning phases are expected to be short lived (up to 6 months) and will be localised.

The operational activities are potentially more significant as they are longer term, over a 5-year period. During the operational phase, the potential visual impacts associated with the project include:

- The proposed development may be perceived as an unwelcome visual intrusion.
- The proposed development will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts.

There are approximately fifteen sensitive visual receptors identified (Section 7.3.1.4) with the potential to be impacted by the LMTP. The visual impact assessment undertaken for the projects shows that all, but three sensitive receptors are located within the low zone of potential visual impact. The following sensitive receptors are located within the moderate zone of potential visual impacts: Stay Cleverly Self-Catering Apartments (SR12), Meransha Self-Catering CC Walvis Bay (SR13) and Cruise Ship Gathering Area (SR15). Figure 8-1 provides a map showing the location of the LMTP in relation to these identified sensitive receptors and potential zones of visual impact.

The visual impact of lighting on the nightscape is largely dependent on the existing lighting present in the surrounding area at night. The night scene in areas where there are numerous light sources will be visually degraded by the existing light pollution and therefore additional light sources are unlikely to have a significant impact on the nightscape. In contrast, introducing new light sources into a relatively dark night sky will impact on the visual quality of the area at night. It is thus important to identify a night-time visual baseline before

exploring the potential visual impact of the proposed LMTP at night. The Walvis Bay town, with its industrial, residential, and commercial land uses, provides the main source of light within the study area. As such, **the visual character of the night environment is considered to be highly 'polluted'. Lighting from the LMTP is, therefore, not expected to intrude on the nightscape as the lighting from this facility will be subsumed with the lights associated with the town.**

The significance of the impact in the unmitigated scenario during the construction phase is considered to be **VERY LOW** and will remain the same (**VERY LOW**) with the implementation of mitigation measures over the 6-month construction period. The significance of the impacts in the unmitigated scenario during the operation phase is considered to be **LOW** and can be reduced to **VERY LOW** with the implementation of mitigation measures, and during decommissioning the significance of the impact is considered **VERY LOW** without the implementation of mitigation measures and can be reduced to **INSIGNIFICANT** with the implementation of mitigation measures.

The quantitative impact assessment results are provided in Table 8-11 and shown in Figure 8-1.

Table 8-11: Impact Significance Summary – Visual Environment Affecting Sense of Place

Type of Impact	Direct		Direct		Direct	
Nature of Impact	Negative		Negative		Negative	
Phases	Construction		Operational		Decommissioning	
Criteria	**Without Mitigation**	**With Mitigation**	**Without Mitigation**	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Low	Low	Low	Low	Low
Duration	Very Short-term (< 1 year)	Very Short-term (< 1 year)	Short-term (1 to 5 years)	Short-term (1 to 5 years)	Very Short-term (< 1 year)	Very Short-term (< 1 year)
Extent	Whole Site	Whole Site	Whole site	Whole site	Whole Site	Whole Site
Consequence	Low	Low	Low	Low	Very Low	Very Low
Probability	Possible	Probable	Probable	Possible	Probable	Possible
Significance	**Very Low -**	**Very Low -**	**Low -**	**Very Low -**	**Very low -**	**Insignificant**
Degree to which impact can be reversed	Fully reversible					
Degree to which impact may cause irreplaceable loss of resources	Low					
Degree to which impact can be avoided	High					

Degree to which impact can be mitigated	High

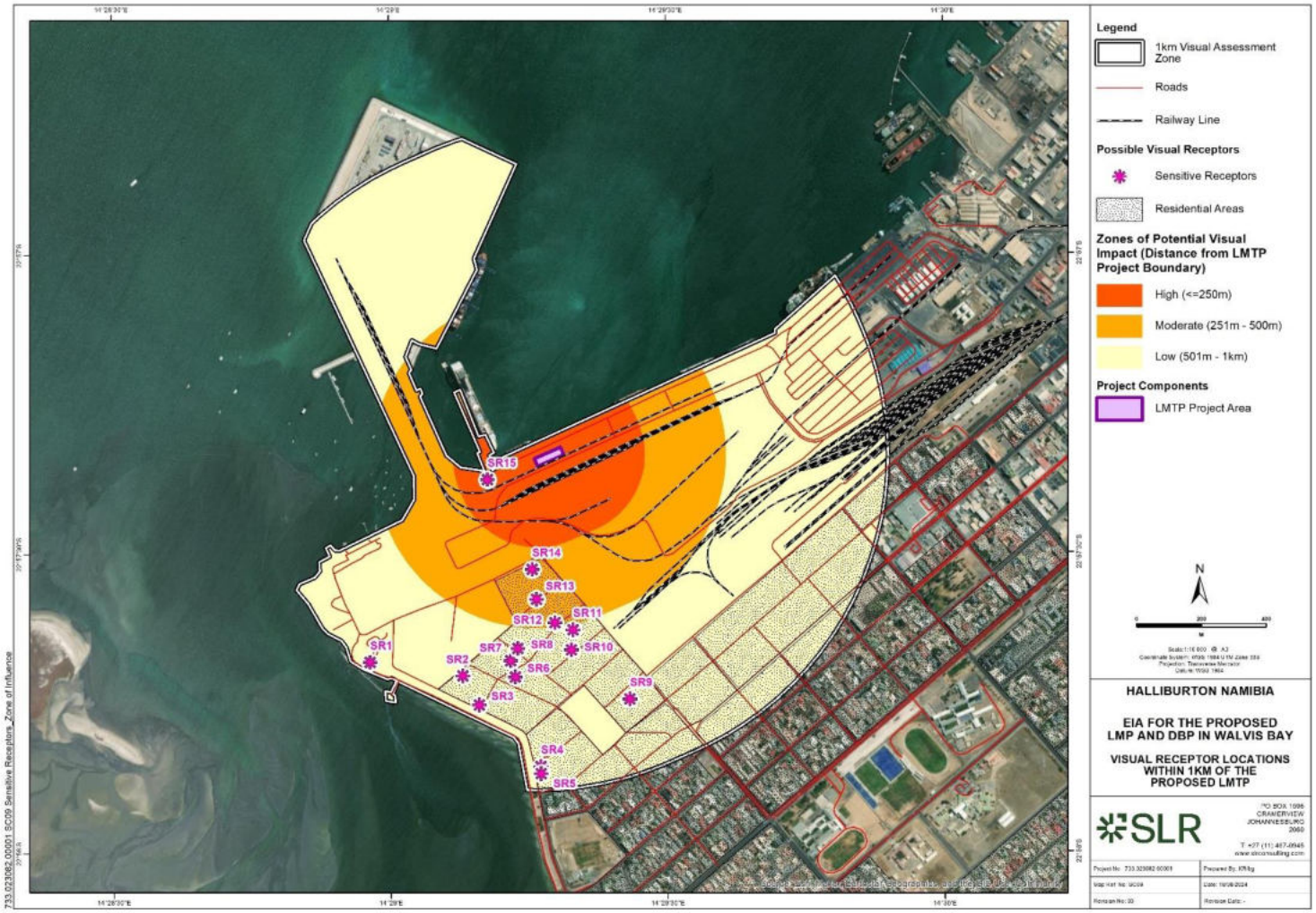


Figure 8-1: Visual Impact on Sensitive Receptors

8.3.3.3 Mitigation Measures

The mitigation measures to be implemented to avoid and /or minimise visual impacts are provided in Table 8-12 below.

Table 8-12: Mitigation measures to avoid and/or minimise visual impacts

Project Phase	Mitigation Measures
Construction Phase	• Carefully plan to minimise the construction period and avoid construction delays. • Maintain a neat construction site by removing rubble and waste materials regularly (good housekeeping). • Position storage / stockpile areas in unobtrusive positions on the site, where possible. • Limit the number of vehicles and trucks travelling to and from the construction site, where possible. • Ensure that dust suppression techniques are implemented. • Ensure that visual management measures are monitored by an Environmental Control Officer (ECO). This will include monitoring activities associated with visual impacts such as the siting and management of storage/stockpiles of construction materials and management of waste materials/rubble.
Operational Phase	• Buildings on the site should be painted with natural tones that fit with the surrounding environment. • Non-reflective surfaces should be utilised where possible. • Ensure that visual management measures are monitored by an internal Environmental Specialist. This will include monitoring activities associated with visual impacts. • Ensure proper waste management practises are implemented on site and ensure a neat and tidy site (see Section 8.3.6.3).
Decommissioning Phase	• All infrastructure that is not required post-decommissioning should be removed. • Carefully plan to minimize the decommissioning period and avoid delays. • Maintain a neat decommissioning site by removing rubble and waste materials regularly. • Position storage/stockpile areas in unobtrusive positions in the landscape, where possible. • All cleared areas should be returned to original asphalt as soon as possible. • Ensure that procedures for the removal of structures and stockpiles during decommissioning are implemented, including recycling of materials.

8.3.4 Contribution to the National, Regional, and Local Economy

8.3.4.1 Impact Description

The proposed Project has the potential to have positive socio-economic impacts in all project phases, which may benefit local, regional, and national economies.

The Project activities/infrastructure likely to cause a positive and negative socio-economic impact include:

Project phase	Activity/infrastructure
Construction	• General construction activities • Procurement of goods and services, including waste management
Operational	• Procurement of goods and services, including waste management • Operating the LMTP • Maintenance of LMTP
Decommissioning and closure	• Procurement of goods and services, including waste management • Dismantling and cleanup

8.3.4.2 Impact Discussion

The underlying motivation for the proposed Project is to ensure that products for oil and gas operations off the Namibian shore are supplied locally. The proposed Project will source labour, most raw materials, and services from within Namibia. This will lead to a boost in the local economy of Walvis Bay through investment, taxes, employment opportunities and procurement of raw materials for the operations. The capital costs for the proposed Project are approximately USD 10.5 million.

The quantitative impact assessment results are provided in Table 8-13.

8.3.4.3 Impact Enhancement Measures

As far as possible, Halliburton should aim to use local people and businesses to realise the construction, operation, decommissioning and closure phases. This will bring a scenario where these socio-economic benefits have a **MEDIUM** positive significance. The benefits from the proposed Project should be enhanced where Halliburton seeks local services or goods as much as possible.

Table 8-13: Impact Significance Summary – Contribution to the National, Regional and Local Economy

Description of Impact		
Type of Impact	Direct	
Nature of Impact	Positive	
Phases	All	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Moderate change (Medium)	Moderate change (Medium)
Duration	Short-term (1 to 5 years)	Short-term (1 to 5 years)
Extent	Regional/National	Regional/National
Consequence	Medium	Medium
Probability	Definite / Continuous (Very high)	Definite / Continuous (Very high)
Significance	**Medium +**	**Medium +**

8.3.5 Job Creation and Skills Development and Transfer

8.3.5.1 Impact Description

The Project operation aims to train and employ locals as well as obtain raw materials, should they be available, from local businesses.

The Project activities/infrastructure likely to cause a positive and negative socio-economic impact include:

Project phase	Activity/infrastructure
Construction	• Employment related to general construction activities • Procurement of goods and services, including waste management
Operational	• Procurement of goods and services, including waste management • Employment during the Operation of the LMTP • Maintenance of LMTP
Decommissioning and closure	• Procurement of goods and services, including waste management • Employment related to dismantling and cleanup

8.3.5.2 Impact Discussion

Halliburton will recruit local people for the positions required for the LMTP operations. Initially, Halliburton staff will provide on-the-job skills development and training to the new employees. Halliburton then aims to transfer the operation of the LMTP fully to local employees, with Halliburton specialists providing oversight. The procurement of raw materials from local businesses will also be required for the duration of operations.

The construction phase of the proposed Project will result in the creation of limited (approximately six) new job opportunities, and short-term (6 months) employment opportunities.

The operational phase will result in the creation of 22 new positions over a medium term (5 years). Together with additional or sustained employment at contractors, the overall impact is considered to be of **MEDIUM** significance.

Table 8-14: Impact Significance Summary – Skills Development and Transfer

Description of Impact		
Type of Impact	Direct	
Nature of Impact	Positive	
Phases	All	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Moderate change (Medium)	Moderate change (Medium)
Duration	Short-term (1 to 5 years)	Short-term (1 to 5 years)
Extent	Regional/National	Regional/National
Consequence	Medium	Medium
Probability	Definite / Continuous (Very high)	Definite / Continuous (Very high)
Significance	**Medium +**	**Medium +**

8.3.5.3 Impact Enhancement Measures

The following measures will ensure that the positive impacts of the proposed Project are enhanced:

- Halliburton will make use of locals as much as possible, particularly where unskilled labour is required.
- Halliburton must develop and implement a skills development and transfer plan that will be implemented during the project,
- Where possible, Halliburton will enforce a requirement for contractors to commit to a recruitment process that includes preference to local recruitment.
- The use of local businesses is recommended, especially in occasions where they can provide what is needed for the project.
- Halliburton will ensure that skills development is done in such a way that the employees are equipped with knowledge and skills applicable in other industries and work as far as possible.

8.3.6 Improper Waste Management

8.3.6.1 Impact Description

During the construction phase inappropriate waste management practices may result in the contamination of surface runoff which will result in the deterioration of marine water quality. It is recognised that there are waste streams during the operational phase which are unique to the operational phase. However, the classes of waste and the risks that inadequate waste management would pose to water resources are materially the same as those during the construction phase.

The Project activities/infrastructure likely to produce waste requiring management include:

Project phase	Activity/infrastructure
Construction	• General construction activities • Cement mixing • Management of dirty water • Storage and handling of new and used materials and chemicals (including hydrocarbons) • Waste management (hazardous and non-hazardous) • Equipment servicing • Use of vehicles and equipment that may leak lubricants and fuel
Operational	• Storage and handling of materials and chemicals (including hydrocarbons and chemicals required for the process) • Management of dirty water/effluent • Waste management (hazardous and non-hazardous) • Use of vehicles and equipment that may leak lubricants and fuel • Storage of products in the storage tanks that may overflow
Decommissioning and closure	• General demolition activities • Management of dirty water • Storage and handling of materials and chemicals (including hydrocarbons) • Waste management (hazardous and non-hazardous) • Use of vehicles and equipment that may leak lubricants and fuel

8.3.6.2 Impact Discussion

The following waste sources are anticipated:

- Empty packaging: oil drums, aerosol cans, big bags, sacks, etc.
- Builder's rubble from construction-related activities.
- General waste from office, laboratory etc;
- Wash water from cleaning the tanks (sludge oily water);
- Synthetic contaminated waste from the centrifugal reconditioning of Synthetic-Based Mud.

This impact has a moderate magnitude at the local spatial scale.

The generation of waste during construction, operation and demolition is highly likely and is deemed to be of medium intensity, will potentially persist only over the short term and potentially extend beyond the site resulting in a medium consequence. The impact is therefore considered to be of **MEDIUM** significance prior to implementation of mitigation measures. The significance of the impact can be reduced to **VERY LOW** following the implementation of measures as outlined in Section 8.3.6.3).

The quantitative impact assessment results are provided in Table 8-15.

Table 8-15: Impact Significance Summary – Improper Waste Management

Description of Impact		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	All	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Prominent change (High)	Minor change (Low)
Duration	Short-term (1 to 5 years)	Short-term (1 to 5 years)
Extent	Beyond site	Whole site and nearby surroundings
Consequence	Medium	Low
Probability	Probable (High)	Possible / frequent (Medium)
Significance	**Medium -**	**Very Low -**
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	Low	
Degree to which impact can be avoided	High	
Degree to which impact can be mitigated	High	

8.3.6.3 Mitigation Measures

Waste management will be undertaken in line with the waste management hierarchy, ensuring waste avoidance and reduction at the LMTP site, re-use and recycling of waste as much as possible, and disposal as the last resort.

Where re-use, recycling or disposal of waste is required, the mitigation measures included in Table 8-16 must be implemented.

Table 8-16: Mitigation measures to avoid and/minimise impacts from improper waste management

Activity	Mitigation Measures
Separation of waste	• All waste shall be separated into general waste and hazardous waste. • Hazardous waste shall not be mixed with general waste • General waste can further be separated into waste that can be recycled and/or reused, if possible • No littering shall be allowed in and around the site, and enough bins shall be provided for the disposal of waste. • Where necessary dedicate a storage area on site for collection of waste.
Storage and disposal of general and non-hazardous waste	• General waste will be collected in an adequate number of litter bins located throughout the site. • Bins must have lids in order to keep rainwater out. • Bins shall be emptied regularly to prevent the bins from overflowing. • All work areas shall always be kept clean and tidy. • All waste management facilities will be maintained in good working order. • Waste shall be stored in demarcated areas according to the type of waste. • Flammable substances must be kept away from sources of ignition and from oxidizing agents. • No builder's rubble shall be disposed of in the marine environment. • If the builder's rubble is not removed immediately, it shall be stockpiled outside the sensitive wetland areas. • Demolition waste and surplus concrete shall be re-used, recycled, or disposed of (last resort) responsibly. • Waste shall not be buried or burned on site. • No dumping shall take place in or near the project site. • All general waste shall be re-used, recycled, or disposed (last resort) of to a licensed landfill site. • Demolition waste and builder's rubble shall be used as cover material at an appropriate licensed landfill site. • Putrescible waste must be handled, stored and disposed of

Activity	Mitigation Measures
	before the probability of it generating odours.
Storage and disposal of hazardous waste	• No dumping of hazardous waste shall be allowed in or near the site. • Hazardous containers shall be reused, recycled, or disposed of (last resort) at an appropriate licensed site. • Hazardous waste will be removed and managed by an approved service provider. • A safe disposal certificate will be provided by the approved service provider as proof of responsible disposal of hazardous waste. • The safe disposal certificates shall be stored and provided on request.

Halliburton will make use of a service provider (WESCO) for waste management. The service provider will be responsible for the collection of waste (hazardous and general) and disposal of the waste at the appropriately registered waste disposal sites.

Waste related complaints and any actions arising from a complaint must be recorded in the complaints register maintained by site management. The investigation of complaints and the outcomes thereof must be recorded for reporting at the relevant authority's request. Halliburton's waste management protocol summarised in Figure 8-2 shall be followed during the implementation of the project.

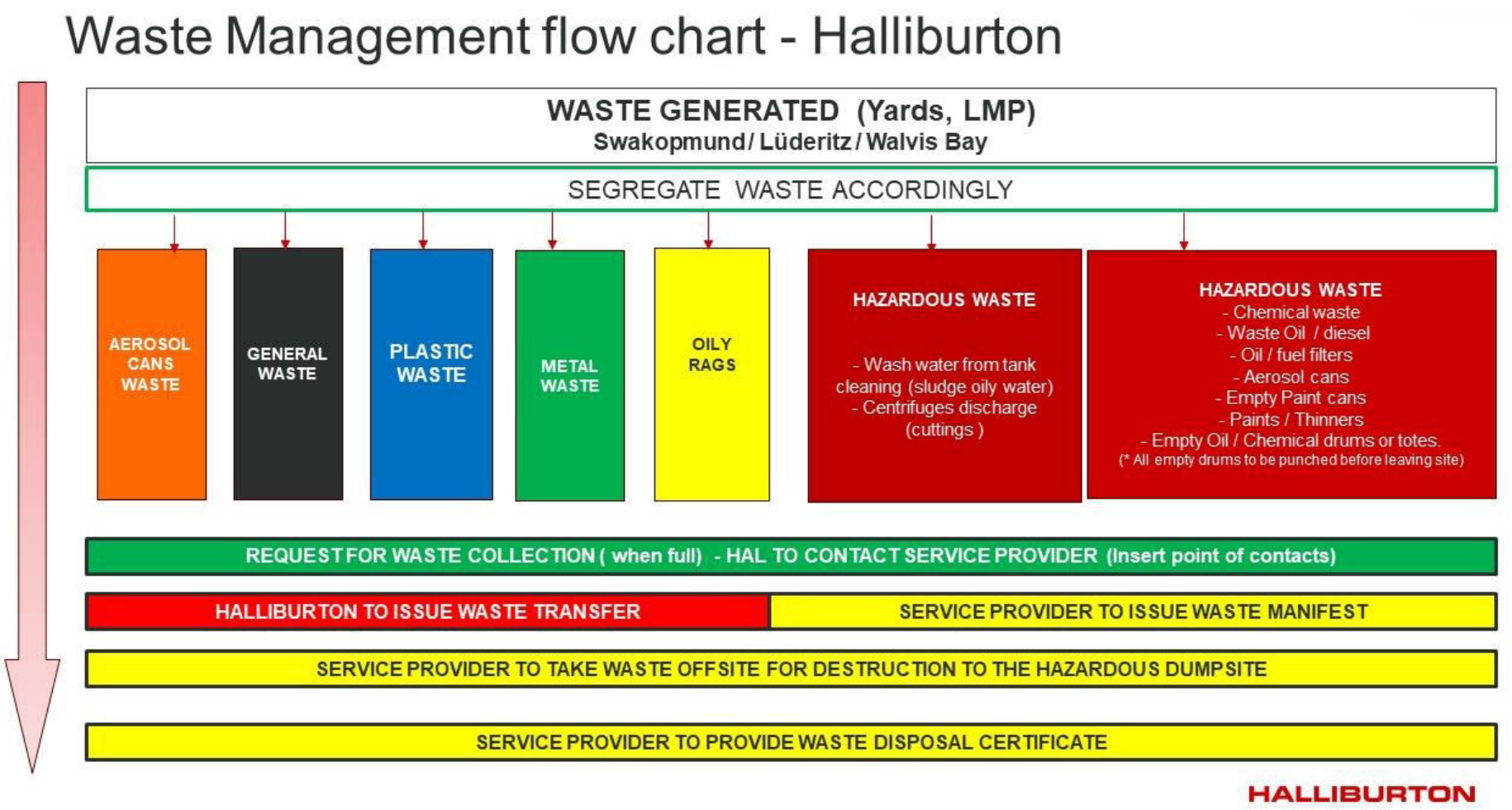


Figure 8-2: Waste Management protocol at the LMTP

8.3.7 Increase in Traffic and Congestion

8.3.7.1 Impact Description

The LMTP construction and operation will increase traffic into and out of the port and may cause congestion. Traffic in the decommissioning and closure phases will reduce to the extent that Project-related traffic ceases.

The Project activities/infrastructure likely to increase traffic and congestion in the area include:

Project phase	Activity/infrastructure
Construction	• General construction activities • Delivery of construction materials • Use of vehicles and machinery to transport construction materials between construction areas
Operational	• Movement of vehicles to and from site • Loading and offloading raw materials for operations
Decommissioning and closure	• General demolition activities • Use of vehicles and equipment

8.3.7.2 Impact Discussion

Port operations can be negatively impacted by traffic congestion due to additional vehicles from the proposed Project. This said, Namport has made the site available to Halliburton for the proposed Project. In addition, the increase in vehicles results in an increased potential for road degradation of the road network in the vicinity of the project.

The highest volumes of traffic are anticipated during the construction period and are short-term.

Liquid and dry powder products required for the process will be shipped into the country by container vessel or by road from local vendors.

The impact significance will be **LOW** over the medium term as operations continue however, this can be reduced to **VERY LOW** with the application of mitigation measures.

The quantitative impact assessment results are provided in Table 8-4.

Table 8-17: Impact Significance Summary – Traffic and Congestion

Description of Impact		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	All	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Minor change (Low)	Minor change (Low)
Duration	Short-term (1 to 5 years)	Short-term (1 to 5 years)
Extent	Regional/National	Regional/National
Consequence	Medium	Medium
Probability	Possible / frequent (Medium)	Unlikely / improbable (Very low)
Significance	**Low -**	**Very low -**
Degree to which impact can be reversed	Fully reversible	

Degree to which impact may cause irreplaceable loss of resources	Low
Degree to which impact can be avoided	High
Degree to which impact can be mitigated	High

8.3.7.3 Mitigation Measures

The mitigation measures to be implemented to avoid and /or minimise traffic impacts are provided in the table below.

- All vehicles will make use of the designated access roads, access points and parking within the Namport area.
- Ensure no vehicles obstruct any traffic or access points to other businesses and facilities on the routes through Walvis Bay.
- Ensure transportation of any hazardous cargo is undertaken in compliance with Namport's operating procedures for Handling and Storage of Dangerous Cargo.
- Ensure all the vehicles shall undergo maintenance on a regular basis.
- Where possible, make use of the rail system to alleviate loads on the roads.
- Ensure drivers have regular training;
- Inspect vehicles for compliance with applicable road safety requirements and ensure compliance.
- Scheduled deliveries during the a set time during the day.
- Use designated parking bays for vehicles.
- Ensure drivers comply with Haliburton's Code of Conduct (e.g. alcohol/drug testing).
- Ensure that speed limits and any other applicable rules of the roads used for the LMTP are strictly followed.

8.4 Cumulative Impact Assessment

Incomparable activities can result in several complex effects on the natural biophysical and social environment. These impacts are mainly identified as direct and immediate effects on the environment by a single entity affecting a variable of the environment. These direct impacts have the potential to combine and interact with other activities, depending on the surrounding environmental state and land use. These impacts may aggregate or interact with other impacts to cause additional effects, not easily quantified when assessing an individual entity.

The EIA Regulations 2012 require that cumulative impacts be assessed. This section provides a description and analysis of the potential cumulative effects of the LMTP, considering the effects of any changes on the biophysical; and socio–economic conditions.

8.4.1 Marine Ecology

Due to the location of the LMTP, in the port area, cumulative marine ecology impacts are expected as follows:

- It is expected that the LMTP will result in negligible cumulative impacts on coastal and marine fauna due to noise and vibrations that may occur during the construction, operation and decommissioning phases of the project.
- The potential spillages from the LMTP have the potential to contribute, together with other port activities and discharges into the bay from other industries, to cumulative impacts on marine water quality.
- Due to past disturbance and alteration of the benthic macrofaunal communities in the port from other developments, the potential spillage of drilling muds has the potential to contribute to cumulative biochemical impacts on marine organisms in unconsolidated sediments.
- Due to past disturbance and alteration of the benthic macrofaunal communities in the port from other developments, the potential spillage of barite and bentonite can be expected to contribute to the cumulative loss of invertebrate macrofauna due to smothering.

The implementation of mitigation measures identified in Section 8.2.1 will ensure that any cumulative impacts due to the LMTP are kept to a minimum.

The impact rating results of the cumulative noise impacts from the project are summarised in Table 8-18.

Table 8-18: Impact Rating –Cumulative marine biodiversity impacts

Nature of Impact	Negative	
Phases	All	
Nature of cumulative impacts	• Cumulative impacts on coastal and marine fauna due to noise and vibrations • Cumulative impacts on marine water quality due to accidental spillages • Cumulative impacts on benthic macrofaunal communities in unconsolidated sediments due to accidental spillage of drilling muds. • Cumulative impacts on benthic macrofaunal communities due to smothering from barite and bentonite.	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Insignificant	**Insignificant**

8.4.2 Noise

Industrial developments have the potential to increase nuisance noise for humans. However, it must be noted that the LMTP is not expected to result in significant additional noise to the baseline noise levels. The excess sound levels from the LMTP are expected to be minimal and any changes in the noise climate caused by the LMTP operations can be considered negligible.

The implementation of mitigation measures identified in Section 8.3.1.3will ensure that any cumulative impacts due to the LMTP are kept to a minimum.

The impact rating results of the cumulative noise impacts from the project are summarised in Table 8-19.

Table 8-19: Impact Rating –Cumulative noise impacts

Nature of Impact	Negative	
Phases	All	
Nature of cumulative impacts	Noise impacts from all project activities combined with the noise from surrounding industrial activities could further increase nuisance noise.	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Insignificant	**Insignificant**

8.4.3 Air Quality

It is expected that the baseline air quality in the project area is already impacted by port-affiliated activities. The air quality impact assessment (Section 8.3.2) shows that the air quality impacts from the LMTP will generally be of low significance and the additional air pollutants (PM, dust, VOCs) to be released by the project will be low beyond the direct vicinity of the development site

The air quality project controls incorporated in the LMTP design (Section 8.1.2), together with the mitigation measures included in Section 8.3.2.3will ensure that the cumulative air quality impacts due to the LMTP are kept to a minimum. It must however be noted that due to the location of Grindrod and other port facilities, the cumulative impacts within the vicinity of the LMTP and the port facilities are considered to be of **MEDIUM** significance as shown in Table 8-20.

Table 8-20: Impact Rating –Cumulative air quality impacts

Nature of Impact	Negative	
Phases	All	
Nature of cumulative impacts	Likely - Grindrod and other port activities	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Medium -	**Medium -**

8.4.4 Visual

Industrial developments have the potential to cause large-scale visual impacts, however, **the existing industrial activities within the Port of Walvis Bay has already resulted in extensive transformation, resulting in a degraded sense of place and visual character in the broader region. Therefore, the congruent industrial nature of the new development will not have an overall visual impact on visual receptors.**

From a visual perspective, the introduction of the LMTP as proposed will not result in any further change in the visual character of the area and will not alter the inherent sense of place. It can be deduced that the proposed development would be perceived as being part of the overall industrial activities undertaken in the Port of Walvis Bay, rather than as a separate development. Although this will not necessarily reduce impacts on the visual character of the area, it could potentially reduce the overall cumulative impacts on the landscape.

The results from the impact rating of cumulative noise impacts are provided in Table 8-21.

Table 8-21: Impact Rating –Cumulative noise impacts

Nature of Impact	Negative	
Phases	All	
Nature of cumulative impacts	• Visual impacts from all project activities combined with the surrounding industrial activity could further alter the sense of place and visual character of the area; and • Visual impacts from project activities combined with the surrounding industrial activity could potentially exacerbate visual impacts on receptors and cruise ship passengers.	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Insignificant	**Insignificant**

8.4.5 Socio-economic

Although no employment statistics of the individual tenants are available, the Namport Annual report for 2023 shows that a total number of 841 full-time employees were employed at 31 March 2023. The LMTP will contribute to limited and short-lived cumulative impacts on job creation, with 6 jobs and 22 jobs created during the construction (up to 6 months) and operational phases (up to 5 years) of the project respectively. However, the skills development and transfer will be invaluable and permanent.

The project will have a cumulative impact on the economy at a local, regional and national level through the investment (capital cost of the project is approximately USD 10.5 million), taxes, employment opportunities and procurement of raw materials for the operations.

The quantitative impact assessment results are provided in Table 8-22.

Table 8-22: Impact Rating – Cumulative socio-economic impact

Description of Impact		
Type of Impact	Direct	
Nature of Impact	Positive	
Phases	All	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Moderate change (Medium)	Moderate change (Medium)
Duration	Short-term (1 to 5 years)	Short-term (1 to 5 years)
Extent	Regional/National	Regional/National
Consequence	Medium	Medium
Probability	Definite / Continuous (Very high)	Definite / Continuous (Very high)
Significance	**Medium +**	**Medium +**

8.4.6 Traffic Cumulative Impacts

According to the traffic assessment, the cumulative impact on traffic during the construction phase will be negligible and short-lived. There will be additional traffic during the project's operational phase due to the transportation of raw materials, and waste. However, the cumulative impacts will be limited since the transportation of some of the liquid and dry powder products that cannot be sourced locally will be shipped into the country by container vessel.

This will contribute to the cumulative traffic impacts which are expected to be of low significance. The implementation of mitigation measures contained in this report and accompanying EMP will reduce the significance of the cumulative impacts even further.

The results from the impact rating of cumulative traffic impacts are provided in Table 8-23.

Table 8-23: Impact Rating –Cumulative traffic impacts

Nature of Impact	Negative	
Phases	All	
Nature of cumulative impacts	Cumulative traffic impacts due to additional trucks and vehicles on roads	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Insignificant	**Insignificant**

9.0 Need and Desirability

9.1 Introduction

The Constitution of the Republic of Namibia for environmental protection. Article 95 (l) of the Constitution of the Republic of Namibia states that "*the State shall actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at … maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of natural resources on a sustainable basis for the benefit of all Namibians both present and future; in particular the Government shall provide measures against the dumping or recycling of foreign nuclear and toxic waste on Namibian Territory*."

Article 10 of the Constitution provides for the creation of the Office of Ombudsman to ensure that the constitutionally protected individual freedoms and other fundamental rights of all people are not denied by the government or others. One of the constitutional obligations of the ombudsman is to "investigate complaints concerning the over-utilization of living natural resources, the irrational exploitation of non-renewable resources, the degradation and destruction of ecosystem and failure to protect the beauty and character of Namibia." The ombudsman in Namibia provides citizens with direct access to the courts and a means to stop activities that harm the environment.

Namibia's Vision 2030 which was formulated in 2001/02, aims to guide the country's development plans from National Development Plan (NDP) II through to NDP VII, while providing direction to government ministries, the private sector, non-governmental organisations, and local authorities Namibia's Vision 2030 fully embraces the idea of sustainable development. For the natural resource sector, it states:

"The nation shall develop its natural capital for the benefit of its social, economic, and ecological well-being by adopting strategies that: promote the sustainable, equitable and efficient use of natural resources; maximise Namibia's comparative advantages; and reduce all inappropriate resource use practices. However, natural resources alone cannot sustain Namibia's long-term development, and the nation must diversify its economy and livelihood strategies."

9.2 Socio-economic Benefits of the Proposed Project

The potential economic benefits associated with the proposed Project are expected to override the potential negative environmental and social impacts of significance, provided that the relevant management and mitigation measures are successfully implemented to avoid/reduce the negative impacts. This is particularly so because the proposed Project will be located in an area that is already disturbed by other similar port-related activities around the proposed Project site.

9.2.1 National and Regional Level

The Project is expected to contribute to government's efforts of meeting the oil and gas needs through cooperation with the private sector. The socio-economic benefits of the proposed Project include:

- Investment: The capital costs for the proposed Project are approximately USD 10.5 million.
- Taxes: The proposed Project will contribute to Namibia's economy through taxes and royalties.

- Employment: It is expected that although unskilled labour will be sourced from around the local communities, specialist and skilled labour may be recruited outside the local boundaries.

9.2.2 Local Level

It is expected that the proposed Project will develop and implement a policy allowing for preferential procurement for the local businesses and training of local Small, Medium, and Micro-sized Enterprises (SMME) on procurement and business management.

The proposed Project is expected to have a positive socio-economic benefit through employment of locals, particularly for unskilled and semi-skilled labour. Although specialist and skilled labour may be recruited outside the local boundaries due to the skills scarcity, local communities will benefit through on-the-job training leading to skills development and transfer. Skills development is a requisite for human resource development and will have a lasting impact on the local economy. The proposed Project will support local development through:

- Hiring nationals from local communities, school/University;
- Skill training for the local people;
- Support local businesses:
    - Purchase of products and equipment when available locally; and
    - Use of local contractors on project and support the development of their skills/portfolio if possible.

9.3 Environmental Responsibility

It is expected that the proposed Project will have limited negative environmental impacts provided that the relevant management and mitigation measures are successfully implemented to avoid/reduce the negative impacts., notably those discussed in Section 8.0 of this report.

10.0 Environmental Statement and Conclusion

SLR has managed this ECC application process and undertaken the associated EIA for the proposed LMTP in accordance with the requirements of the EMA and the EIA Regulations 2012 as well as the instruction of the MEFT. This has included a public participation process which has sought to identify stakeholders, provide these parties with an adequate opportunity to participate in and comment on the EIA documents prepared for the proposed Project.

The aim of this Scoping Report and accompanying EMP is to provide an indication of the potential positive and negative environmental and socio-economic impacts associated with the proposed Project activities. The proposed Project will be located within the existing Namport port area on Berth 8, Port of Walvis Bay. This site zoned as Industrial Area and the proposed Project activities are in line with this zoning.

Potential environmental, social and cultural impacts have been identified, described and assessed in Section 8.0. Extensive consideration has been given to the proposed location and design of the project and no fatal flaws have been identified during this EIA Phase. Specialist studies that were conducted for those issues that require specialist input, including a visual impact assessment, an air quality impact assessment, and a marine ecology impact assessment.

The impact assessment found that all the potential impacts can be mitigated to be within **LOW, VERY LOW AND INSIGNIFICANT SIGNIFICANCE** rating. A summary of the Environmental Impact Assessment is provided in Table 10-1. Potential impacts require careful mitigation and monitoring measures which have been identified and included in the EMP attached as Appendix I.

It is anticipated that it will be possible to successfully mitigate all of the environmental impacts to acceptable levels and the implementation will be monitored and audited to determine the effectiveness of the measures implemented.

No fatal flaws/aspects or red flags have been identified that could render this proposed project unfeasible and impractical. Therefore, it is SLR's opinion that, based on the findings of the EIA process, **there is no reason why the proposed development may not continue subject to the recommended mitigation measures being implemented.** The proposed Project should be allowed to proceed, given the relatively small potential contribution of the project to cumulative impacts (given the implementation of the appropriate recommended environmental management measures) and also considering the positive social and economic benefits associated with the project.

Table 10-1: Summary of the Findings of the Environmental Impact Assessment

Environmental Aspect	Issue/Benefit	Relevant Project Phase			Significance Rating Impact Assessment	
		Construction	Operation	Decommissioning and Closure	Unmitigated Scenario	Mitigated Scenario
BIOPHYSICAL	Coastal and underwater noise and vibration levels impacting marine communities	X	X	X	Very low	Insignificant
	Contamination of marine waters	X	X	X	Medium	Very low
	The smothering of macrofauna by barite and bentonite		X		Very low	Insignificant
	Biochemical impacts of accidental spillage of drilling muds on benthic communities		X		Very low	Insignificant
	Impacts of increased turbidity on marine ecology	X	X	X	Insignificant	Insignificant
	Indirect biochemical impacts in the sediments		X		Low	Insignificant
	Increase in ambient air concentrations affecting sensitive receptors	X			Medium	Low
			X		Medium	Low
				X	Low	Very low
	Increase in disturbing noise levels affecting sensitive receptors	X	X	X	Low	Insignificant
SOCIO-ECONOMIC	Alteration of the visual environment affecting sense of place	X			Very low	Very low
			X		Low	Very low
				X	Very low	Insignificant
	Contribution to the national, regional, and local economy	X	X	X	Medium	Medium
	Job creation and skills development and transfer	X	X	X	Medium	Medium
	Impacts relating to traffic	X	X	X	Low	Very low
	Impacts relating to improper waste management				Medium	Very low

Environmental Aspect	Issue/Benefit	Relevant Project Phase			Significance Rating Impact Assessment	
		Construction	Operation	Decommissioning and Closure	Unmitigated Scenario	Mitigated Scenario
	Impacts relating to decommissioning and closure	X	X	X	**Low**	**Very low**

11.0 References

Faul, A. & Botha, P., 2023. *Updated Environmental Management Plan for the Operations of the Commercial Harbour: Port of Walvis Bay,* s.l.: s.n.

Findlay, K., 1996. *The impact of diamond mining noise on marine mammal fauna off southern Namibia. Specialist Study #10. In: Environmental Impact Report. Environmental Evaluation Unit (ed.) Impacts of deep sea diamond mining, in the Atlantic 1 Mining Licence Area in Namibia,* s.l.: s.n.

Hooks, P. & Duvenhage, R., 2013. *Potential Marine Ecosystem Impacts Resulting from the Proposed Construction and Operation of the New Tanker Berth and Jetty, Walvis Bay, Namibia. A Preliminary Field Survey and Scoping Assessment.,* s.l.: s.n.

Laird, M. C., Hutchings, K., Nalusha, S. H. & Clark, B. M., n.d. *Marine Ecology Report for the National Oil Storage Facilities Project, Walvis Bay. Report No. 1790/4 prepared by Anchor Environmental Consultants (Pty) Ltd and Green Team Consultants CC for Om'kumoh AIJ JV. 95 pp,* s.l.: s.n.

Perry, J., 2005. *Environmental Impact Assessment for Offshore Drilling the Falkland Islands to Desire Petroleum Plc. 186pp,* s.l.: s.n.

Record of Report Distribution

SLR Reference:	733.023082.00001
Title:	Environmental Impact Assessment for Halliburton's proposed Liquid Mud Treatment and Completion Fluid Plant
Report Number:	03
Client:	Halliburton Industries Limited

Name	Entity	Copy No.	Date Issued	Issuer
Mr Erasmus Shivolo	MME	1	2 August 2024	N. Masawi
Mr Timoteus Mufeti	MEFT	2	2 August 2024	N. Masawi
SLR website	Project Stakeholder Database	-	2 August 2024	N. Masawi

Appendix A Environmental Assessment Practitioner Qualifications

Environmental Impact Assessment for Halliburton's proposed Liquid Mud Treatment and Completion Fluid Plant

Final Scoping Report

Halliburton Industries Limited

SLR Project No.: 733.023082.00001

August 2, 2024

Appendix B Authority Consultation

Environmental Impact Assessment for Halliburton's proposed Liquid Mud Treatment and Completion Fluid Plant

Final Scoping Report

Halliburton Industries Limited

SLR Project No.: 733.023082.00001

August 2, 2024

Appendix C ECC Application

Environmental Impact Assessment for Halliburton's proposed Liquid Mud Treatment and Completion Fluid Plant

Final Scoping Report

Halliburton Industries Limited

SLR Project No.: 733.023082.00001

August 2, 2024

Appendix D Impact Assessment Methodology

Environmental Impact Assessment for Halliburton's proposed Liquid Mud Treatment and Completion Fluid Plant

Final Scoping Report

Halliburton Industries Limited

SLR Project No.: 733.023082.00001

August 2, 2024

Appendix E Public Participation Record

Environmental Impact Assessment for Halliburton's proposed Liquid Mud Treatment and Completion Fluid Plant

Final Scoping Report

Halliburton Industries Limited

SLR Project No.: 733.023082.00001

August 2, 2024

- List of Stakeholders Consulted and proof of notification
- Copy of the Notification Letter, BID in English and proof of distribution
- Copy of the Advertisements in English and Afrikaans placed in the Namibian Sun and Republikein on 15 and 22 May 2024.
- Copy of the site notice in English and Afrikaans together with a map illustrating the location of the notices.
- Public meeting attendance register, presentation and meeting minutes

Appendix F Legislative Framework

Environmental Impact Assessment for Halliburton's proposed Liquid Mud Treatment and Completion Fluid Plant

Final Scoping Report

Halliburton Industries Limited

SLR Project No.: 733.023082.00001

August 2, 2024

Appendix G Technical Drawings

Environmental Impact Assessment for Halliburton's proposed Liquid Mud Treatment and Completion Fluid Plant

Final Scoping Report

Halliburton Industries Limited

SLR Project No.: 733.023082.00001

August 2, 2024

Appendix H Specialist Studies

Environmental Impact Assessment for Halliburton's proposed Liquid Mud Treatment and Completion Fluid Plant

Final Scoping Report

Halliburton Industries Limited

SLR Project No.: 733.023082.00001

August 2, 2024

H.1 Marine Ecology

H.2 Air Quality

H.3 Visual Impact Assessment

Appendix I Environmental Management Plan

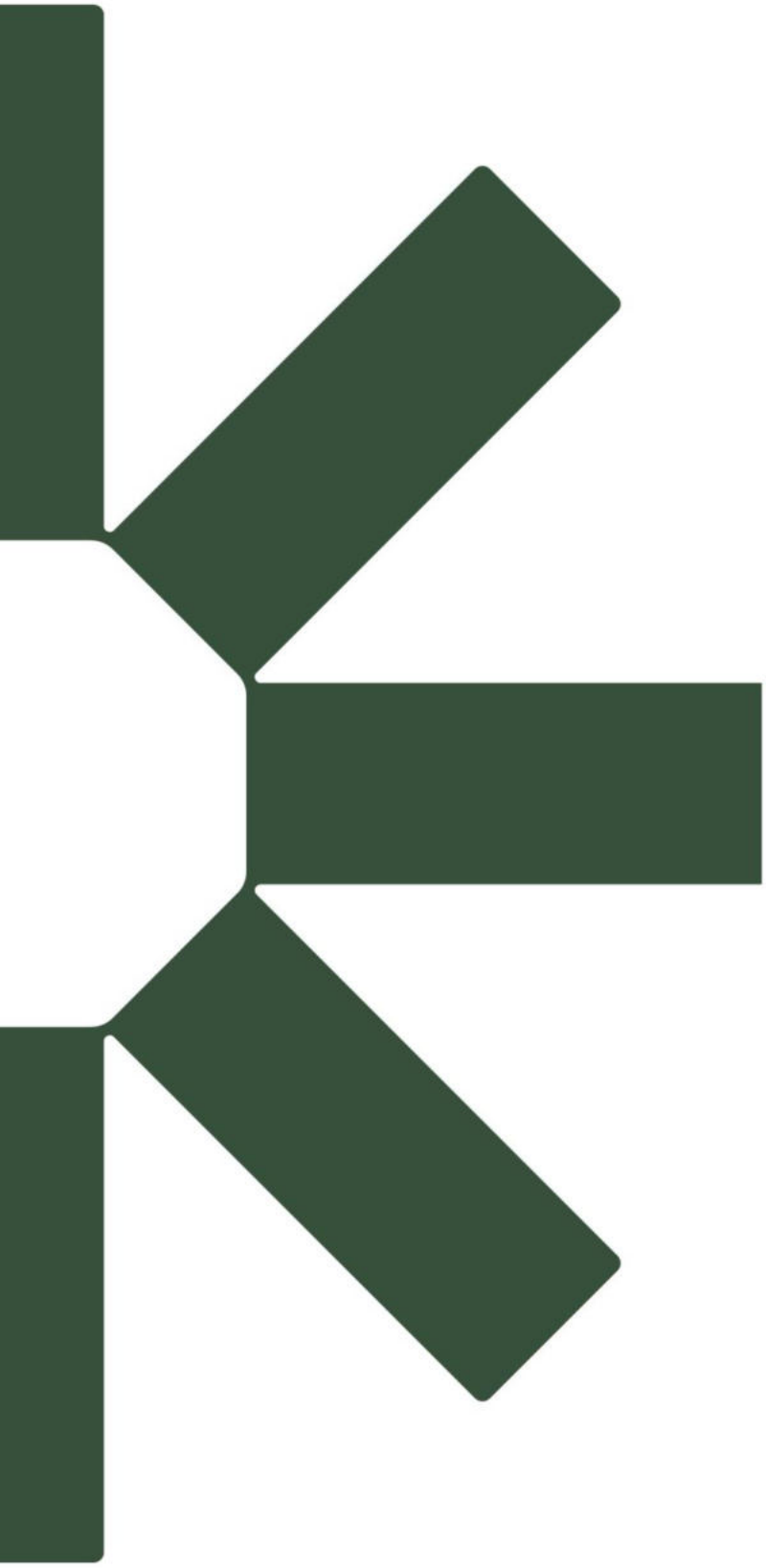
Environmental Impact Assessment for Halliburton's proposed Liquid Mud Treatment and Completion Fluid Plant

Final Scoping Report

Halliburton Industries Limited

SLR Project No.: 733.023082.00001

August 2, 2024



Making Sustainability Happen