2022

Development and operation of bulk liquid-petroleum-gas (LPG)/liquid natural gas (LNG) import, storage and distribution facilities in the Port of Walvis Bay for Hakahana Lacho Power and Gas, North Port, Walvis Bay, Erongo Region

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LIST OF ACRONYMS

AIDS	Acquired immune deficiency syndrome
CRR	Comments and response report
dB	Decibels
DESR	Draft Environmental Scoping Report
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
EAR	Environmental Assessment Report
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
FESR	Final Environmental Scoping Report
ESR	Environmental Scoping Report
HIV	Human immunodeficiency virus
I&AP	Interested and Affected Party
IUCN	International Union for Conservation of Nature
MET	Ministry of Environment and Tourism
MEFT: DEA	Ministry of Environment, Forestry and Tourism: Department of Environmental Affairs
MURD	Ministry of Urban and Rural Development
MWTC	Ministry of Works Transport and Communication
PPP	Public participation process
p/km^2	People per square kilometre
SADC	Southern African Development Community

1. INTRODUCTION

1.1 Project Background

Over the last 10 or more years, and increasingly so over the last 5 years, the Namibian Ports Authority (Namport) has received several enquiries from private entities who wish to setup LPG and LNG import, storage and distribution facilities in the Port of Walvis Bay on port land. It is clear that there exists a definite market-demand to import and land LPG and LNG into Walvis Bay by ship, for distribution and consumption in Namibia and/or further distribution to other countries in Southern Africa. A large portion of land has thus been made available at the Port of Walvis Bay North Port (approximately 82 hectares), on which Namport will allow liquid and gas storage and distribution facilities, such as LPG and LNG terminals to be developed and operated. In response to this enquiries and demand Namport issued a Request for Proposals (RFP).

Hakahana Lacho Power and Gas responded to this RFP and submitted it's proposal which was met with Namport's approval. The facility will consist of a separate Bulk Storage area, a Truck Loading Gantry, a Rail Siding where rail tank cars can be loaded, Cylinder Filling, Pipeline, an Office, and Parking. Various pumps with interconnecting pipelines will join the different areas.

The above activity is discussed in more detail in Chapter 4. The proponent appointed Environam Consultants Trading cc (ECT) to undertake the Environmental Assessment (EA) in order to obtain an Environmental Clearance Certificate (ECC) for the activity from the Office of the Environmental Commissioner in the Ministry of Environment, Forestry and Tourism (MEFT).

The process will be undertaken in terms of the gazetted Namibian Government Notice No. 30 Environmental Impact Assessment Regulations (herein referred to as EIA Regulations) of the Environmental Management Act (No 7 of 2007) (herein referred to as the EMA). The EIA process will investigate if there are any potential significant bio-physical and socio-economic impacts associated with the proposed development and related infrastructure and services.

The EIA process would also provide an opportunity for the public and key stakeholders to provide comments and participate in the process. It will also serve the purpose of informing the proponent's decision-making, and that of MEFT.

1.2 Project Location

The proposed site is located in the North Port area of the port of Walvis Bay, where a large portion of land measuring 12 hectares in extent has been made available for this purpose by Namport. The site is found on the northern entrance into Walvis Bay from Swakopmund direction just off the B2 National Road. See **Figures 1 and 2** below for the locality maps of Walvis Bay and the development site.

Figure 1: Locality map of Walvis Bay

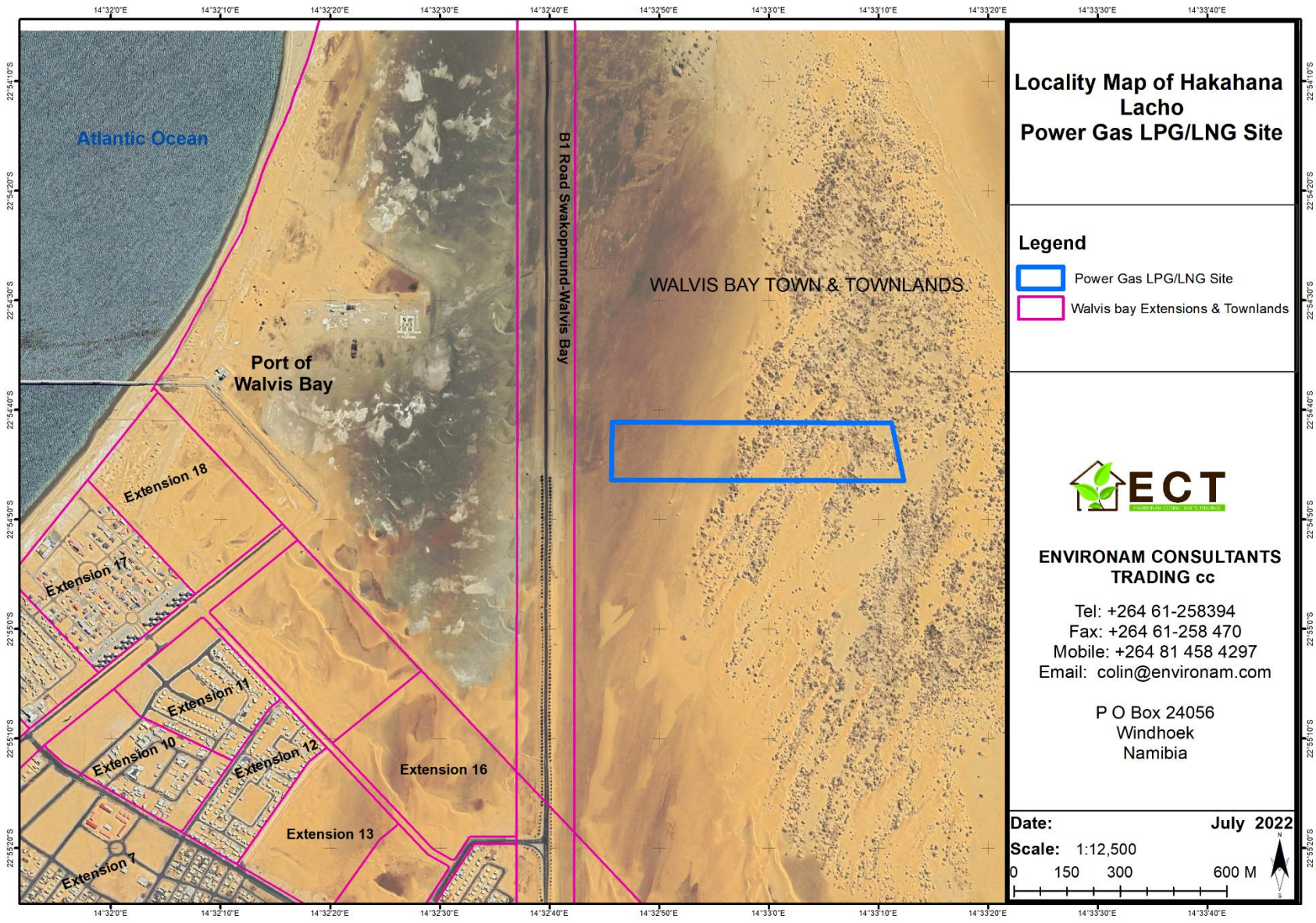

Figure 2: Locality map of the proposed development

1.3 Terms of Reference and Scope of Project

The scope of this project is limited to conducting an environmental impact assessment and applying for an Environmental Clearance Certificate for the proposed development and operation of bulk liquid-petroleum-gas (LPG)/liquid natural gas (LNG) import, storage and distribution facilities in the Port of Walvis Bay, North Port, Walvis Bay, Erongo Region and associated infrastructure as indicated in section 1.1 above. This includes consultations with client; site investigations and analysis; stakeholder consultations; impact analysis; mitigation formulation; report writing; and draft Environmental Management Plan.

1.4 Assumptions and Limitations

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

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

1.5 Content of Environmental Scoping Report

In terms of Section 8 of the gazetted EIA Regulations certain aspects must be included in a Scoping Report. **Table 1** below delineate, for ease reference, where this content is found in the Environmental Scoping Report.

Table 1: Contents of the Scoping / Environmental Assessment Report

Section	Description	Section of ESR/ Annexure
8 (a)	The curriculum vitae of the EAPs who prepared the report;	Refer to **Annexure E**
8 (b)	A description of the proposed activity;	Refer to Chapter 4
8 (c)	A description of the site on which the activity is to be undertaken and the location of the activity on the site;	Refer to Chapter 3
8 (d)	A description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed listed activity;	Refer to Chapter 3
8 (e)	An identification of laws and guidelines that have been considered in the preparation of the scoping report;	Refer to Chapter 2
8 (f)	Details of the public consultation process conducted in terms of regulation 7(1) in connection with the application, including	Refer to Chapter 5

Section	Description	Section of ESR/ Annexure
	(i) the steps that were taken to notify potentially interested and affected parties of the proposed application	Refer to Chapter 5
	(ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given;	Refer to **Annexures A** and **B** for site notices and advertisements respectively.
	(iii) a list of all persons, organisations and organs of state that were registered in terms of regulation 22 as interested and affected parties in relation to the application;	Refer to **Annexure D**
	(iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;	Refer to **Annexure D**
8 (g)	A description of the need and desirability of the proposed listed activity and any identified alternatives to the proposed activity that are 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;	Refer to Chapter 4
8 (h)	A description and assessment of the significance of any significant effects, including cumulative effects, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the proposed listed activity;	Refer to Chapter 7
8 (i)	terms of reference for the detailed assessment;	Refer to Chapter 1
8 (j)	An environmental management plan	Refer to **Annexure F**

2. LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK

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

Table 2: Legislation applicable to the proposed development

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
The Constitution of the Republic of Namibia as Amended	Article 91 (c) provides for duty to guard against "the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia." Article 95(l) deals with the "maintenance of ecosystems, essential ecological processes and biological diversity" and sustainable use of the country's natural resources.	Sustainable development should be at the forefront of this development.
Environmental Management Act No. 7 of 2007 (EMA)	Section 2 outlines the objective of the Act and the means to achieve that. Section 3 details the principle of Environmental Management	The development should be informed by the EMA.
EIA Regulations GN 28, 29, and 30 of EMA (2012)	GN 29 Identifies and lists certain activities that cannot be undertaken without an environmental clearance certificate. GN 30 provides the regulations governing the environmental assessment (EA) process.	**Activity 2.1** The construction of facilities for waste sites, treatment of waste and disposal of waste. **Activity 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. **Activity 9.5** Construction of filling stations or any other facility for the underground and aboveground storage of dangerous goods, including petrol, diesel, liquid, petroleum, gas or paraffin. **Activity 10.1(a)** The construction of – Oil, water, gas and petrochemical and other bulk supply pipelines. **Activity 10.1©** The construction of – Railways and harbours
Convention on Biological Diversity (1992)	Article 1 lists the conservation of biological diversity amongst the objectives of the convention.	The project should consider the impact it will have on the biodiversity of the area.
Draft Procedures and Guidelines for conducting EIAs and compiling EMPs (2008)	Part 1, Stage 8 of the guidelines states that if a proposal is likely to affect people, certain guidelines should be considered by the proponent in the scoping process.	The EA process should incorporate the aspects outlined in the guidelines.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
Namibia Vision 2030	Vision 2030 states that the solitude, silence and natural beauty that many areas in Namibia provide are becoming sought after commodities and must be regarded as valuable natural assets.	Care should be taken that the development does not lead to the degradation of the natural beauty of the area.
Water Act No. 54 of 1956	Section 23(1) deals with the prohibition of pollution of underground and surface water bodies.	The pollution of water resources should be avoided during construction and operation of the development.
The Ministry of Environment, Forestry and Tourism (MEFT) Policy on HIV & AIDS	MEFT has developed a policy on HIV and AIDS. In addition, it has also initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments.	The proponent and its contractor/s have to adhere to the guidelines provided to manage the aspects of HIV/AIDS. Experience with construction projects has shown that a significant risk is created when construction workers interact with local communities.
Urban and Regional Planning Act (Act of 2018).	Urban and Regional Planning Act (Act of 2018) regulates subdivisions of portions of land falling within a proclaimed Local Authority area.	Section 16 of Chapter 3 deals with the Ministers' declaration of authorised planning authorities and establishment of joint committees.
Local Authorities Act No. 23 of 1992	The Local Authorities Act prescribes the manner in which a town or municipality should be managed by the Town or Municipal Council. Sections 34-47 make provision for the aspects of water and sewerage.	The development has to be comply with the provisions of the Local Authorities Act
Labour Act no 11 of 2007	Chapter 2 details the fundamental rights and protections. Chapter 3 deals with the basic conditions of employment.	Given the employment opportunities presented by the development, compliance with the labour law is essential.
Public Health Act no 36 of 1919	Section 119 prohibits persons from causing nuisance.	The developer and contractors are to comply with these legal requirements.
Nature Conservation Ordinance no 4 of 1975	Chapter 6 provides for legislation regarding the protection of indigenous plants	Indigenous and protected plants have to be managed within the legal confines.
Atmospheric Pollution Prevention Ordinance (No. 11 of 1976).	The Ordinance objective is to provide for the prevention of the pollution of the atmosphere, and for matters incidental thereto.	All activities on the site will have to take due consideration of the provisions of this legislation.
Roads Ordinance 17 of 1972	This Ordinance consolidates the laws relating to roads.	The provisions of this legislation have to be taken into consideration in as far as access to the development site is concerned.
Roads Authority Act, 1999	Section 16(5) of this Act places a duty on the Roads Authority to ensure a safe road system.	Some functions of the Roads Ordinance 17 of 1972 have been assigned to the Roads Authority.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
Walvis Bay Town Planning Scheme.	The town planning scheme has as its general purpose the co-ordinated and harmonious development of the local authority area, or the area or areas situate therein.	The site fall in the local authority area of Walvis Bay and has to conform to the Walvis Bay Town Planning Scheme.
Namibia Ports Authority Act Act No. 2 of 1994	Provides for the establishment of the Namibian Ports Authority to undertake the management and control of ports. Outline the functions of the Namibian Ports Authority among which is the protection of the environment	The site fall in the jurisdiction of Namport.
Territorial Sea and Exclusive Economic Zone of Namibia Act Act No. 3 of 1990	Provide for the conservation of the marine ecosystem and the responsible administration, conservation, protection and promotion of marine resources on a sustainable basis Under this act the following were determined: • Regulations relating to the exploitation of marine resources (2001) • Declaration of the Namibian Islands' Marine Protected Area: Marine Resources Act (2009) • Regulations relating to Namibian Islands' Marine Protected Area: Marine Resources Act, 2000 (2012)	The operations and activities on site should not provide a threat to the marine ecosystem.
Dumping At Sea Control Act Act No. 73 of 1980	Provide for the control of dumping of substances in the sea Provides for permits to be issued to allow dumping at sea of scheduled substances	The ocean and marine ecosystem should not be put at risk as a result of poor waste management.
Aquaculture Act (2002)	Provides for water quality monitoring to protect aquaculture activities	The site is adjacent to aquaculture activities.
Marine Traffic Act Act No. 2 of 1981	Regulate marine traffic in Namibia	Marine traffic activities related to the operations should conform to this legislation.
Namport Safety, Health, Environment and Quality Policy	Provides guidance to all members responsible for managing Safety, Health, Environment and Quality related aspects. Ensures compliance with all applicable legal SHEQ and related requirements.	The operations and related activities off this development should at all times abide to these policies.

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

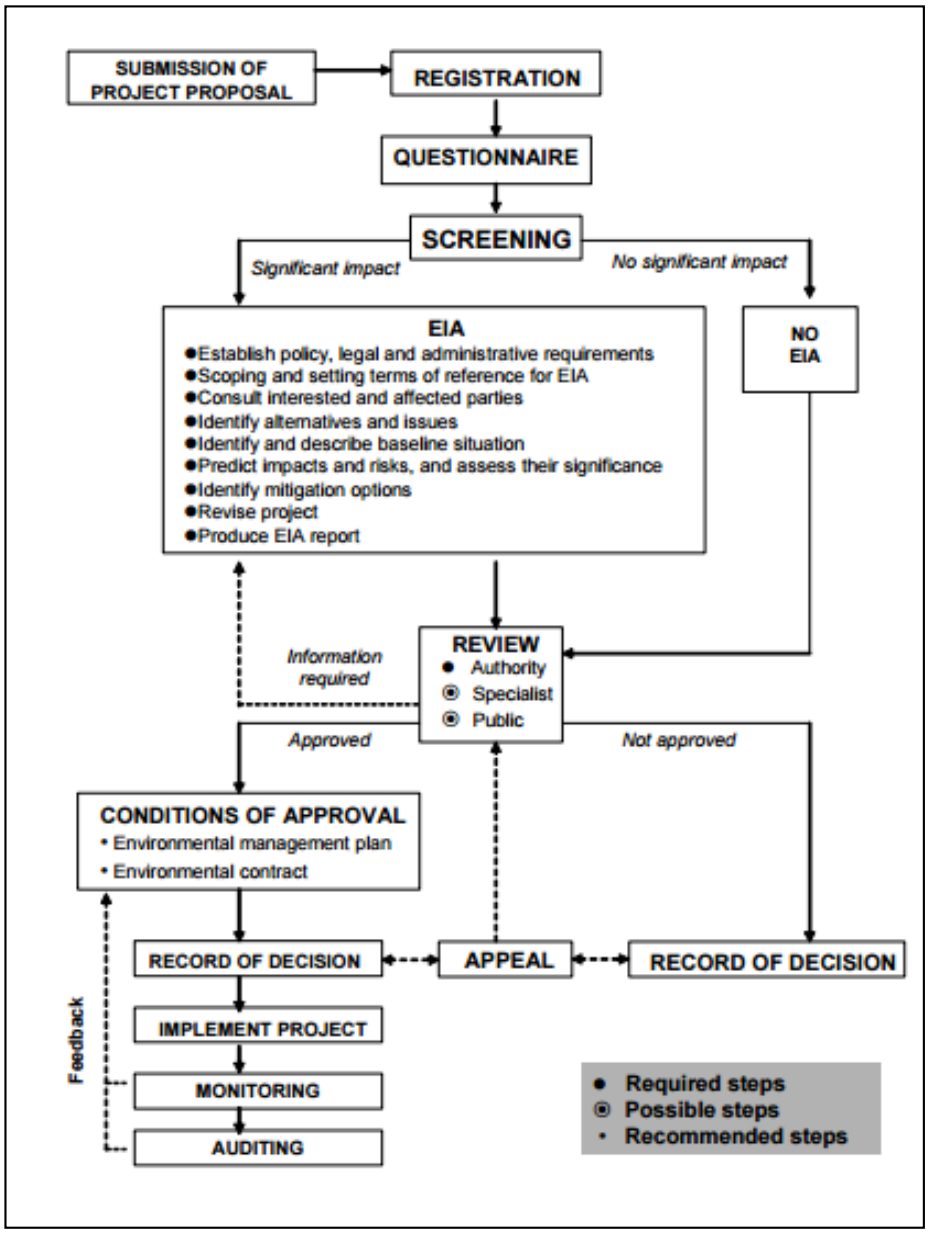

Figure 3: EIA Flowchart for Namibia (SELH, 2012)

3. ENVIRONMENTAL BASELINE DESCRIPTION

3.1. Social Environment

3.1.1. Socio-Economic Context

The statistics shown in **Table 3** below are derived from the 2011 Namibia Population and Housing Census (NSA, 2011):

Table 3: Statistics of Walvis Bay Urban Constituency

WALVIS BAY URBAN CONSTITUENCY	
Population	35,828
Females	16,478
Males	19,350
Private Households	10,317
Population under 5 years	10%
Population aged 5 to 14 years	14%
Population aged 15 to 59 years	72%
Population aged 60 years and above	
Female: male ratio	100:117
Literacy rate of 15 years old and above	99%
Head of household - Females	33%
Head of household - Males	67%
People above 15 years who have never attended school	3%
People above 15 years who are currently attending school	9%
People above 15 years who have left school	86%
People with disability	2%
People aged 15 years and up who belong to the labour force	81%
Population employed	73%
Homemakers	12%
Students	47%
Retired, too old etc.	40%
Income from pension	2%
Income from business and non-farming activities	9%
Income from farming	0%
Income from cash remittance	5%
Wages and salaries	80%

3.1.2. Archaeological and Heritage Context

While many archaeological sites have been found along the Namibian coast and some sites provide evidence of coastal occupation for a long time, many of these are considered "lucky finds" since the chances of artefacts surviving long and then being found are obviously small. As a result, the number of known archaeological sites with very old artefacts is few (Raison, 2016). It is unlikely that the development site will have any significant archaeological resources; however, an accidental find procedure may be required. If any heritage or culturally significant artefacts are found during the construction, construction must stop and the National Heritage Council of Namibia immediately notified.

3.2. Bio-Physical Environment

3.2.1. Climate

Walvis Bay is considered to have a desert climate. During the year, there is virtually no rainfall. The Köppen-Geiger climate classification is BWk. In Walvis Bay, the average annual temperature is 16.6 °C. In a year, the average rainfall is 11 mm. The least amount of rainfall occurs in May. Most precipitation falls in March, with an average of 5 mm. The temperatures are highest on average in February, at around 19.2 °C. In September, the average temperature is 13.7 °C. It is the lowest average temperature of the whole year (Climate-data, 2020). See **Figure 4** for an average temperature graph and **Figure 5** for an average rainfall data for Walvis Bay.

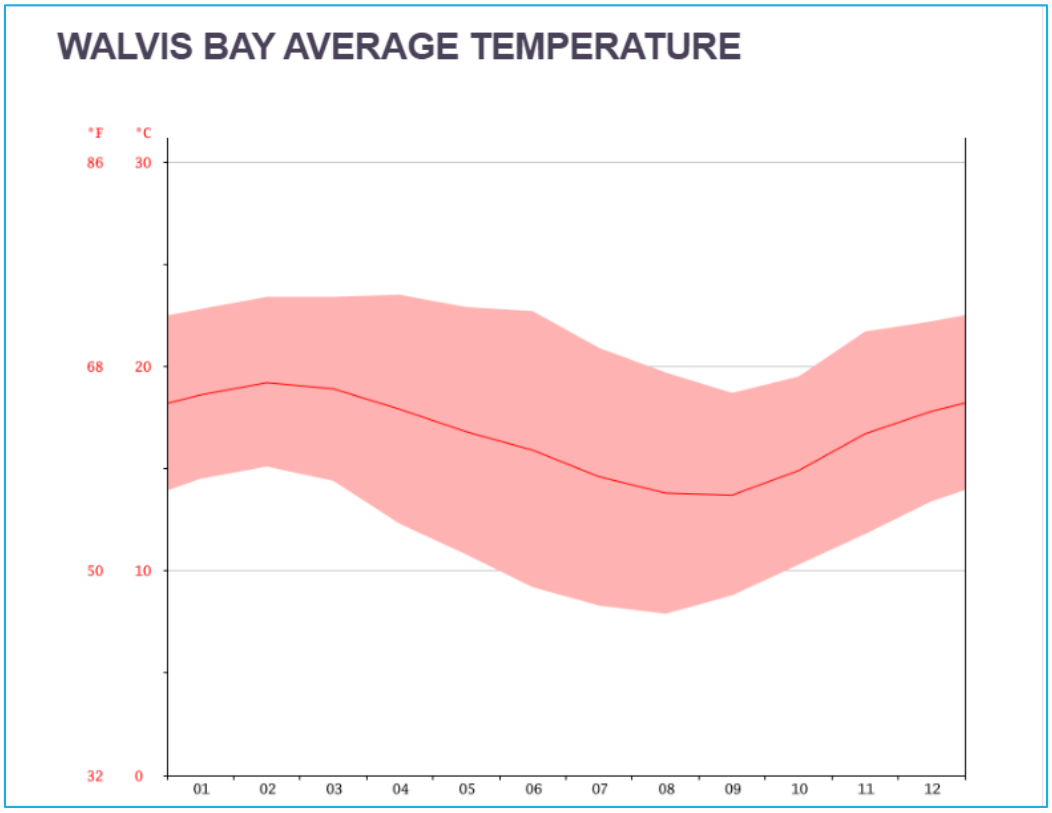

Figure 4: Average temperature graph for Walvis Bay (Climate-data, 2020a)

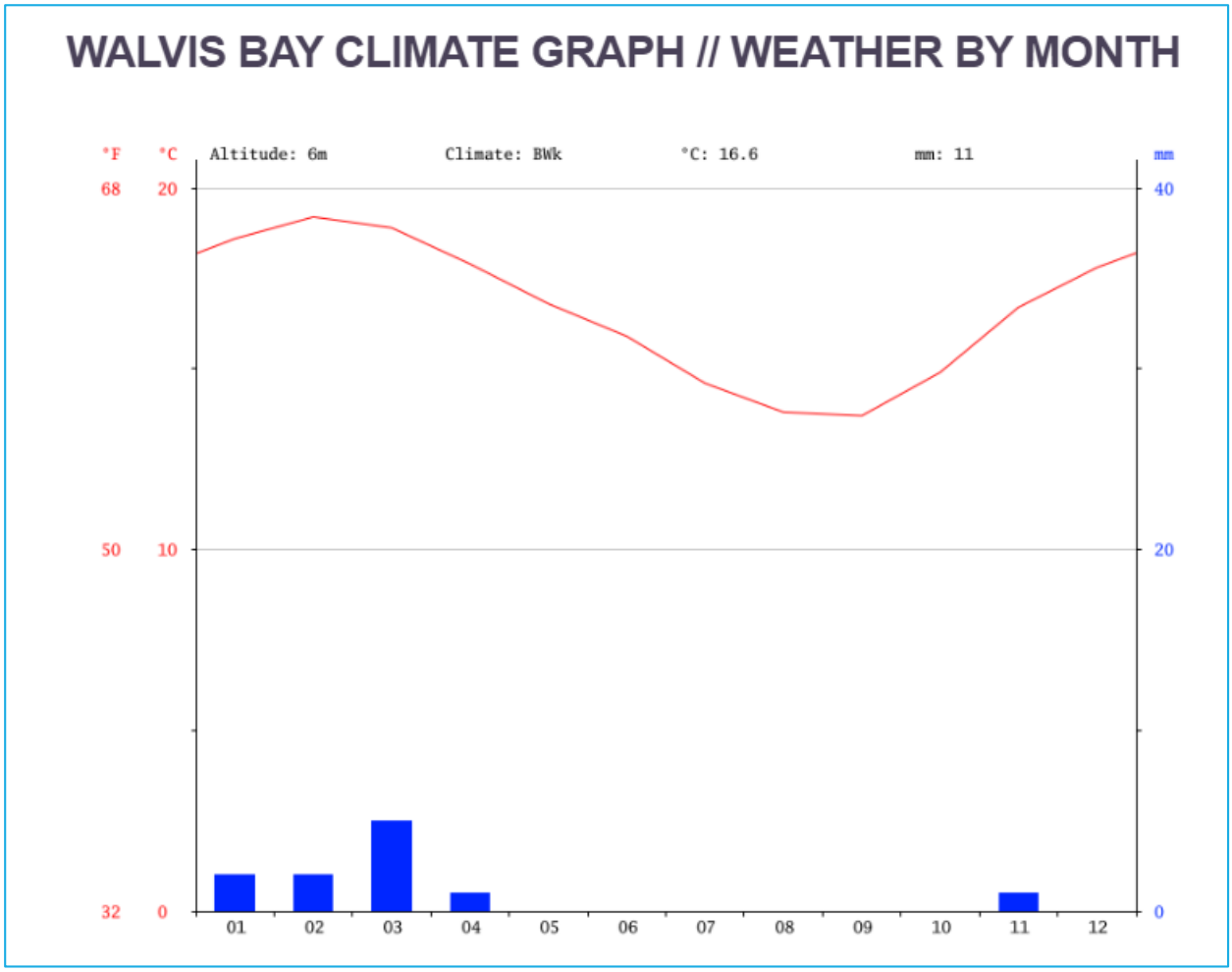

Figure 5: Average monthly rainfall graph for Walvis Bay (Climate-data, 2020b)

3.2.2. Topography, Geology and Hydrogeology

The Erongo Region, stretches from the Central Plateau westwards across the Central-Western Plains and Escarpment to the Central Namibian coast roughly over a distance between 200 and 350 km, and Northwards from the Ugab River in the north to the Kuiseb river in the south over a distance of up to 300 km, covers an area of 63,586 km^2, which is 7.7 per cent of Namibia's total area of about 823,680 km^2. On the Western side it is flanked by the Atlantic Ocean. Erosion cutting eastwards into the higher ground led to the formation of the Central-Western Plains, leading to the formation of the catchment area of several major ephemeral rivers such as the Khan, Omaruru, Swakop and Ugab, the water of these rivers reach the sea when in full flood during a good rainy season (ERC, 2020).

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

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

The desert geology consists of sand seas near the coast, while further inland there is an occurrence of gravel plains and scattered mountain outcrops. Some of the highest sand dunes, up to around 300 m high, can be found here (ERC, 2020). Water for domestic and industrial use in Walvis Bay comes mainly from the Kuiseb aquifer in the lower Kuiseb River. These aquifers are recharged by runoff from the central highlands in central Namibia where rainfall is more reliable and more significant than at the coast (Nacoma, 2010).

3.2.3. Terrestrial Ecology

The bare gravel plains within an area of about 40 km of the coast, receive frequent fog moisture providing an ideal home to rich growths of lichens, many of which are endemic to Namibia. Lichen help to bind the soil rendering it less vulnerable to wind erosion, they do this by forming a "carpet" on the surface pavement of small stones and gravel, or by creating a surface crust on the soil (Nacoma, 2010). No vegetation could be found on the proposed site which is bare for the most part.

Some endemic coastal invertebrates and reptiles inhabit a narrow belt of dune hummocks within the Namibian coastal strip. This zone also supports marine life and surf zone species. Damara terns, which are near endemic to Namibia and near threatened, are found in concentrated numbers along the coastline stretching from south of Walvis Bay to about the Ugab river, where they nest on gravel plains within 3 – 5 km of the shore and forage over the shallow Bay water, over reefs or in salt ponds (Nacoma, 2010).

There are artificially high densities of jackals and gulls due to the increase in numbers of seal colonies and line fishermen which apply heavy predator pressure on the nesting terns. The central Namib coast is also home to the two vulnerable flamingo species, the greater and the lesser (Nacoma, 2010). There are no protected or red data listed plants or animal species found on the site.

3.3. Surrounding Land Use

While the general area is mostly undeveloped, Namport has made provision for land allocations for various uses. Most of the plots adjacently east and north of the development site are reserved for temporary dry bulk as well as liquid bulk uses. To the south provision has been made for a railway marshalling yard. The site is bordered to the west by the B2 National road and further across in the western direction there are properties reserved for break bulk and multi-purpose use and Namport administration. Further west nearshore are two existing new tanker berths owned by the Ministry of Mines and Energy. South of the berths various residential extensions such as Extensions 10, 11, 12, 18, 19 etc. can be found. see **Figure 6** below for the

Namport Land Allocation Layout. The proposed site is thus well suited for the proposed development.

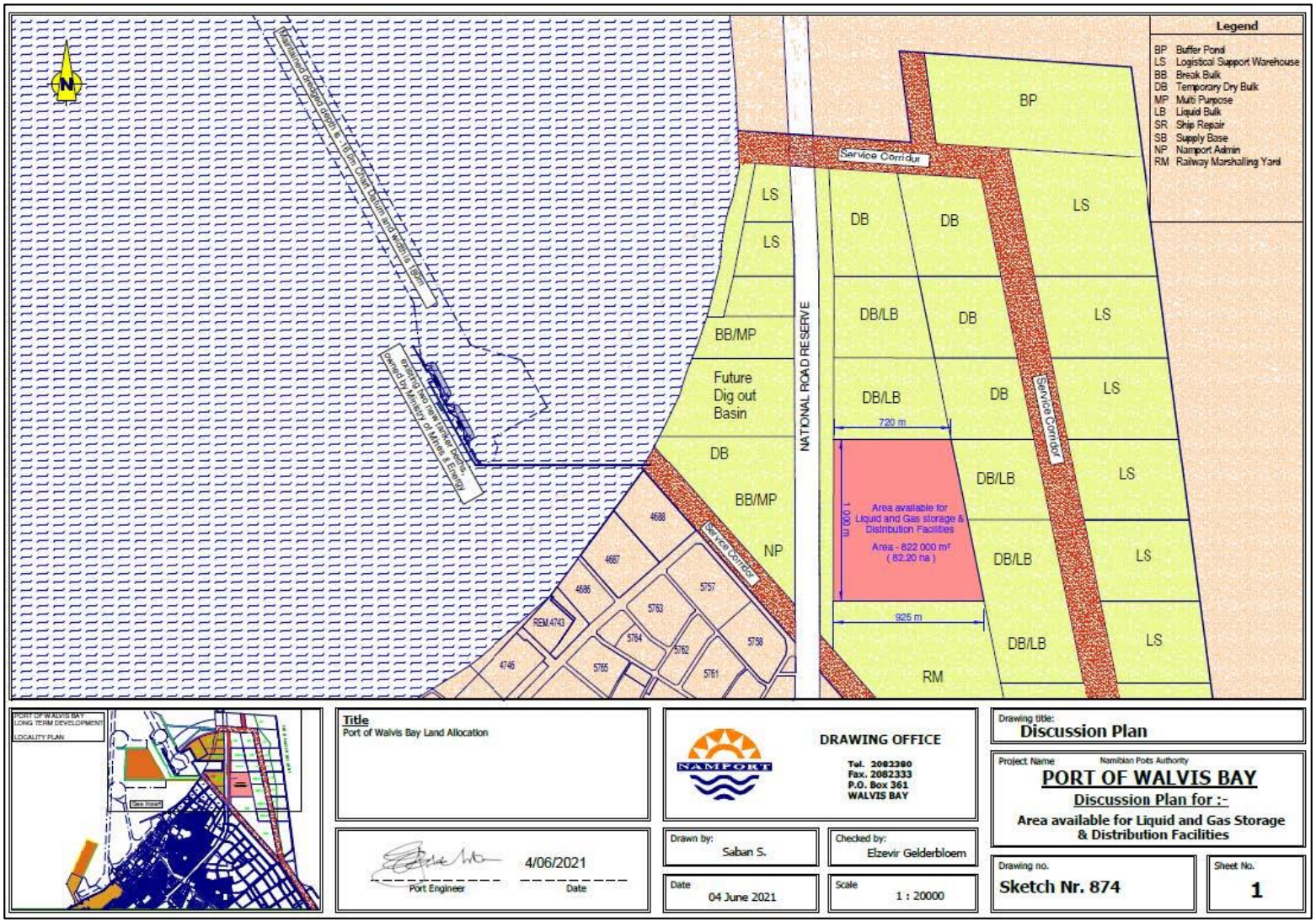

Figure 6: Namport Land Allocation Layout (Namport, 2021)

3.4. Physical Environment

The infrastructure needs of the proposed project can be categorised into two broad classifications namely:

- Basic infrastructure that includes electricity and roads.
- Environmental infrastructure that consist of water supply, sewage and drainage systems, solid waste management and landscaping.

Bulk water services will be supplied by the Municipality of Walvis Bay. Sewer will be managed by a septic tank system. Electricity will be supplied by the regional electricity distributor, Erongo RED. The site is accessible from the B2 in the western direction. Permission in this regard has to be obtained from the Roads Authority. Namport has already commenced talks with the Roads Authority and the outcomes are expected by the proponent.

4. PROJECT DESCRIPTION

4.1. Site Description

The proposed development aims to provide facilities for the operations of bulk liquid-petroleum-gas (LPG)/liquid natural gas (LNG) import, storage and distribution facilities in the Port of Walvis Bay. The facility will consist of a separate Bulk Storage area, a Truck Loading Gantry, a Rail Siding, where rail tank cars can be loaded, Cylinder Filling, Pipeline and an Office and Parking. Various pumps with interconnecting pipelines will join the divisions as shown on the drawings.

i) Bulk Storage

This will be built in batches of 10 x 500m^3 horizontal mounded tanks. Each batch of 10 tanks will have a safety distance of 15m between them. As the facility grows in throughput, additional batches of 10 tanks will be installed increasing over time to a total 10000 tons (20 batches x 10 x 500m^3) =10 000m^3. Mounted tanks were chosen because of their inherent safety from BLEVE's (Boiling Liquid Expanding Vapour Explosion).

ii) Truck Gantry

The gantry is a specialised truck loading facility consisting of pipes, connections and equipment to record the quantity of product loaded. The amount of product loaded will be determined by mass flow meters.

iii) Rail Siding

The rail siding will not be constructed at the time of the first stage of the development and it is envisaged it will only be constructed once a rail line has been made available for the tank cars.

iv) LPG Cylinder Filling Platform with scales

It is envisaged to build a suitable Filling platform with 2 stationery filling scales capable of filling 6 tones into cylinders per day. As the volumes increase, further scales will be installed until it is justified to install a motorised system consisting of a carousel with conveyer belts.

v) Office

The office building will be a single storey building to cater for 6 personnel, a store room, kitchen, offices and ablutions.

vi) Main pump station

The main pump station will be located between the Truck gantry and the bulk storage area. It is considered to use submersible pumps inside the tanks.

vii) Pipe line from harbour to storage tanks

This is necessary to receive product efficiently and in the safest manner.

See **Annexure I** for the site layout plan of the development and infrastructure.

4.2. Decision Factors

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

- North Port of Walvis Bay, SADC Gateway Development
- Namport Discussion Plan for Area available for Liquid and Gas Storage & Distribution Facilities
- Port of Walvis Bay SADC Gateway - Strategic Environmental Assessment
- Port of Walvis Bay SADC Gateway - Strategic Environmental Management Plan
- Walvis Bay Town Planning Scheme.
- Character of the general area.

4.3. No – Go Alternative

The no-go alternative would essentially entail maintaining the current situation, whereby the country is not utilising the comparative advantages offered by the Walvis Bay port. The opportunities will be lost to other coastal cities on the continent. In addition, no operational jobs that come with the envisaged project will be created.

5. PUBLIC PARTICIPATION PROCESS

5.1. Public Consultation Process Phase 1

In terms of Section 21 of the EIA Regulations a call for public consultation with all I&APs during the EIA process is required. This entails consultation with members of the public and providing them an opportunity to comment on the proposed project. The Public Consultation Process does not only incorporate the requirements of Namibia's legislation, but also takes account of national and international best practises. Please see **Table 4** below for the activities undertaken as part of the public participation process.

Table 4: Table of Public Consultation Activities

ACTIVITY	REMARKS
Placement of site notices/posters in Walvis Bay	See **Annexure A**
Placing advertisements in two newspapers for two consecutive weeks, namely Windhoek Observer and Namib Times	See **Annexure B**
Written notice to Interested and Affected Parties via Email	See **Annexure D**
Meeting with Namport Officials	24/04/2022
Public Consultation Meeting at Walvis Bay Community Hall	24/04/2022

A public meeting was arranged for 24 May 2022 at Walvis Bay Community Hall in. Apart from the consultant and the proponent's team no other members of the public turned up at the meeting. The comment period of the initial public participation process commenced on **12 May 2022** and ended on **31 May 2022.** Minutes of the consultations held with the Namport Officials together with the comments received from various stakeholders are attached in **Annexure D**.

5.2. Public Consultation Process Phase 2

The second phase of the Public Consultation Process involved the lodging of the Draft Environmental Scoping Report (DESR) to all registered I&AP for comment. Registered and potential I&APs were informed of the availability of the DESR for public comment. I&APs were given time until **26 July 2022** to submit comments or raise any issues or concerns they may have with regard to the proposed project.

6. ASSSESSMENT METHODOLGY

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

Assessment of the predicted significance of impacts for a proposed development is by its nature, inherently uncertain. To deal with such uncertainty in a uniform manner, standardised and internationally recognised methodologies have been developed. One such accepted methodology is applied in this study to assess the significance of the potential environmental impacts of the proposed development, outlined as follows in **Table 5**.

Table 5: Impact Assessment Criteria

CRITERIA	CATEGORY
Impact	Description of the expected impact
Nature Describe type of effect	**Positive**: The activity will have a social / economical / environmental benefit. **Neutral**: The activity will have no effect

CRITERIA	CATEGORY
	Negative: The activity will have a social / economical / environmental harmful effect
Extent Describe the scale of the impact	**Site Specific:** Expanding only as far as the activity itself (onsite) **Small:** restricted to the site's immediate environment within 1 km of the site (limited) **Medium:** Within 5 km of the site (local) **Large:** Beyond 5 km of the site (regional)
Duration Predicts the lifetime of the impact.	**Temporary:** < 1 year (not including construction) **Short-term:** 1 – 5 years **Medium term:** 5 – 15 years **Long-term:** >15 years (Impact will stop after the operational or running life of the activity, either due to natural course or by human interference) **Permanent:** Impact will be where mitigation or moderation by natural course or by human interference will not occur in a particular means or in a particular time period that the impact can be considered temporary
Intensity Describe the magnitude (scale/size) of the Impact	**Zero:** Social and/or natural functions and/ or processes remain unaltered **Very low:** Affects the environment in such a way that natural and/or social functions/processes are not affected **Low:** Natural and/or social functions/processes are slightly altered **Medium:** Natural and/or social functions/processes are notably altered in a modified way **High:** Natural and/or social functions/processes are severely altered and may temporarily or permanently cease
Probability of occurrence Describe the probability of the Impact <u>actually</u> occurring	**Improbable:** Not at all likely **Probable:** Distinctive possibility **Highly probable:** Most likely to happen **Definite:** Impact will occur regardless of any prevention measures
Degree of Confidence in predictions State the degree of confidence in predictions based on availability of information and specialist knowledge	**Unsure/Low:** Little confidence regarding information available (<40%) **Probable/Med:** Moderate confidence regarding information available (40-80%) **Definite/High:** Great confidence regarding information available (>80%)
Significance Rating The impact on each component is determined by a combination of the above criteria.	**Neutral:** A potential concern which was found to have no impact when evaluated **Very low:** Impacts will be site specific and temporary with no mitigation necessary. **Low:** The impacts will have a minor influence on the proposed development and/or environment. These impacts require some thought to adjustment of the project design where achievable, or alternative mitigation measures **Medium:** Impacts will be experienced in the local and surrounding areas for the life span of the development and may result in long

CRITERIA	CATEGORY
	term changes. The impact can be lessened or improved by an amendment in the project design or implementation of effective mitigation measures. **High:** Impacts have a high magnitude and will be experienced regionally for at least the life span of the development, or will be irreversible. The impacts could have the no-go proposition on portions of the development in spite of any mitigation measures that could be implemented.

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

For each impact, the EXTENT (spatial scale), MAGNITUDE (size or degree scale) and DURATION (time scale) are described. These criteria are used to ascertain the SIGNIFICANCE of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The decision as to which combination of alternatives and mitigation measures to apply lies with the proponent, and their acceptance and approval ultimately with the relevant environmental authority.

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

7. MITIGATION HIERACHY

The mitigation hierarchy is a tool aimed at helping to manage biodiversity risk, and is commonly applied in Environmental Impact Assessments. The most common reference point for banks providing project finance is mitigation measures; this provides the financial institutions with information on how environmental and social risks will be managed (See **Figure 7** below). These cover avoidance, minimization, restoration and compensation amongst other things. It is possible and considered sought after to enhance the environment by ensuring that positive gains are included in the proposed activity or project. If negative impacts occur, then the hierarchy indicates further steps.

Figure 7: Mitigation Hierarchy

Impact avoidance: This step is most effective when applied at an early stage of project planning. It can be achieved by:

- not undertaking certain projects or elements that could result in adverse impacts;
- avoiding areas that are environmentally sensitive; and
- putting in place preventative measures to stop adverse impacts from occurring.

Impact minimization: This step is usually taken during impact identification and prediction to limit or reduce the degree, extent, magnitude, or duration of adverse impacts. It can be achieved by:

- scaling down or relocating the proposal;
- redesigning elements of the project; and
- taking supplementary measures to manage the impacts

Restoration: This step is taken to improve degraded or removed ecosystems following exposure to impacts that cannot be completely avoided or minimised. Restoration tries to return an area to the original ecosystem that occurred before impacts. Restoration is frequently needed towards the end of a project's life-cycle, but may be possible in some areas during operation.

Impact compensation: This step is usually applied to remedy unavoidable residual adverse impacts. It can be achieved by:

- rehabilitation of the affected site or environment, for example, by habitat enhancement;
- restoration of the affected site or environment to its previous state or better; and
- replacement of the same resource values at another location (off-set), for example, by wetland engineering to provide an equivalent area to that lost to drainage or infill. Offsets are often complex and expensive; it is therefore preferable to pay attention to earlier steps in the mitigation hierarchy.

8. POTENTIAL IMPACTS

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

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

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

It should also be acknowledged that Namport has got its own Environmental Management Plan for the Operation of the Commercial Harbour: Port of Walvis Bay. It is thus important for the proponent to familiarise himself with the content of that plan so that it is implemented together with the Environmental Management Plan to be developed from this assessment.

8.1. Planning and Design Phase Impacts

During the planning and design phase consideration is given to aspects such as surface and groundwater; air quality, land use; fauna and flora; existing infrastructure; traffic, and archaeology. Note should be taken that the planning and design phase impacts are applicable during the operational phase as well.

8.1.1. Surface and Groundwater

Walvis Bay port in general is located in an environmentally sensitive area, particularly its proximity to the Ramsar site which includes the Walvis Bay Lagoon, the salt works and the southern part of the bay, west of the lagoon. Walvis Bay town is terrestrially surrounded by the Dorob National Park, managed by the Ministry of Environment, Forestry and Tourism. The project location is outside of protected areas (Faul, A., Botha, P. Coetzer, W. 2019). The proposed development site is located approximately 1km from the shoreline of the Atlantic Ocean, this puts the surface and ground water resources in the area at risk of pollution. Subsurface sediments to the shallow groundwater is permeable and can therefore transport contaminants to the groundwater. Groundwater can, in turn, can serve as a pathway for contaminants to reach the ocean where fauna and flora can be impacted. While groundwater in the vicinity will not be the source of potable water, it should nevertheless be protected (Botha et al., 2016). This is likely to happen in the absence of well designed and constructed

water, wastewater and storm water drainage infrastructure. The storage and handling of products on unpaved surfaces may lead to contamination of underground water resources through seepage.

Poorly constructed and maintained service infrastructure in general may also for example lead to seepage of waste water into the water bodies. Surface and ground water contamination may result from nonpoint source runoff from nearby activities; urban runoff conveyed to the sea by storm sewer system; and occurrences of bank erosion (Sosiak and Dixon, 2006). Uncontrolled solid waste management is another potential pollutant of the surface water. Ensure that storage areas are paved with impermeable material to guarantee containment and prevent seepage into the underground. The paving should be designed by an independent engineer. A baseline sampling and testing of the underlying soil and groundwater should be conducted to understand the character of the soil and water table. Due to the extreme corrosive coastal environment, chemical weathering of metal and concrete structures is a concern, therefore the choice of building materials is important and regular maintenance is essential to maintain the integrity of all infrastructure (Botha et al., 2016).

8.1.2. Air Quality

LPG is a clean fuel technology and itself does not pose threat to the environment through emissions. The only emission sources of significance for the project emission inventory during normal operations include:

- Intermittent emissions from routine testing of backup power and trucks offloading LPG.
    - Emissions from trucks offloading the LPG gas
    - Emissions from trucks and other vehicles to be loaded with cylinders.

The area shall be paved, to minimise risks of dust pollution. Given that the project will be associated with fugitive emissions such as vehicle entrainment dust, it has the potential of impacting on receptors in the near and medium fields depending on the wind speed and wind direction. The neighbouring properties including the residential areas in the vicinity of the proposed operations in Walvis Bay are some of the potential receptors.

Climatic condition variations play a major role in determining the diffusion, direction, distribution and transportation of atmospheric pollutants of the area. The factors that are vital for dust emission rates are wind speed and direction, temperature (which influences evaporation) and rainfall.

Walvis Bay is considered to have a desert climate. During the year, there is nearly no rainfall. The predominant wind direction in Walvis Bay is south westerly (See **Figure 8** below) with strong wind speeds of up to 19km/h. Walvis Bay temperature in the year ranges from 20- 40 degree Celsius (Meteoblue, 2021). Care should therefore be taken to contain any potential emissions in the direction of the residential area and Namport administration property located in that direction.

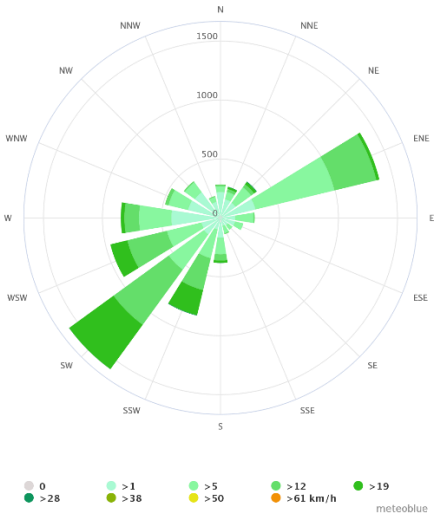

Figure 8: Predominant Wind direction graph in Walvis Bay (Meteoblue, 2021)

Air pollution occurs when gases, dust particles, fumes or odour are introduced into the atmosphere in a way that makes it harmful to humans, animals and plants. Air pollution threatens the health of humans and other living beings in our planet (Mahendra & Vaibhaw, 2013). One way to determine the air pollutant levels resulting from emission sources would be to measure the levels of all substances emitted to the surrounding community. However, actual measurements are not always available for proposed projects as they have not yet been constructed (DiGiovanni & Countinho, 2017). No baseline assessment was conducted for this project. The main pollutant of concern expected from the proposed activity is particulate matter.

Dust emissions occurs as a result of vehicle-entrained dust from paved and unpaved roads, wind erosion from open areas and material handling. Vehicle-entrained dust emission from unpaved roads potentially represents a significant source of fugitive dust. When vehicles travel on unpaved road, the force of the wheels on the road surface results in the grinding of surface material and particles are lifted and dropped from the rolling wheels (USEPA, 2006).

The quantity of dust emission from a given segment of unpaved road varies with the volume of traffic, speed, vehicle weights. Dust emissions from unpaved road usually results in high fugitive dust emissions, these impacts are usually close to the source (USEPA 2006). The dust particulate from vehicle entrainment on unpaved roads is expected during the operations of the proposed project.

8.1.3. Land Use Change

The proposed site is mostly surrounded by planned industrial developments in all directions. The proposed development is aligned to the character of the planned developments in the immediate surrounds save for the residential areas to the south-west. The proposed site is thus well suited for the proposed development.

8.1.4. Fauna and Flora (Biodiversity)

Walvis Bay falls within Important Bird Area (IBA) NA014 and NA013, with IBA NA014 renowned as the most important coastal wetland area in Southern Africa. It serves as an over-wintering area for important birds such as Greater and Lesser Flamingos, Great White Pelican, and Chestnut-Banded Plovers (Faul, A., Botha, P. Coetzer, W. 2019).

Duck and geese populations are also supported by the artificial wetland, the sewerage ponds, in the vicinity. IBA NA013, consisting of the coastal area between Walvis Bay and Swakopmund is known to host approximately 13 000 shorebirds of approximately 31 species. It also supports the densest colony of breeding Damara Terns known. There is also a bird island (guano platform), that provides roosting and breeding sites to large numbers of birds. Pollution events, such as oil spills, in the areas surrounding the port can have serious negative impacts on the bird breeding and feeding grounds and for species such as the Bank Cormorant (Faul, A., Botha, P. Coetzer, W. 2019).

The marine animals found in the Walvis Bay area are mainly cetaceans such as the Common Bottlenose Dolphins, the Namibian endemic Heaveside's Dolphins, Dusky Dolphins, Humpback Whales, Southern Right Whales and Pigmy Right Whales. Cape Fur Seals are also a common occurrence. Five species of turtles are found in the Namibian coastal waters generally, the most common in the area of interest being the Leatherback, and the Green Sea Turtles and to a lesser extent, the Hawksbill Sea Turtle (Faul, A., Botha, P. Coetzer, W. 2019).

These marine animal serve as an important tourist attraction, contributing a great deal to this million-dollar industry. Therefore, pollution of the marine environment will have a damaging effect on the populations of these mammals. The population levels may also be impacted by increased ship strikes due to increased ship traffic. Equally, excessive noise producing events in the marine environment may also negatively impact marine mammals (Faul, A., Botha, P. Coetzer, W. 2019).

8.1.5. Existing Service Infrastructure Impacts

The project will lead to increased pressure on existing infrastructure such as roads, service lines etc. due to the increased number of people who will be using these facilities which will directly translate into an increase in volume of the relevant parameter. Bulk water services will be supplied by the Municipality of Walvis Bay. Sewer will be managed by a septic tank system. Electricity will be supplied by the regional electricity distributor, Erongo RED. The site is accessible from the B2 in the western direction. Permission in this regard has to be obtained from the Roads Authority. Namport has already commenced talks with the Roads Authority and the outcomes are expected by the proponent.

It is important to note that the country in general is constrained and faced with a crisis in terms of water and electricity availability; and an increased demand for these amenities will further add to the predicament. The proposed development will make use of added infrastructure

specifically regarding electricity and water. This additional demand is expected to be fairly Medium-Low.

The operations are not water intensive; however, a reasonable amount of water may be required for maintenance of equipment. By applying a series of the mitigation measures as proposed for the development it is believed that any potential impacts can be significantly reduced. The water volumes and electrical demands for the project is not expected to have a significant negative impact on the infrastructure. It is critical that any service infrastructure should be designed and construction supervised by qualified and registered engineering professionals.

8.1.6. Traffic Impacts

There will be movement of traffic during the operational phase of the project. Due to the nature of the development and the land use, vehicles that will frequent the area would mostly consist of vehicles used to transport the products from the site. The proposed access will be obtained from the B2 National Road that passes the site on its western boundary. Walvis Bay generally has been experiencing congestion on the particular stretch of the road, hence the construction of the Walvis Bay Interchange that diverts the large vehicles and trucks destined into Walvis Bay from the inland.

With the expansion of the harbour at the North Port and the development of the heavy industrial area at Farm 58, an increase in traffic, and specifically heavy vehicle traffic can be expected. This has seen the proposed development of a number of multi-purpose service corridors which have been included in the Integrated Urban Spatial Development Framework (IUSDF) of the Walvis Bay Municipality. These will link the North Port, Farm 58 (heavy industrial area) and the national road and rail system. In response to the IUSDF proposal, a transportation master plan for the town is in the process of being drawn up. From preliminary traffic figures it is expected that 1,500 heavy vehicles trips and 20,000 light vehicle trips will be generated at Farm 58 during peak hours. At the North Port an estimated 600 to 700 heavy and 3,000 to 4,000 light vehicles will comprise additional traffic (Botha et al., 2016).

Serious concerns have been expressed about the capacity of the current railway systems, which are thought to not be nearly as efficient and effective as needed for any form of cargo that relies on a speedy and reliable transportation system. As a result, substantial congestion on local roads is to be expected, despite the necessary corridor projects that have been put in place. Heavy vehicle traffic has increased over the past few years and the regional and national roads leading to and from Walvis Bay are increasingly under pressure (Botha et al., 2016).

Within Walvis Bay, the potential impacts of the North Port development have been calculated and planned with the commensurate implementation projects, such as this one by Hakahana Lacho oil and Gas. This was done to ensure that individual road transportation and corridor projects are budgeted for and implemented in time to ensure that the port extension, the heavy industrial area and the links between the two is such that it would not compromise traffic

movement in Walvis Bay. The cumulative impacts of all the likely developments in the town has been duly considered and planned. If the capacity of rail does not improve tremendously, there will be cumulatively, a major traffic impact on Walvis Bay and along the mentioned corridor roads when all the envisaged projects on the North Port comes into operation. However, it assumed that the rail infrastructure will be upgraded to carry the bulk of cargo, at least from the harbour to the heavy industrial area for further distribution (Botha et al., 2016). The project of interest is not expected to have a significant impact on the traffic flow when considered individually.

It is thus expected that traffic on the B2 stretch between Swakopmund will be increased and will pose a safety risk amplifying the chances of accidents. It is proposed that the trucks going to and from the site are directed to the same route that flows from the C14 into and out of the town, i.e. the transportation route of the trucks to the Hakahana LPG/LNG site will follow the C14 as it comes through the new interchange from Swakopmund, from where it proceeds to the right at the traffic circle into the B2 National Road in the northern direction. See **Figure 9** below for the route map (blue line). It is important that drivers ferrying dangerous goods need to have their licences endorsed to ensure the safety of transporting the products.

Figure 9: Transportation Route (Blue Line)

8.2. Construction Phase Impacts

LPG/LNG tanks and other supporting infrastructure will be installed at the site. Most raw materials and fittings required for the LPG/LNG facility will be sourced locally. Heavy duty machinery including cranes, bulldozers, excavators, front-end loaders and electric welding

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

8.2.1. Flora and Fauna

There are no protected or red data listed plants or animal species found on the site however care should be taken that no risk is posed to the adjacent marine ecosystem, including seabirds, that may be found in the area during the construction phase. See also **8.1.4** in the planning and design phase impacts, which is applicable to this section.

8.2.2. Pressure on existing infrastructure

During the construction phase there will be an additional demand for basic municipal services such as water, electricity and sewer. The services will be used for both human consumption and for construction purposes. Waste will be generated from construction activities such as domestic waste from construction team; sewage; waste oil; treated timber; polythene and plastics packing material; lubricants; containers of used construction materials; and wastewater from hydrostatic testing.

Some of the excavation material will be rendered unusable and thus will have to be disposed of. This also applies to some of the soil/rocks which may not be reusable after excavation processes are complete. All these materials need to be collected, transported and disposed of appropriately at an approved designated area. It is encouraged that other alternative uses of these materials should be found.

The main sources of energy that will be required for construction of the project will include mains electricity and hydrocarbons (especially diesel). Electricity will be used for welding, metal cutting/grinding and provision of light. Diesel will run material transport vehicles and building equipment/machinery. The proponent should promote efficient use of building materials and energy through proper planning to reduce economic and environmental costs of construction activities.

Both the workers and the construction works will create an increased demand for water in addition to the existing demand. Water will be mostly used in the creation of aggregates for construction works and for wetting surfaces for softening or hardening after creating the formworks. These impacts will however only be limited to the construction phase and will thus have minimal short term impact. The risk of wastage and pollution may occur if no proper management actions are implemented.

8.2.3. Surface and Ground Water Impacts

Surface and ground water impacts may be encountered during the construction phase. The risk of contaminating such water sources can be increased by accidental spillage of oils and fuels

and any other equipment used during construction; chemical contamination from construction materials such as cement, paint and mechanical fluids. Storm water runoff may run into the site thereby causing interference to the construction operation. Construction of offices and paved roads could result in additional runoff through creation of impervious areas and compaction of soils. Impervious areas and compacted soils generally have higher runoff coefficients than natural area, and increased flood peaks are a common occurrence in developed areas. This risk is minimised by the fact that the construction period will be a short term activity.

8.2.4. Air Quality

Particulate matter pollution is likely to occur during the site clearance, excavation and loading and transportation of the construction waste. There is a possibility of PM10 suspended and settle-able particles affecting the site workers and even neighbours' health. Exhaust emissions are likely to be generated during the construction period by the various construction machinery and equipment.

Motor vehicles used to ferry the work force and materials for construction would cause a potentially significant air quality impact by emitting pollutants through gaseous exhaust emissions. Control measures, such as use of dust suppression techniques, will be used in construction zones as required to minimize the impacts from fugitive dust. The air emissions from the construction equipment will be localized and temporary, lasting the duration of construction activities.

Routine inspection and maintenance of construction equipment will minimize exhaust fumes. The proposed facilities will be designed to conform to national and international standards. Subsequently emissions from trucks and customers' vehicles etc. are expected to be low. It is important that dust is managed well to avoid a negative impact to the surrounding communities and other developments in the vicinity during the short-term construction phase.

8.2.5. Noise Impacts

Noise is perceived as one of the most undesirable consequences of a construction activity. The most common reported impacts are interference in oral communication and sleep disturbance. Construction activities are expected to generate noise levels to a limit of 85 decibels and other safety hazards. During the construction phase the proposed project will utilize machineries such as hydraulic excavator, mobile service crane, dump trucks and tipper trucks which are likely to generate noise. The contractor on site will be expected to provide well planned programs for equipment usage.

The construction works on site will most likely have noise impacts due to the moving machines (mixers, tippers), incoming vehicles to deliver construction materials and workers to site and other normal construction activities. This may prove to be a potential source of disturbance to the surrounding neighbours and a health hazard to the workers themselves. Such noise emissions should be minimised as much as possible from the source point while workers should be provided

with appropriate personal protective wear. The construction activities will be limited to daytime.

8.2.6. Traffic Impacts

Traffic is expected to increase during the construction phase of the project. Trucks and other heavy machinery will be required to deliver, handle and position construction materials as well as to remove spoil material. Not only will the increase in traffic result in associated noise impacts, it will also impact on the vehicular traffic in the area. The use of slow moving heavy construction trucks has the potential to cause traffic jams especially along the already busy B2 National Road. See **8.1.6.** in the planning and design phase above, which is also applicable to this section.

8.2.7. Solid Waste Management

Large amounts of solid waste will be generated during construction of the project. These will include metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, paper bags, empty cartons, empty paint and solvent containers, broken glass among others. Solid wastes if not well managed have a potential of causing disease outbreaks due to suitable breeding conditions for vectors of cholera and typhoid.

The construction workers will also generate faecal waste during their day-to-day operations. The generated waste needs proper handling to prevent diseases, for example cholera, typhoid and diarrhoea outbreak on the site. Unless this is addressed, it can prove to be an environmental/health disaster. Mobile toilets should be established on site to avoid such health risks.

Enough waste bins and skip containers should be availed to manage the solid waste. All solid waste should be disposed of at the designated landfill site of Walvis Bay as approved by the local authority.

8.2.8. Storage and Utilisation of Hazardous Substances

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

8.2.9. Health and Safety

The potential health and safety impacts of the proposed project include the occupational health and safety risks related to the project activities; risks to the public as a result of events of major disasters such as fire outbreaks and explosions. A number of activities undertaken during

development of the proposed project have potential risks to the health and safety of the workers. During the construction phase, the potential health and safety risks the workers are likely to be exposed to include: Injuries resulting from falling from LPG tanks installation; Injuries resulting from operation of machinery, equipment, tools and construction vehicle, and road accidents.

During construction of the proposed project, it is expected that construction workers are likely to have accidental injuries and hazards as a result of accidental occurrences, handling hazardous waste, lack or neglect of the use of protective wear etc. All necessary health and safety guidelines should be adhered to so as to avoid such circumstances. It is recommended that before the construction activities, there is need for the materials to be well inspected and harmonised to the occupational health and safety standards.

8.2.10. Social Impacts

One of the main positive impacts during projects construction phase is the availability of employment opportunities especially to casual workers and several other specialised workers. Employment opportunities are of benefit both economically and in a social sense. In the economic sense it means abundant unskilled labour will be used in construction, hence economic production. Several workers including casual labourers, masons, carpenters, joiners, electricians and plumbers are expected to work on the site from start to the end. Apart from casual labour, semi-skilled and unskilled labour and formal employees are also expected to obtain gainful employment during the period of construction.

Through the use of locally available materials during the construction phase of the project including cement, concrete and ceramic tiles, timber, sand, ballast electrical cables etc. the project will contribute towards growth of the local, regional and national economy by contributing to the gross domestic product. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of these materials will be payable directly to the suppliers.

There are usually several informal businesses which come up during the construction periods of such projects. These include activities such as food vendors who benefit directly from the construction, staff members who buy food and other commodities from them. This will promote the informal sector in securing some temporary revenue and hence livelihood. The local community will benefit through preferential recruitment of local labour and procurement as far as possible.

8.2.11. Archaeological

Very limited archaeological investigations have been carried out at the study site, however Walvis Bay and its surrounds are regarded as having global archaeological importance due to very well preserved evidence of early contact between indigenous Namibian communities and sea-faring traders (Botha et al., 2016).

Two main archaeologically significant features in the study area have been identified. These are:

1. a group of shell-middens with an approximate age of 1,600 years that was found at the extinct mouth of the Tumas River; and
2. an undescribed tidal lagoon.

Molluscan fauna like Bullia digitalis and Dosina lupines was collected from the tidal lagoon and was dated to be 40,830 ± 480 years old. Evidence of human occupation is dated at 1,370 ± 30 years ago based on analysis of a pottery vessel found at the shell-midden sites. Remains of more recent human activity are shuttered concrete structures which may have been used during construction of the coastal railway line and coastal defence installations at Rand Rifles (Botha et al., 2016).

8.3. Operational Phase Impacts

The operational phase impacts that have been identified are: environmental monitoring and evaluation; noise; impact on human health; waste management; social; and visual impact.

8.3.1. Environmental Monitoring and Evaluation

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

8.3.2. Noise Impacts

The operational phase could typically generate noise through the amount and frequency of use of the various types of vehicles that will be used to move the products while manoeuvring around the site. Road noise from the vehicles engines and the tyres contact with the road surface as well as noise from the warning devices on the trucks, generator, compressor and the pumps are all potential sources of noise pollution.

Namibia has no environmental noise and impact guidelines, reference is thus made to guidelines published by the International Finance Corporation (IFC, 2007) (See **Table 6** below) and the South African Bureau of Standards (SABS) (SANS 10103, 2008). Both these guidelines are in line with the World Health Organisation (WHO) Guidelines for Community Noise (WHO, 1999).

Table 6: Environmental Noise standard

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

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

8.3.3. Impact on Human Health

As discussed in 5.1.2.1. Dust emissions from unpaved road usually results in high fugitive dust emissions. The impact of particulate matter on human health is largely dependent on (i) particle characteristics, particularly particle size and chemical composition, and (ii) the duration, frequency and magnitude of exposure. The potential occupational health and safety impacts during the operation phase include injuries to workers from, routine monitoring and maintenance and deaths and injuries from major disasters e.g. explosions and fire outbreaks. During the operation phase, the workers may come in contact with liquid LPG and suffer from severe cold burns.

Liquefied Petroleum Gas is a highly flammable product and can be detrimental to the public safety if measures are not put in place. The impact significance related to public safety is likely to be high during the operation phase of the project. Leakage of LPG can cause serious health risk to humans. Accidents can occur due to increased traffic of trucks bringing in LPG, and customers buying LPG from the filling plant.

8.3.4. Waste Management

During the operation phase, waste to be generated include domestic waste generated by the operations staff, components or parts of the facility's infrastructure being removed during maintenance, and redundant electronic equipment. The contractor should develop an integrated solid waste management system for the site. A lot of waste such as waste from foodstuffs, empty plastic containers, cartons, papers etc. will be generated during the operational phase of the project. Once the proposed project is complete and operational, they are expected to generate a large amount of solid waste on a daily basis.

Namport follows its in-house operating procedures for waste management, which is currently outsourced to the Walvis Bay Municipality. This is in line with the requirements of the

International Maritime Organization (IMO) which obliges all ports to provide sufficient waste disposal facilities for visiting vessels. General and hazardous waste are removed by the municipality and sorted at the municipal landfill site or hazardous waste site as necessary (Faul, A., Botha, P. Coetzer, W. 2019).

Waste should then be categorised into various types such as hazardous, general and recyclable. This may include the following: black sand (oil polluted), boxes, general domestic waste, industrial waste, metals, tyres and other. Development of the port, increases cargo throughput, and leads to an increase in the population of the town, resulting in an increase of the amount of waste generated. The Walvis Bay landfill site currently has sufficient capacity in terms of the space available, and sand resource to cover the waste, to cope with the expected increases. Planning is more critical for the conveyance efficiencies that will be challenged as volumes and tonnage increase (Faul, A., Botha, P. Coetzer, W. 2019). The proponent should manage their waste in consultation with the Municipality of Walvis Bay, in conformance with the in-house procedures of Namport.

Development of the port will only contribute a small portion to the total waste received by the waste disposal site. Domestic waste due to the population increase in Walvis Bay is likely to have a greater impact. As a responsible authority, the Walvis Bay Municipality must ensure that provision is made for waste disposal and sewage removal given the projected growth of the town (Faul, A., Botha, P. Coetzer, W. 2019).

8.3.5. Social Impact

The construction and operation of the LPG/LNG facility will have a positive impact on the socio-economic status of Walvis Bay and its residents. This is due to the job opportunities that will be created both directly related to the operations and indirectly from supporting services; as well as the opportunities for skills development and on-site training. During the construction phase a few temporary jobs will be created but more permanent jobs will be created when operations commences. The establishment of the facility will have a positive effect on increased port services.

8.3.6. Visual and Sense of Place Impacts

The proposed site which is intended for the development is currently vacant and undeveloped and will now be developed with various infrastructure. Individuals who frequent the area on a regular basis will experience a change in their sense of place of the area. The extent of this disturbance will depend on how high they valued the initial aesthetic quality of the site. Therefore, the aesthetics quality of the new structures has to be pleasing and designed to blend in with the natural surrounds.

9. SUMMARY OF POTENTIAL IMPACTS

A summary of the significance of the potential impacts from the proposed project assessed above is included in **Table 7**. The **Tables 8 – 10** provide a summary of the mitigation measures proposed for the impacts.

Table 7: Summary of potential impacts

Impacts	Negative		Positive		No Impact
	Short Term	Long Term	Short Term	Long Term	
Planning and Design Phase					
1. Surface and ground water	X				
2. Air quality		X			
3. Land use				X	
4. Fauna and flora		X			
5. Existing infrastructure	X				
6. Traffic		X			
Construction Phase					
7. Fauna and flora	X				
8. Pressure on existing infrastructure	X				
9. Surface and groundwater	X				
10. Health, safety and security	X				
11. Air quality	X				
12. Noise	X				
13. Traffic	X				
14. Waste management	X				
15. Hazardous substances	X				
16. Social	X				

17. Archaeological	X				
Operational Phase					
18. Environmental Monitoring and evaluation		X			
19. Noise		X			
20. Impact on human health		X			
21. Waste Management		X			
22. Social				X	
23. Visual	X				

Table 8: Proposed mitigation measures for the planning and design phase

PLANNING AND DESIGN PHASE IMPACTS	
Impact	**Mitigation Measures**
Surface and Ground Water	• Appoint professional engineers to develop a detailed storm water management design as part of the infrastructure service provision of the development. • The service infrastructure should be designed and constructed by suitably qualified engineering professionals. • Develop and implement a preventative maintenance plan for the service infrastructure. • Ensure that storage areas are paved with impermeable material to guarantee containment and prevent seepage into the underground. The paving to be designed by an independent engineer. • Conduct baseline sampling and testing of the underlying soil and groundwater. • No dumping of waste products of any kind in or in close proximity to any water bodies. • Ensure that surface water accumulating on-site are channelled and captured through a proper storm water management system to be treated in an appropriate manner before disposal into the environment. • Wastewater should not be discharged directly into the environment. • Disposal of waste from the development should be properly managed. • Hazardous waste and contaminated water and soil must be disposed of at an appropriately designated facility or by approved contractors. Hazardous waste disposal certificates must be kept on file. • All hazardous substances must be stored in a properly bunded area to prevent any spillages from entering the surrounding environment. • Emergency response plans and spill contingency plans must be in place and include all fuels, chemicals or hazardous substances being handled. In the case of tenants, copies of these documents must be submitted to Namport. • Spill containment equipment such as booms and absorbents must be readily accessible. Training in the use of these are paramount. • Any hazardous substance spill on the site must be cleaned and disposed of to prevent it from entering the ocean either by wind or water runoff. • For any chemicals that may form part of effluent to be discharged into the ocean, environmental effects must be considered and alternative chemicals investigated if needed. • Effluent must meet standards as per the effluent discharge permits and Water Quality Guidelines. • Use of reputable and well trained contractors is essential.
Air Quality	• Ensure that personnel and contractors are made aware of the risks associated with the products and equipment so that they know the potential impact on them.

PLANNING AND DESIGN PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Report any incidents immediately. • Apply paving to the surface to avoid or minimise dust pollution. • Limit movement and number of vehicles and adhere to off road speed limit. • Ensure personnel wears correct PPE to prevent exposure to pollutants. • Building interiors and surfaces should be cleaned regularly. Strict adherence to housekeeping practices will help reduce dust levels. • Air quality in Walvis Bay or receptors on any part of the transport route and at receptors may not increase above 0.0003 mg/m3. • Restrict operation in wind conditions above 40km/h wind speed. • Once dust plumes that cannot be contained becomes visible, all operations must cease with immediate effect and only restart once sufficient mitigation measures have been implemented or when the cause of dust subsides. • Preventative and corrective maintenance should be done on equipment and machinery. • Dust suppression infrastructure should be in good working order.
Fauna and Flora	• Report any extraordinary fauna sightings to the Ministry of Environment, Forestry and Tourism and / or Ministry of Fisheries and Marine Resources. • Ensure waste cannot be blown away by wind. • The establishment of habitats and of roosting and nesting sites for birds in the port area must be prevented where possible. • To prevent bird collisions with structures at night, all lights used at the site should be directed downwards to the working surfaces and only be switched on when and where necessary.
Existing Service Infrastructure	• Ensure professional design and construction of service infrastructure from qualified and registered engineers. • Ensure consultation and compliance with relevant authorities responsible for services, such as the Municipality and Erongo Red. • Properly documenting all construction activities undertaken in the port through ‘as-built’ drawings and associated documents. • The contractor must determine exactly where services amenities and pipelines are situated before construction / maintenance commences (utility clearance e.g. ground penetrating radar surveys). • Designs and building materials should be as such to reduce dependency on artificial heating and cooling in order to limit the overall energy demand.

PLANNING AND DESIGN PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Water saving mechanisms should be incorporated within the proposed development's design and plans in order to further reduce water demands. • Train employees on the importance of water and energy savings. • Adhere to water quality guidelines in terms of The Water Act, 1956. • Promptly detect and repair water pipe and tank leaks. • Users to conserve water e.g. by avoiding unnecessary toilet flushing. • Ensure taps are not running when not in use. • Install water conserving taps that turn-off automatically when water is not being used. • Switch off electrical equipment, appliances and lights when not being used. • Install occupation sensing lighting at various locations such as storage areas which are not in use all the time. • Install energy saving fluorescent tubes at all lighting points within the facility instead of bulbs which consume higher electric energy. • Monitor energy use during the operation of the project and set targets for efficient energy use. • Conduct regular inspections for drainage pipe blockages or damages and fix appropriately. • Ensure regular monitoring of the sewage discharged from the project to ensure that the stipulated sewage/effluent discharge rules and standards are not violated.
Traffic	• Confirm acceptable transport route with the Municipality Traffic Department, and adhere to it. • Ensure all relevant approvals for access from and onto the B2 Road, are obtained from the Roads Authority. • Ensure drivers overnighting in Walvis Bay have proper facilities to do so. • Drivers to comply to local traffic rules. • Ensure drivers are endorsed to operate trucks and vehicles, with hazardous substances. • Ensure that road junctions have good sightlines. • Adhere to the speed limit. • Implement traffic control measures where necessary. • In cooperation with the relevant authority, erect clear signage regarding restricted areas and roads, access and exit points to the port, speed limits, traffic rules, rail level crossings, etc. • Trucks should not be allowed to obstruct any traffic or access points to any other businesses and facilities on the routes through Walvis Bay.

PLANNING AND DESIGN PHASE IMPACTS	
Impact	**Mitigation Measures**
	• If any extraordinary traffic impacts are expected, traffic management should be performed in conjunction with the local traffic department. • Should hazardous cargo be transported, cognisance should be taken of Namport's operating procedures for Handling and Storage of Dangerous Cargo. This will involve planning of the route as well as arrangements with the Municipality and the Ministry of Safety and Security.

Table 9: Proposed mitigation measures for the construction phase

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
Fauna and flora	• Report any extraordinary fauna sightings to the Ministry of Environment, Forestry and Tourism and / or Ministry of Fisheries and Marine Resources. • Ensure waste cannot be blown away by wind. • The establishment of habitats and of roosting and nesting sites for birds in the port area must be prevented where possible. • To prevent bird collisions with structures at night, all lights used at the site should be directed downwards to the working surfaces and only be switched on when and where necessary.
Pressure on existing infrastructure	• Educate workforce on water saving measures. • Ensure all potable water points are metered and regularly read. • Promptly detect and repair of water pipe and tank leaks. • Ensure taps are not running when not in use. • Ensure proper recycling of water from other uses for sprinkling dusty pavements. • Ensure that the workforce is provided with temporary toilets during the construction phase. • Ensure electrical equipment, appliances and lights are switched off when not being used. • Install energy saving fluorescent tubes at all lighting points instead of bulbs which consume higher electric energy. • Conduct a baseline crack survey to address the potential of cracks in the surrounding structures due to vibrations from roller compactors.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
Surface and Ground Water	• It is recommended that construction takes place outside of the rainy season in order to limit flooding on site and to limit the risk of ground and surface water pollution. • No dumping of waste products of any kind in or in close proximity to water bodies. • Heavy construction vehicles should be kept out of any surface water bodies and the movement of construction vehicles should be limited where possible to the existing roads and tracks. • Ensure that oil/ fuel spillages from construction vehicles and machinery are minimised and that where these occur, that they are appropriately dealt with. • Drip trays must be placed underneath construction vehicles when not in use to contain all oil spillages that might be leaking from these vehicles. • Contaminated runoff from the construction sites should be prevented from entering the surface and ground water bodies. • All materials on the construction site should be properly stored. • Disposal of waste from the site should be properly managed and taken to the Walvis Bay landfill site. • Construction workers should be given ablution facilities at the construction site that are located at least 30 m away from any surface water and these should be regularly serviced. • Washing of personnel or any equipment should not be allowed on site. Should it be necessary to wash construction equipment this should be done at an area properly suited and prepared to receive and contain contaminated waters.
Health, Safety and Security	• Construction personnel should not overnight at the site, except for security personnel. • Ensure that all construction personnel are properly trained depending on the nature of their work. • Provide for a first aid kit and properly trained personnel to apply first aid when necessary. • Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc. should be made available and construction personnel must be trained to use the equipment. • Implement all necessary measures to ensure health and safety of workers and the general public during operation. • Firefighting equipment such as fire extinguishers should be provided at strategic locations such as stores and construction areas.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Regular inspection and servicing of the equipment must be undertaken by a reputable service provider and records of such inspections maintained. • Fire escape routes and assembly point to be marked. • A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases and Covid-19. • Provide free condoms in the workplace throughout the construction phase. • Facilitate access to Antiretroviral medication for construction personnel. • Conform to the stipulated protocols related to Covid-19. • Restrict unauthorised access to the site and implement access control measures. • Clearly demarcate the construction site boundaries along with signage of no unauthorised access. • Clearly demarcate dangerous areas and no go areas on site. • Signs such as "NO SMOKING" must be prominently displayed within the premises, especially in parts where inflammable materials are stored. • Staff and visitors to the site must be fully aware of all health and safety measures and emergency procedures. • The contractor/s must comply with all applicable occupational health and safety requirements. The workforce should be provided with all necessary Personal Protective Equipment where appropriate.
Air quality	• All loose material should be kept on site for the shortest possible time. • It is recommended that dust suppressants such as Dustex be applied to all the construction clearing activities to minimise dust. • Construction vehicles to only use designated roads. • During high wind conditions the contractor must make the decision to cease works until the wind has calmed down. • Vehicle idling time shall be minimised. • Alternatively fuelled construction equipment shall be used where feasible equipment shall be properly tuned and maintained. • Sensitise truck drivers to avoid unnecessary running of vehicle engines at loading/offloading points and parking areas, and to switch off or keep vehicle engines at these points. • Cover any stockpiles with plastic to minimise windblown dust.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Ensure construction vehicles are well maintained to prevent excessive emission of smoke.
Noise	• No amplified music should be allowed on site. • Inform neighbouring communities and companies of construction activities to commence and provide for continuous communication between them and contractor. • Sensitise construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used. • Sensitise construction drivers to avoid unnecessary running of vehicle engines or hooting especially when passing through sensitive areas such as residential areas. • Ensure that construction machinery is kept in good condition to reduce noise generation. • Ensure that all generators and heavy duty equipment are insulated or placed in enclosures to minimize ambient noise levels. • Limit construction times to acceptable daylight hours. • Install technology such as silencers on construction machinery. • Do not allow the use of horns/hooters as a general communication tool, but use it only where necessary as a safety measure. • Provide protective equipment such as ear muffs, masks and ear plugs to workers.
Traffic	• Limit and control the number of access points to the site. • Ensure that road junctions have good sightlines. • Construction vehicles need to be in a road worthy condition and maintained throughout the construction phase. • Transport the materials in the least amount of trips as possible. • Adhere to the speed limit. • Implement traffic control measures where necessary, especially from and into the B2 National Road. • Minimise the movement of heavy vehicles during peak time.
Waste Management	• It is recommended that waste from the temporary toilets be disposed of at the Walvis Bay Wastewater Treatment Works, on a regular basis. • A sufficient number of waste bins should be placed around the site for the soft refuse. • A sufficient number of skip containers for the heavy waste and rubble should be provided for around the site. • The waste containers should be able to be closed to prevent birds and other animals from scavenging.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Adopt the waste management hierarchy i.e. prevention, minimisation, reuse, recycling, energy recovery, and lastly disposal. • If disposal is the only option, it should take place at a designated landfill in Walvis Bay. • Ensure accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed, rather than cutting them to size, or having large quantities of residual materials. • Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of. • Ensure that damaged or wasted construction materials including pipes, doors, plumbing and lighting fixtures, marbles will be recovered for refurbishing and use in other projects. • Donate recyclable/reusable or residual materials to local community groups, institutions. • Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time. • Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements. • Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste.
Hazardous Substances	• All chemicals and other hazardous substances must be stored and maintained in accordance with the Hazardous Substances Ordinance (No. 14 of 1974), with all relevant licences and permits to be obtained where applicable. • Given the potential harm to human health during handling and use of any of hazardous substances it is essential that all staff be trained with regards to the proper handling of these substances as well as First Aid in the case of spillage or intoxication. • Storage areas for all substances should be bunded and capable to hold 120% of the total volume of a given substance stored on site.
Social	• Ensure locals enjoy priority in terms of job opportunities, to the extent possible, for skills that are available locally. • Ensure local procurement where commodities are available locally.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
Archaeological	• Prevent damage to any archaeologically significant sites in the construction area. • In the event of a chance find, please implement the following Archaeological Chance Finds Procedure: **Action by person (operator) identifying archaeological or heritage material:** a) If operating machinery or equipment: **stop work** b) Identify the site with flag tape c) Determine GPS position if possible d) Report findings to foreman **Action by foreman:** a) Report findings, site location and actions taken to superintendent b) Cease any works in immediate vicinity **Action by superintendent:** a) Visit site and determine whether work can proceed without damage to findings b) Determine and mark exclusion boundary c) Site location and details to be added to AH GIS for field confirmation by archaeologist **Action by archaeologist:** a) Inspect site and confirm addition to AH GIS b) Advise NHC and request written permission to remove findings from work area c) Recovery, packaging and labelling of findings for transfer to National Museum **In the event of discovering human remains:** a) Actions as above b) Field inspection by archaeologist to confirm that remains are human c) Advise and liaise with NHC and Police d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.

Table 10: Proposed mitigation measures for the operational phase

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
Environmental monitoring and Evaluation	• An Environmental Practitioner should monitor the implementation of the EMP, and recommend any changes to this document when necessary. • The Environmental Practitioner should inspect the site on a regular basis (preferably monthly or bi-monthly). • Biannual reports are to be submitted to the Environmental Commissioner.
Visual and Sense of Place	• It is recommended that more 'green' technologies be implemented within the architectural designs and building materials of the development where possible in order to minimise the visual prominence of such a development within the more natural surrounding landscape. • Natural colours and building materials such as wood and stone should be incorporated as well as the use of indigenous vegetation in order to beautify the development. • Visual pollutants can further be prevented through mitigations (i.e. keep structures unpainted and minimising large advertising billboards).
Noise	• Follow Labour Act Regulations - Noise Regulations (Regulation 197), and / or WHO guidelines on maximum noise levels (Guidelines for Community Noise, 1999), to prevent hearing impairment for workers on site and a nuisance for nearby residential areas / neighbours. • Minimize or prevent noise producing activities and plan to restrict these to daytime as far as practically possible. • All machinery must be regularly serviced to ensure minimal noise production. • The use of low frequency white noise or flashing lights should be considered instead of audible high frequency warning signals for moving forklifts or trucks. • Erect temporary or permanent noise barriers / sound baffles, should the need arise. • Placement of noise producing equipment, e.g. compressors, in such a way that noise is directed away from receptors and / or are attenuated. • Where possible, use infrastructure to act as noise barriers to sensitive environments. • Hearing protectors as standard PPE for workers in situations with elevated noise levels.
Impact on human health	• Ensure familiarity with Namport's risk assessment guideline as contained in the document "Port of Walvis Bay – Quantitative Risk Assessment for Land Planning Related to Proposed Bulk Liquid Storage in the NAMPORT Area to Reduce Potential Impacts on Surrounding Populations in Walvis Bay".

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Ensure that personnel handling the product are made aware of the risk associated with it so that they know the potential impact on them. • Report any incidents immediately. • Implement all necessary measures to ensure health and safety of the workers and the general public during operation of the project as stipulated in the relevant legislation, Namport and company policies. • Train all workers in fire safety procedures. • Install Emergency Shut Down (ESD) at strategic point of the LPG plant. • Ensure regular monitoring of LPG tanks, install leakage detectors. • Enlist the services of registered oil waste handlers to manage oil waste. • Ensure the general safety and security at all times by providing day and night security guards • Provide adequate lighting within and around the premises. • Promptly detect and repair tank leaks. • Use dust suppressant technologies to manage dispersal and pollution. • Ensure personnel wears correct PPE to prevent exposure to particulate matters. • Once dust plumes that cannot be contained becomes visible, all operations must cease with immediate effect and only restart once sufficient mitigation measures have been implemented or when the cause of dust subsides. Operational processes include activities such as handling and loading / offloading of product on site, transport through town, offloading in the port, etc.
Waste management	• The area will be kept free of waste, except in designated waste storage areas. • Any wastes distributed by winds will be regularly cleaned up. • A sufficient number of waste bins should be placed around the site for the soft refuse. • A sufficient number of skip containers for the heavy waste should be provided for around the site. • Categorise waste into various types such as hazardous, general and recyclable. • Hazardous waste to be disposed of at the appropriate facilities of the Walvis Bay Municipality. • Adopt the waste management hierarchy i.e. prevention, minimisation, reuse, recycling, energy recovery, and lastly disposal. • If disposal is the only option it should take place at a designated landfill in Walvis Bay.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
Social	• The proponent must employ local Namibians where possible. • If the skills exist locally, employees must first be sourced from the town, then the region and then nationally. • Deviations from this practice must be justified. • Procurement should be done locally, then regionally, and nationally in that order where goods and services are available.

10. DECOMMISSIONING

It is not envisaged to decommission the facility in the immediate future. However, should this be considered at the end of its useful life, the development will be dismantled so as to restore the area to *ante operam* conditions. A full decommissioning plan should be developed within the first 24 months of operation.

11. CONCLUSION AND RECOMMENDATIONS

11.1. Planning and Design Phase Impacts

During the planning and design phase the impacts of air quality, fauna and flora, and traffic were assessed to have a long-term negative effect without mitigation. The impacts will however be significantly reduced when the recommended mitigation measures in the scoping report and environmental management plan (EMP) are implemented. The impacts on the land use was deemed to be high positive.

11.2. Construction Phase Impacts

With reference to **Table 9**, most of the construction phase impacts were deemed to have a negative impact without mitigation. However, these were mostly short-term and can be significantly reduced with the mitigation measures proposed.

11.3. Level of Confidence in Assessment

With reference to the information available at this stage, the confidence in the environmental assessment undertaken is regarded as being acceptable for decision-making in terms of the environmental impacts and risks. The Environmental Assessment Practitioner believes that the information contained within this ESR is adequate to allow MEFT: DEA to determine the environmental viability of the proposed project.

It is acknowledged that the project details may evolve during the detailed design and construction phases. However, these are unlikely to change the overall environmental acceptability of the proposed project and any significant deviation from what was assessed in this ESR should be subject to further assessment. If this was to occur, an amendment to the Environmental Authorisation may be required in which case the prescribed process would be followed.

11.4. Mitigation Measures

With the implementation of the recommended mitigation measures in this report as well as in the EMP, the significance of the planning and design, construction and operational phase impacts is likely to be reduced to a ***Low (negative)***. It is further extremely important to include an Environmental Control Officer (ECO) on site during the construction phase of the proposed

project to ensure that all the mitigation measures discussed in this report and the EMP are enforced.

It is strongly advised that the proponent appoint suitably qualified professionals to design and supervise the construction of the services and other infrastructure. It is also advised to develop and implement a preventative maintenance plan, which shall be monitored and evaluated regularly.

It is noted that where appropriate, these mitigation measures and any others identified by the EC could be enforced as Conditions of Approval in the Environmental Authorisation.

11.5. Opinion with respect to the Environmental Authorisation

Regulation 15(j) of the EMA, requires *that the EAP include an opinion as to whether the listed activity must be authorised and if the opinion is that it must be authorised, any condition that must be made in respect of that authorisation*.

The project, including the construction and operation of the LPG/LNG tanks and associated infrastructure is anticipated to provide sufficient stock of the product to augment the market-demand for the importation and landing of LPG/LNG for distribution and consumption in Namibia and further distribution to other countries in Southern Africa. The potential adverse impacts associated with the proposed project are possible to mitigate successfully. The impacts before implementation of mitigation measures are assessed as very low to medium low and the ratings are expected to improve further with the implementation of the proposed mitigation measures to low (negative).

The facility will be designed, constructed and operated according to the latest industry norms and standards. Programs and plans developed and implemented through the EMP will be monitored and audited to ensure compliance. The benefits associated with putting up the project will include: Employment creation, individual investments, improved trade between the developer and entire partners, gains in local and national economy, available and affordable gas.

Based on the evidence produced during the assessment process, it is very unlikely that this project will have any significant negative impacts on the environment. It is therefore recommended that a clearance certificate be issued for the project.

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