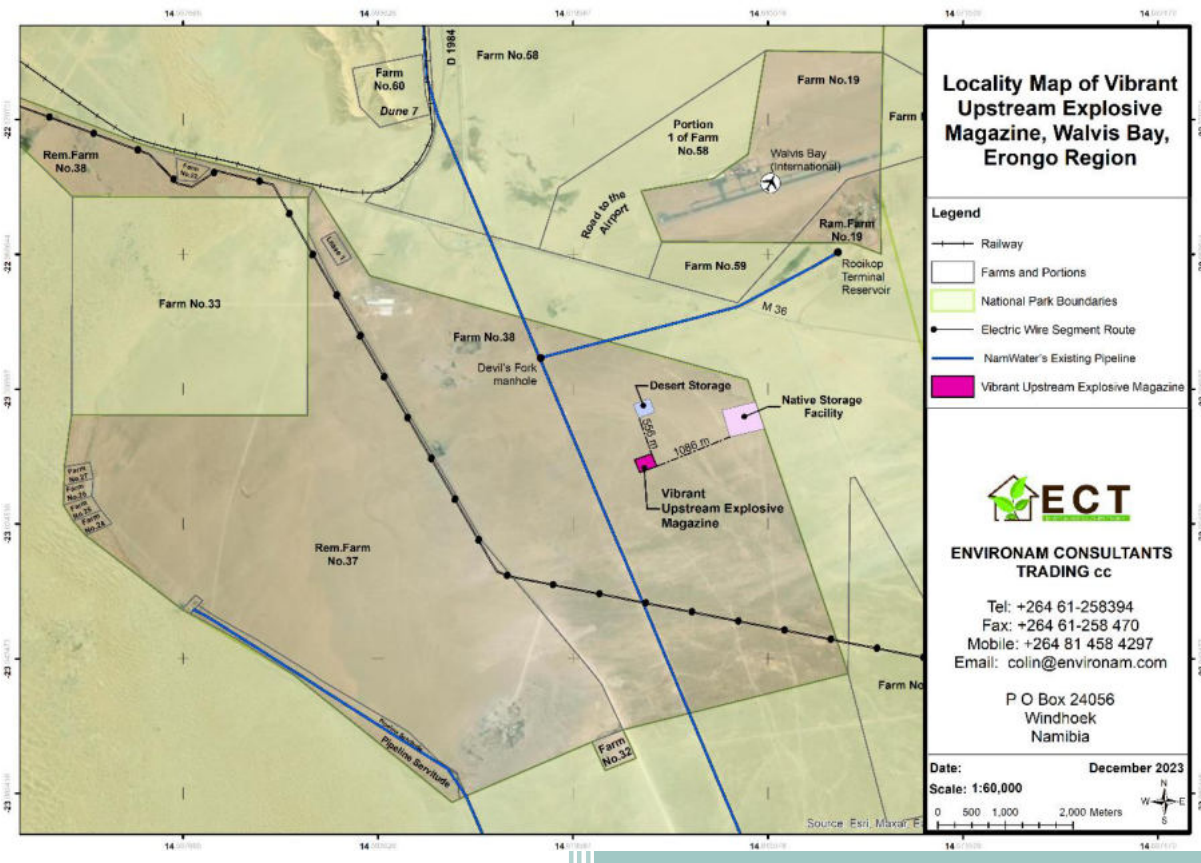
ENVIRONMENTAL SCOPING REPORT: Proposed Construction of a Dangerous Goods Storage Facility on Lease No.22 Over Farm No. 38, Walvis Bay, Erongo Region



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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
EA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
FESR	Final Environmental Scoping Report
ESR	Environmental Scoping Report

GTZ	Gesellschaft für Technische Zusammenarbeit
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

VUS (Vibrant Upstream Services Pty Ltd) is a wholly owned Namibian company that specializes in oil and gas infrastructure development. It provides support services for the Upstream Oil and Gas industry. The company is also committed to developing the capacity of Namibian businesses and individuals throughout its operations in order to enhance local content.

VUS aims to fill the gaps in the local industry and ensure their clients receive world class services by partnering with international market leaders in dangerous goods storage facilities, oil and gas services, and enhancing Namibian and African competence.

As part of its upstream oil and gas service offering, VUS provides:

- The storage and warehousing of goods;
- Licenses and permits for oilfield service companies and dangerous goods storage companies;
- Maritime services;
- Customs clearance and logistics;
- Providing tubular services, fabrications, and engineering,
- The provision of manpower, training, and development.

Walvis Bay is becoming the centre for Namibian dangerous goods storage, so many resources, especially financial, will be channelled to Walvis Bay in order to bolster the industry. For the swift and efficient service of their clients, VUS has identified the need to set up operations in Walvis Bay. Hence, they have applied to the Municipality of Walvis Bay for access to land for the construction of storage and handling facilities for dangerous goods. Explosives and radioactive materials used in the oil and gas sector make up most of the dangerous goods.

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 EA Regulations) of the Environmental Management Act (No 7 of 2007) (herein referred to as the EMA). The EA 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 EA 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 on a Lease No.22 Over Farm No. 38, Walvis Bay in Erongo Region. The site is found to the south-western side of Native Storage Facility and south-east of Desert Storage. It is found on centre coordinates -23.016773°, 14.628614°. See Figures 1 and 2 below for the locality maps of Walvis Bay and the development site.

Figure 1: Locality map of Walvis Bay

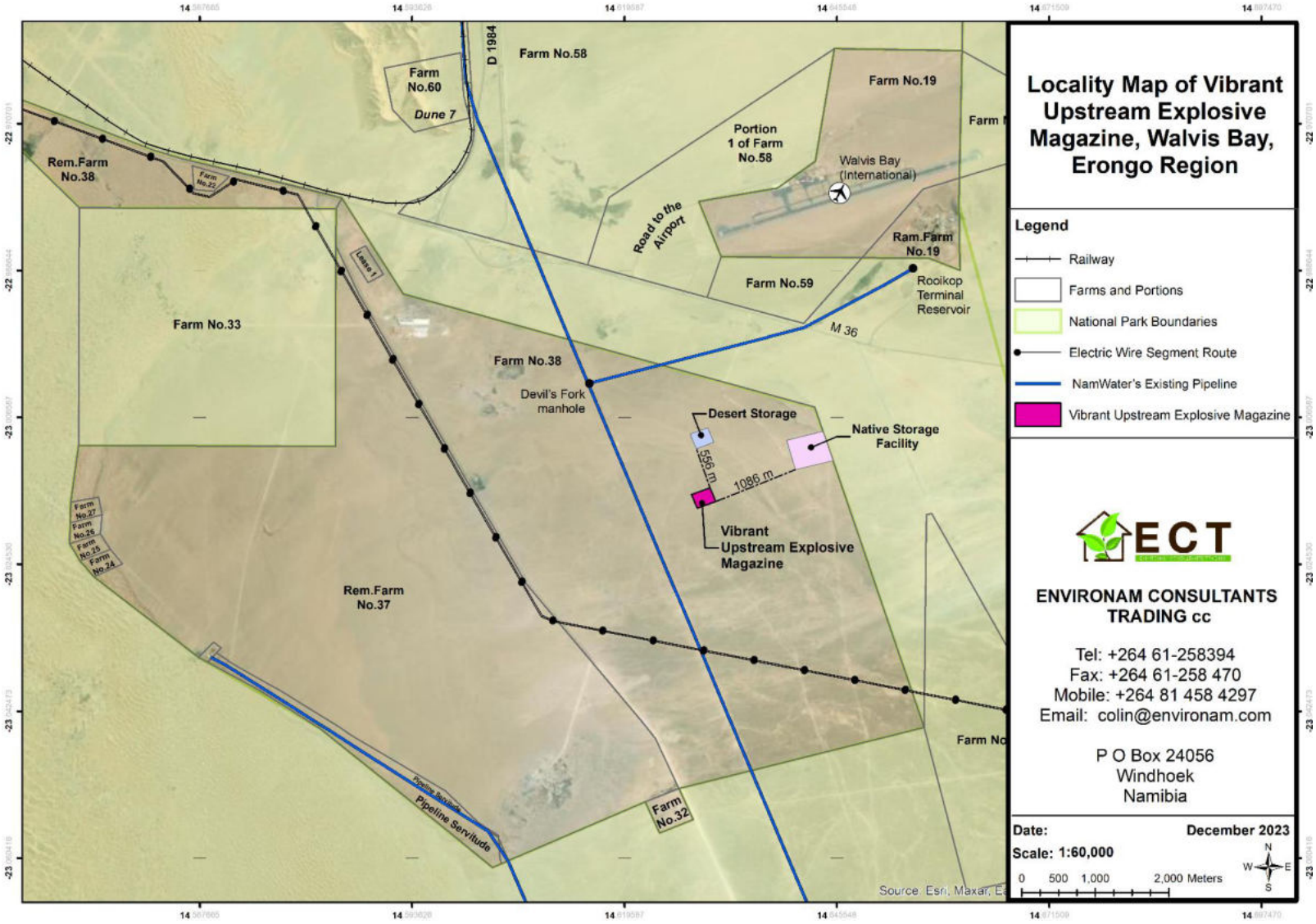

Figure 2: Locality map of the proposed development

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 Construction of a Dangerous Goods Storage Facility on Lease No.22 Over Farm No. 38, 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 EA 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.
EA Regulations GN 28, 29, and 30 of EMA (2012)	GN 29 Identifies and lists certain activities that cannot be undertaken without an environmental clearance certificate. GN 30 provides the regulations governing the environmental assessment (EA) process.	**Activity 9.1** The manufacturing, storage, handling or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974; **Activity 9.2** Any process or activity which requires a permit, licence or other form of authorisation, or the modification of or changes to existing facilities for any process or activity which requires an amendment of an existing permit, licence or authorisation or which requires a new permit, licence or authorisation in terms of a law governing the generation or release of emissions, pollution, effluent or waste.
Explosives Act 1956 (Act 26 of 1956) and the Explosives Regulations, 1972 (GNR1604 of 8 September 1972)	Regulation 7.2.2 of the Regulations and Sections 22 and 30(1) of the Act stipulates that no explosives magazine may be constructed without approval of the plans by the Chief Inspector of Explosives.	Relevant plans must be submitted and approved before construction.
Atomic Energy & Radiation Act 5 of 2005	Sections 16, 18 and 19 deal with the licencing and registration of persons involved in storage of radiation sources.	The development should adhere to this legislation.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
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 EAs and compiling EMPs (2008)	Part 1, Stage 8 of the guidelines states that if a proposal is likely to affect people, certain guidelines should be considered by the proponent in the scoping process.	The EA process should incorporate the aspects outlined in the guidelines.
Namibia Vision 2030	Vision 2030 states that the solitude, silence and natural beauty that many areas in Namibia provide are becoming sought after commodities and must be regarded as valuable natural assets.	Care should be taken that the development does not lead to the degradation of the natural beauty of the area.
Water Resources Management Act 11 of 2013.	A permit application in terms of Sections 72(1) of the Water Act is required for the disposal of industrial or domestic waste water and effluent.	The pollution of water resources should be avoided during construction and operation of the development.
The Ministry of Environment, Forestry and Tourism (MEFT) Policy on HIV & AIDS	MEFT has developed a policy on HIV and AIDS. In addition, it has also initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments.	The proponent and its contractor/s have to adhere to the guidelines provided to manage the aspects of HIV/AIDS. Experience with construction projects has shown that a significant risk is created when construction workers interact with local communities.
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 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 and Environmental Health Act of 2015	The Act serves to protect the public from nuisance and states that person may not cause a health nuisance or may not permit to exist on a land or premises owned or occupied by him or her, or of which he or she is in charge, a health	The construction of infrastructure will take place across publicly accessible premises. The proponent should ensure that the site is off limits from public during construction to avoid incidences.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
	nuisance or other condition liable to be injurious or dangerous to health.	
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.
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 falls in the local authority area of Walvis Bay and has to conform to the Walvis Bay Town Planning Scheme.

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

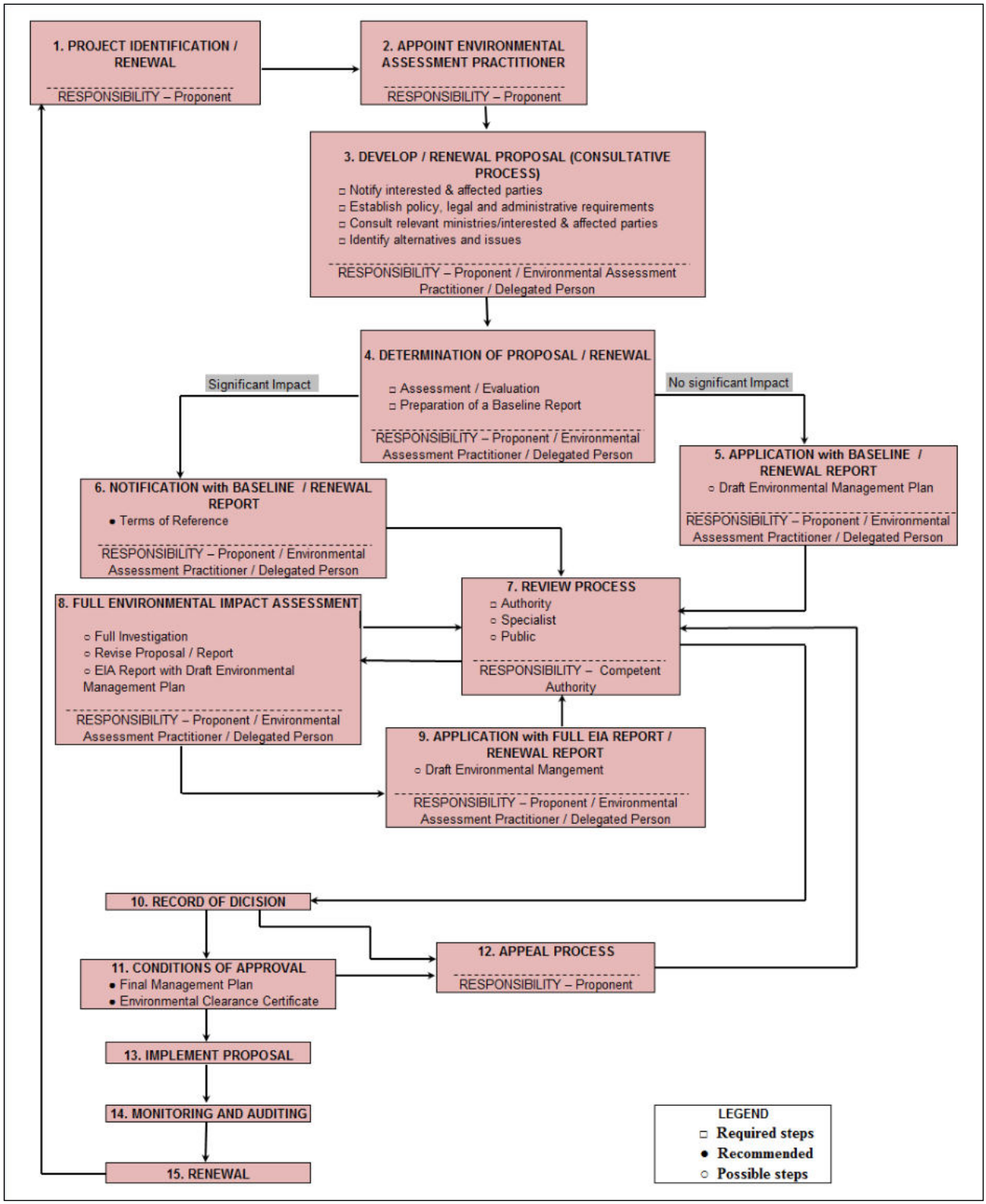

Figure 3: EA Flowchart for Namibia (Environmental Assessment Policy of 1995)

3. ENVIRONMENTAL BASELINE DESCRIPTION

3.1. Social Environment

3.1.1. Socio-Economic Context

The statistics shown in Table 3 below are derived from the 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, 2024). See Figure 4 for an average temperature graph and Figure 5 for an average rainfall data for Walvis Bay.

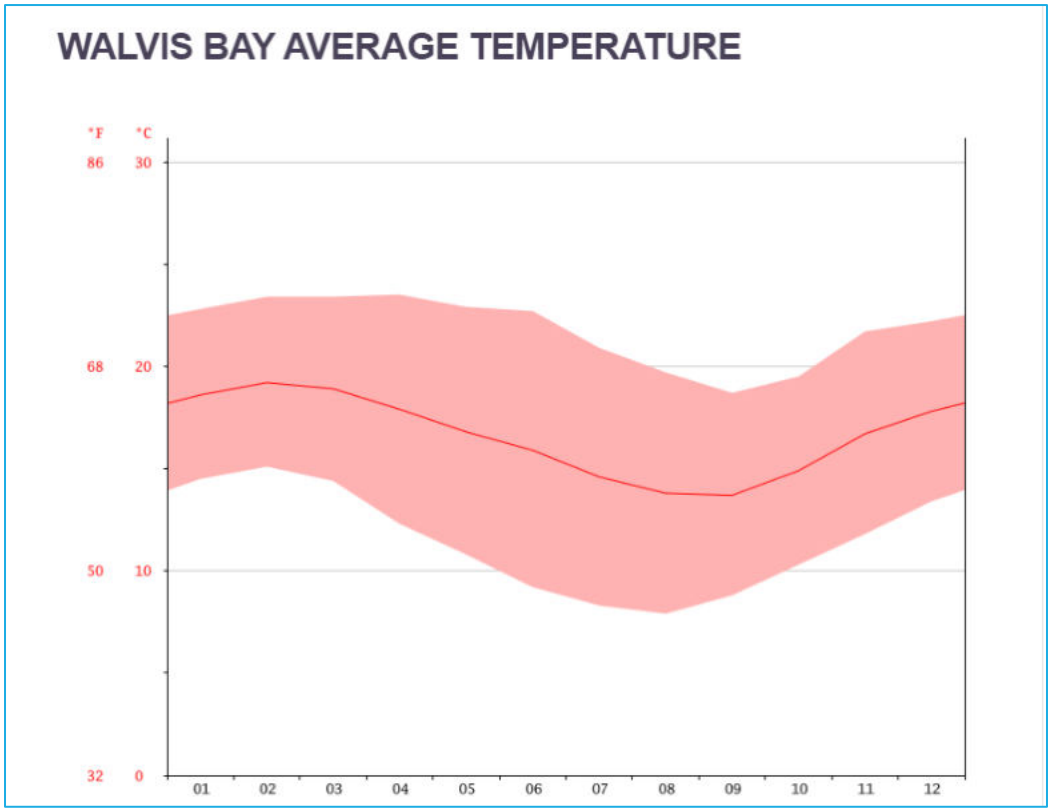

Figure 4: Average temperature graph for Walvis Bay (Climate-data, 2024a)

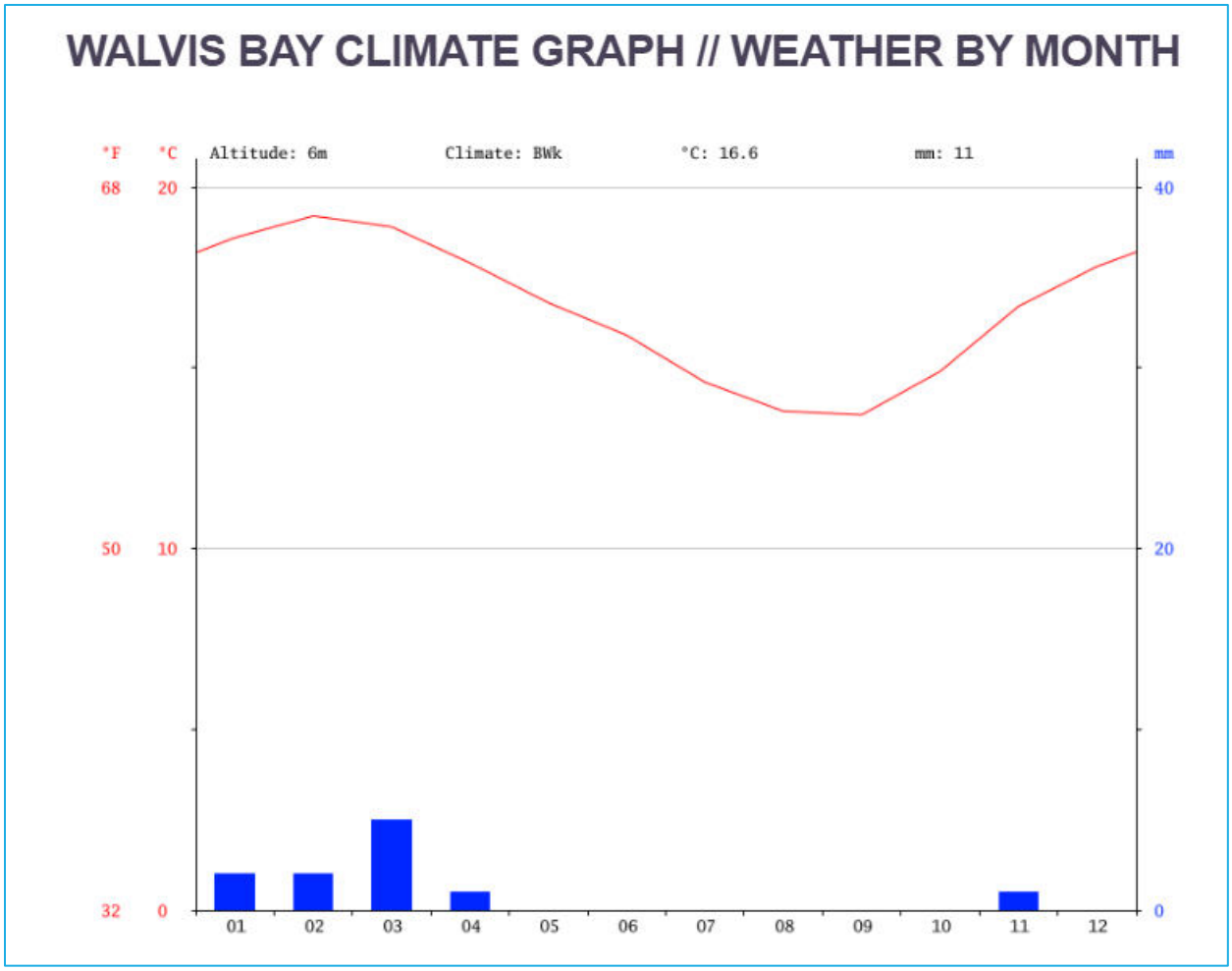

Figure 5: Average monthly rainfall graph for Walvis Bay (Climate-data, 2024b)

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 reaches 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 helps to bind the soil rendering it less vulnerable to wind erosion, they do this by forming a "carpet" on the surface pavement of small stones and gravel, or by creating a surface crust on the soil (Nacoma, 2010). No dense vegetation could be found on the proposed site, which is bare for the most part. However, sporadic occurrences of the common coastal shrub species, *Arthraerua leubnitziae* and *commiphora Saxicola* can be found on site.

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. Figure 6 below provides a view of the general area and surrounds of the proposed development site.

Figure 6: General area of the proposed development site

3.3. Surrounding Land Use

The proposed site is mostly surrounded by undeveloped land that is earmarked for further Industrial developments that is also linked to the handling and storage of dangerous goods, as some conditional allocations have been done by the municipality. The existing and operational Native Storage Facility can be found to the north-east, while on the northern direction and allocation has been done to Desert Storage, which is currently undeveloped. Other activities and infrastructure in the vicinity include Erongo Quarry and Civil Works with Namwater pipeline and linear electricity lines running south and west of the site. The Municipality of Walvis Bay has identified and designated a Portion of Farm 38 specifically for the storage and handling of dangerous goods. Lease No.22 Over Farm No. 38 fall within this portion.

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 consists of water supply, sewage and drainage systems, solid waste management and landscaping.

There is a consideration to extend bulk water services to the site from the existing Namwater pipeline found in the development area, although technical details have to be discussed with Namwater and the proponent's design team. The proponent intends to construct septic tanks to manage sewer and waste water generated from the activities of the development. Electricity will be provided to the site in consultation with the regional electricity distributor, ErongoRED.

4. PROJECT DESCRIPTION

4.1. Project Activities

The proposed development aims to provide access to land for the construction of storage and handling facilities for dangerous goods used in the oil and gas industry consisting mainly of explosives and radioactive materials.

4.1.1. Explosives

The use of explosives in Oil & Gas Exploration can be classified in two main categories:

- Wireline perforation
- Tubing Conveyed Perforating (TCP)

1. Wireline Perforation

- Wireline (or electric line) is the traditional way to run perforating guns.
- It provides the advantages of real-time depth control and selectivity along with reduced logistics.
- Pipe Recovery – When retrieving tubes used for production from the well, these tubes may become stuck during the process and will need to be cut.
- Will require explosives to create holes in the tube in order to cut the pipe / loosen the pipe.
- Wireline conveyed perforating has many advantages such as: Flexibility in choosing gun system. See figure 7 for the illustration of wireline perforation.

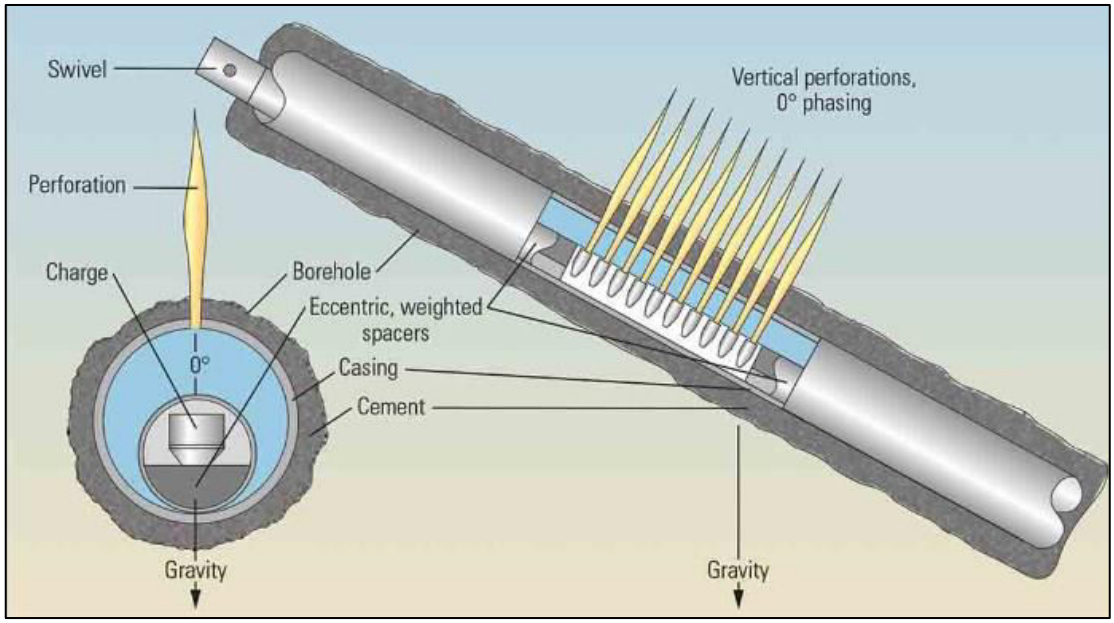

Figure 7: Wireline Perforation

2. Tubing Conveyed Perforating (TCP)

- TCP is the act of blasting holes through steel casing, cement and formation rock.
- Perforating guns carry explosive shaped charges downhole, where they are detonated to create tunnels that act as conduits through which reservoir fluids flow from the formation, into the wellbore and up to the surface.
- The long-term viability and profitability of most oil and gas assets depend on this activity. Figure 8 illustrates the workings of TCP.

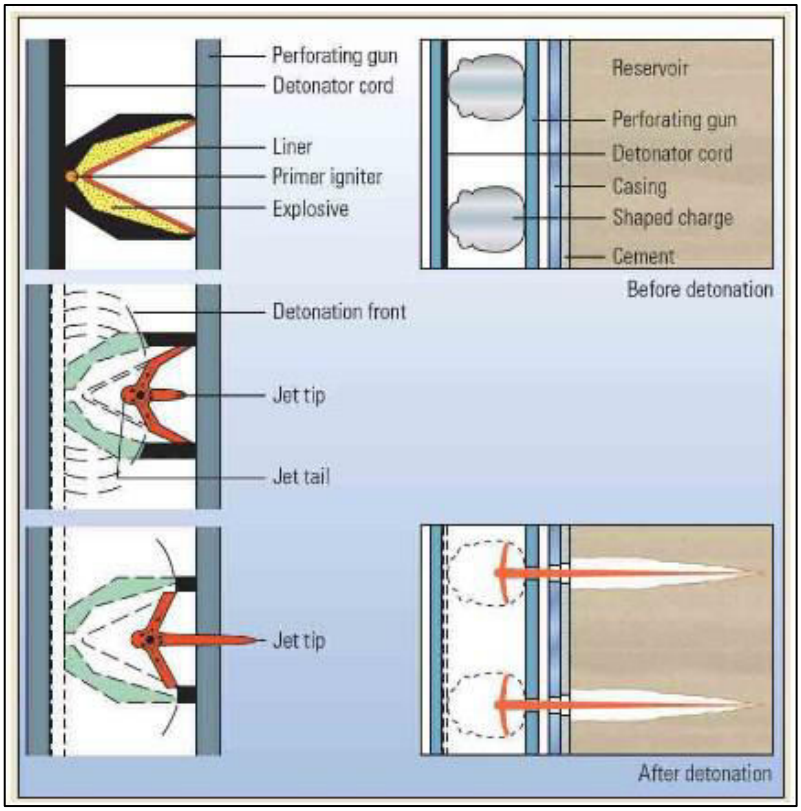

Figure 8: Tubing Conveyed Perforating (TCP)

Perforating Guns

- A perforating gun is metal tube fitted with explosives. It is inserted into the cased wellbore and the explosives are detonated to puncture the production reservoir.
- Its aim is to provide effective flow of material (oil/gas) between the cased wellbore and a production reservoir.
- Perforating guns come in variety of shapes and sizes.
- Casing guns (top) house large shaped charges and offer flexible phasing orientation and shot density options.
- Through-tubing guns (bottom) are designed to pass through tight restrictions while maximizing shaped charge size. See Figure 9 for illustration.

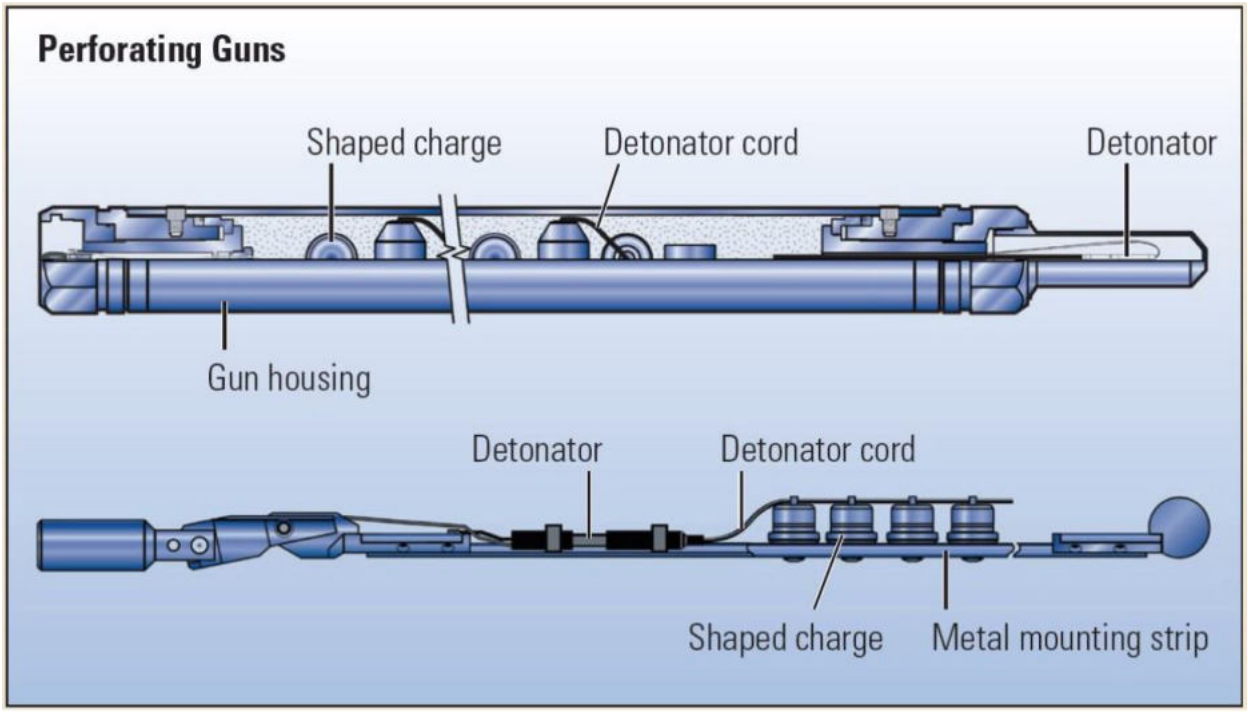

Figure 9: Perforating Guns

Bunker Capacity and Safety Distances

Bunkers are envisaged to be built on site. 3 bunkers will populate a compartmentalized area within the identified land which will be replicated 3 times resulting in a total of 9 bunkers (See Figure 11 below). Other facilities include:

- ✓ 1 Gun loading Facility which will populate a compartmentalized area within the identified land which will be replicated 3 times resulting in a total of 3 Gun Loading Facilities.
- ✓ Each compartmentalized area will consist of:
  - Explosive Magazine A - Capacity = 100 000 kg
  - Explosive Magazine B - Capacity = 100 00kg
  - Explosive Magazine C - Capacity = 50 000kg
  - Gun loading Facility – to be used for loading of guns. Capacity = 100 000kg
- ✓ Each magazine will be situated approximately 110m from one another in compliance with the furthest safety distances stipulated in the Regulations to the Explosives Act No. 26 of 1956.

4.1.2. Radiation Sources

The facilities will also make provision for the storage and handling of radioactive materials used in the oil and gas sector. A list of the sources is appended to this report as APPENDIX B. The categories and use of the radioactive sources is listed in Table 4 below, of which well logging gauges is the main use.

Table 4: Categories and use of the radioactive sources

Security Group	Source Category	Examples of practices
A	***1***	**Radioisotope thermoelectric generators (RTGs)** **Irradiators** **Teletherapy** **Uranium Oxide Concentrate** **Fixed multi-beam teletherapy (gamma knife)**
B	***2***	**Industrial radiography** **High/medium dose rate brachytherapy**
	3	**Fixed industrial gauges (e.g. level, dredger, conveyor)** **Well logging gauges**
C	***4***	**Low dose rate brachytherapy (except those below)** **Thickness/fill-level gauges** **Portable gauges (e.g. moisture/density)** **Bone densitometers** **Static eliminators**
D	***5***	**Low dose rate brachytherapy eye plaques and permanent implant sources** **X ray fluorescence devices** **Electron capture devices**

In exploration of mineral resources such as oil, gas, and coal, well logging provides fast and detailed data for subsurface and structural mapping of geological formations. Using radioactive material for the purpose of making physical measurements, a well log is produced that reveals the details of the geologic formations penetrated by a borehole. The log may be based either on visual inspection of samples brought to the surface (geological logs) or on physical measurements made by instruments lowered into the hole (geophysical logs). A well can be logged at any stage of its life cycle, including when it is being drilled, completed, produced, or abandoned. An oil and gas exploration well, a groundwater exploration well, a mineral exploration well or a geothermal exploration well may be logged (AERB, 2024) as part of the environmental and geotechnical studies conducted on the well.

The use of radioactive sources is particularly important in the oil and gas industry, where they are used for measuring and controlling the process of flow, level, density, and the sedimentation of oil and gas during drilling, production, refining, and petrochemical processes

Oil exploration involves the use of sealed radioactive sources and portable mini-neutron generators in well logging operations. For detection purposes, neutron-neutron logging is performed, neutron-gamma logging is performed, and Gamma-Gamma logging is performed. For this purpose, 137Cs, 60Co, 241Am, 241Am-Be, and 239PuBe are commonly used gamma and neutron sources (AERB, 2021).

The sources to be stored will include Americium (Am) 241/Beryllium (Be) a neutron radiation emitter and Cesium (Cs-137) that emits gamma and beta radiation. The activity levels for Cs-137 ranges from 55-74 GBq and the activity levels of Am241/Be ranges from 148-703 GBq. Cs-137 and Am/Be are sealed sources contained in metal capsules designed to prevent any dispersion of radioactive substances into the environment under normal conditions of use. These sources are normally used in conjunction with a test tools or measurement device in the oil and gas exploration for the measurements of density and moisture content. The activity of source depends on the specific tool to be used. The facility will only be used for the storage of radioactive sources.

The environment contains natural sources of radiation and radioactivity is a natural phenomenon. There are many beneficial uses for radiation and radioactive substances, including power generation, medicine, industry, and agriculture. Radiation risks posed by these applications to workers, the public, and the environment must be assessed and, if necessary, controlled (IAEA, 2020).

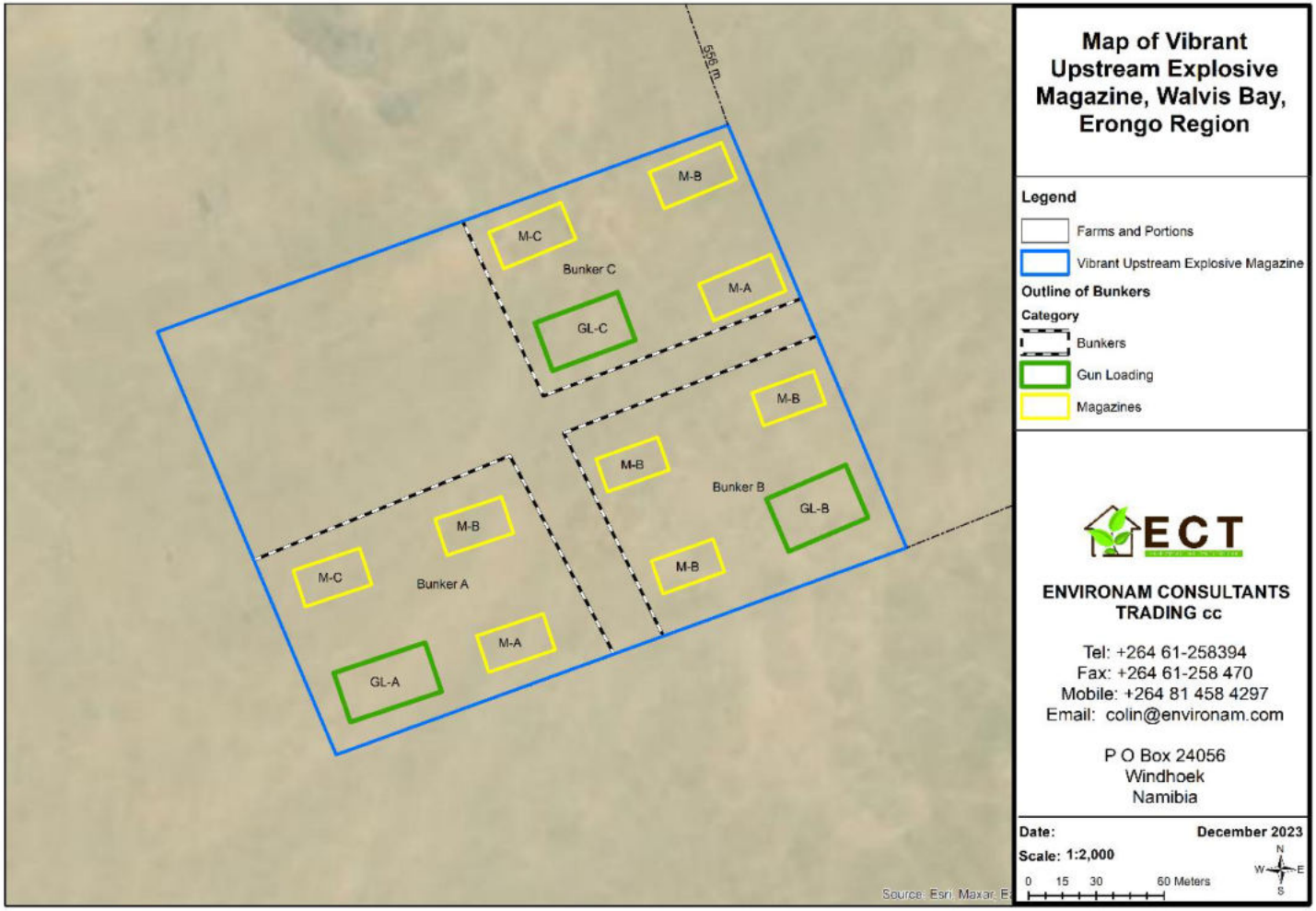

Figure 10: Outline of bunkers

4.2. Decision Factors

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

- Walvis Bay Town Planning Scheme.
- Character of the general area.
- Comparative advantage and strategic value of Walvis Bay as an investment location.

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 Walvis Bay as an investment destination of choice. The opportunities to provide these essential services will be lost to other coastal cities on the continent. In addition, no construction and 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 EA Regulations a call for public consultation with all I&APs during the EA process is required. This entails consultation with members of the public and providing them an opportunity to comment on the proposed project. The Public Consultation Process does not only incorporate the requirements of Namibia's legislation, but also takes account of national and international best practises. Please see Table 5 below for the activities undertaken as part of the statutory public participation process.

Table 5: Table of Public Consultation Activities

ACTIVITY	REMARKS
Placement of site notices/posters in Walvis Bay	See **Annexure A**
Placing advertisements in three newspapers for two consecutive weeks, namely Windhoek Observer, Namib Times and Confidente	See **Annexure B**
Written notice to Interested and Affected Parties via Email	See **Annexure D**
Public meeting in Walvis Bay	13/12/2023

In addition to the above statutory public consultation activities, a comprehensive engagement with relevant stakeholders and authorities formed part of the consultation process. To this effect a meeting was arranged on 10 October 2023 at the Blue Whale Hotel in Walvis Bay where Vibrant Upstream made a presentation to the audience on the following subjects:

- Introduction of Vibrant Upstream Services
- Locality Plan of the development

- Overview of Business Plan & Operations at site
- Use of Explosives in Oil & Gas Exploration
- Permits and registrations reuired
- Proposed outline of bunkers to be built; and
- The Health Safety and Environment Plan

The meeting was attended by:

- Members of the Namibian Police Force from the - Office of the Inspector-General
- Members of the Namibian Police Force - Office of the Regional Commander
- Members of the Namibian Police Force - Office Explosives Control Sub-Division in the Region
- Office of the President
- Members from the Namibian Defence Force
- Namibian Airport Company
- Municipality of Walvis Bay
- Vibrant Upstream Services (Pty) Ltd
- Environam Consultants Trading

The meeting culminated in a visit to the proposed development site at Farm 38, see Figure 11 for pictures of the site visit. A report on the meeting and attendance register are attached in Annexure D of this report. The general feeling of the Namibian Police was that they were pre-satisfied with the selected site.

Figure 11: Site visit

The comment period of the initial public participation process commenced on 30 November 2023 and ended on 20 December 2023. Minutes, comments and input 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 **07 August 2024** to submit comments or raise any issues or concerns they may have with regard to the proposed project.

6. ASSSESSMENT METHODOLGY

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

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

Table 6: Impact Assessment Criteria

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

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

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

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

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

7. MITIGATION HIERACHY

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

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

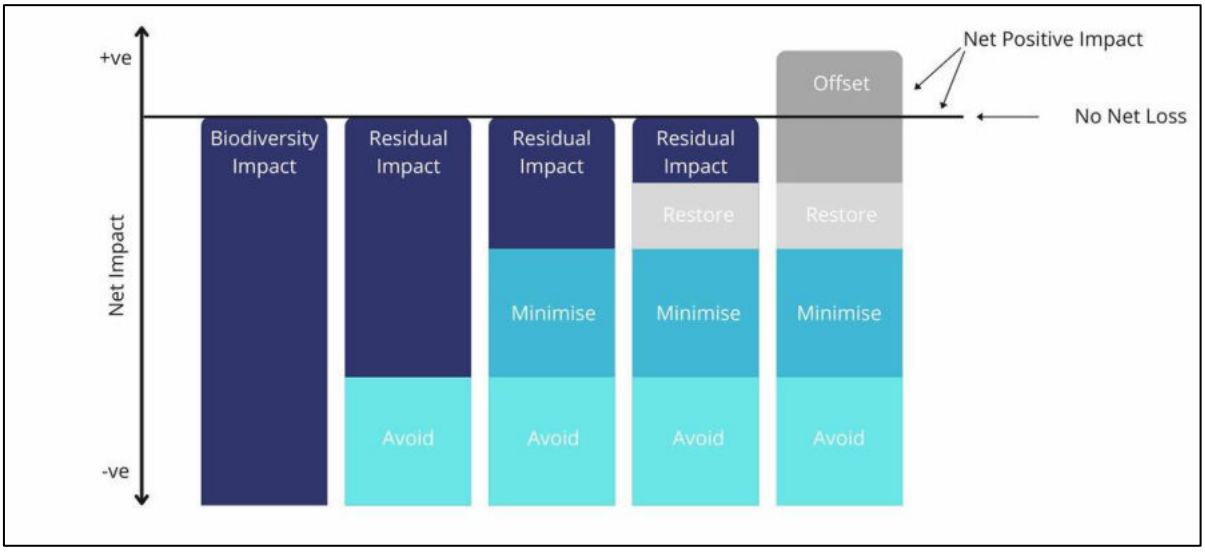

Figure 12: Mitigation Hierarchy

Sequential steps of the mitigation hierarchy

1. **Avoidance**: the first step of the mitigation hierarchy comprises measures taken to avoid creating impacts from the outset, such as careful spatial placement of infrastructure, or timing construction sensitively to avoid or disturbance. Examples include the placement of roads outside of rare habitats or key species' breeding grounds, or timing of seismic operations when aggregations of whales are not present. Avoidance is often the easiest, cheapest and most effective way of reducing potential negative impacts, but it requires biodiversity to be considered in the early stages of a project.

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

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

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

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

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

8. POTENTIAL IMPACTS

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

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

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

8.1.1. Planning and Design Phase Impacts

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

8.1.2. Surface and Groundwater

The proposed development site is located approximately 19 km from the shoreline of the Atlantic Ocean, this puts the surface and ground water resources in the area at risk of pollution. This is likely to happen in the absence of well designed and constructed storm water drainage infrastructure. 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.

8.1.3. Fauna and Flora

The general area is sparsely populated with flora, and not much vegetation visible. The existing vegetation is more characteristic and typical of a coastal environment, in particular the Kuntze's brownanthus bushes are found in the general area, but the proposed area is open with no vegetation visible. The proposed development areas and associated infrastructure would be relatively small and thus only have localised negative implications on the environment and

associated fauna and flora. The overall impact on the local fauna and flora and associated habitat would be relatively small. While no obvious large animals could be observed on the development site, it could be expected that the area may also support species of smaller vertebrates such as reptiles, amphibians, mammals and birds.

8.1.4. Existing Service Infrastructure

There is a consideration to extend bulk water services to the site from the existing Namwater pipeline found in the development area, although technical details have to be discussed with Namwater and the proponent's design team as there appear to be challenges with water pressure from the pipeline. The proponent intends to install septic tanks to manage sewer and waste water generated from the activities of the development.

Electricity will be provided to the site in consultation with the regional electricity distributor, ErongoRED. Access will initially be obtained from the C14 road towards the Walvis Bay International Airport then turn off southwards on the gravel road towards Native Storage Facility.

8.1.5. Safety distances

Safety distances are usually set to prevent explosions and can vary from tens of meters to hundreds of meters. Different types and quantities of explosives require different safety distances as far as explosives magazines are concerned. It's important to ensure compliance to relevant regulations and guidelines. Namibia is regulated in this regard by the Explosives Act 26 of 1956, which provides under 7.3.1 a Table of Distances that need to be followed, see Table 7 below. This table is in line with international best practise.

Table 7: Table of distances

Net explosives	25-kilogram cartons	To other magazines			To railways, roads, open sportsground, navigable water, or dwelling-house in same ownership as magazine and occupied by the owner or an employee			To other dwelling-houses or public buildings*		
Quantity kilograms	Number	Cat. X Mounded or unmounded	Cat. Y mounded or unmounded	Cat. Z or ZZ mounded	Cat. X mounded or unmounded	Cat. Y mounded or unmounded	Cat. Z or ZZ mounded	Cat. X mounded or unmounded	Cat. Y mounded or unmounded	Cat. Z or ZZ mounded
500	20	9	12	19	15	25	47	31	50	95
750	30	9	13	22	17	29	61	33	57	122
1 000	40	9	14	24	18	32	75	36	63	150
1 250	50	10	15	26	18	34	85	37	68	170
2 500	100	13	18	32	21	43	130	42	86	260
5 000	200	17	21	40	23	54	180	46	108	360
10 000	400	21	28	50	25	68	235	50	136	470
12 500	500	23	30	55	26	73	255	52	146	510
15000	600	24	33	58	27	78	270	54	156	540
20 000	800	25	37	65	28	85	300	55	170	600
25 000	1 000	26	40	70	29	90	320	57	180	640
30 000	1 200	27	45	75	30	100	345	60	200	690

Net explosives	25-kilogram cartons	To other magazines			To railways, roads, open sportsground, navigable water, or dwelling-house in same ownership as magazine and occupied by the owner or an employee			To other dwelling-houses or public buildings*		
Quantity kilograms	Number	Cat. X Mounded or unmounded	Cat. Y mounded or unmounded	Cat. Z or ZZ mounded	Cat. X mounded or unmounded	Cat. Y mounded or unmounded	Cat. Z or ZZ mounded	Cat. X mounded or unmounded	Cat. Y mounded or unmounded	Cat. Z or ZZ mounded
40 000	1 600	27	50	80	30	110	380	60	220	760
50 000	2 000	27	55	85	30	115	400	60	230	800
75 000	3 000	27	65	100	32	135	470	65	270	940
100 000	4 000	27	75	110	33	145	510	65	290	1 020
150 000	6 000	27	90	125	35	170	590	70	340	1 180
200 000	8 000	27	95	135	35	180	640	70	360	1 280

8.1.2.1.1 Traffic

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 by the workforce as well as delivery vehicles and clients. This will add additional pressure on the existing D1983 and C14 roads, if not well managed.

8.2. Construction Phase Impacts

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

8.2.1. 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.

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. 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. This risk is minimised by the fact that the construction period will be a short term activity.

8.2.4. Health, Safety and Security Impacts

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

8.2.5. Air Quality

During the construction phase fugitive dust and exhaust gases generated have a potential impact on the air quality of the area and its surroundings. Dust is a major component of air pollution and could negatively affect the health of nearby communities if not mitigated. Due to the proximity of the development site to the C14 Main Road as well as to the D1983, traffic on these roads is also at risk of being impacted by dust. These are however short-term impacts.

Dust is generated mainly from the following activities:

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

The project area is a safe distance away from the nearest and planned residential areas and other developments, and dust would therefore not interfere significantly on the community during the short-term construction phase.

8.2.6. Noise Impacts

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

8.2.7. 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. This will add additional pressure on the existing D1983 and C14 roads, if not well managed.

8.2.8. Solid Waste Management

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

8.2.9. 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.

8.2.10. Social Impacts

The project will result in long-term positive impacts as far as the social welfare of the affected community is concerned. There is potential of an influx of migrant workers into the town of Walvis Bay. This would boost the local economic development of the town as a result of an increase in consumers of goods, and spending power. The local community will benefit through preferential recruitment of local labour and procurement as far as possible.

8.3. Operational Phase Impacts

The operational phase impacts that have been identified are: environmental monitoring and evaluation; explosives legislation; noise; health, safety and security; waste management; transport; 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.

Several national and international bodies have developed guidelines and regulatory standards with respect to radioactive source management. The International Atomic Energy Agency (IAEA) has developed a comprehensive system of safety standards and guidelines for radiation protection, safety, and security of radioactive sources. IAEA has developed various codes and guidance documents in the areas of occupational radiation protection, radioactive waste management, and safety of transport of radioactive materials, and physical protection of radioactive sources. In addition to IAEA, several other international organizations, national government agencies, and competent authorities have developed regulatory and/or technical guidelines with regard to the beneficial management of radioactive sources.

Subject to the "Atomic Energy and Radiation Protection Act, Act of 2005 (hereto referred to as Act) and the Radiation Protection and Waste Disposal Regulations (2011) (hereto referred to as Regulations), the storage of radioactive sources requires authorization and licensing from the National Radiation Protection Authority (NRPA). A Radiation Management Plan (RMP) is a prerequisite document required as part of the licensing process. The Radiation Management Plan will be submitted together with the application for the Environmental Clearance Certificate to the Office of the Environmental Commissioner. The implementation of the Radiation Management Plan will have to be carried out by a competent person.

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 for delivery of goods, transportation of workforce, clients, 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 i.e. hooters.

Namibia has no environmental noise and impact guidelines, reference is made to guidelines published by the International Finance Corporation (IFC, 2007) (See Table 8 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 8: 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

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

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

8.3.3. Health, Safety and Security Impacts

The critical group likely for public exposure would be the personnel working at nearby warehouses within farm 38. The likely exposure pathway would be direct gamma exposure. The route to the storage facility on farm 38 does not include passing by a potential member of the public. Visitors/clients shall be provided with adequate information and control measures on the radiation exposure hazards and will be accompanied to at all times to the radiation storage bunker. All the administrative duties i.e. sign in will be done at the office complex, whilst the source is guarded at the storage site.

The sources to be stored will Americium (Am) 241/Beryllium (Be) a neutron radiation emitter and Cesium (Cs-137) that emits gamma and beta radiation. These sources used in well logging are classified as category 3 radioactive sources as per the IAEA categorisation of radioactive Sources. The security arrangements will consist of Detection, Delay and Response measures. A missing or stolen radioactive source constitute as a breach of security and can be a significant hazard if found by members of the public unaware of the radiation danger. It is imperative that anyone working with a radiation device be aware of the security implications.

- In case of a stolen radioactive source the following will be implemented:
- The Radiation Safety Officer (RSO) should also immediately report a loss or theft to the local police and the NRPA.
- The RSO to notify the client
- A national security event response will be initiated with the National emergency response team.

8.3.4. Waste Management

Waste generated is likely to include empty storage containers and packaging, general litter, by-products of any vehicle maintenance (including petroleum products, coolants, degreasing agents, sediment, rubber particles, detergents), and other hazardous materials. All waste should be disposed of in line with the national waste management directives. General and hazardous waste will be removed by the municipality or contractors and sorted at the municipal landfill site or hazardous waste site as necessary. The proponent should manage their waste in

close consultation with the Municipality of Walvis Bay, in line with their requirements. All radioactive sources when no longer in use, will be returned to the manufacturer or supplier for final disposal by the respective client.

8.3.5. Transport

Vibrant Upstream will not be transporting radioactive sources. Radioactive sources will be transported by the respective clients to the storage facility. Should a client require transporting, Vibrant Upstream will contract services of a licensed transporter.

8.3.6. Social Impact

The development 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 commence. The development will have a positive effect on increased port services.

8.3.7. 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 9**. The **Tables 10 – 13** provide a summary of the mitigation measures proposed for the impacts.

Table 9: 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. Fauna and flora	X				
3. Existing infrastructure	X				
4. Traffic		X			
Construction Phase					
5. Fauna and flora	X				
6. Pressure on existing infrastructure	X				
7. Surface and groundwater	X				
8. Health, safety and security	X				
9. Air quality	X				
10. Noise	X				
11. Traffic	X				
12. Waste management	X				
13. Hazardous substances	X				
14. Social	X				
Operational Phase					
15. Environmental monitoring and evaluation		X			

16. Noise		X			
17. Health, safety and security		X			
18. Waste Management		X			
19. Transport		X			
20. Social				X	
21. Visual	X				

Table 10: Proposed mitigation measures for the planning and design phase

PLANNING AND DESIGN PHASE IMPACTS	
Impact	**Mitigation Measures**
Fauna and Flora	• Adapt the proposed development to the local environment – e.g. small adjustments to the site layout to avoid potential features such as existing vegetation. • Plant local indigenous species of flora as part of the landscaping as these species would require less maintenance than exotic species. • Prevent the introduction of potentially invasive alien ornamental plant species such as; Lantana, Opuntia, Prosopis, Tecoma, etc. as part of the landscaping as these species could infestate the area further over time.
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, Erongo Red and Namwater. • 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. • Water saving mechanisms should be incorporated within the proposed development's design and plans in order to further reduce water demands. • Re-use of treated waste water should be considered wherever possible to reduce the consumption of potable water • Train employees on the importance of water and energy savings. • Adhere to water quality guidelines in terms of The Water Resource Management Act.
Safety Distances	• Maintain safety distances between the magazine and other infrastructure, as well as other magazines in line with the table of distances as outlined in the Explosives Act 26 of 1956.
Traffic	• Ensure that road junctions have good sightlines. • Adhere to the speed limit. • Implement traffic control measures where necessary. • In cooperation with the local authority, erect clear signage regarding restricted areas and roads, access and exit points to the port, speed limits, traffic rules, rail level crossings, etc. • If any extraordinary traffic impacts are expected, traffic management should be performed in conjunction with the local traffic department.

Table 11: Proposed mitigation measures for the construction phase

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
Fauna and flora	• Prevent contractors from collecting wood, veld food, etc. during the construction phase. • Do not clear cut the entire development site, but rather keep the few individuals shrubs not directly affecting the development as part of the landscaping.
Pressure on Existing Infrastructure	• Educate workforce on water saving measures. • Ensure all potable water points are metered and regularly read. • Ensure that the workforce is provided with temporary toilets during the construction phase.
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, they are appropriately dealt with. • Drip trays must be placed underneath construction vehicles when not in use to contain all oil and 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.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
	• 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. • 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. • Cover any stockpiles with plastic or any suitable material to minimise windblown dust. • 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. • 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.

CONSTRUCTION PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Ensure that road junctions have good sightlines. • Construction vehicles' need to be in a road worthy condition and maintained throughout the construction phase. • Transport the materials in the least number of trips as possible. • Adhere to the speed limit. • Implement traffic control measures where necessary. • Minimise the movement of heavy vehicles during peak time.
Waste Management	• It is recommended that waste from the 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. • Solid waste will be collected and disposed of at an appropriate local landfill in Walvis Bay, in consultation with the local authority.
Hazardous Substances	• All chemicals and other hazardous substances 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.

Table 12: 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. • A competent person should monitor the implementation of the Radiation Management Plan. The monitoring report should be submitted to the NRPA.
Explosives Legislation	• Ensure compliance with the Explosives Act 1956 (Act 26 of 956) and its Explosives Regulations, 1972 as amended.
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. • 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. • Ensure wastewater collected in septic tanks are not radioactive. • Ensure septic tank system is installed in accordance with statutory regulation. • Ensure proper containment is provided for septic tanks underground. • The wall and floor must be concrete slabs and ensure no seepage to the ground • Frequent monitoring to establish the level of waste water • Ensure frequent emptying to prevent overflow • Disposal of waste from the development should be properly managed. • Hazardous waste and contaminated water and soil must be disposed of at an appropriately classified 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.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Any fuel spillage of more than 200 litres must be reported to the Ministry of Mines and Energy. • Emergency response plans and spill contingency plans must be in place and include all fuels, chemicals or hazardous substances being handled. • All operational surfaces, chemical and fuel storage tanks must be installed with spill containment areas as per the relevant SANS standards (or better. • Proper monitoring of the product levels must take place to eliminate overfilling. • Ensure that any fuel and chemical products are contained in containment structures (e.g. plastic liners, drip trays etc.). • Avoid discharge of pollutants (such as cement, concrete, lime, chemicals, contaminated waste water or leachate) into stormwater channels and water courses. • Equipment and materials to deal with spill cleanup must be readily available on site and staff must be trained as to how to use the equipment and briefed about reporting procedures. • Develop and implement a groundwater monitoring system and programme, with the aim of monitoring possible contamination to the water resources. • Groundwater monitoring boreholes installed should be sampled and analysed periodically. • Regular tank and pipeline tightness inspections are advised to eliminate the risk of impact on the environment due to leakage. • The condition of the reticulation systems will have to be checked regularly and repaired to prevent leakages. • The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently. • Ensure all stormwater drains or channels are clear of litter or obstructing material. • Remove all excess sedimentation, rubble and any other waste material present in the waterway and dispose of in a suitable manner to ensure proper drainage runoff.
Health, Safety and Security	• Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises. • Operators must be properly trained on safety and health issues of the project. • Well stocked first aid box which is readily available and accessible should be provided within premises. • Signs such as 'NO SMOKING' must be prominently displayed in parts where inflammable materials are stored on the premises.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**

	• Workers should be fully equipped with personal protective equipment gear.
	• Staff must be properly trained and made aware of all the MSDS (Material Safety Data Sheets) sheets of all chemicals on site.
	• In the event of a source damage or leaking the following actions shall be taken immediately:
	  ○ Isolate area around the source to prevent the potential spread of contamination.
	  ○ Inspect the area and confirm if there is any contamination.
	  ○ Ensure that source is in a suitable container for storage until disposal arrangements can be implemented.
	  ○ Re-inspect the area to ensure there has been no contamination. If contamination exists, the area needs to be clean before it is re-occupied.
	  ○ Complete an incident notification form and report the accident to the NRPA.

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.
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 neighbouring properties. • 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. • Provide hearing protectors as standard PPE for workers in situations with elevated noise levels.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
	• Delivery of fuel and chemical products by road tankers should be limited to normal working hours (07h00 to 19h00). • Loud music from vehicles / trucks frequenting the development should be restricted. • Maintain the grievance mechanism to capture public perceptions and complaints with regard to noise impacts, track investigation actions and introduce corrective measures for continuous improvement.
Waste management	• The area will be kept free of waste, except in designated waste storage areas. Any wastes distributed by winds will be regularly cleaned up. • Ensure that no excavated soil, refuse or building rubble generated on site are placed, dumped or deposited on adjacent/surrounding properties or land. • A sufficient number of weather- proof bins / containers 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. • Solid waste will be collected and disposed of at an appropriate local land fill. • 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. • Hazardous waste storage is to be clearly marked to indicate the presence of hazardous substances, and the protocols associated with handling of such hazardous wastes shall be known by all relevant staff members. • Ablution facilities should be provided for by the contractor during this phase. No urinating outside these designated facilities. • Place priority on waste reduction, waste reuse and waste recycling, in that order. • Contamination of soil should be prevented through the use of containment areas as provided. • Any contaminated soil generated must be contained and bioremediated accordingly. • Each waste should be kept in a unique container at all times. Unidentified wastes must not, under any circumstances, be mixed with other wastes. • Potential spills of raw materials must be managed in accordance with the requirements of for that specific raw material. Each waste should be disposed of by an approved method. • All areas involving storage or use of oils and fuels must be bunded. • Storm water spill (if any) and/or spills captured within the bund walls must be channeled and treated by an oil water separator.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
	• All radioactive sources when no longer in use, will be returned to the manufacturer or supplier for final disposal by the respective client.
Transportation	• Radioactive sources will be transported to and from the storage facility by the respective clients.
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. • Local businesses and industries should be supported.
Air quality	• Manage activities that generate emissions or dust. • Minimise the movement of vehicles in the area. • The development needs to be controlled and managed as required by the Public and Environmental Health Act of 2015 and Atmospheric Pollution Prevention Ordinance (No. 11 of 1976). • It is advised to pave the internal road network. • Provide for area air sampler(s) for monitoring dust for long-lived alpha and beta particles. This should be done weekly as part of the workplace monitoring programme. • All monitoring equipment should be calibrated at an approved metrology laboratory in accordance with a standard schedule and maintain calibration certificates for all equipment. • Vehicle idling time shall be minimised by putting up educative signs. • All venting systems and procedures have to be designed according to SANS standards (SANS 1929:2011) and placed in a sensible manner. • Vent pipes should be placed in such a manner as to prevent impact on potential receptors. Use vapour recovery equipment and techniques to avoid air pollution and minimise fuel loss.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**

Fire and Explosion	• Explosives are stored in dedicated explosive storage magazines separate from detonators, delays and detonating cord.
	• Magazines have been fitted with lightning protection and locks, and are surrounded by earthen bund walls within a secure compound.
	• Emergency response procedures should be in place so as to alert the employees on how to react to fire and explosions incidents.
	• An incident reporting procedure should also be implemented to make the employees aware of how, when and to whom to report fire and explosion incidents.
	• Regular inspections should be carried out to inspect and test fire fighting equipment and emergency response at the development.
	• Ensure sufficient water is available all the time for fire fighting purposes.
	• It is highly recommended that electrical wiring of the facility be installed and approved by a qualified electrician who will issue a Certificate of Compliance.
	• To handle a major fire for radioactive sources effectively, the following procedure will be followed:
	  ○ Immediately call the Walvis Bay fire department.
	  ○ Do not delay lifesaving actions.
	  ○ The facility representative (RSO/ARSO, Consultant) are to assist Fire Department with facility specifications and radiation protection. Make sure they are aware where radioactive materials are stored as well as any precautions to avoid exposure or risk of creating or spreading radioactive contamination by use of high-pressure water, etc.
	  ○ Consult with the Fire Department and set up a controlled area where the firefighters can be surveyed for contamination of their protective clothing and equipment after the fire is extinguished.
	  ○ Once the fire is extinguished, advise the Fire Department not to enter potentially contaminated areas or areas where radioactive sources may be present until a thorough evaluation and survey are performed to determine the extent of the damage to the licensed material in use and in storage areas.
	  ○ Perform thorough contamination surveys of the First Responders and their equipment before they leave the controlled area and decontaminate, if necessary.
	  ○ Supervise decontamination activities.

OPERATIONAL PHASE IMPACTS	
Impact	**Mitigation Measures**
	○ Document incident. Determine cause and needed corrective actions. ○ Notify the National Radiation Protection Authority of the incident.

Table 13: Proposed mitigation measures for the decommissioning phase

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
General Guidelines	• Read safety data sheets (SDSs), equipment manuals, instrument instructions, standard operating procedures (SOPs) and any other pertinent documents in preparation for handling facility items. This will allow the user to be aware of the hazards associated with items being handled, packed, and moved. • Wear personal protective equipment (PPE) appropriate for the materials being handled. • Perform basic surface and visible decontamination of all spaces. This includes common areas such as stock rooms, waste collection areas, and equipment rooms. This also includes storage units such as freezers and refrigerators. • Perform basic surface and visible decontamination of all equipment. • A decommissioning Hazard Tag should be affixed to the equipment to be moved when decontamination is complete.
Fauna and flora	• Disturbance of areas outside the designated working zone is not allowed. • No vegetation should be removed outside the designated project area. • Prevent contractors from collecting wood, veld food, etc. during the decommissioning phase.
Surface and Ground Water Impacts	• Use drip trays, linings or concrete floors when evidence of leaks are observed on vehicles or equipment. • Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons in close proximity to water ways and bodies. • Decommissioning activities should be planned outside of the rainy season in order to limit the risk of ground and

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
	surface water pollution. • Contaminated runoff from the project site should be prevented from entering any water ways / bodies; and ground water bodies. • Existing ablution facilities at the project site should be used. No urinating outside these designated facilities will be allowed. • Waste disposal from the site should be properly managed and taken to the local disposal site. • Should it be necessary to wash equipment used during decommissioning activities, this should be done at an area properly suited and prepared to receive and contain contaminated waters. • An emergency plan should be in place on how to deal with spillages and leakages during this phase. • Proper environmental awareness and remedial response training of the decommissioning team must be conducted on a regular basis.
Health, Safety and Security	• Ensure that all construction personnel are properly trained depending on the nature of their work. • Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles or machinery not being used. • Enforce the use of appropriate Personal Protective Equipment (PPE) for the right task or duties at all times. • All areas where radioactive materials were handled and stored (including equipment and machinery) shall be secured to prevent unauthorized entry and removal. • Provide for first aid kit and properly trained personnel to apply first aid when necessary. • A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases and Covid-19. • Provide free condoms in the workplace throughout the decommissioning phase. • Facilitate access to antiretroviral medication for construction personnel. • Conform to the stipulated protocols related to Covid-19. • Restrict unauthorized access to the site and implement access control measures. • Clearly demarcate the decommissioning site boundaries along with signage of no unauthorized access. • Clearly demarcate dangerous areas and no go areas on site. • Adequate lighting within and around the decommissioned location should be erected, when visibility becomes an issue.

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
	• 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. • Adhere to the Covid-19 protocols as and when they are applicable.
Traffic	• Limit and control the number of access points to the site. • Ensure that road junctions have good sightlines. • Construction vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents. • Construction vehicles need to be in a road worthy condition and maintained throughout the decommissioning phase. • Transport materials in the least number of trips as possible. • Adhere to the speed limit. • Implement traffic control measures where necessary. • Construction vehicles should not be allowed to obstruct the C23 road, hence no stopping in the road, wholly or partially, but rather pull off the road or park on the roadside.
Noise	• No amplified music should be allowed on site. • Inform neighbouring communities of decommissioning activities to commence and provide for continuous communication between them and contractor. • Limit decommissioning times to acceptable daylight hours. • Install technology such as silencers on machinery utilised during decommissioning activities. • Do not allow the use of horns/hooters as a general communication tool, but use it only where necessary as a safety measure. • Provide protective equipment such as masks, ear muffs and ear plugs to workers.
Air quality	• All loose material should be kept on site for the shortest possible time. • It is recommended that dust suppressants such as Dustex be applied to all the decommissioning clearing activities to minimise dust. • Construction vehicles to only use designated roads. • During high wind conditions the contractor must make the decision to cease works until the wind has calmed

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
	down. • Cover any stockpiles with plastic to minimise windblown dust. • Ensure construction vehicles are well maintained to prevent excessive emission of smoke.
Waste management	• A sufficient number of waste bins should be placed around the site for the soft refuse. • A sufficient number of skip containers for the heavy waste and rubble should be provided for around the site. • The waste containers should be able to be closed to prevent birds and other animals from scavenging. • Solid waste will be collected and disposed of at an appropriate local disposal site in Walvis Bay, in consultation with the local authority. • Regular inspection and housekeeping procedures should be maintained at all times.
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. • Awareness of the hazardous nature of various types of waste should be enforced. • 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.
Radioactive Materials	• Consult the Radiation Management Plan for more detailed guidance on handling, storage and disposal of radioactive waste. • Completely wipe down and decontaminate any equipment and other surfaces exposed to radioactive material with decontaminate cleanser. • Perform initial contamination swipe and survey testing in areas exposed to radioactive material as well as surrounding areas. • Final swipe tests should be performed by the NRPA to ensure levels of decontamination are in compliance with relevant regulations and guidelines. • Remove all radioactive labels, stickers, and tape from all facility equipment, refrigerators, sinks, and hoods after final swipe tests results.

DECOMMISSIONING PHASE IMPACTS	
Impact	**Mitigation Measures**
Socio-economic	• Ensure locals enjoy priority in terms of job opportunities, to the extent possible, for skills that are available locally. • Ensure local procurement where commodities are available locally.

10. CONCLUSION AND RECOMMENDATIONS

11.1. Construction Phase Impacts

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

11.2. Planning and Design Phase

During the planning and design phase the impacts of traffic were assessed to have a long-term negative effect without mitigation, while the impacts of surface and groundwater; fauna and flora, and existing infrastructure were assessed to have short-term negative effect. 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 and social aspect are deemed to be high positive. This development is not only important to provide services to the end-users, but it also promotes local economic development.

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*.

Walvis Bay is becoming the centre for Namibian dangerous goods storage, so many resources, especially financial, will be channelled to Walvis Bay in order to bolster the industry. The positive dynamics around the oil and gas sector requires that Namibian entrepreneurs take advantage of this position to elevate the country's economic profile and augment the local and national economic development.

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.

11. REFERENCES

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APPENDIX A: Explosive List for Storage

EXPLOSIVE LIST FOR STORAGE LICENCE UPDATE

BELOW EXPLOSIVES ARE COMPATIBLE AND CAN BE STORED TOGETHER

PART NUMBER	PROPER UN SHIPPING NAME	DESCRIPTION	QUANTITY TO BE STORED(EA)	UOM	QUANTITY PER FULL BOX	TOTAL QUANTITY OF BOXES TO BE STORED	NEC (KG)	NEC TOTAL (KG)	UN No.	CLASS	TYPE	COMMENTS
160251	BOOSTER	BSTR,BI-DI,HMX, 0.6 G,Z908, DYNAWELL	700	EACH	100	7	0.0006	0.42	UN0352	1.4D	SECONDARY	
439331	BOOSTER	BOOSTER,BI-DI,HMX,DET-3050-429,0.65G	600	EACH	100	6	0.00065	0.39	UN0384	1.4S	SECONDARY	
101653762	BOOSTER	BOOSTER, HMX,12.7 MM, 1.4S, 1.4 GRAMS	40	EACH	20	2	0.0014	0.056	UN0384	1.4S	SECONDARY	
102782450	BOOSTER	BSTR,12.7 MM,THREADED,HMX,1.4GM	40	EACH	20	2	0.0014	0.056	UN0383	1.4B	SECONDARY	
101868137	BOOSTER	BOOSTER - BIDIRECTIONAL - HNS, OOT	200	EACH	100	2	0.00062	0.124	UN0383	1.4B	SECONDARY	
101653763	BOOSTER	BOOSTER, HNS, 12.7MM, 1.4 GRAM, 1.4B	40	EACH	20	2	0.0014	0.056	UN0383	1.4B	SECONDARY	
100157004	BOOSTER	BOOSTER,BI-DRCTNL,HNS,DYNAWELL,0.6G	200	EACH	100	2	0.0006	0.12	UN0352	1.4D	SECONDARY	
102054947	CHARGES, SHAPED	CHG,390 MAXFORCE®,HMX,SDP,39G	4480	EACH	40	100	0.039	174.72	UN0440	1.4D	SECONDARY	
100156995	CHARGES, SHAPED	CHG,4.625,SUPER HOLE,HMX, 28 GRAMS	7000	EACH	40	160	0.0280	196	UN0440	1.4D	SECONDARY	
100157043	CHARGES, SHAPED	CHG, SHAPE, VENTNG DEVICE,HMX, 3.6G	20	EACH	10	2	0.0036	0.072	UN0440	1.4D	SECONDARY	
102823156	CHARGES, SHAPED	DYNAWELL 39g DP2 St. HNS	224	EACH	32	7	0.0390	8.736	UN0440	1.4D	SECONDARY	
100014486	CHARGES, SHAPED	CHG,TBG PNCHR,2.0 IN,HMX,6.5GRAMS	100	EACH	50	2	0.0065	0.65	UN0440	1.4D	SECONDARY	
100000569	CHARGES, SHAPED	CHG,TBG CUTR,HMX,1.375 OD, 4 GR	2	EACH	1	2	0.004	0.008	UN0440	1.4D	SECONDARY	
101210198	CHARGES, SHAPED	CHG,2.125 IN. MILL DEEPSTAR™,HMX, 15.5G	100	EACH	50	2	0.0155	1.55	UN0440	1.4D	SECONDARY	
102736073	CHARGES, SHAPED	CHG,4.75 IN, DP, HNS, 39G	4000	EACH	50	80	0.039	156	UN0440	1.4D	SECONDARY	
101205518	DETONATING CORD	CORD, DETONATING, HMX, 40 GR LS,A545015	1000	EACH	500	2	0.0026	2.6	UN0289	1.4D	SECONDARY	
192446	DETONATING CORD	CRD,DET,HMX,80 GR/FT,OCTOCRD PT185,1.4D	500	EACH	500	1	0.0054	2.7	UN0289	1.4D	SECONDARY	
101340955	DETONATING CORD	CD,DET,80 GR,HMX,LS,XHV,NYL JKT,AIR PK	7000	FEET	500	14	0.0052	36.4	UN0289	1.4D	SECONDARY	
100157000	DETONATING CORD	CD,DET,HNS,RND,80 GR/FT,FEP PLSTC JKT	2000	FEET	250	8	0.0054	10.8	UN0289	1.4D	SECONDARY	
102410695	DETONATING CORD	CD,DET,HNS,80 GR,LS,1.4D,,A585015	2000	FEET	500	4	0.0052	10.4	UN0289	1.4D	SECONDARY	
101293167	CHARGES, EXPLOSIVE, COMMERCIAL	KIT, PELLET/CRTG,1.75 IN,HMX,DCST,993.5G	4	EACH	1	4	0.9935	3.974	UN0444	1.4D	SECONDARY	
101293168	CHARGES, EXPLOSIVE, COMMERCIAL	KIT,PELLET/CRTG, 2 IN,HMX,DCST, 1340.4G	6	EACH	1	6	0.6702	4.0212	UN0444	1.4D	SECONDARY	
101293152	CHARGES, EXPLOSIVE, COMMERCIAL	KIT,PELLET/CART,HMX,2.625 DCST, 2.355 KG	4	EACH	1	4	2.355	9.42	UN0444	1.4D	SECONDARY	
101978738	CHARGES, EXPLOSIVE, COMMERCIAL	KIT,EXPLO/HDW,CUTR,SEG,4.5IN,HMX,114.28G	4	EACH	1	4	0.11428	0.45712	UN0352	1.4D	SECONDARY	
101978736	CHARGES, EXPLOSIVE, COMMERCIAL	KIT,EXPLO/HDW,CUTR,SEG,3.625OD,HMX,54.8G	4	EACH	1	4	0.0548	0.2192	UN0352	1.4D	SECONDARY	
100118417	FUZES, DETONATING	MDF ASSEMBLY, DCST-A, S274-5, HNS, 2.3G	20	EACH	20	1	0.0023	0.046	UN0257	1.4B	SECONDARY	

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102350510	DETONATORS, ELECTRIC	DETN,RED, TOP FIRE,ELECTRIC, 1.03G	40	EACH	20	2	0.00103	0.0412	UN0255	1.4B	PRIMARY	
102351326	DETONATORS, ELECTRIC	DETONATORS, ELECTRIC, 1.4B, IGNITR	20	EACH	20	1	0.001	0.02	UN0255	1.4B	PRIMARY	
100010855	DETONATORS, ELECTRIC	DETN,ELEC,D1210,HNS,RESISTORIZED	20	EACH	20	1	0.0004	0.008	UN0255	1.4B	PRIMARY	
102478439	DETONATORS, ELECTRIC	DETN, RED®, BLOCK, HMX, 1.0 GRAMS	40	EACH	20	2	0.00100	0.04	UN0255	1.4B	PRIMARY	
101897553	DETONATORS, NON-ELECTRIC	FUSE,6-MINUTE DELAY, HNS,H TEMP, CAD	40	EACH	10	4	0.03316	1.3264	UN0500	1.4S	PRIMARY	
100014330	DETONATORS, NON-ELECTRIC	INITR,PYX DETN,SEALED,NON-ELEC 1.4S	40	EACH	20	2	0.000505	0.0202	UN0455	1.4S	PRIMARY	
100005302	DETONATORS, NON-ELECTRIC	INITIATOR,HIGH TEMP,PERCUSSION,UN0455	40	EACH	10	4	0.000957	0.03828	UN0455	1.4S	PRIMARY	
116970	DETONATORS, NON-ELECTRIC	PERCUSSION PRIMER ASSEMBLY0.034G	40	EACH	10	4	0.000034	0.00136	UN0455	1.4S	PRIMARY	
101835255	DETONATORS, NON-ELECTRIC	PERCUSSION PRIMER,HTPI,CAD, 072170-1	40	EACH	40	1	0.00005	0.002	UN0454	1.4S	PRIMARY	
100008255	DETONATORS, NON-ELECTRIC	SLM DLY OP ASSY,6 MINUTE, PYX,UN0455	40	EACH	40	1	0.031	1.24	UN0455	1.4S	PRIMARY	

APPENDIX B: List of Radioactive Sources

LIST OF RADIOACTIVE SOURCES TO BE STORED

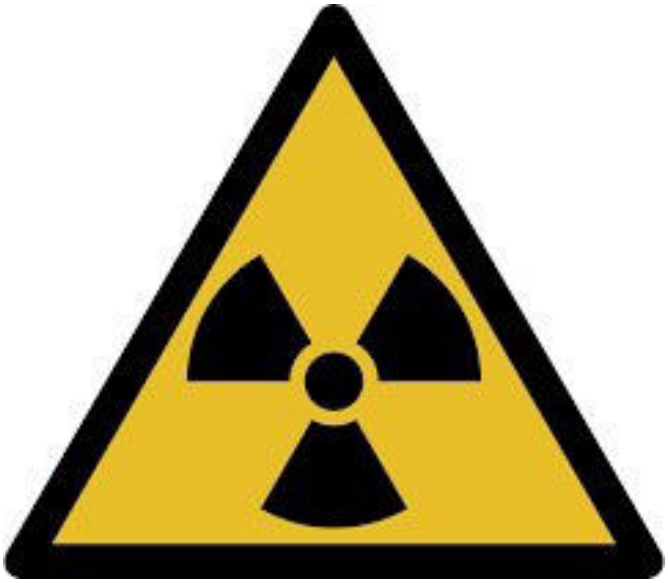
Description of Radiation Source	Model	Serial Number	Activity (Bq)	Date of Activity
RAM_AM241_50 NCI LP_CSNG PULSAR	A1220	F4-351	1,813.00	15/07/2022
RAM_AM241_50 NCI LP_CSNG PULSAR	A1220	F4-361	1,814.00	15/07/2022
RAM_AM241_50 NCI LP_CSNG PULSAR	A1220	E7-515	1,809.30	15/07/2022
RAM_Co 57_3_mCi LP_Gas Hold Up	A3000	K6-134	27,402.20	15/07/2022
RAM_Cs137_1600_nCi LP_SDL_PULSAR	CDC.PLS	BB-9482	52,070.10	15/07/2022
RAM_CS137_500_NCI LP_SDL PULSAR	CDC.PLS	BB-9495	20,279.70	15/07/2022
RAM_Cs137_1600_nCi LP_SDL_PULSAR	CDC.PLS	RK924	43,060.60	15/07/2022
RAM_Cs137_1.78_Ci LP_SDLD	CDC.CY6	5450GW	45,542,388,704.80	15/07/2022
RAM_Cs137_1.78 Ci_LP_SDLD	X2063/1	5312GW	44,444,140,655.90	15/07/2022
RAM_CS137_40_mCi JL_Shepherd_Cal_Seri_10	CDC.800	8332GM	831,981,123.10	15/07/2022
RAM_Cs137_1.78_Ci SLDT-I	CDC.CY6	5527GW	46,429,555,216.20	15/07/2022
RAM_Cs137_1600_nCi LP_SDL PULSAR	CDC.PLS	OL437	41,536.20	15/07/2022
RAM_CS137_500_NCI_LP SDL PULSAR	VZ-2134	PS952	13,231.20	15/07/2022
RAM_Cs137_1600_nCi LP_SDL_PULSAR	CDC.PLS	RK927	43,060.60	15/07/2022
RAM _AM241_150_MCI LP_FDR	AMC.CY2	77428B	5,461,645,169.20	15/07/2022
RAM _AM241_150_MCI LP_FDR	AMC.CY2	4213AR	5,420,455,873.80	15/07/2022
RAM _AM241_150_MCI LP_FDR	AMC.CY2	3107AR	5,413,856,128.30	15/07/2022
RAM _AM241_150_MCI LP_FDR	AMC.CY2	2281CW	5,385,866,175.90	15/07/2022
RAM _AM241_150_MCI LP_FDR	AMC.CY2	0774CW	5,372,804,435.90	15/07/2022
RAM _AmBe241_15_Ci DSN LGP	AMN.CY1	73521B	546,517,662,032.50	15/07/2022
RAM _AmBe241_500_mCi LP_NTN CAL source	AN-HP	CAL-24	16,550,443,596.80	15/07/2022
RAM _AmBe241_500_mCi LP_NTN CAL source	AN-HP	CAL-159	16,777,266,916.80	15/07/2022
RAM _AmBe241_500_mCi LP_NTN CAL source	AN-HP	CAL-128	17,776,196,479.90	15/07/2022
RAM _AmBe241_15_Ci LP_DSNT	AN-HP	DSN-467	545,345,910,098.10	15/07/2022
RAM_TH232_2.5_uCi_ LP 3-5/8 GR SLV CAL	GS-M	TB-553	92,500.00	15/07/2022
RAM_TH232_2.5_uCi_LP 3-5/8 GR SLV CAL	GS-M	JL1235412-01	185,000.00	15/07/2022
RAM_TH232_2.5_uCi_LP 3-5/8 GR SLV CAL	GS-M	JL1235011-06	62,160.00	15/07/2022
RAM_TH232_5_uCi LP_1-11/16 GR BLNKT	GS-M	JL0924509-06	62,160.00	15/07/2022
RAM_CS137_500_NCI LP_SDL PULSAR	VZ-2134	RK965	13,456.90	15/07/2022
RAM_CS137_500_NCI LP_SDL PULSAR	CDC.PLS	RT822	13,612.30	15/07/2022

RAM_CS137_500_NCI LP_SDL PULSAR	CDC.PLS	RT822	13,612.30	15/07/2022
RAM_Cs137_1600_nCi LP_SDL PULSAR	CSC.PLS	RT805	43,560.10	15/07/2022
RAM_CS137_500_NCI LP_SDL PULSAR	VZ-2134	RK945	13,456.90	15/07/2022
RAM_AMBE241_550_MCI LP_PSGT VFY	AMN.PE8	9775NE	19,341,805,370.50	15/07/2022
RAM_H3_300_ mCi NTN GEN TUBE, GAS FILLED	013-1004-000	SP1934	6,675,325,266.80	15/07/2022
RAM_H3_300_ mCi NTN GEN TUBE, GAS FILLED	013-1004-000	SP2108	7,206,734,270.30	15/07/2022
RAM_H3_300_ mCi NTN GEN TUBE, GAS FILLED	013-1004-000	SP1448	5,086,612,266.40	15/07/2022
RAM_H3_300_ mCi NTN GEN TUBE, GAS FILLED	013-1004-000	SP1887	11,083,164,748.40	15/07/2022
RAM_H3_300_ mCi NTN GEN TUBE, GAS FILLED	013-1004-000	SP1363	4,785,843,610	15/07/2022
Cobalt-60_CO-60 Radioactive Marker Beads	CO-60	Co-60	370	15/07/2022

APPENDIX C: Radiation Management Plan

VIBRANT
UPSTREAM SERVICES (PTY) LTD
YOUR NAMIBIAN UPSTREAM SERVICES PARTNER

RADIATION MANAGEMENT PLAN



APRIL 2024

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1. VIBRANT UPSTREAM BUSINESS PROFILE

Vibrant Upstream Services (Pty) Ltd ("Vibrant Upstream") is a wholly owned Namibian energy, oilfield services and infrastructure development company set up to provide support services to the upstream Oil and Gas industry. Vibrant is committed to enhancing local content and developing the capacity of Namibian individuals and businesses throughout our operations.

In partnership with international market leaders in the oil and gas services, we aim to fill the gaps identified in the local industry and ensure our clients get world class services while simultaneously developing the local competency of Namibia and the rest of Africa.

Vibrant Upstream is duly registered in accordance with the laws of the Republic of Namibia, under registration no. 2022/0790 and tax identification number 13655341. Our offices are located at 8612 Hosea Kutako Drive, Southport Building, 1st Floor, Unit 6A and B, Southern Industry, Windhoek, Namibia.

This Radiation Management Plan (RMP) describes all radiation-relevant aspects of the storage of radioactive sources at Vibrant Upstream. The content and structure of this RMP is based on the requirements of the Atomic Energy and Radiation Protection Act, 2005 (Act No. 5 of 2005), the Radiation Protection and Waste Disposal Regulations (2011) and NRPA guidance on the development of a Radiation Management Plan document no NRPA_G_01.

OVERVIEW OF VIBRANT UPSTREAM RADIATION-RELEVANT ACTIVITIES

In fulfillment of our pursuit to provide support services to the upstream Oil and Gas industry, Vibrant Upstream is intent on constructing and operating storage facility for radioactive sources. The radioactive storage facility will be constructed on farm 38, Walvisbay, Erongo Region, located about 18 km's from the town on the road to the Walvisbay Airport.

The sources to be stored will include Americium (Am) 241/Beryllium (Be) a neutron radiation emitter and Cesium (Cs-137) that emits gamma and beta radiation. The activity levels for Cs-137 ranges from 55-74 GBq and the activity of Am241/Be ranges 148-703 GBq. Cs-137 and Am/Be are

sealed sources contained in metal capsules designed to prevent any dispersion of radioactive substances into the environment under normal conditions of use. These sources are normally used in conjunction with a test tools or measurement device in the oil and gas exploration for the measurements of density and moisture content. The activity of source depends on the specific tool to be used.

The facility is only used for the storage of radioactive sources.

2. ORGANISATIONAL ARRANGEMENTS

Vibrant Upstream Team

Vibrant Upstream Storage Facility Team with bearing on radiation safety and security will consist of the following:

- Executive Director who is the Designated Legal Person -Has the overall responsible for the safety and security of radioactive sources at the storage facility.

a. Radiation Safety Officer-Overall responsibility for the effective management and implementation of the radiation protection program.

3. OCCUPATIONAL RADIATION PROTECTION PROGRAMME

The radioactive source storage facility be delineated as a controlled area. The storage facility will be constructed with 220mm brick wall and the underground pit will be constructed with 220mm concrete block.

Signage will be posted bearing the radiation symbol and the words:

'CAUTION RADIATION CONTROLLED AREA'

Vibrant Upstream general policy is to keep radiation levels for personnel as LOW AS REASONABLY ACHIEVABLE (ALARA). The maintain the personnel exposure to radiation as low as reasonably achievable the principles of radiation protection will be implemented. Radiation protection principles of time, distance and shielding should be used at all times to ensure that doses remain below regulatory requirements and consistent with the ALARA principle.

Methods of dose assessment and Dosimetry service provider

- Vibrant Upstream employee's occupational exposure will be monitored using individual exposure.
- In addition to individual monitoring workplace monitoring programme will be implemented using Electronic Personnel Dosimeter (EPD) and radiation survey meter will be used.

- A contamination monitor will also be kept on the site.

Occupational Dose Limits

Occupational dose limits that will be implemented at Vibrant Upstream is as documented in the Radiation Protection and Waste Disposal Regulations.

Table 1: Vibrant Upstream

Group to be Monitored	Dose limit
Radiation Workers	20 mSv (average over 5 years)
Members of the Public	1 mSv

Engineered controls.

- Only authorized person should be at the radiation sources storage facility area using ALARA principles.
- All radioactive material shall be secured and kept in a designated storage area.

The health surveillance program

Health surveillance is used to identify possible health risk hazard and early signs of work-related illness are detected. All employees will undergo an appropriate initial and periodic medical examinations at an occupational health practitioner.

4. PUBLIC EXPOSURE MONITORING PROGRAMME

Description of exposure pathways and Critical groups

The likely public exposure critical group would be the personnel working at nearby warehouses within farm 38. The likely exposure pathway would be direct gamma exposure. The route to the storage facility on farm 38 does not include passing by a potential member of the public.

Visitors/clients shall be provided with adequate information and control measures on the radiation exposure hazards and will be accompanied to at all times to the radiation storage bunker.

All the administrative duties i.e. sign in will be done at the office complex, whilst the source is guarded at the storage site.

5. SAFETY AND SECURITY OF RADIATION SOURCES

Measures that will be employed to ensure the safety and security of sources

The sources to be stored will Americium (Am) 241/Beryllium (Be) a neutron radiation emitter and Cesium (Cs-137) that emits gamma and beta radiation.
These sources used in well logging are classified as category 3 radioactive sources as per the IAEA categorisation of radioactive Sources. The security arrangement will consist of Detection, Delay and Response measures.

Description of the scenarios relating to potential breach of security involving radioactive sources

A missing or stolen radioactive source constitute as a breach of security and can be a significant hazard if found by members of the public unaware of the radiation danger. It is imperative that anyone working with a radiation device be aware of the security implications.
In case of a stolen radioactive source the following will be implemented:

- The RSO should also immediately report a loss or theft to the local police and the NRPA.
- The RSO to notify the client
- A national security event response will be initiated with the National emergency response team.

6. TRANSPORT PLAN

Vibrant Upstream will not be transporting radioactive sources. Radioactive sources will be transported by the respective clients to the storage facility. Should a client require transporting, Vibrant Upstream will contract services of a licensed transporter.

7. EMERGENCY PREPAREDNESS AND RESPONSE

Radioactive sources have the potential for accident that could lead to unplanned exposure.

Possible incidents that would require emergency response are listed below:

- Damage leaking source
- Fire involving radioactive source
- Theft of the source from the storage facility

Damaged/Leaking source

In the event of a source damage or leaking the following actions shall be taken immediately:

- Isolate area around the source to prevent the potential spread of contamination.
- Inspect the area and confirm if there is any contamination.
- Ensure that source is in a suitable container for storage until disposal arrangements can be implemented.
- Re-inspect the area to ensure there has been no contamination. If contamination exists, the area needs to be clean before it is re-occupied.
- Complete an incident notification form and report the accident to the NRPA.

Involvement in a Fire

To handle a Major Fire effectively, the following procedure will be followed:

a. Immediately call the Walvisbay fire department.
b. Do not delay lifesaving actions.
c. The facility representative (RSO/ARSO, Consultant) are to assist Fire Department with facility specifications and radiation protection. Make sure they are aware where radioactive materials are stored as well as any precautions to avoid exposure or risk of creating or spreading radioactive contamination by use of high-pressure water, etc.

d. Consult with the Fire Department and set up a controlled area where the firefighters can be surveyed for contamination of their protective clothing and equipment after the fire is extinguished.
e. Once the fire is extinguished, advise the Fire Department not to enter potentially contaminated areas or areas where radioactive sources may be present until a thorough evaluation and survey are performed to determine the extent of the damage to the licensed material in use and in storage areas.
f. Perform thorough contamination surveys of the First Responders and their equipment before they leave the controlled area and decontaminate, if necessary.
g. Supervise decontamination activities.
h. Document incident. Determine cause and needed corrective actions.
i. Notify the National Radiation Protection Authority of the incident.

Vibrant Upstream Emergency Contacts

Name	Function	Contacts
Shakwa Nyambe	Executive Director	+264 81 149 9585
Elifas Simon	Manager	+264 81 122 8578
Fire coordinator	Walvisbay Fire department	+264 81 922
Police	Walvisbay Police	+264 64 21 9048
NRPA	NRPA Regulator	+264 612032417/18

8. WASTE MANAGEMENT PROGRAMME

All radioactive sources when no longer in use, will be returned to the manufacturer or supplier for final disposal by the respective client.

REFERENCES

ATOMIC ENERGY BOARD OF NAMIBIA, Advisory Material on Appropriateness and Competence of the person who can be appointed as Radiation Safety Officer.

GOVERNMENT OF NAMIBIA, Atomic Energy and Radiation Protection Act. Act 5 of 2005, (2005).

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MINISTRY OF HEALTH AND SOCIAL SERVICES, Radiation Protection and Waste Disposal Regulations, MoHSS, (2011).

NATIONAL RADIATION PROTECTION AUTHORITY, Guide on the Development of a Radiation Management Plan, NRPA G_01 (2012).

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439331	BOOSTER	BOOSTER,BI-DI,HMX,DET-3050-429,0.65G	600	EACH	100	6	0.00065	0.39	UN0384	1.4S	SECONDARY	
101653762	BOOSTER	BOOSTER, HMX,12.7 MM, 1.4S, 1.4 GRAMS	40	EACH	20	2	0.0014	0.056	UN0384	1.4S	SECONDARY	
102782450	BOOSTER	BSTR,12.7 MM,THREADED,HMX,1.4GM	40	EACH	20	2	0.0014	0.056	UN0383	1.4B	SECONDARY	
101868137	BOOSTER	BOOSTER - BIDIRECTIONAL - HNS, OOT	200	EACH	100	2	0.00062	0.124	UN0383	1.4B	SECONDARY	
101653763	BOOSTER	BOOSTER, HNS, 12.7MM, 1.4 GRAM, 1.4B	40	EACH	20	2	0.0014	0.056	UN0383	1.4B	SECONDARY	
100157004	BOOSTER	BOOSTER,BI-DRCTNL,HNS,DYNAWELL,0.6G	200	EACH	100	2	0.0006	0.12	UN0352	1.4D	SECONDARY	
102054947	CHARGES, SHAPED	CHG,390 MAXFORCE®,HMX,SDP,39G	4480	EACH	40	100	0.039	174.72	UN0440	1.4D	SECONDARY	
100156995	CHARGES, SHAPED	CHG,4.625,SUPER HOLE,HMX, 28 GRAMS	7000	EACH	40	160	0.0280	196	UN0440	1.4D	SECONDARY	
100157043	CHARGES, SHAPED	CHG, SHAPE, VENTNG DEVICE,HMX, 3.6G	20	EACH	10	2	0.0036	0.072	UN0440	1.4D	SECONDARY	
102823156	CHARGES, SHAPED	DYNAWELL 39g DP2 St. HNS	224	EACH	32	7	0.0390	8.736	UN0440	1.4D	SECONDARY	
100014486	CHARGES, SHAPED	CHG,TBG PNCHR,2.0 IN,HMX,6.5GRAMS	100	EACH	50	2	0.0065	0.65	UN0440	1.4D	SECONDARY	
100000569	CHARGES, SHAPED	CHG,TBG CUTR,HMX,1.375 OD, 4 GR	2	EACH	1	2	0.004	0.008	UN0440	1.4D	SECONDARY	
101210198	CHARGES, SHAPED	CHG,2.125 IN. MILL DEEPSTAR™,HMX, 15.5G	100	EACH	50	2	0.0155	1.55	UN0440	1.4D	SECONDARY	
102736073	CHARGES, SHAPED	CHG,4.75 IN, DP, HNS, 39G	4000	EACH	50	80	0.039	156	UN0440	1.4D	SECONDARY	
101205518	DETONATING CORD	CORD, DETONATING, HMX, 40 GR LS,A545015	1000	EACH	500	2	0.0026	2.6	UN0289	1.4D	SECONDARY	
192446	DETONATING CORD	CRD,DET,HMX,80 GR/FT,OCTOCRD PT185,1.4D	500	EACH	500	1	0.0054	2.7	UN0289	1.4D	SECONDARY	
101340955	DETONATING CORD	CD,DET,80 GR,HMX,LS,XHV,NYL JKT,AIR PK	7000	FEET	500	14	0.0052	36.4	UN0289	1.4D	SECONDARY	
100157000	DETONATING CORD	CD,DET,HNS,RND,80 GR/FT,FEP PLSTC JKT	2000	FEET	250	8	0.0054	10.8	UN0289	1.4D	SECONDARY	
102410695	DETONATING CORD	CD,DET,HNS,80 GR,LS,1.4D,,A585015	2000	FEET	500	4	0.0052	10.4	UN0289	1.4D	SECONDARY	
101293167	CHARGES, EXPLOSIVE, COMMERCIAL	KIT, PELLET/CRTG,1.75 IN,HMX,DCST,993.5G	4	EACH	1	4	0.9935	3.974	UN0444	1.4D	SECONDARY	
101293168	CHARGES, EXPLOSIVE, COMMERCIAL	KIT,PELLET/CRTG, 2 IN,HMX,DCST, 1340.4G	6	EACH	1	6	0.6702	4.0212	UN0444	1.4D	SECONDARY	
101293152	CHARGES, EXPLOSIVE, COMMERCIAL	KIT,PELLET/CART,HMX,2.625 DCST, 2.355 KG	4	EACH	1	4	2.355	9.42	UN0444	1.4D	SECONDARY	
101978738	CHARGES, EXPLOSIVE, COMMERCIAL	KIT,EXPLO/HDW,CUTR,SEG,4.5IN,HMX,114.28G	4	EACH	1	4	0.11428	0.45712	UN0352	1.4D	SECONDARY	
101978736	CHARGES, EXPLOSIVE, COMMERCIAL	KIT,EXPLO/HDW,CUTR,SEG,3.625OD,HMX,54.8G	4	EACH	1	4	0.0548	0.2192	UN0352	1.4D	SECONDARY	
100118417	FUZES, DETONATING	MDF ASSEMBLY, DCST-A, S274-5, HNS, 2.3G	20	EACH	20	1	0.0023	0.046	UN0257	1.4B	SECONDARY	

BELOW EXPLOSIVES ARE COMPATIBLE AND CAN BE STORED TOGETHER

PART NUMBER	PROPER UN SHIPPING NAME	DESCRIPTION	QUANTITY TO BE STORED(EA)	UOM	QUANTITY PER FULL BOX	TOTAL QUANTITY OF BOXES TO BE STORED	NEC (KG)	NEC TOTAL (KG)	UN No.	CLASS	TYPE	COMMENTS
102350510	DETONATORS, ELECTRIC	DETN,RED, TOP FIRE,ELECTRIC, 1.03G	40	EACH	20	2	0.00103	0.0412	UN0255	1.4B	PRIMARY	
102351326	DETONATORS, ELECTRIC	DETONATORS, ELECTRIC, 1.4B, IGNITR	20	EACH	20	1	0.001	0.02	UN0255	1.4B	PRIMARY	
100010855	DETONATORS, ELECTRIC	DETN,ELEC,D1210,HNS,RESISTORIZED	20	EACH	20	1	0.0004	0.008	UN0255	1.4B	PRIMARY	
102478439	DETONATORS, ELECTRIC	DETN, RED®, BLOCK, HMX, 1.0 GRAMS	40	EACH	20	2	0.00100	0.04	UN0255	1.4B	PRIMARY	
101897553	DETONATORS, NON-ELECTRIC	FUSE,6-MINUTE DELAY, HNS,H TEMP, CAD	40	EACH	10	4	0.03316	1.3264	UN0500	1.4S	PRIMARY	
100014330	DETONATORS, NON-ELECTRIC	INITR,PYX DETN,SEALED,NON-ELEC 1.4S	40	EACH	20	2	0.000505	0.0202	UN0455	1.4S	PRIMARY	
100005302	DETONATORS, NON-ELECTRIC	INITIATOR,HIGH TEMP,PERCUSSION,UN0455	40	EACH	10	4	0.000957	0.03828	UN0455	1.4S	PRIMARY	
116970	DETONATORS, NON-ELECTRIC	PERCUSSION PRIMER ASSEMBLY0.034G	40	EACH	10	4	0.000034	0.00136	UN0455	1.4S	PRIMARY	
101835255	DETONATORS, NON-ELECTRIC	PERCUSSION PRIMER,HTPI,CAD, 072170-1	40	EACH	40	1	0.00005	0.002	UN0454	1.4S	PRIMARY	
100008255	DETONATORS, NON-ELECTRIC	SLM DLY OP ASSY,6 MINUTE, PYX,UN0455	40	EACH	40	1	0.031	1.24	UN0455	1.4S	PRIMARY	

APPENDIX B: List of Radioactive Sources

LIST OF RADIOACTIVE SOURCES TO BE STORED

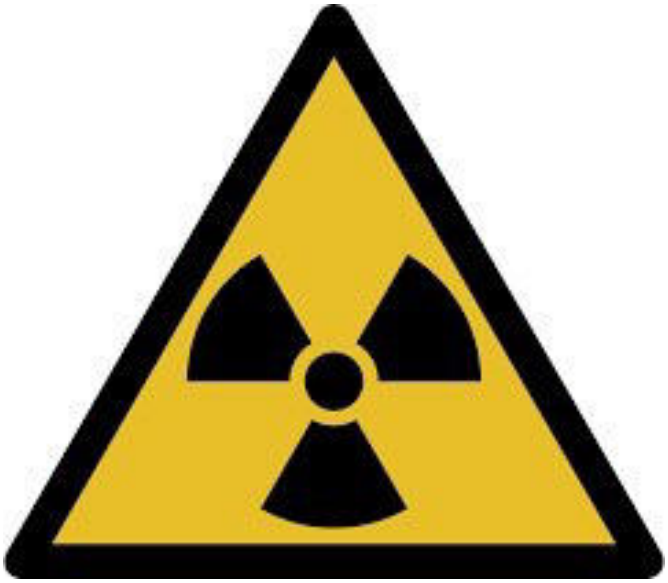
Description of Radiation Source	Model	Serial Number	Activity (Bq)	Date of Activity
RAM_AM241_50 NCI LP_CSNG PULSAR	A1220	F4-351	1,813.00	15/07/2022
RAM_AM241_50 NCI LP_CSNG PULSAR	A1220	F4-361	1,814.00	15/07/2022
RAM_AM241_50 NCI LP_CSNG PULSAR	A1220	E7-515	1,809.30	15/07/2022
RAM_Co 57_3_mCi LP_Gas Hold Up	A3000	K6-134	27,402.20	15/07/2022
RAM_Cs137_1600_nCi LP_SDL_PULSAR	CDC.PLS	BB-9482	52,070.10	15/07/2022
RAM_CS137_500_NCI LP_SDL PULSAR	CDC.PLS	BB-9495	20,279.70	15/07/2022
RAM_Cs137_1600_nCi LP_SDL_PULSAR	CDC.PLS	RK924	43,060.60	15/07/2022
RAM_Cs137_1.78_Ci LP_SDLD	CDC.CY6	5450GW	45,542,388,704.80	15/07/2022
RAM_Cs137_1.78 Ci_LP_SDLD	X2063/1	5312GW	44,444,140,655.90	15/07/2022
RAM_CS137_40_mCi JL_Shepherd_Cal_Seri_10	CDC.800	8332GM	831,981,123.10	15/07/2022
RAM_Cs137_1.78_Ci SLDT-I	CDC.CY6	5527GW	46,429,555,216.20	15/07/2022
RAM_Cs137_1600_nCi LP_SDL PULSAR	CDC.PLS	OL437	41,536.20	15/07/2022
RAM_CS137_500_NCI_LP SDL PULSAR	VZ-2134	PS952	13,231.20	15/07/2022
RAM_Cs137_1600_nCi LP_SDL_PULSAR	CDC.PLS	RK927	43,060.60	15/07/2022
RAM _AM241_150_MCI LP_FDR	AMC.CY2	77428B	5,461,645,169.20	15/07/2022
RAM _AM241_150_MCI LP_FDR	AMC.CY2	4213AR	5,420,455,873.80	15/07/2022
RAM _AM241_150_MCI LP_FDR	AMC.CY2	3107AR	5,413,856,128.30	15/07/2022
RAM _AM241_150_MCI LP_FDR	AMC.CY2	2281CW	5,385,866,175.90	15/07/2022
RAM _AM241_150_MCI LP_FDR	AMC.CY2	0774CW	5,372,804,435.90	15/07/2022
RAM _AmBe241_15_Ci DSN LGP	AMN.CY1	73521B	546,517,662,032.50	15/07/2022
RAM _AmBe241_500_mCi LP_NTN CAL source	AN-HP	CAL-24	16,550,443,596.80	15/07/2022
RAM _AmBe241_500_mCi LP_NTN CAL source	AN-HP	CAL-159	16,777,266,916.80	15/07/2022
RAM _AmBe241_500_mCi LP_NTN CAL source	AN-HP	CAL-128	17,776,196,479.90	15/07/2022
RAM _AmBe241_15_Ci LP_DSNT	AN-HP	DSN-467	545,345,910,098.10	15/07/2022
RAM_TH232_2.5_uCi_ LP 3-5/8 GR SLV CAL	GS-M	TB-553	92,500.00	15/07/2022
RAM_TH232_2.5_uCi_LP 3-5/8 GR SLV CAL	GS-M	JL1235412-01	185,000.00	15/07/2022
RAM_TH232_2.5_uCi_LP 3-5/8 GR SLV CAL	GS-M	JL1235011-06	62,160.00	15/07/2022
RAM_TH232_5_uCi LP_1-11/16 GR BLNKT	GS-M	JL0924509-06	62,160.00	15/07/2022
RAM_CS137_500_NCI LP_SDL PULSAR	VZ-2134	RK965	13,456.90	15/07/2022
RAM_CS137_500_NCI LP_SDL PULSAR	CDC.PLS	RT822	13,612.30	15/07/2022

RAM_CS137_500_NCI LP_SDL PULSAR	CDC.PLS	RT822	13,612.30	15/07/2022
RAM_Cs137_1600_nCi LP_SDL PULSAR	CSC.PLS	RT805	43,560.10	15/07/2022
RAM_CS137_500_NCI LP_SDL PULSAR	VZ-2134	RK945	13,456.90	15/07/2022
RAM_AMBE241_550_MCI LP_PSGT VFY	AMN.PE8	9775NE	19,341,805,370.50	15/07/2022
RAM_H3_300_ mCi NTN GEN TUBE, GAS FILLED	013-1004-000	SP1934	6,675,325,266.80	15/07/2022
RAM_H3_300_ mCi NTN GEN TUBE, GAS FILLED	013-1004-000	SP2108	7,206,734,270.30	15/07/2022
RAM_H3_300_ mCi NTN GEN TUBE, GAS FILLED	013-1004-000	SP1448	5,086,612,266.40	15/07/2022
RAM_H3_300_ mCi NTN GEN TUBE, GAS FILLED	013-1004-000	SP1887	11,083,164,748.40	15/07/2022
RAM_H3_300_ mCi NTN GEN TUBE, GAS FILLED	013-1004-000	SP1363	4,785,843,610	15/07/2022
Cobalt-60_CO-60 Radioactive Marker Beads	CO-60	Co-60	370	15/07/2022

APPENDIX C: Radiation Management Plan

VIBRANT
UPSTREAM SERVICES (PTY) LTD
YOUR NAMIBIAN UPSTREAM SERVICES PARTNER

RADIATION MANAGEMENT PLAN



APRIL 2024

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1. VIBRANT UPSTREAM BUSINESS PROFILE

Vibrant Upstream Services (Pty) Ltd ("Vibrant Upstream") is a wholly owned Namibian energy, oilfield services and infrastructure development company set up to provide support services to the upstream Oil and Gas industry. Vibrant is committed to enhancing local content and developing the capacity of Namibian individuals and businesses throughout our operations.

In partnership with international market leaders in the oil and gas services, we aim to fill the gaps identified in the local industry and ensure our clients get world class services while simultaneously developing the local competency of Namibia and the rest of Africa.

Vibrant Upstream is duly registered in accordance with the laws of the Republic of Namibia, under registration no. 2022/0790 and tax identification number 13655341. Our offices are located at 8612 Hosea Kutako Drive, Southport Building, 1st Floor, Unit 6A and B, Southern Industry, Windhoek, Namibia.

This Radiation Management Plan (RMP) describes all radiation-relevant aspects of the storage of radioactive sources at Vibrant Upstream. The content and structure of this RMP is based on the requirements of the Atomic Energy and Radiation Protection Act, 2005 (Act No. 5 of 2005), the Radiation Protection and Waste Disposal Regulations (2011) and NRPA guidance on the development of a Radiation Management Plan document no NRPA_G_01.

OVERVIEW OF VIBRANT UPSTREAM RADIATION-RELEVANT ACTIVITIES

In fulfillment of our pursuit to provide support services to the upstream Oil and Gas industry, Vibrant Upstream is intent on constructing and operating storage facility for radioactive sources. The radioactive storage facility will be constructed on farm 38, Walvisbay, Erongo Region, located about 18 km's from the town on the road to the Walvisbay Airport.

The sources to be stored will include Americium (Am) 241/Beryllium (Be) a neutron radiation emitter and Cesium (Cs-137) that emits gamma and beta radiation. The activity levels for Cs-137 ranges from 55-74 GBq and the activity of Am241/Be ranges 148-703 GBq. Cs-137 and Am/Be are

sealed sources contained in metal capsules designed to prevent any dispersion of radioactive substances into the environment under normal conditions of use. These sources are normally used in conjunction with a test tools or measurement device in the oil and gas exploration for the measurements of density and moisture content. The activity of source depends on the specific tool to be used.

The facility is only used for the storage of radioactive sources.

2. ORGANISATIONAL ARRANGEMENTS

Vibrant Upstream Team

Vibrant Upstream Storage Facility Team with bearing on radiation safety and security will consist of the following:

- Executive Director who is the Designated Legal Person -Has the overall responsible for the safety and security of radioactive sources at the storage facility.

a. Radiation Safety Officer-Overall responsibility for the effective management and implementation of the radiation protection program.

3. OCCUPATIONAL RADIATION PROTECTION PROGRAMME

The radioactive source storage facility be delineated as a controlled area. The storage facility will be constructed with 220mm brick wall and the underground pit will be constructed with 220mm concrete block.

Signage will be posted bearing the radiation symbol and the words:

'CAUTION RADIATION CONTROLLED AREA'

Vibrant Upstream general policy is to keep radiation levels for personnel as LOW AS REASONABLY ACHIEVABLE (ALARA). The maintain the personnel exposure to radiation as low as reasonably achievable the principles of radiation protection will be implemented. Radiation protection principles of time, distance and shielding should be used at all times to ensure that doses remain below regulatory requirements and consistent with the ALARA principle.

Methods of dose assessment and Dosimetry service provider

- Vibrant Upstream employee's occupational exposure will be monitored using individual exposure.
- In addition to individual monitoring workplace monitoring programme will be implemented using Electronic Personnel Dosimeter (EPD) and radiation survey meter will be used.

- A contamination monitor will also be kept on the site.

Occupational Dose Limits

Occupational dose limits that will be implemented at Vibrant Upstream is as documented in the Radiation Protection and Waste Disposal Regulations.

Table 1: Vibrant Upstream

Group to be Monitored	Dose limit
Radiation Workers	20 mSv (average over 5 years)
Members of the Public	1 mSv

Engineered controls.

- Only authorized person should be at the radiation sources storage facility area using ALARA principles.
- All radioactive material shall be secured and kept in a designated storage area.

The health surveillance program

Health surveillance is used to identify possible health risk hazard and early signs of work-related illness are detected. All employees will undergo an appropriate initial and periodic medical examinations at an occupational health practitioner.

4. PUBLIC EXPOSURE MONITORING PROGRAMME

Description of exposure pathways and Critical groups

The likely public exposure critical group would be the personnel working at nearby warehouses within farm 38. The likely exposure pathway would be direct gamma exposure. The route to the storage facility on farm 38 does not include passing by a potential member of the public.

Visitors/clients shall be provided with adequate information and control measures on the radiation exposure hazards and will be accompanied to at all times to the radiation storage bunker.

All the administrative duties i.e. sign in will be done at the office complex, whilst the source is guarded at the storage site.

5. SAFETY AND SECURITY OF RADIATION SOURCES

Measures that will be employed to ensure the safety and security of sources

The sources to be stored will Americium (Am) 241/Beryllium (Be) a neutron radiation emitter and Cesium (Cs-137) that emits gamma and beta radiation.
These sources used in well logging are classified as category 3 radioactive sources as per the IAEA categorisation of radioactive Sources. The security arrangement will consist of Detection, Delay and Response measures.

Description of the scenarios relating to potential breach of security involving radioactive sources

A missing or stolen radioactive source constitute as a breach of security and can be a significant hazard if found by members of the public unaware of the radiation danger. It is imperative that anyone working with a radiation device be aware of the security implications.
In case of a stolen radioactive source the following will be implemented:

- The RSO should also immediately report a loss or theft to the local police and the NRPA.
- The RSO to notify the client
- A national security event response will be initiated with the National emergency response team.

6. TRANSPORT PLAN

Vibrant Upstream will not be transporting radioactive sources. Radioactive sources will be transported by the respective clients to the storage facility. Should a client require transporting, Vibrant Upstream will contract services of a licensed transporter.

7. EMERGENCY PREPAREDNESS AND RESPONSE

Radioactive sources have the potential for accident that could lead to unplanned exposure.

Possible incidents that would require emergency response are listed below:

- Damage leaking source
- Fire involving radioactive source
- Theft of the source from the storage facility

Damaged/Leaking source

In the event of a source damage or leaking the following actions shall be taken immediately:

- Isolate area around the source to prevent the potential spread of contamination.
- Inspect the area and confirm if there is any contamination.
- Ensure that source is in a suitable container for storage until disposal arrangements can be implemented.
- Re-inspect the area to ensure there has been no contamination. If contamination exists, the area needs to be clean before it is re-occupied.
- Complete an incident notification form and report the accident to the NRPA.

Involvement in a Fire

To handle a Major Fire effectively, the following procedure will be followed:

a. Immediately call the Walvisbay fire department.
b. Do not delay lifesaving actions.
c. The facility representative (RSO/ARSO, Consultant) are to assist Fire Department with facility specifications and radiation protection. Make sure they are aware where radioactive materials are stored as well as any precautions to avoid exposure or risk of creating or spreading radioactive contamination by use of high-pressure water, etc.

d. Consult with the Fire Department and set up a controlled area where the firefighters can be surveyed for contamination of their protective clothing and equipment after the fire is extinguished.
e. Once the fire is extinguished, advise the Fire Department not to enter potentially contaminated areas or areas where radioactive sources may be present until a thorough evaluation and survey are performed to determine the extent of the damage to the licensed material in use and in storage areas.
f. Perform thorough contamination surveys of the First Responders and their equipment before they leave the controlled area and decontaminate, if necessary.
g. Supervise decontamination activities.
h. Document incident. Determine cause and needed corrective actions.
i. Notify the National Radiation Protection Authority of the incident.

Vibrant Upstream Emergency Contacts

Name	Function	Contacts
Shakwa Nyambe	Executive Director	+264 81 149 9585
Elifas Simon	Manager	+264 81 122 8578
Fire coordinator	Walvisbay Fire department	+264 81 922
Police	Walvisbay Police	+264 64 21 9048
NRPA	NRPA Regulator	+264 612032417/18

8. WASTE MANAGEMENT PROGRAMME

All radioactive sources when no longer in use, will be returned to the manufacturer or supplier for final disposal by the respective client.

REFERENCES

ATOMIC ENERGY BOARD OF NAMIBIA, Advisory Material on Appropriateness and Competence of the person who can be appointed as Radiation Safety Officer.

GOVERNMENT OF NAMIBIA, Atomic Energy and Radiation Protection Act. Act 5 of 2005, (2005).

INTERNATIONAL ATOMIC ENERGY AGENCY, Categorization of Radioactive Sources, IAEA Safety Standards Series No. RS-G-1.9, IAEA, Vienna (2005).

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MINISTRY OF HEALTH AND SOCIAL SERVICES, Radiation Protection and Waste Disposal Regulations, MoHSS, (2011).

NATIONAL RADIATION PROTECTION AUTHORITY, Guide on the Development of a Radiation Management Plan, NRPA G_01 (2012).