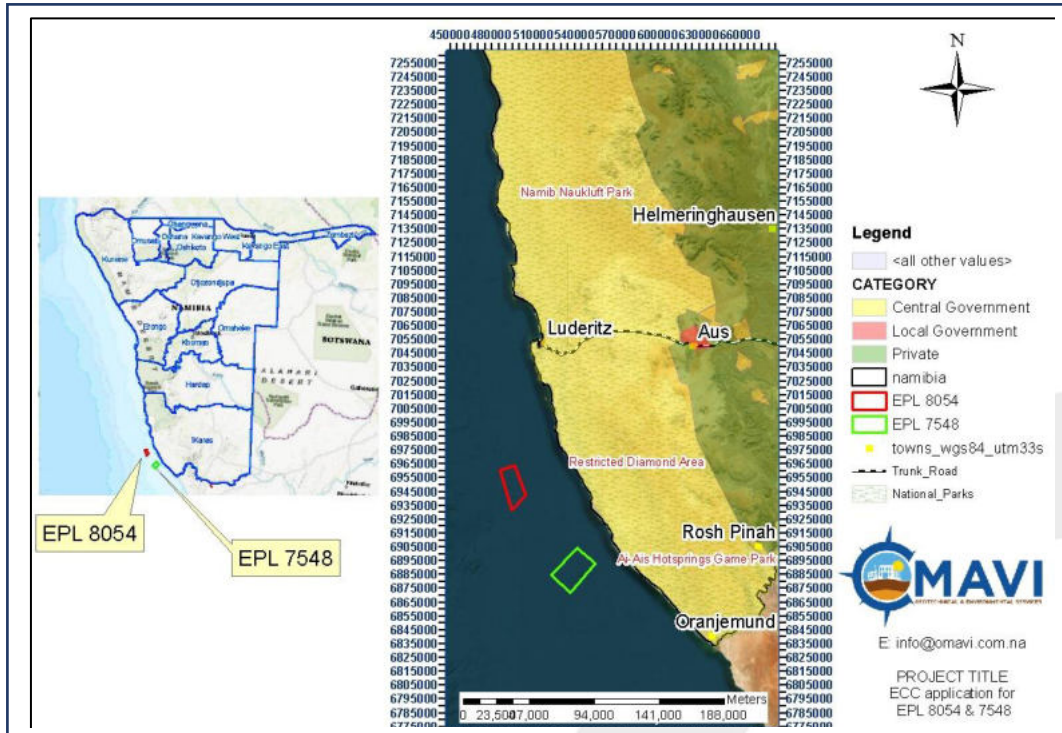


ENVIRONMENTAL MANAGEMENT PLAN



TO

Support NEW APPLICATION for Environmental Clearance Certificate (ECC) for the proposed offshore geophysical surveying and bulk exploration sampling for precious stones (and to a lesser extent precious metals, base and rare metals) on EPL 8054 and 7548 located in the southern west coast - Namibia

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LIST OF ABBREVIATIONS

BCLME	Benguela Current Large Marine Ecosystem
DEAF	Department of Environmental Affairs and Forestry
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
EIA	Environmental Impact Assessment
I&APs	Interested and Affected Parties
IMDH	International Mining & Dredging Holding (Pty) Ltd
ICCAT	International Commission for the Conservation of Atlantic Tunas
MFMR	Ministry of Fisheries and Marine Resources
MEFT	Ministry of Environment, Forestry and Tourism
MURD	Ministry of Urban and Rural Development
NIMPA	Namibian Islands Marine Protected Area



1 INTRODUCTION

This report provides details on the following aspects:

- A brief description of the proposed project activities; summary of the relevant regulatory framework in which the EMP shall be implemented; summary of the key potential impacts as identified in the environmental impact assessment; the environmental management and monitoring actions recommended to either mitigate or enhance potential impacts; and lastly, an independent judgement of the Environmental Assessment Practitioner (EAP) on how the proposed project activities should be executed to ensure safe and sustainable unlocking, and potentially development, of the targeted offshore mineral resources in the framework of industry best practice.

1.1 Objectives of the EMP Report

The primary objective of the EMP is to outline what measures and management strategies the proponent intends to proactively (and where inevitable, reactively) implement during the planning and execution of the proposed activities to ensure that those impacts which are deemed to have a significant impact on the receiving biophysical, physical and socio-economic environment are effectively managed to the extend practical.

In so doing, the proponent would be able to minimize the likely adverse impacts whilst maximizing potential benefits throughout the lifespan of the project. The EMP sets out the various regulatory requirements which the proponent ought to adhere to in so far as environmental best practice is concerned. The EMP further sets out the recommended adaptive environmental monitoring and performance programme which the proponent needs to implement to ensure that an inventory of high-quality baseline environmental data is developed over the exploration phase, and that factual to semi-factual data is collected over such duration with regards to key environmental performance indicators. Lastly, it is crucial to emphasise that the EMP is a live document which will be updated periodically to ensure that at any given point in time it reflects measures which are relevant and applicable to the prevailing site and operational conditions of the project.

1.2 Assumptions and Limitations of the EMP Report

This EMP was developed based on the following assumptions and limitations:

- The report is based on findings of the impacts assessment as carried out to date
- The EMP is a live document and shall be reviewed and updated periodically as and when the scope of activities changes and/ or when further data or information becomes available

- Where there is any conflict between the provisions of this EMP and any contractor's obligations under their respective service contracts, including statutory requirements (such as licences, project approval conditions, permits, standards, guidelines, and relevant laws), the contract and statutory requirements are to take precedence provided they are not in conflict with any environmental law or will in any way damage the environment.
- All personnel working on the project will be legally required to comply with the requirements set out in the EMP that is approved by the Government of the Republic of Namibia through the office of the Environmental Commissioner.
- Because of the high costs involved in mobilizing an exploration survey and sampling vessel, site-specific data and information of environmental significance will only be collected during the initial phases of exploration when the vessel(s) would be mobilized and commissioned for a multi-purpose campaign aimed at collecting data on:
 - The seafloor texture and morphology
 - The sub-surface geology and
 - Environmental data (e.g., marine mammals and sea birds sightings; videos and samples of benthic organisms and ecosystem; seawater temperatures and general quality; other socio-economic uses of the area based for instance on sightings of fishing/ other mining vessels and/ or oil/ gas platforms; etc)

This therefore implies that the EMP will be adjusted and updated continuously during and after the initial exploration campaigns to ensure that it reflects aspects recorded and observed on site. I.e., an adaptive strategy would be followed in formulating this EMP into a comprehensive and project area-specific document over time so that by the time this project advances to mining license stage (if exploration results are positive), there would be actual site-specific environmental data on which the EIA for such mining license could be based.

- The information contained in this EMP has been based on the project description as provided in the environmental impact report and its associated specialist inputs on fisheries, oceanography and general marine biology.

1.3 About the Proponent

Pointe Noire Investments cc (Reg. no.: cc/2013/04242) is the sole holder and proponent of the two (2) EPLs concerned herein, namely: EPL 7548 and EPL 8054. This proponent intends to work directly with a third party partner who will provide the necessary financial and technical support towards the implementation of the planned geophysical and seabed bulk gravel sampling activities.

1.4 About the Environmental Assessment Practitioner

OMAVI Geotechnical & Environmental Services was appointed by the licenses holder to undertake an Environmental Scoping Assessment (ESA) and prepare the project-specific Environmental Management Plan (EMP) for the proposed offshore diamond prospecting activities, in accordance with the Environmental Management Act, 2007 and its 2012 EIA

regulations. OMAVI Geotechnical & Environmental Services is a specialist environmental consulting entity, with considerable industry experience in environmental compliance and environment management of exploration and mining projects. Our team of scientists possesses the right set of technical and analytical skills which collectively ensure that we understand, in an integrated manner, how a set of planned activities would interact with the biophysical, socio-economic, and political landscape within which such activities are envisioned to take place. Additionally, OMAVI is robustly experienced in undertaking state of the environment reporting, Waste Management Planning, Environmental Management Plans (EMPs), public participation, as well as the management and co-ordination of all aspects of the Environmental Impact Assessment (EIA) value chain. OMAVI has been active in the above fields, and in so doing has made a positive contribution towards environmental protection and sustainable development in Namibia.

At OMAVI we are grounded in the idea that a balance between development and environmental protection is achievable through proactive and integrated planning whereby projects are designed and executed with sustainability, closure and rehabilitation goals in mind.

In addition to the in-house team from OMAVI, two (2) specialist studies were undertaken as follows:

- An oceanographic study – to help better understand the oceanic physical processes, climatic conditions of the southern west coast, and how such an environment would likely be affected by the proposed activities.
- A marine biology and fisheries study – to help better understand the fisheries and marine biological setting in the area, and how these would likely be impacted by the proposed activities.

1.5 Project Description

1.5.1 Project locality

The 2 EPLs concerned are located within the 200m water depth contour, off the southern west coast of Namibia. EPL 7548 is located approximately 20km offshore directly southwest of Chameis Bay, while EPL 8054 is located about 40km offshore directly west of Bongenfels. The 2 license fall outside the demarcation of the so-called Ecologically or Biologically Significant Areas (EBSAs), namely:

- The Namibia Marine Islands
- The Orange Seamount and Canyon Complex and
- The Orange Cone

Exploration will primarily focus on unlocking potential marine diamond deposits in the 2 areas, with opportunistic sampling of the continental shelf overburden and footwall sediments to be taken in select areas for subsequent geochemical assaying for the other commodities listed.

Both licenses are situated within the Namibian waters Exclusive Economic Zone and are surrounded and/ or lie near other inactive and active offshore diamond, oil and gas prospecting and mining concessions as depicted in Figure 1.1. A regional locality map for these licenses is also provided in Figure 1.2, while the approximate corner coordinates for the 2 license areas are provided in Table 1-1. The relative location of the licence areas to the EBSAs is shown in Figure 1.3.

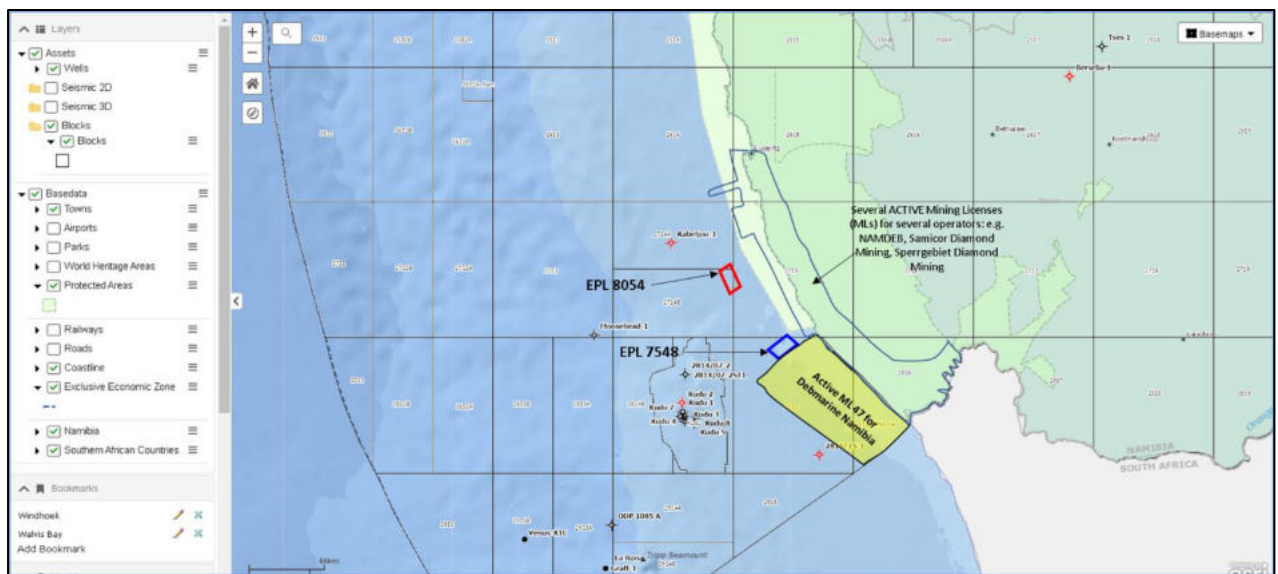


Figure 1.1. Location of EPLs 8054 and 7548 relative to active exploration and mining concessions for diamonds as well as Oil & Gas

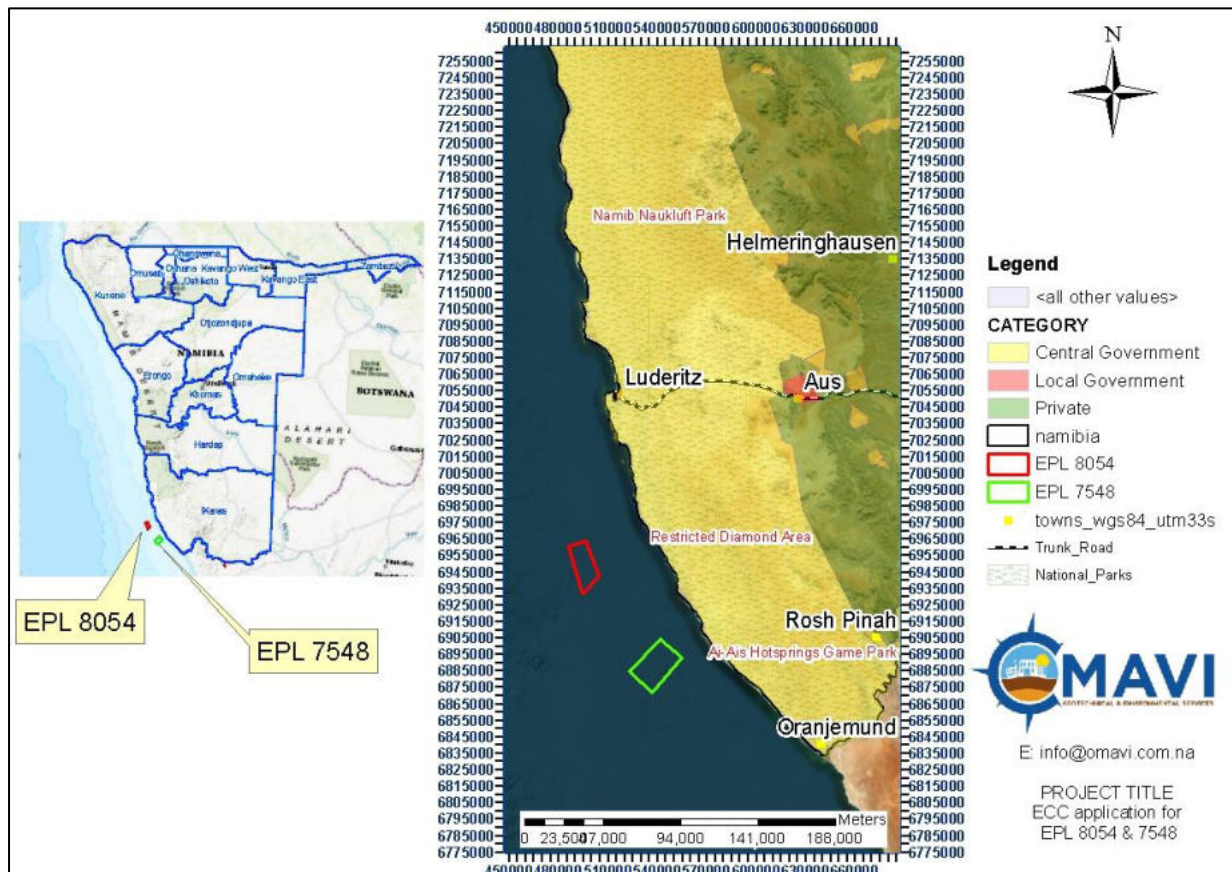


Figure 1.2. Regional and local locality map of EPLs 7548 and 8054.

Table 1-1. Approximate Corner Coordinates - EPL 7548 and EPL 8054

SITE NAME	LATITUDE	LONGITUDE
EPL 7548	-28°05'25.63" S	15°33'36.41" E
	-28°16'43.43" S	15°22'40.36" E
	-28°10'6.69" S	15°14'12.09" E
	-27°59'3.32" S	15°25'13.90" E
EPL 8054	-27°28'43.05" S	14°51'27.29" E
	-27°26'53.40" S	14°57'48.27" E
	-27°38'30.02" S	15°02'36.96" E
	-27°44'38.54" S	14°56'39.71" E

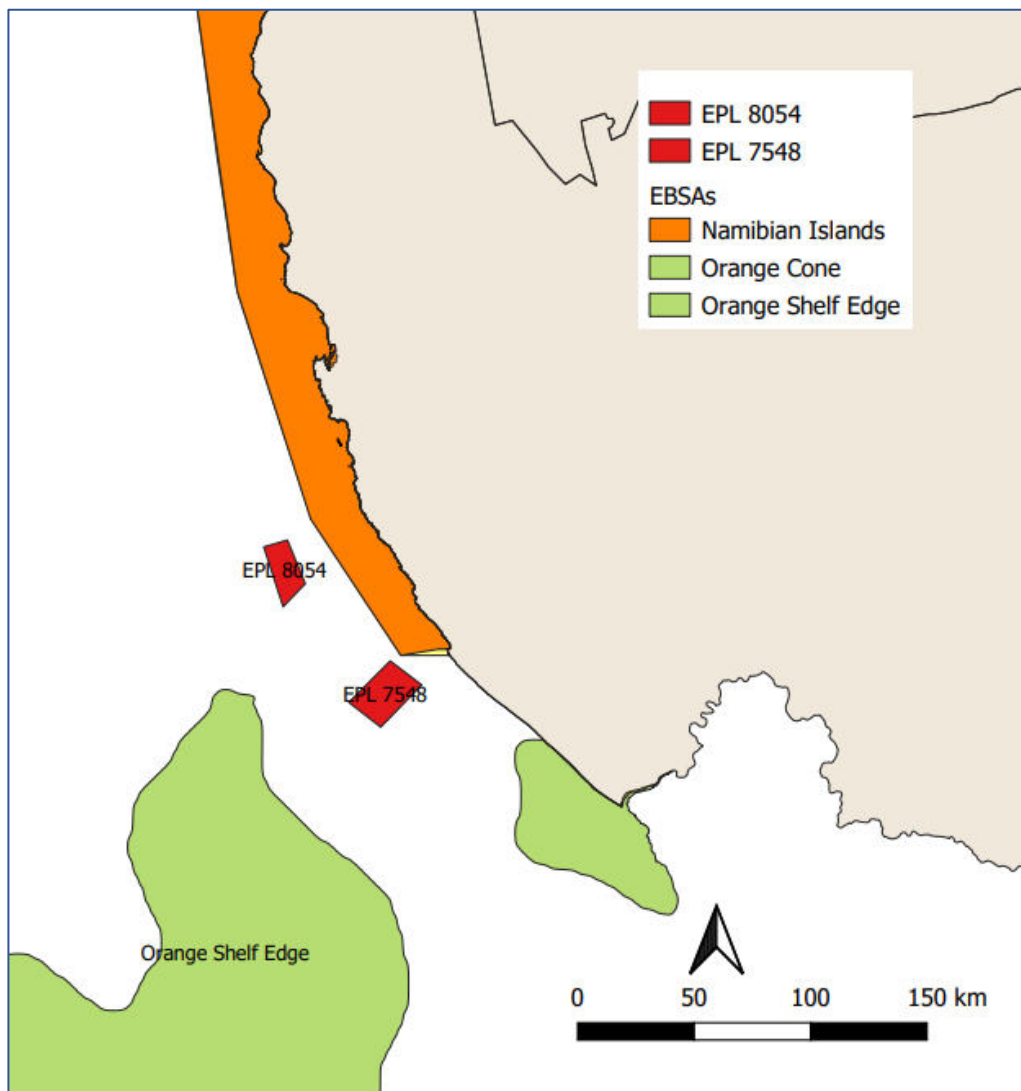


Figure 1.3. Location of EPL 8054 and 7548 relative to the EBSAs

1.5.2 Exploration and Mining history of the license area and surroundings

The two EPLs lie in the south-western coast of Namibia, forming part of a broad offshore area which has been widely explored and mined for gem quality diamonds by several prospectors and miners over many decades. According to Schneider (2020), the first diamonds from the sea floor were recovered in shallow waters off the Namibian coast some 110 years ago. However, it took 50 more years, before some systematic sea floor diamond mining with purpose-built barges to prospect and recover diamonds from Namibian waters in the early 1960s. This was followed by a period of detailed exploration and mining tool development, which saw Namibia emerge as the leading nation in marine diamond mining in the late 1980s. Today, a fleet of several modern mining and exploration vessels is involved in the recovery of more than three quarters of Namibia's diamond production. As the process involves modification of the seafloor, careful monitoring and impact mitigation is carried out according to international best standards.

It is well documented that in 1961 an American entrepreneur by the name of Sammy Collins established a company known as Marine Diamond Company (Pty) Ltd in the then South-West Africa, to prospect and exploit diamond deposits offshore adjacent to the coastal mines then operated by Consolidated Diamond Mines (CDM) (Pty) Ltd onshore. He reportedly discovered economically viable deposits in the sea, close to the shore immediately to the north of Chameis Bay and thereafter commenced with production using specially constructed barges and a converted tank-landing craft. Offshore diamond prospecting and mining along the Namibian west coast has continued to this day, facilitated by continuous improvements in technologies utilized in the exploration, mining and recovery processes.

At present companies such as Debmarine Namibia (DBMN), Samicor/ Nutam, and Namibia Diamond Company (Pty) Ltd remain big players in offshore/ marine diamond resource prospecting and the management of a fleet of vessels in the vicinity of the concerned EPLs. Their current prospecting and production activities are conducted offshore between Luderitz and Oranjemund, in water depths up to just over 200m. Several smaller players are also active in this same area, but due to limited capacity their activities are largely confined to the shallow waters, typically in water depths not exceeding 50m to 100m. A map showing the various historical and active diamond mining licenses in the vicinity of the 2 EPL areas is provided in Figure 1.4. These are clear indications of the intensity of exploration and mining activities targeting offshore mineral resources in the area, and are clear indications that the proposed scope of exploration activities are not new to this broad south western coast of Namibia. These activities further suggest the non-pristine nature of the natural environment.

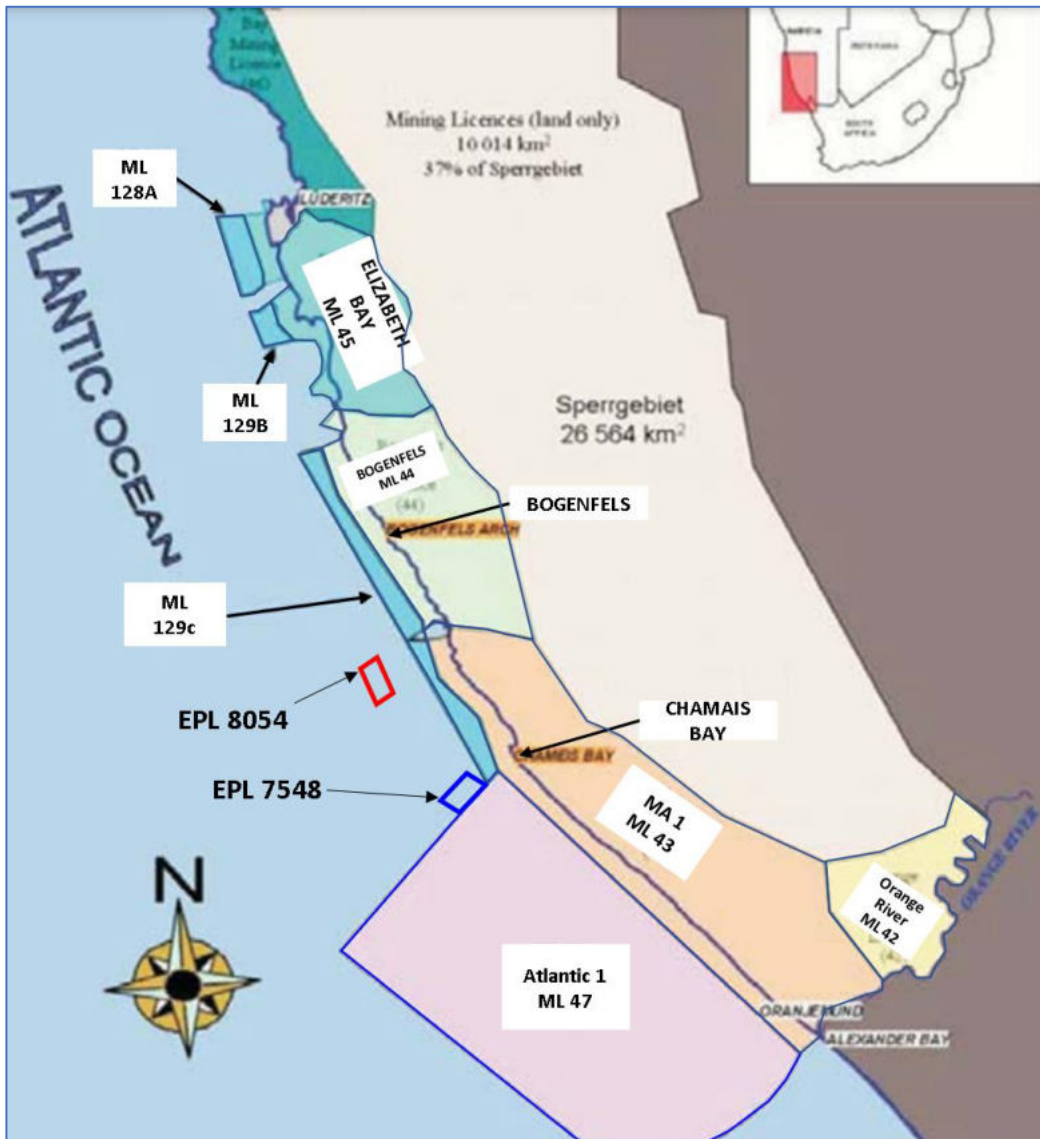


Figure 1.4. Map of historic and active diamond mining licenses in the vicinity of the 2 EPL areas

Based on the current licensing database of the MME, the project areas fall within or in close proximity to Oil/ Gas blocks 2714A, 2715 and 2815 which are largely held by the Namibian National Petroleum Corporation (Namcor). According to the National Petroleum Corporation (NAMCOR), Namibia has four (4) offshore basins which cover a combined surface area of approximately 826 000 km² with water depths ranging from 0 to 400m and have been subjected to seismic survey and exploratory drilling for oil and gas over the years until to date. These basins include the Orange Basin, the Luderitz Basin, the Walvis Basin and the Namib Basin. The 2 EPLs fall within the Orange Basin and thus form part of a potential oil and gas field (refer to Figure 1.5).

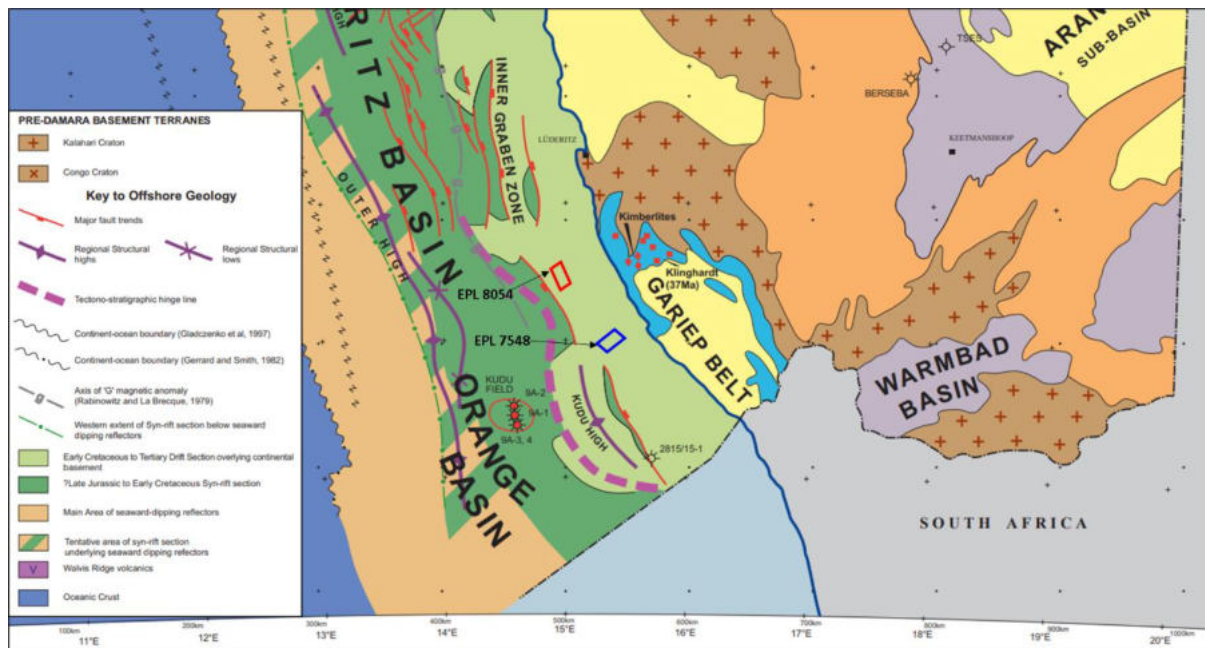


Figure 1.5. Onshore and offshore geological map of southern Namibia (1:2000 000 scale)

With an open licensing system adopted in 1999, Namibia experienced an influx in oil/ gas exploration activities from 2008 to date especially the acquisition of 2D and 3D seismic surveys as more corporate entities showed interest in the hydrocarbon potential of the West African margin. Within this period six (6) exploratory wells were drilled by various operators: Sintezneftegas drilled Kunene-1 and Moosehead-1 wells in 2013, and Repsol drilled Welwitichia-1 Well in 2014. Some of these well results confirmed the presence of Lower Cretaceous clastic and carbonate reservoirs and also proved an oil-based working petroleum system with two thick, rich mature source rocks within the Aptian Interval. In 2018 two more wells were drilled in the Walvis Basin by Tullow Namibia (Cormorant-1) and Chariot Oil & Gas (Prospect S), respectively. Recent drilling campaigns in 2021/ 2022 by Shell Namibia (Graff-1) and TotalEnergies (Venus-1X.T1) made significant light oil discoveries with associated gas within the Orange Basin. These wells and associated license blocks are shown schematically in Figure 1.1 as well as the figure below, together with the principal holders of those licenses. Exploration activities for oil and gas in the Orange Basin are expected to intensify in the coming years, but little interference and competition for ground is expected between the latter activities and those for diamond exploration as oil/gas exploration will be concentrated more in the deep waters.

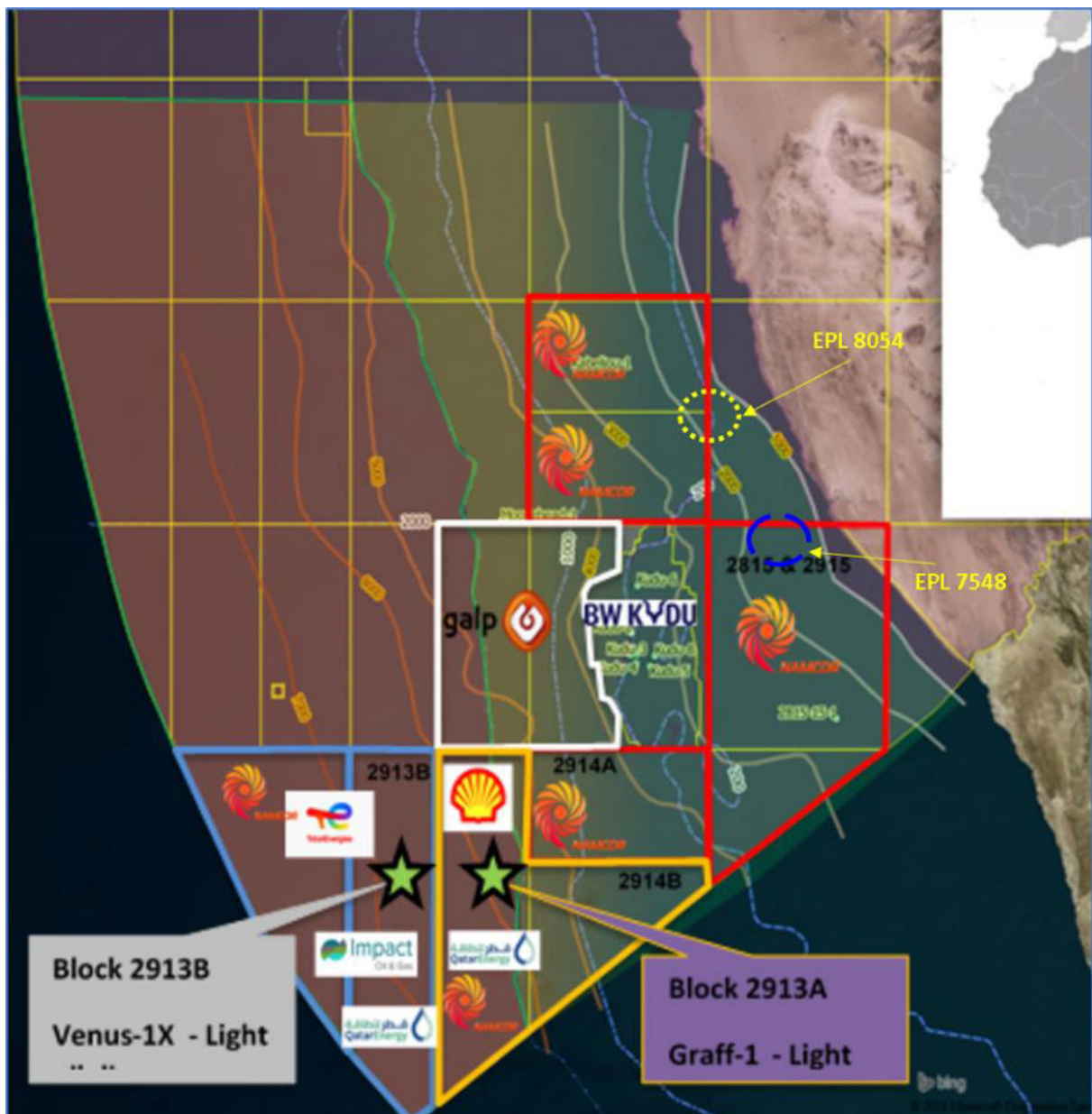


Figure 1.6. Oil/ Gas blocks coinciding with the 2 EPLs as well as recent exploratory wells and associated operators

1.5.3 Scope of planned activities

The envisaged exploration program, which has been costed and was ultimately approved by the proponent and their third-party partners, would entail non-intrusive geophysical surveying followed by intrusive bulk seafloor subsurface sampling and onboard processing. A phased approach was deemed to be the most economical option as it would minimize and de-risk CAPEX requirements, and the overall objective is to search for potential occurrences of economic deposits of diamondiferous gravels and to a lesser extent metallic deposits (of rare, base and precious metals) for possible future mining using specialised chartered exploration and mining vessels. The phased program will commence with the acquisition of seafloor and seafloor subsurface geophysical data, and based on the interpretation of such data targets for bulk sampling will then be generated. This approach will ensure that all bulk sampling and subsequent onboard sample processing activities are focussed on a select number of high potential areas, which in turn would ensure that the program is optimized and that the overall footprint of offshore ground to be disturbed is minimized. Bulk sampling would be further phased out into 2 sub-phases, comprising:

- An initial phase during which as many of the reasonably sized gravel terraces identified from geophysical data would be sampled to ground-truth geophysics in terms of gravel occurrence and identify possible mineralization, and
- A follow up in-fill sampling phase
- During each of these sub-phases, opportunistic sampling for metallic deposits (i.e., rare, base and precious metals) will be undertaken by collecting bagged samples of overburden and footwall material for subsequent geochemical analysis onshore.

Due to limited to non-existent local availability of suitable technologies, it is envisioned that either prospecting activities will be carried out using vessels chartered from IMDH or a similar organization, namely: the DP Star for geophysical surveying and the mv Explorer for bulk sampling. It is also important to mention that in addition to these two key activities, the proposed prospecting program will trigger other supporting activities which were equally considered in this EIA report. The table below summarises the full list of activities which would be triggered by this project.

Table 1-2. Summary of key project activities planned (details for each project are contained in the accompanying EIA report)

PROJECT ACTIVITY	STAGE OF PROJECT ACTIVITY WILL TAKE PLACE
Vessel mobilization (sailing/ steaming, laying anchors, positioning) and demobilization	During phase 1 (geophysical surveying) & phase 2 (bulk sampling)
Seafloor bathymetric surveying	During phase 1 (geophysical surveying)
Seafloor subsurface seismic surveying	During phase 1 (geophysical surveying)
Seafloor subsurface bulk sampling	During phase 2 (bulk sampling)
Onboard processing of sediments	During phase 2 (bulk sampling)
Discharge of tailings overboard	During phase 2 (bulk sampling)
Vessel support flights and associated processes	During phase 1 (geophysical surveying) & phase 2 (bulk sampling)

Sailing of support vessel (to transport supplies; remove waste; bunkering purposes, etc)	During phase 1 (geophysical surveying) & phase 2 (bulk sampling)
Bunkering/ re-fuelling at sea	During phase 1 (geophysical surveying) & phase 2 (bulk sampling)
Management of various forms of waste at sea and onshore (e.g., sewage, packaging materials, waste glass/ cans/plastic; detergents, scrap metals, used oils/ lubricants, infectious waste, empty drums and containers)	During phase 1 (geophysical surveying) & phase 2 (bulk sampling)
Mixing and management of FeSi	During phase 2 (bulk sampling)
Operation of office and logistics support base in Luderitz	During phase 1 (geophysical surveying) & phase 2 (bulk sampling)

Specific and in-depth details for each of the above-mentioned planned activities can be found in Section 2.3 of the accompanying EIA report.

2 LAWS AND POLICIES RELEVANT TO THIS EMP

In Namibia all aspects related to the prospecting, mining and extraction plus processing of mineral resources are vested in the state and regulated by the Ministry of Mines and Energy (MME) whereas overall sustainable exploitation and management of the environment and use of natural resources is regulated by the Ministry of Environment, Forestry and Tourism (MEFT).

The Minerals Prospecting and Mining Act (Act No. 33) of 1992 is the principal act governing exploration, mining and beneficiation of mineral resources in the Republic of Namibia. Numerous references to environmental protection and sustainability are contained in this Act, which provide for mine health and safety, environmental impact assessments, rehabilitation and the sustainable utilization of natural resources to either prevent or minimize pollution.

On the other hand, MEFT is the overseeing regulating agency for the administration and enforcement of the Environmental Management Act of 2007 (Act no. 7 of EMA), with the enforcement of the Environmental Impact Assessment Regulations of 2012 specifically being entrusted with the Department of Environmental Affairs and Forestry (DEAF) within MEFT. This Act stipulates that possession of an Environmental Clearance Certificate is a pre-requisite for the continuation of running or operating any activities that are listed under the Environmental Impact Assessment Regulations of 2012. The act further sets out under Section 58 and in the Government Notice No. 29 of 2012 a detailed framework and schedule for conducting Environmental Impact Assessments for mining and mineral processing companies or any entity that plans to undertake exploration, mining, and/ or processing of mineral resources at any scale.

In addition to the above local legislature, the below listed organs of state would be obligated to play a key role in this project towards environmental protection and the over safety and health of all involved personnel:

- **Ministry of Fisheries and Marine Resources (MFMR):** The MFMR, specifically the Directorate of Marine Resource Management, is mandated to control the well-being and sustainable utilization of all living marine resources within the Republic of Namibia. For projects which are to be undertaken at sea this ministry forms part of the EIA reviews, and is an integral stakeholder which would be required to provide inputs into the evaluation of these reports.
- **Ministry of Health and Social Services (MOHSS):** The use of radiation sources and X-ray machines in the diamond sorting and recovery process would require authorization from the National Radiation Protection Authority (NRPA) in accordance with the rules and regulations set out under the Atomic Energy and Radiation Protection Act (Act no. 5 of 2005). The occupational and public health division of this ministry would also play a key role towards the prevention, regulation and response of occupation and public health issues which may arise from the project.
- **Ministry of Works and Transport (MWT):** The Directorate of Maritime Affairs is the central government's lead agency responsible for effective implementation and enforcement of the National Maritime Pollution Contingency Planning, and response in accordance with the Prevention and Combating of Pollution of the Sea by Oil Act (Act no. 6 of 1981, and amended by Act no. 24 of 1991). In addition, the Directorate of Civil Aviation (DCA) will oversee all aircraft and helicopter related services to ensure compliance to local and international air flight requirements. It would therefore play a key role in preventing and/ or managing pollution that could arise from operating vessels at sea.

It is emphasized here that every effort was made by OMAVI's team to seek input into this project from the relevant departments in these ministries during the public participation stage. This was accomplished through written communications in the form of both emails and official letters, but unfortunately, no written inputs had been received by OMAVI's office at the time the stakeholder engagement period ended (refer to the Proof of Consultation package, attached).

In accordance to the above local legislature, a number of mandatory permits are required by the proponent and her partners as set out in Table 2-1 below.

Table 2-1. Permitting requirements for the proposed project

Permit/ Authorizations Required	Governing local law	Required by When	Permitting Body
Exclusive Prospecting License (EPL)	Minerals (Prospecting and Mining) Act (Act No. 33) of 1992	Must be renewed every 3-years	Mines Directorate (Ministry of Mines and Energy)
Environmental Clearance Certificate (ECC)	Environmental Management Act of 2007	Must be renewed every 3-years	Department of Environmental Affairs and Forestry (Ministry of Environment, Forestry and Tourism)
Radiation authorization for transportation, storage and usage of radiation source	Atomic Energy and radiation Protection Act (Act No. 5 of 2005)	Before usage of the onboard recovery plant	National Radiation Authority of Namibia (Ministry of Health and Social Services)
Pollution Safety Certificate for Vessels operating within Namibia's maritime environment	- Prevention and Combating of Pollution of the Sea by Oil Act (Act no. 6 of 1981, and amended by Act no. 24 of 1991) - Maritime Traffic Act (Act no. 2 of 1981) (and Amended by Act no. 15 of 1991)	Before mobilization of the chartered vessels	Department of Maritime Affairs (Ministry of Works and Transport)
Permits and authorization for recovery, storage and trading/ dealing with rough diamonds in Namibia	Ministry of Mines and Energy (MME): Diamond Affairs	Certificate handling and dealing with rough diamonds	Diamond Act (Act no. 13 of 1999) and the diamond control regulations gazetted on 1 April 2000 and Amended in 2003

2.1 Relevant regional and international obligations

Further to the local regulating framework outlined above, Namibia is party to a number of international conventions which are of significance to marine operations as set out in below.

Table 2-2. Summary of regional and international conventions relevant to this project

International Convention	Relevance to this project
International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 Protocol on Preparedness, Response and Co-operation to Pollution Incidents by	Provides the basis for: <ul style="list-style-type: none"> - developing a national system for pollution response

<p>Hazardous and Noxious Substances, 2000 (OPRC-HNS Protocol)</p>	<ul style="list-style-type: none"> - maintaining adequate capacity and resources to address oil and hazardous and noxious substances (HNS) incidents - facilitating international cooperation and mutual assistance in preparing for and responding to major oil and HNS incidents
<p>International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)</p>	<p>Namibia is party to Annexes I, II, III, IV, V and VI of MARPOL 73/78. Those Annexes relevant to the proposed exploration activities are briefly described below:</p> <ul style="list-style-type: none"> - Annex I – regulates the discharge of any oils and oily mixtures from ships - Annex II – regulates and controls pollution by noxious liquid substances - Annex III – regulates prevention of pollution by harmful substances carried by sea in packaged form - Annex IV – regulates the prevention of pollution by sewage from ships - Annex V – regulates the prevention of pollution by garbage from ships - Annex VI – regulates the prevention of air pollution from ships
<p>United Nations Convention on the Law of the Sea, 1982</p>	<p>Article 221 provides general powers for party states to take and enforce measures beyond the territorial sea to protect their coastline or related interests from pollution or threat of pollution following a maritime casualty or acts relating to such a casualty, which may reasonably be expected to result in major harmful consequences</p>
<p>The Abidjan Convention for the Co-operation in the Protection and Development of the Marine and Coastal environment of the West and Central Region, 1981</p>	<p>Protocol Concerning Co-operation in Combating Pollution in Cases of Emergency in the Western and Central African Region, 1985. The protocol provides for cooperation when responding to marine pollutions.</p>
<p>Benguela Current Convention</p>	<p>Benguela Current Convention creates the legal framework for Angola, Namibia and South Africa to promote integrated management, sustainable development and protection of the Benguela Current Large Marine Ecosystem (BCLME) using an eco-system approach to ocean governance focusing, inter-alia, on the management of shared fish stocks, environmental monitoring and early warning, biodiversity and ecosystem health, socioeconomics and governance</p>

3.1 Summary of impact triggering activities for key potential impacts

Table 3-1 below summarises the various impact triggering activities and processes for the key potential impacts identified for this project. An understanding of each major project activity and the potential impacts it is likely to trigger has significant bearing on deducing appropriate impact mitigation and/ or enhancing measures and strategies.

Table 3-1. Summary of impact triggering activities and their likely impacts

Major Triggering Activity(s)	Nature of impact	Likely Impact(s)
Acquisition of relevant permits from central government to support authorization of the proposed operation (e.g., EPL, ECC, radiation certificates, sea operations certificate, etc.)	Positive	Generation of revenue for government and business support to local technical permitting services providers
General operation of exploration vessels within Namibian waters		Generation of revenue for central government through port fees, various forms of taxes, airport charges
		Creation of limited number of jobs and procurement opportunities for locals
		Boost in business opportunities through procurement of support goods and services
		Use of Luderitz airport as logistics base
		Knowledge + skills transfer and development to Namibians from the involvement of locals in the proposed surveying and sampling campaigns
		Sponsorship for local research and educational projects to enhance understanding of the baseline recipient environment, rates of disturbance recovery post disturbance from sampling activities, marine mammals

		sighting studies, impacts on fisheries, and experiments on suitable sub-surface sediment recovery technologies to use
Conducting offshore geophysical surveys (coupled Side-Scan-Sonar/ Multibeam echo sound; and Seismic Acoustic surveys)	Negative	Lighting pollution which can in turn cause trauma and potentially impair eye sight in fish and marine mammals
		Generation of anthropogenic sounds due to acoustic sounds, and subsequent noise pollution which can in turn cause trauma to fish and marine mammals
Exclusion of other commercial activities (e.g., fishing) from the area due to right of way regulations		
Seabed and sub-bottom sediment sampling and overboard disposal of tailings		Generation of anthropogenic sounds and ground vibrations, and subsequent noise pollution which can in turn cause trauma to fish and marine mammals
		Excess sediment mobilization and loading into the demersal and pelagic ecosystems with subsequent adverse impacts on productivity of demersal and pelagic organisms
		Disturbance and destruction of benthic ecosystems due sediment loading and interaction of the sampling tool with ground
	Depletion of water column and near-bottom oxygen concentration through bacterial Decomposition of organic matter deposited with the tailings spoil	
		Blocking of vessel seawater intake system by dense surface aggregations of jellyfish may occur, thus, resulting in production delays

		Potential destruction of unknown wrecks / damage of sites of archaeological and/or palaeo-environmental value during prospecting activities
Operation of an onboard marine sediment processing and diamond recovery plant		<p>Repeated exposure of personnel working in the recovery section to radioactive sources (X-rays)</p> <p>Possible pollution due to handling and storage of FeSi</p> <p>Increased seawater turbidity due to overboard tailings discharge, with possible reduction in productivity of pelagic organisms</p> <p>Personnel health and safety risks (e.g., trips and falls, exposure to noise and vibrations)</p>
General operation of a sampling vessel on anchors		<p>Exclusion of other commercial activities (e.g., fishing) from the area due to right of way regulations</p> <p>Solid & liquid waste generation, waste handling, waste storage onboard and possible exposure of marine living organisms to such waste</p> <p>Irretrievable loss of sampling tools or anchors on the seabed, thereby creating artificial hazards on the seabed</p> <p>Collisions of birds with ship cables</p> <p>Exposure of sea mammals and birds to oils and other toxic substances (e.g., FeSi)</p> <p>Personnel safety risk arising from possible pirate attacks</p> <p>Possible pollution by hydrocarbons during re-fueling and due to accidental spillages</p>

		Air pollution due to gas emissions from burning fuels, incinerators, running engines
		Risk of sinking of exploration or support vessel, or of helicopter, resulting in marine pollution from oils, waste onboard and radioactive material on seabed
		Risk of ignoring or not enforcing or implementing impact management actions/ measures recommended due to poor environmental awareness; or poor internal communication on the EMP's requirements; or lack of willingness by management to comply; or inadequate allocation of required resources
Support activities for surveying and sampling vessel		Risk of sinking of personnel helicopter(S) and support vessels, resulting in marine pollution from oils, waste onboard and radioactive material on seabed
		Possible disturbance of estuarine birds at the Kunene River Mouth and biologically significant coastal areas by noise caused by the use of helicopters for transfer of crew and supplies
Project closure activities (whether planned, or sudden due to poor sampling results)		Termination of all exploration activities and relinquishing of the EPL, resulting in loss of license levies, taxes, limited employment and support to secondary industries
		Post-decommissioning environmental deterioration; disputes with alternative resource operators (e.g., from fisheries, oil and gas exploration); and disputes with employees



3.2 Environmental Management Actions

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In accordance with the findings of the impact assessment carried out in the accompanying environmental impact assessment report, the impact management actions outlined in Table 3-2 below are recommended. The primary goal of the EMP is to formulate and provide integrated practical measures that can elevate the significance level of the positive impacts to a medium and/ or high category, and simultaneously, reduce the significance level of the adverse impacts to a low category to the extent practical.

Table 3-2. Recommended impact management Plan Actions for the proposed offshore geophysical surveying and bulk sampling activities

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
POSITIVE IMPACTS						
Generation of revenue for government through port fees, various form of taxes & licensing/ permitting levies	- Timely payment of all levies and license fees to the government of the Republic of Namibia	<ul style="list-style-type: none"> - MME to enforce compliance on payment of license levies - NAMPORT to ensure that port and harbour fees are collected as and when required - The Namibian Airports Company (NAC) to ensure that airport levies are collected timely - NAMRA to ensure that all parties (e.g., proponent and any 	- All government taxes, and applicable license levies/ fees as well as port/ harbour are paid on time	Proponent (Executive Management: Operations, Finance and Legal) Various appointed technical permitting consultants Organs of State (NAMRA, NAMPORT, NAC)	- Financial resources	Ongoing over duration of proposed activity and validity period of license

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
	<p>- Preferential opportunities for business and employment are created for Namibians, prioritising people/entities of the Kharas region</p> <p>- The local airport in Luderitz must be utilized as support logistical bases for the proposed operations if the need for such support bases arises</p> <p>- Research opportunities on marine geology, marine biology, fisheries and</p>	<p>third party partners) involved in the honour all state tax obligations</p> <p>- MME to ensure they have full-time onboard representation in the form of a mineral expert (such as diamond inspector) to regulate rough diamond recoveries and handling</p>				
<p>Creation of limited number of jobs and procurement opportunities for locals</p>	<p>- Research opportunities on marine geology, marine biology, fisheries and</p>	<p>- Given the fact that the exploration phase shall be constrained by financial resources and time, at least until such time that initial exploration results have substantiated the need to expand the project's budget and duration, there is not much which can be changed in terms of the project's design to increase local content in employment</p>	<p>- Prioritise outsourcing maintenance support and other services to experienced local entities and persons</p> <p>- Come up with a dedicated fund for skills development, training and research for a selected number of</p>	<p>Proponent (Management: Human Resources, Procurement, Operations)</p> <p>Namibian Labour Commission</p> <p>MEFT inspectors</p> <p>MME inspectors</p>	<p>- Human capital (active youth)</p> <p>- Financial resources for training & development of required skills amongst local youth</p>	<p>Ongoing over duration of proposed activity and validity period of license</p>

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
	marine GIS are promoted by management to help develop a strong inventory or database of site specific baseline information	<p>and procurement opportunities</p> <p>- Minor modifications can however be made to the project's modus operandi by proponent to ensure that employment opportunities are biased towards Namibians.</p>	youths from the Region			
Boost in business opportunities through procurement of support goods supply and technical/ maintenance/ advisory services		<p>- Only local companies should be shortlisted to provide supplies, technical advisory, administrative advisory & maintenance services</p> <p>- Preference to be given to local companies operating in the region, provided that they have demonstrated sound capacity and reliability</p>	<p>- To the extent practical specialised maintenance work is outsourced to Namibian companies. Where capacity lacks the proponent has actively developed practical measures to change that</p> <p>- at least 70% of the annual budget for outsourced services</p>	<p>Proponent (Management: Operations, Finance, Procurement/ Supply Chain, Engineering/ Technical Services)</p> <p>MEFT inspectors</p> <p>MME inspectors</p>	- Financial resources	Ongoing over duration of proposed activity and validity period of license

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
			<p>and supplies has gone to Namibian entities</p> <ul style="list-style-type: none"> - All technical permitting & administrative or legal advisory services is outsourced to local entities, prioritising those from the region - Support community upliftment projects in Luderitz as part of Corporate Social Responsibility 			
Use of Luderitz airport and harbour as logistics base		- the proponent must ensure that if any helicopter support services would be required, local companies must be invited to provide such a service first	- Use local harbours (Ludertiz) and their services for all major mechanical support and crew change flights to and from vessels	Vessel Manager Vessel Master	Human resources Financial resources	Ongoing over duration of proposed activity and validity period of license

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>- all efforts must be explored first to make use of Luderitz airport, harbour and other infrastructure/ facilities as logistics base</p>	<p>- All harbour, port and port, and handling facilities fees are settled within the allocated timeframes</p>	<p>Proponent (Management: Operations and Procurement/ Supply Chain Manager)</p>	<p>MEFT inspectors MME inspectors</p>	
<p>Administrative & technical Knowledge + skills transfer and development to Namibians</p>		<p>- Considering the tight schedule and limited financing allocated for the exploration phase, IMDH (or similar alternative) would be required to come with its technical personnel from South Africa; especially operators of sophisticated machinery. Hence, there will be limited room to train new locals during the exploration phase. However, if an economically viable deposit is discovered and the project is justified to proceed to</p>	<p>- Continuous Personnel Development trainings form a key part of each employee's KPIs</p> <p>- Environmental, safety and health awareness training is conducted regularly</p> <p>- Safety, health and environmental aspects are integrated into sub-contractor's contracts</p>	<p>Vessel Manager</p> <p>Proponent (Management: Human Resources; Engineering/ Technical Services; Environmental Officer)</p>	<p>Human capital</p> <p>Financial resources</p> <p>MEFT inspectors</p> <p>MME inspectors</p> <p>MFMR inspectors</p>	<p>Ongoing over duration of proposed activity and validity period of license</p>

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>mining phase, then the significance of this impact can elevate to very high</p> <p>- Continuous training on fire fighting, surviving at sea, environmental & health/ safety, sustainability aspects</p>	<p>Full-time presence of onboard fisheries + diamond inspector + mammals observer</p>			
<p>Sponsorship for local research and educational projects to enhance understanding of the baseline recipient environment, rates of disturbance recovery post disturbance from sampling activities, and experiments on suitable sub-surface sediment recovery technologies to use</p>		<p>- Where possible supply research/exploration data to the marine sciences and fisheries research communities to help stimulate research on geological and natural resource management in the area</p> <p>- Where possible, sponsor Namibian research and education</p>	<p>- Without comprising on data confidentiality requirements of the proponent, geological and geophysical data from the programme can be availed to research centres to stimulate research in areas of marine geology, marine biology, fisheries and marine archaeology</p>	<p>Proponent (Management: Geology and Environmental)</p> <p>MEFT inspectors</p> <p>MME inspectors</p> <p>MFMR inspectors</p> <p>Other operators in the same area</p>	<p>Financial resources</p> <p>Data from surveying & sampling</p> <p>Human capital (the local youth)</p>	<p>Ongoing over duration of proposed activity and validity period of license</p>

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>to contribute to public understanding of relevant environmental issues and environmental management practices e.g., invite scientists and experts to participate in environmental monitoring programmes and share knowledge on findings including contributions to marine biodiversity conservation, migration patterns of pelagic fauna, and habitat characteristics</p> <p>- Collaborate with other offshore players (e.g., Debmarine Namibia, Samcor, Namdeb, Shell, TotalEnergies, etc)</p>	<p>- Sponsorship funding is availed by proponent for such research activities</p>			

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		operating in the same area to build up a large database of the southern coast and marine environment				
ADVERSE IMPACTS						
Lighting pollution which can in turn cause trauma to fish and marine mammals	- The lighting and geophysical surveying technologies used emit light and sound levels which are minimal without compromise on quality of data	- No direct intervention possible other than the no-go alternative. The impact is highly reversible and short-lived over duration of the survey or sampling - Lighting can be minimized by ensuring that it is only used when necessary	None proposed at this stage	Vessel Master Proponent (Technical/ Engineering Manager) Proponent (Environmental)	Human capital	Ongoing during operation of vessels

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
<p>Generation of anthropogenic sounds due to acoustic sounds, and subsequent noise pollution which can in turn cause trauma to fish and marine mammals</p>	<p>- Where marine mammals are spotted within a 500m radius, halt operations</p>	<p>- No mitigation measures are possible but the following is recommended to better quantify the impact during subsequent prospecting stages:</p> <ul style="list-style-type: none"> - Consider providing specialised marine mammals observer training for the relevant monitors - Formulate and maintain a database of the geophysical techniques likely to be used for offshore diamond exploration and over time quantify noise/ sound levels generated from each of those sources - Carry out "soft starts" for any equipment of source levels greater than 210 dB re 1 µPa at 1 m over a period of 20 	<p>None proposed at this stage</p>	<p>Officer (onboard)</p> <p>MEFT, MME & MFMR inspectors</p>	<p>Funding for continuous improvement research and development (R&D)</p> <p>Human capital with suitable expertise & training</p>	<p>Ongoing during operation of vessels</p>

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>minutes to give adequate time for marine mammals to leave the vicinity</p> <ul style="list-style-type: none"> - Maintain an ongoing programme for marine life sightings from vessels to record the presence and proximity behaviour of sea mammals and seabirds near the vessels - Based on learnings from adjacent DBMN operations, when marine mammals are spotted while the vessel is on anchor or discharging tailings the vessel should remain stationary until the mammal has moved at least 500m or more away from the vessel - Implement a research programme on the noise impact of sonar 				

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>surveying on fish and marine mammals, as well as research into quieter sound sources</p> <p>- Use the lowest practicable power levels needed to achieve the survey objectives and consider methods to reduce and/or buffer unnecessary high frequency noise produced</p>				
Possible exclusion of other commercial activities (e.g., fishing, oil/ gas exploration) from the area due to right of way regulations arising from presence of exploration vessels	<p>- Right of way rules for vessels operating at sea are strictly adhered to and respected</p> <p>- Possible conflict with fishing minimized</p>	<p>- A process of notification and information-sharing should be followed with key identified fishing and Oil/ Gas industry associations as well as the Namibian Navy Hydrographic section. The required safety zones around the survey and sampling vessels should be communicated via the issuing of Daily Navigational Warnings for the duration of the</p>	<p>- Record of number of complains launched on conflict with other commercial activities</p> <p>- Record of sightings of other vessels and/ or oil rigs observed in the area, including a record of their</p>	<p>Vessel Manager and Vessel Master (to manage conflicts)</p> <p>- Proponent (Public Relations Officer)</p> <p>- Head of Namibian Navy</p>	<p>Maritime communication services</p> <p>Trained personnel</p>	Ongoing over durations of campaigns

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>sampling operations through the Namibian Naval Hydrographic Office</p> <ul style="list-style-type: none"> - At all times vessels must maintain a safe clearance distance between each other, with their respective Masters ensuring clear communication at all times - In the vessel logbook, record sightings of and interactions with other vessels to note potential conflicts over rights of passage and access to resources - At least 21 days prior to commencement of exploration activities <p>Notify: (1) the Executive Director of MME, (2) the</p>	<p>primary goal for being present in the area</p>	<p>Hydrographic Survey division</p> <p>MWT (maritime inspectors)</p> <p>MDF Navy chief</p>		

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>Executive Director of MWT, (3) the Executive Director of MFMR, (4) the Chief of Namibian Defence (Navy), (5) fishing associations, and (6) Namport's head of sea traffic in writing providing particular details of the intended dates of crew boarding at Luderitz, the destination location, nature and extent of such operations, and which lines of sight the vessels will be using for communication. Also notify other potential user groups with similar details such as fishing / aquaculture industry, NamPort and Kharas Regional Council,</p>				

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>Skeleton Coast National Park in writing, providing particulars regarding the location, nature, extent and duration of such operations. Lastly, notify Luderitz and Oranjemund Radios of intended vessel activities, light buoys and exclusion zones and perform a comprehensive risk assessment prior to sailing; covering the steaming and establishment in the EPL areas</p>				
<p>Disturbance and destruction of benthic ecosystems due sediment loading and interaction of the</p>	<p>Footprint of disturbed seabed is minimized during sampling and monitoring depicts recovery</p>	<p>- No direct intervention possible other than the no-go alternative. Optional measures to reduce the risk include setting aside an</p>	<p>- Footprint area of sampled positions does not exceed the sampling tool footprint area by 20%</p>	<p>Vessel Master Sampling tool operators</p>	<p>Funding to implement interventions</p>	<p>Ongoing during proposed sampling programme</p>

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
sampling tool with ground		<p>appropriate (i.e. size and seabed composition) portion of the EPL areas that will not be directly or indirectly impacted by bulk sampling operations in the foreseeable future; preferably low grade areas or areas with little to no mineralisation. Such areas could also serve as undisturbed reference sites in long-term monitoring studies assessing offshore sampling impacts</p> <p>- Develop a robust benthic sampling programme, that would be able to determine pre- and post-mining benthic community composition and demonstrate natural</p>		<p>Hydrographic Surveyor</p> <p>Environmental Officer (should flag oversized drill holes)</p> <p>MEFT inspectors</p>		

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>post-mining recovery of impacted communities</p> <p>- Disturbance of seabed is minimized by conducting post-sampling surveying/ scans to assess extent of tool wander or sample footprint. Technological and vessel handling interventions are undertaken to minimize tool wandering</p>				
<p>Depletion of water column and near-bottom oxygen concentration through bacterial Decomposition of organic matter deposited with the tailings spoil</p>	<p>Depletion of water column and near-bottom oxygen is minimized by minimizing organic input</p>	<p>- No direct intervention possible other than the no-go alternative. Optional measures to reduce the risk include setting aside an appropriate (i.e. size and seabed composition) portion of the EPL area that will not be directly or indirectly impacted by bulk sampling operations in the foreseeable future;</p>	<p>- Oxygen levels in water column and near bottom waters is comparable to those of undisturbed areas. Ambient oxygen levels can be established by sampling water column oxygen during geophysical survey phase (those</p>	<p>Environmental Officer</p> <p>MFMR inspectors</p>	<p>Funding & skilled/ trained human capital</p>	<p>Ongoing during the exploration campaign</p>

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>preferably low grade areas or areas with little to no mineralisation. Such areas could also serve as undisturbed reference sites in long-term monitoring studies assessing offshore sampling impacts</p> <p>- Measure oxygen levels in water column and near bottom at control sites and compare with those from sampled area</p> <p>- Based on results of bottom-oxygen levels, consider undertaking field/laboratory studies regarding the physiological oxygen tolerance for some large dermesal and benthic species, considered characteristic</p>	<p>values may be regarded as control values)</p>			

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
<p>Blocking of vessel seawater intake system by dense surface aggregations of jellyfish may occur, thus, resulting in production delays</p>	<p>Disturbance of aggregations of jellyfish is prevented and minimized</p>	<p>- Forward looking sonar could be installed on the vessel to identify dense masses of sub-surface jellyfish during operations. A "jellyfish observer" on deck should be able to identify jellyfish aggregations at the surface</p> <p>- Jellyfish sightings must form an integral part of the marine sighting program</p> <p>- Presence of an independent marine mammal observer (MMO) on the vessel, and must keep watch for marine mammals as well as aggregations of jellyfish</p> <p>- In the case of blockage, jellyfish will</p>	<p>- Sightings of all jellyfish aggregations are recorded and prevented from disturbance</p> <p>- Number of blockages due to jellyfish ingress are recorded</p>	<p>Environmental Officer onboard</p> <p>Sampling tool operators</p> <p>MFMR inspectors</p>	<p>Human capital</p>	<p>Ongoing during sampling campaign</p>

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		have to be physically removed or flushed from the system immediately				
Potential destruction of unknown wrecks / damage of sites of archaeological and/or palaeo-environmental value during prospecting activities	<p>- The Chance Find Approach is implemented where necessary</p> <p>- Disturbance or destruction of wrecks is prevented to the extent practical</p>	<p>- Specialist archaeologists to be hired to analyse high-resolution seafloor texture and sub-bottom geophysical data for possible wrecks, and delineate such sites out for further investigation prior to sampling</p> <p>- It is essential that the relevant managers and specialists be informed on finding of historical material that artefacts are retained and mining ceases within 500 m from the centre of the site until the area has been surveyed and clearance has been received from the relevant authorities. The Namibia National</p>	- Identified wrecks are preserved and protected by enforcing a 500-800m buffer zone	<p>Proponent (Environmental Manager)</p> <p>Vessel Master</p> <p>National Heritage Council</p>	<p>Funding to conduct further research on any wrecks found</p> <p>Human and intellectual capital</p>	Ongoing throughout exploration campaign

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		Heritage Council's procedures on Chance Finds should be strictly adhered to				
Repeated exposure of personnel working in the recovery section to radioactive sources (X-rays), as well as repeated exposure to vibrations, noise and trips and fall hazards in the plant	- The safety of all personnel onboard is optimized. Aim for Zero Lost Time due to safety incidences	<ul style="list-style-type: none"> - Vessels must be anchored when in position to maintain stability onboard - Oily decks must be regularly rinsed to minimize risks of fall and trips - All work onboard a vessel should be well coordinated through clear lines of communications - At all times vessels must maintain good communication and coordination with nearby vessels 	<ul style="list-style-type: none"> - Record of Annual radiation doze for each personnel working in the recovery. Interventions taken if dozes exceed threshold values - All personnel provided with all required/ necessary PPE at all times - Records of safety trainings and safety talks is available - Records of all incidences is available 	<ul style="list-style-type: none"> Vessel Manager Vessel Master Proponent (Health and Safety Officer) National Radiation Protection Authority MME inspectors Labour inspectors 	Financial resources	Ongoing over duration of campaign

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<ul style="list-style-type: none"> - At all times vessels must maintain a safe clearance distance between each other, with their respective Masters ensuring clear communication at all times 				
Possible pollution of seawater due to spillage and inadequate recovery of FeSi	<ul style="list-style-type: none"> - Promote integrated environmental, exploration and engineering approaches for all operating vessels 	<ul style="list-style-type: none"> - Optimal usage of ball mills set to optimal timeframes when processing materials from high-shell areas - Continuously monitor recovery rates and extend of FeSi 	<ul style="list-style-type: none"> - Record of incidences of FeSi spillage (records to include quantities involved) - Photographic evidence of the effectiveness of ball-mill crushing 	<ul style="list-style-type: none"> Proponent (Metallurgist) Environmental Officer onboard 	<ul style="list-style-type: none"> Funding Human & intellectual capacity 	Ongoing over duration of campaign
Increased seawater turbidity due to overboard tailings discharge, with possible reduction in productivity of pelagic organisms		<ul style="list-style-type: none"> - No absolute mitigation is possible - If the levels recorded in the sacrificial mixing zone exceed set water quality criteria (e.g. turbidity levels), conduct an ecological 	<ul style="list-style-type: none"> - Record of seawater turbidity levels prior to and at different times after decommissioning sampling. Formulate trends in turbidity levels decline over time 	Environmental Manager	<ul style="list-style-type: none"> Funding Seawater sampling tools 	Ongoing over duration of campaign

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>hazard assessment on the suspended sediment plumes</p> <ul style="list-style-type: none"> - Strictly implement a plume suspension monitoring program from the onset of the program to determine rate of plume dispersement - Have the monitoring results scientifically evaluated by an appropriate and suitably qualified expert - Consider hiring an expert to model rates of dispersal and diffusion of suspended sediment plume around sampling vessel - Monitor patterns of fish stocks in areas surrounding the EPL to 				

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>assess trends in available stocks</p> <p>- Consider quantifying the clay content of sampled seafloor sediments as that will help provide insights on risks posed by sediment plume</p>				
<p>Personnel health and safety risks (e.g., trips and falls, exposure to noise and vibrations)</p>	<p>- Promote and enforce safe and healthy working environment at all times</p> <p>- Avail all necessary gear required by crew to perform their tasks safely</p> <p>- Aim for zero LTIs</p>	<p>- Vessels must be anchored when in position to maintain stability</p> <p>- Oily decks must be regularly rinsed to minimize risks of fall and trips</p> <p>- All work onboard a vessel should be well coordinated through clear lines of communications</p>	<p>- Record of all safety and illness incidences is kept onboard</p> <p>- Record of all safety courses attended by each personnel each year</p>	<p>Vessel Manager</p> <p>Vessel Master</p> <p>Proponent (Health and Safety Officer)</p>	<p>Funding</p>	<p>Ongoing over duration of campaign</p>

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<ul style="list-style-type: none"> - At all times vessels must maintain good communication and coordination with nearby vessels - Usage of appropriate PPE at all times 				
<p>Solid & liquid waste generation, waste handling, waste storage onboard and possible exposure of marine living organisms to such waste and possibility of marine pollution due to accidental spillages, etc</p>	<ul style="list-style-type: none"> - Pollution of marine habitats and resources is prevented at all costs - Waste streams are effectively managed, with emphasis placed on minimising waste generation at sources - Reuse, recycling and recovering 	<ul style="list-style-type: none"> - The vessels must obtain specific exemption from the Namibian Directorate of Maritime Affairs before refuelling within 200 nautical miles of the coast - In the event of an oil spill, do the following: (1) follow approved procedures as set out in the Oil spill contingency plan, (2) Immediately (within 12 hours) inform the relevant competent authorities such as the Maritime Division at MWT, the Resource 	<ul style="list-style-type: none"> - Record of types and quantities of each type of waste generated onboard is kept - Records (including photographic evidence) of all waste spillage incidences is kept 	<p>Vessel Master</p> <p>Environmental Officer onboard</p> <p>Namibia Maritime Division at MWT</p> <p>Waste collection and recycling contractors</p>	<p>Funding</p> <p>Skilled human capital</p>	<p>Ongoing over duration of campaign</p>

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
	value from waste is promoted	<p>Management Division at MFMR, Chief of the Navy, and the Luderitz/Walvis Bayharbour masters</p> <ul style="list-style-type: none"> - Ensure that safe inshore waste disposal arrangements are in place throughout the operations - Comply with all legal requirements for waste management and pollution control, and employ "good housekeeping" and monitoring practices as set out under the MARPOL requirements - Ensure that a certified waste collection/ service provider is appointed to collect, transfer and handle all waste (e.g., scrap 				

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>metal, used oils, FeSi) that needs to be transferred to land for disposal, re-use and/ or recycling</p> <p>- A logbook of all waste and hazardous substances dispatched from a vessel at any given time should be kept. Such records should include type and quantity of waste, details of off-taker, destination location</p>				
Irretrievable accidental loss of sampling tools or anchors on the seabed, resulting in seabed hazards	- All accidentally lost tools/ equipment/ gear is recovered before decommissioning to eliminate future presence of hazards	- Develop and maintain hazards database listing the type of gear, equipment, tool left on seabed within or near the EPL areas. For each hazard details relating to gear type, position, dates of accident &	<p>- A well organized database of for all seabed hazards is in place</p> <p>- All seabed hazards are recovered prior to decommissioning</p>	<p>- Vessel Master (responsible for safe gear recovery)</p> <p>- Vessel Surveyor (responsible for hazard positions)</p>	Funding	Ongoing over duration of campaign

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		recovery, must be recorded		& updating database)		
Possible pollution by hydrocarbons during re-fueling and due to accidental spillages	Pollution of marine habitats and resources is prevented at all costs	<ul style="list-style-type: none"> - Usage of low sulphur marine gas oils must be adhered to at all times since such oils evaporate rapidly - Refueling must strictly take place under very strict conditions - All containers containing oils and lubricants must be appropriately sealed 	<ul style="list-style-type: none"> - Photographic evidence of spillages during refuelling - Incident reports of all such incidences 	<ul style="list-style-type: none"> Vessel Master Proponent (Technical/ Engineering Manager) Environmental Officer onboard Namibia Maritime Division at MWT 	Handling capacity and equipment	Ongoing over duration of campaign
Air pollution due to gas emissions from burning fuels, incinerators, running engines	Minimize air pollution through usage of low sulphur oils and minimizing gas emissions	- Strictly enforce compliance to atmospheric emissions as set out under Annex VI of MARPOL	<ul style="list-style-type: none"> - Low sulphur marine gas oil is used on all exploration vessels - All deviations from compliance to Annex VI of 	<ul style="list-style-type: none"> Vessel Manager Vessel Master Proponent (Technical/ 	<ul style="list-style-type: none"> Funding Skilled, trained personnel with technical knowhow 	Ongoing over duration of campaign

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		- Usage of low sulphur marine gas oils must be adhered to at all times	MARPOL are well recorded	Engineering Manager) MEFT inspectors		
Deterioration of fish stocks due to illegal fishing for crew consumption and due to fleeing of fish from the area due to noise pollution and vibrations	Co-existence with other commercial industries such as fishing is promoted through well coordinated communication channels	- Conduct environmental awareness program for conservation of marine biota - Take stringent disciplinary action and penalties for any transgression - Monitor fish catch rate data from nearby areas (by MFMR inspectors)	- trends in fish catch rates from areas surrounding the EPL are reported as part of bi-annual environmental monitoring, through coordination with the MFMR inspectors	Environmental Officer onboard	Intellectual capacity	Ongoing over duration of campaign
Risk of sinking of exploration or support vessel, or of helicopter, resulting in marine pollution from oils, waste onboard and	- Utmost safety of all vessels and helicopter flights is promoted at all times	- Stringent enforcement of vessel and aircraft safe operating procedures, including adherence to regular maintenance	- Records of bad weather days are kept	Vessel Master Helicopter Captain	Funding and intellectual capacity + experience to respond to bad weather	Ongoing over duration of campaign

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
radioactive material on seabed		- No flights are permitted when it is foggy		Namibia Maritime Directorate		
Risk of sinking of personnel helicopter(S) and support vessels, resulting in marine pollution from oils, waste onboard and radioactive material on seabed		- Vessel master must always keep up with weather forecasts and alert all crew of any severe weather conditions		National Radiation Protection Authority		
		- Sampling and surveying will stop when the weather is bad and unsafe to allow safe working				
		- Strict enforcement of vessel and aircraft oil spill management system during all operations				
		- Strict enforcement of vessel and aircraft safety operating procedures				

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<ul style="list-style-type: none"> - Strict adherence to and enforcement of procedures set out in the company's Radiation Management Plan 				
Possible disturbance of sea birds near biologically significant coastal areas by noise caused by the use of helicopters for transfer of crew and supplies	Observe a no-fly zone 3km seaward and 1km landward of sensitive area	<ul style="list-style-type: none"> - re-route helicopter routes to avoid the biologically sensitive areas - Helicopters must be made to fly at a certain minimum height above the ground/ seawater level to minimize noise levels at ground level - the alternative of no helicopter flying during the exploration voyages, except in cases of emergencies 	<ul style="list-style-type: none"> - A no-fly 3km zone is consistently observed - Records that helicopters are flown above a certain minimum height to minimize trauma and disturbance of fauna 	<ul style="list-style-type: none"> Helicopter Captains Vessel Master MFMR inspectors 	Skilled pilots	Ongoing throughout project duration
Lack of local empowerment of	Strictly enforce empowerment of	-The supplying of goods and services for the project should be given	-at least 70 % of annual	Vessel Manager	Procurement budget	Ongoing throughout project duration

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
communities through goods and services supply / provision	Namibian businesses	<p>to local suppliers to boost local business development.</p> <p>- For procurement opportunities related to onshore waste collection & handling, waste re-use, recycling preference should be given to local companies</p>	<p>procurement budget allocated or spent on Namibian owned companies which are previously disadvantaged</p>	<p>Proponent (Procurement Manager)</p> <p>Proponent (Engineering/ Technical Manager)</p> <p>Namibian Investment Promotion Board</p>	<p>Technical & other intellectual permitting capacities</p>	
Termination of all exploration activities and relinquishing of the EPLs, resulting in loss of license levies, taxes, limited employment and support to secondary industries	Unlock any potential mineral resource within the license areas	<p>- To eliminate risk of walking away from a potential mine, thorough analysis and interpretation of geophysical and sampling data should be carried out by competent persons</p> <p>- The proponent's onboard representatives in</p>	<p>- Suitably qualified & experienced geologists and geophysicists are employed to analyse all exploration data</p> <p>- Suitably qualified & experienced resource modellers are employed to</p>	<p>Proponent (Management: Geology and Finance)</p> <p>MME inspectors</p>	<p>Funding to hire the necessary technical and financial experts</p> <p>Human capital (suitably qualified & experienced)</p>	During the exploration program

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>collaboration with the MME diamond inspector should closely monitor recoveries of diamonds from all samples to eliminate risk of under declaring the number and size of diamonds recovered</p>	<p>compute and run financial models</p> <p>- A systematic resource evaluation process is strictly adopted to avoid overlooking any data and information</p>			
<p>Post-decommissioning environmental deterioration; disputes with alternative resource operators (e.g., from fisheries, oil and gas exploration); and disputes with employees</p>	<p>Optimized management of social aspects relating to the closure plan, especially if sampling results are unfavourable and future exploration is unlikely</p>	<p>- The proponent and their partners must appoint an independent interdisciplinary committee to undertake the following aspects in regards to project closure/ termination:</p> <p>- Develop a closure plan for the project</p>	<p>- The project's closure plan is developed and continuously updated over the life of the operation</p> <p>- Results from post-exploration seafloor scans are incorporated in closure plan to inform future interventions</p>	<p>Proponent (Environmental Manager; Public Relations Manager)</p> <p>MEFT, MME & MFMR inspectors</p>	<p>Funding for closure planning and implementation</p>	<p>Closure planning must be an ongoing process over the duration of the operation</p>

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<ul style="list-style-type: none"> - outline relevant decommissioning and rehabilitation monitoring programmes for post closure - develop and manage a fund for project post-closure monitoring - account for social and labour welfare post closure - ensure that closure planning continues throughout the life of the operation - allocate resources to gather relevant information throughout 	<ul style="list-style-type: none"> - Baseline data is gathered over the life of the operation to ensure that the ultimate closure plan is based on site-specific data and information - all residual and latent environmental impacts and the risks thereof occurring have been identified, quantified and arrangements for the management thereof have been finalised. 			

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>the life of the project to ensure that environmental risks are quantified and managed proactively</p> <p>- make provision as part of ongoing environmental management for post-prospecting surveys of selected areas to demonstrate recovery (3-5 year intervals)</p> <p>- maintain adequate Protection and Indemnity (P&I) Insurance Cover to allow for Closure</p> <p>Rehabilitation and Aftercare liabilities and</p>	<p>- Provision has been made as part of ongoing environmental management for post-sampling/ mining surveys of selected areas to demonstrate recovery (3-5 year intervals)</p>			

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		<p>- Ensure that the following documentation is submitted to the Mining and Environmental Commissioners: (1) the Project Closure Plan, (2) the Final Environmental Performance Assessment Report, (3) all bi-annual environmental monitoring reports</p>				
Risk of ignoring, or not implementing or ignoring the impact management measures recommended	Adherence to impact management actions set out in the EMP is strictly maintained	- Emphasis to all managers of the proponent of the legal implications which could arise from non-compliance	- Demonstration of the effective implementation of monitoring programs can be availed	All personnel from the proponent's team MEFT, MME & MFMR inspectors	Funding and intellectual capacity resources for ongoing training and awareness campaigns	Ongoing over duration of campaign

Impact	Management Objective(s)	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Key Resources Required	Timing of management action(s)
		- Continuous environmental awareness training to employees and management	- Management of each vessel scores at least 90% in exams concerning the requirements of the EMP			



3.3 Recommended Adaptive Environmental Monitoring Program

There are generally information gaps which will require ongoing research, as the currently available scientific baseline information for the receiving environment and the types of effects from the proposed activities on the marine environment are not entirely well quantified. In particular, knowledge on the scale of physical and biological effects created by the sediment plumes including rates of dispersion and dispersion distances of such plumes, ecotoxicity and cumulative effects need more focused study after commencement of sampling. The adaptive monitoring program recommended under this section for the proposed mineral exploration (geophysical survey and sampling operations) operations outlines further data collection and analyses required to ensure that an inventory of factual baseline data of the receiving environment is developed and that safe operations to protect the marine environment during the exploration and mining process is consistently promoted from the onset.

Such a program has been developed to allow flexibility in both the timing and monitoring locations to allow the proposed operation to adapt to conditions encountered and to allow decisions to be made in the field timeously, based on all available data collected after the commencement of the planned activities. Purpose driven adaptive impact monitoring and management is a deliberate process of learning by doing to improve management over time. In the context of this project it can be applied by both the proponent and regulatory bodies. It is envisioned that by undertaking monitoring before, during and after the surveying and sampling operations, it would be possible to identify unpredicted effects and take the necessary precautions to eliminate the likely impacts before the effects become significant.

The objectives of the recommended adaptive environmental monitoring programme can be summarised as follows:

- Comply with changing regulations, project design requirements;
- Develop an inventory of site-specific baseline data as more data and information becomes available from the exploration campaign
- Measure physical disturbance and subsequent recovery
- Understand the cumulative impacts, as well as the recovery of the affected biophysical environment and
- Provide a basis on which the Environmental Management report can be amended and updated on a going basis.

This monitoring program should be implemented right from the onset of the first exploration campaign (i.e., during geophysical surveying) to collect the necessary data (with the aid of both laboratory and field-based equipment) required for subsequent analysis and modelling of key environmental aspects which need to be monitored over a period of time in order to understand the impacts:

- Sediment plumes (travel and dispersal distances as well as rates of dispersion)
- Water quality in terms of oxygen levels, turbidity and overall chemistry

- Water temperatures (e.g., how this changes with decreasing distance to the vessel)
- Recovery rates of sampled sites on the seabed
- Recolonization rates of benthic communities
- Extend and frequency of grievance or conflicts with other commercial sea operations (primarily fishing)
- Impacts of sediment plumes on coastal ecosystems and nearby Biologically sensitive areas
- Fisheries catch rates and stocks changes and patterns
- Frequency of marine mammals and jelly fish aggregation sightings
- Water oxygen levels
- Possible archaeology/ heritage wrecks

It is highly recommended that the implementation of the monitoring program covering the above aspects is undertaken as a joint effort involving the proponent's inhouse team and supporting marine scientists from various local and international research groups such as the Benguela Current Convention. Lastly, it is worth emphasising that strong buy-in from executive management of the proponent would be required to avail the necessary resources to the key responsible personnel/ custodian, the Environmental Manager or Environmental Officer.

4 CONCLUSIONS AND RECOMMENDATIONS

Despite the fact that no sampling and other ground-truthing activities have previously taken place in the specific EPL areas, extensive literature review supplemented by data and information from operations of a similar nature by Debmarmine Namibia and Samicor (specifically in regards to offshore diamond prospecting) in nearby exploration and mining blocks provided valuable information and lessons on what impacts can be expected from the proposed geophysical and sampling activities. It is expected that the recommended adaptive monitoring program would assist in developing an inventory of sound baseline data for the area, and further analyse and understand the likely impacts, thereby ensuring that our understanding potential impacts is continuously enhanced and that the recommended impact enhancement and mitigation measures can be refined on a regular basis (e.g., bi-annually) to be more reflective of what is happening in reality.

Based on the results of the impact assessment exercise undertaken, the recommended impact management actions, and the proposed adaptive environmental monitoring program; it is recommended that the proponent can be granted an Environmental Clearance Certificate (ECC) to commence with offshore mineral prospecting activities within the 2 EPLs. It is further recommended that key recommendations put forth in this EMP are incorporated as key implementation conditions on such ECC.