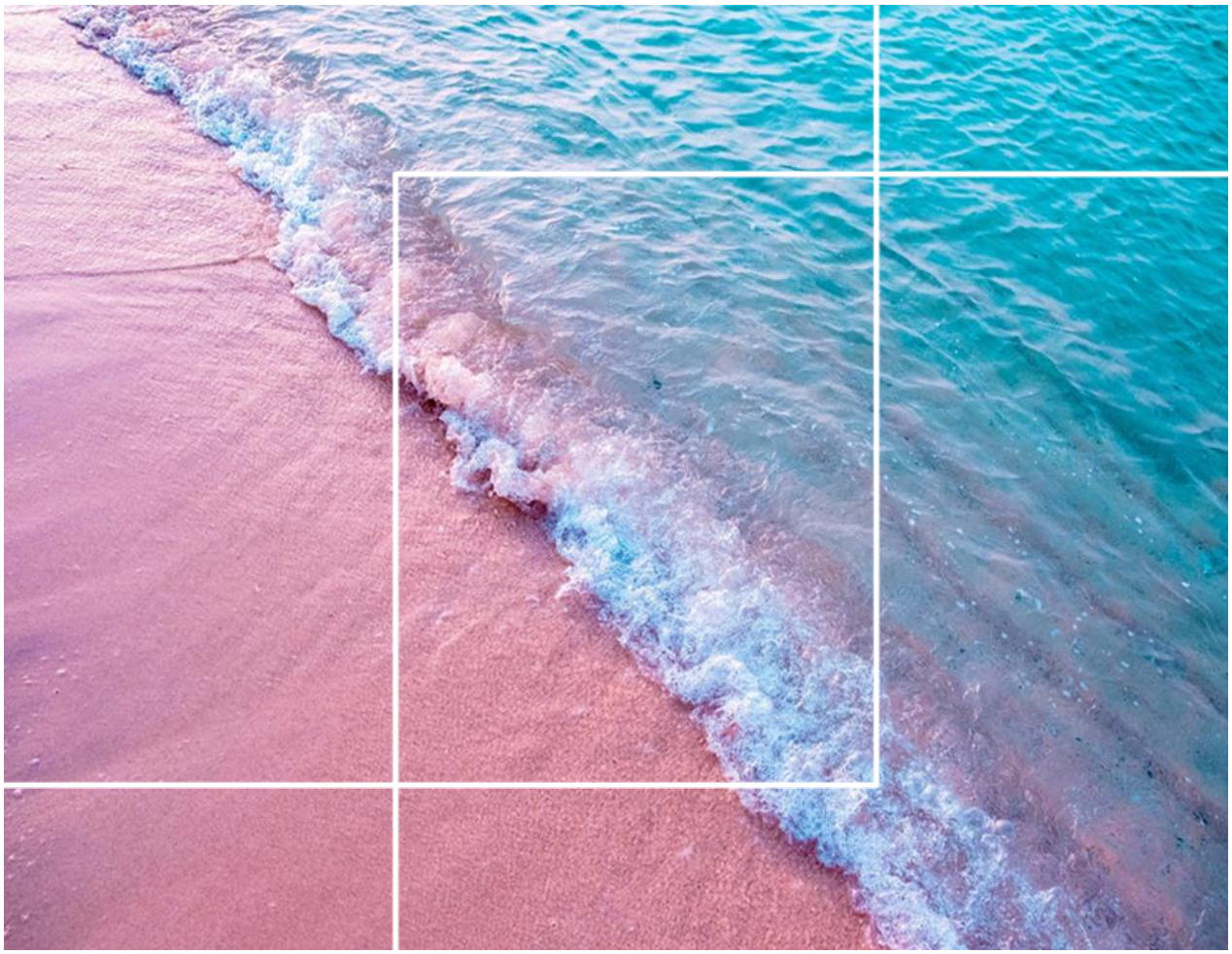

Namibian Marine Phosphate (Pty) Ltd

Submitted to: Namibia Marine Phosphate (Pty) Ltd.
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REPORT:

SANDPIPER MARINE PHOSPHATE PROJECT - ENVIRONMENTAL MANAGEMENT PLAN

PROJECT NUMBER: ECC-133-377-REP-21-A

REPORT VERSION: REV 01

DATE: 22 APRIL 2022

TITLE AND APPROVAL PAGE

Project Name:	Sandpiper Marine Phosphate Project - Environmental Management Plan
Client Company Name:	Namibia Marine Phosphate (Pty) Ltd.
Client Representatives:	Mr C. Jordinson & Mr M. Woodborne
Ministry Reference:	APP-003397
Authors:	Environmental Compliance Consultancy
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DISCLAIMER

Environmental Compliance Consultancy (ECC) (Reg. No. CC 2013/11401) has prepared this scoping report and the preliminary EMP on behalf of the proponent. This report has been authored by employees of ECC, who have no material interest in the outcome of this report, nor do any of the ECC team have any interest that could be reasonably regarded as being capable of affecting their independence in the preparation of this report. ECC is independent from the proponent and has no vested or financial interest in the project, except for fair remuneration for professional fees rendered based upon agreed commercial rates. Payment of these fees is in no way contingent on the results of this report or the assessment, or a record of decision issued by Government. No member or employee of ECC is, or is intending to be, a director, officer, or any other direct employee of Namibia Marine Phosphate (NMP). No member or employee of ECC has, or has had, any shareholding in Namibia Marine Phosphate (NMP). Any personal views or opinions expressed by the writer may not necessarily reflect the views or opinions of Environmental Compliance Consultancy or its client.

Please note at ECC we care about lessening our footprint on the environment; therefore, we encourage that all documents are printed double sided.

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DEFINITIONS AND ABBREVIATIONS

ABBREVIATIONS	DESCRIPTION
CFCs	Chlorofluorocarbons
CSI	Corporate Social Investment
ECC	Environmental Compliance Consultancy
EMA	Environmental Management Act
EMP	Environmental management plan
ESIA	Environmental and Social Impact Assessment
GIS	Geographic Information System
HR	Human Resources
I&APs	Interested and Affected Parties
MARPOL	International Convention for the Prevention of Pollution from Ships
MEFT	Ministry of Environment, Forestry and Tourism
MFMR	Ministry of Fisheries and Marine Resources
MME	Ministry of Mines and Energy
MSDS	Material Data Safety Sheets
Namport	Namibia Ports Authority
NHC	National Heritage Council
NGOs	Non-Governmental Organisations
NMP	Namibian Marine Phosphate
NOx	Nitrogen oxides
OOHSE	Occupational, Health, Safety and Environment
PPE	Personal Protective Equipment
SOx	Sulfur oxides
TSHD	Trailing Suction Hopper Dredger
ToR	Terms of Reference
VOCs	Volatile Organic Compounds

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Environmental Compliance Consultancy (ECC) has been retained by Namibian Marine Phosphate (Pty) Ltd (NMP) ("The Proponent") to conduct an environmental and social impact assessment (ESIA) for the mining of phosphate, within the proposed mining area located in Mining Licence (ML) 170, off the Namibian coast 120km to the southwest of Walvis Bay (-24° 19' 59.99" S: 13° 53' 20" E). The eastern boundary of the mining licence is located approximately 40 km off the coast (directly west of Conception Bay) (see Figure 1).

The proposed Sandpiper Marine Phosphate Project ("the Project") will undertake mining activities within an initial target area (SP-01) which is within ML 170 representing approximately 2.2% of the total mining licence area of 2,233 km^2. The proposed mining operation will entail dredging and recovery of marine phosphate sediments using a trailing suction hopper dredger (TSHD) from water depths between 190 to 250 m. The scale of the proposed Project within SP1 target area will involve mining of a total area of 34 km^2 over a period of 20 years at an average of less than 1.7 km^2 annually, that equates to 0.0003% of the seabed within Namibia's exclusive economic zone, coexisting with existing marine diamond mining and the fishing industry operations of a significantly larger scale. The other target sites SP-02 and SP-03 also contain phosphate resources and may be considered at a later stage (Refer Fig 1).

ECC has compiled this environmental management plan (EMP) in terms of the Environmental Management Act (EMA), No.7 of 2007 and its regulations of 2012. The purpose of this EMP is to support the full environmental and social impact assessment (ESIA) report. The EMP will be updated pending the inclusion of additional specialist studies that form part of the impact assessment report.

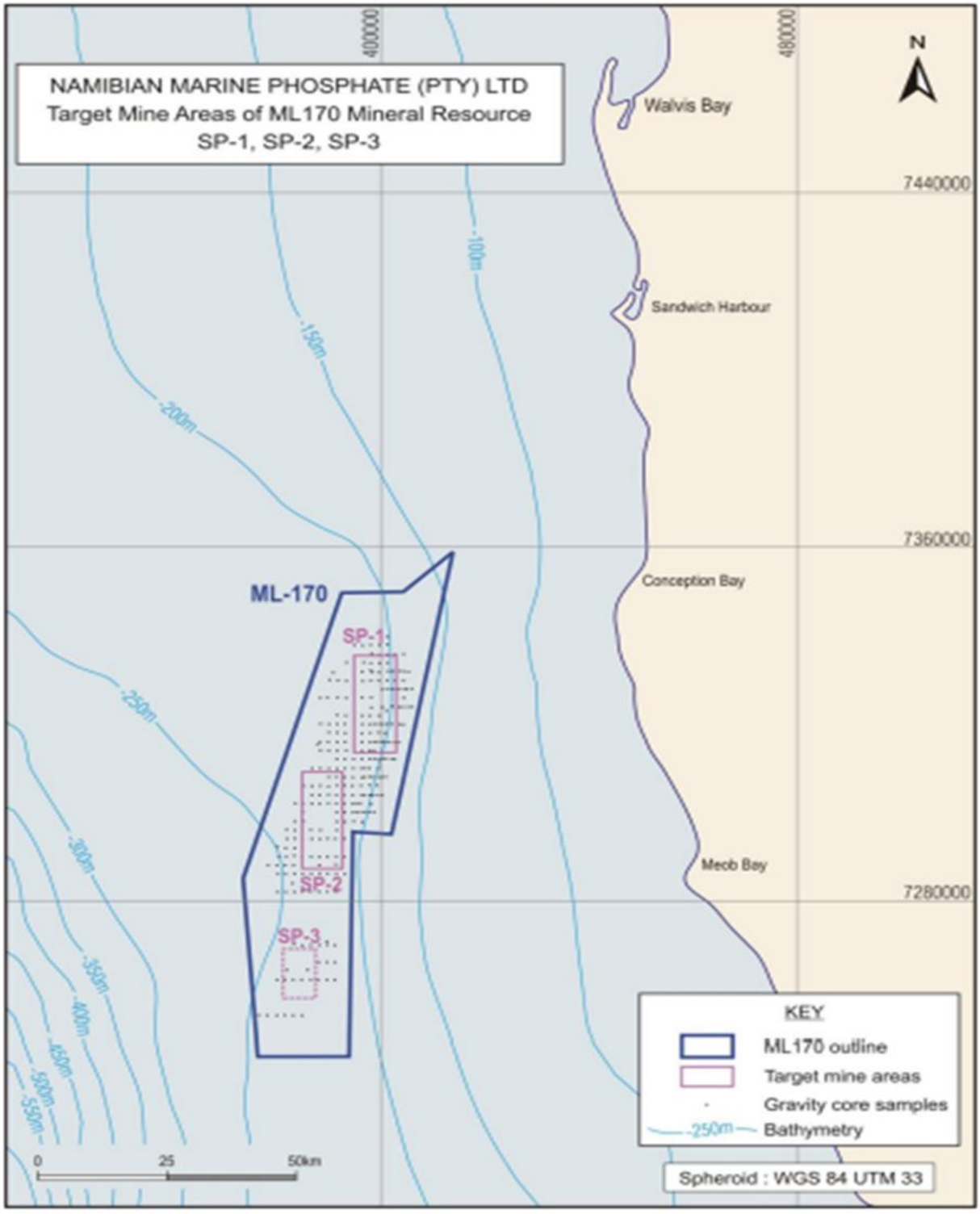

Figure 1: Locality map showing the location of the proposed Sandpiper Marine Phosphate Project

1.2 ENVIRONMENTAL REGULATORY REQUIREMENTS

The proposed Project is considered as a listed activity as stipulated in the Environmental Management Act, No. 7 of 2007 and its regulations, promulgated in 2012. An environmental scoping report, environmental impact assessment (EIA) and environmental management plan (EMP) are required to be submitted as part of the application to support the decision-making process for issuing an environmental clearance certificate.

This report presents the EMP and has been undertaken in terms of the requirements of the Environmental Management Act, No.7 of 2007 and its regulations.

1.3 PURPOSE AND SCOPE OF THIS REPORT

The preliminary environmental management plan (hereafter referred to as the EMP) provides a logical framework, mitigation measures and management strategies for the mining activities associated with the proposed Project. This ensures that the potential environmental and social impacts are curbed and minimised as far as practically possible and that statutory and other legal obligations are adhered to and fulfilled. Outlined and defined in the EMP are the protocols, procedures and roles and responsibilities to ensure that management requirements are effectively and appropriately implemented.

The EMP forms an appendix (Appendix A) to the environmental scoping report and is based on the findings of the assessments carried out to date. The environmental scoping report provides for further information on the proposed Project, assessment methodology, terms of reference (ToR), applicable legislation and assessment findings.

This EMP is a live document and shall be reviewed at predetermined intervals and/or updated during the ESIA process when or if the scope of work alters, or when further data or information is added. All personnel working on the Project will be legally required to comply with the requirements set out in the final EMP that is approved by the competent authorities and Ministry of Environment, Forestry and Tourism (MEFT).

The scope of this EMP includes all activities associated with the marine component of mining related activities.

1.4 MANAGEMENT OF THIS EMP

The Proponent, NMP, will hold the environmental clearance certificate for the proposed Project and will be responsible for the implementation and management of this EMP. Before the mining activities commence, this EMP will be reviewed, amended as required and approved ready for implementation. The implementation and management of this EMP and thus the monitoring of

compliance, will be undertaken through daily duties and activities, as well as defined monthly and annual or other periodic inspections and/or monitoring surveys.

1.5 LIMITATIONS, UNCERTAINTIES AND ASSUMPTIONS RELATED TO THIS EMP

This EMP does not include measures for compliance with statutory occupational health and safety requirements. This will be provided in the safety management plan to be developed by the Proponent.

Where there is any conflict between the provisions of this EMP and any contractor's obligations under their respective contracts, including statutory requirements (such as licences, project approval conditions, permits, standards, guidelines and relevant laws), the contract should be amended, and statutory requirements are to take precedence.

The information contained in this EMP has been based on the project description as provided in the scoping report. If and where mining requirements are changed, this EMP may require updating and/or potential further assessment to be undertaken.

1.6 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Environmental Compliance Consultancy (ECC) (Reg. No. CC 2013/11401) has prepared this preliminary EMP on behalf of the Proponent.

This report has been authored by employees of ECC, who have no material interest in the outcome of this report, nor do any of the ECC team have any interest that could be reasonably regarded as being capable of affecting their independence in the preparation of this report. ECC is independent from the proponent and has no vested or financial interest in the project, except for fair remuneration for professional fees rendered based upon agreed commercial rates. Payment of these fees is in no way contingent on the results of this report or the assessment, or a record of decision issued by Government. No member or employee of ECC is, or is intending to be, a director, officer, or any other direct employee of Namibian Marine Phosphate (NMP). No member or employee of ECC has, or has had, any shareholding in Namibian Marine Phosphate (NMP).

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2 ENVIRONMENTAL MANAGEMENT FRAMEWORK

This EMP provides measures, guidelines and procedures for managing and mitigating potential environmental impacts. The EMP also indicates monitoring and reporting guidelines and sets responsibilities for those carrying out management and mitigation measures.

2.1 OBJECTIVES AND TARGETS

Environmental objectives and targets have been developed so that mining activities can minimise potential impacts on the environment, as far as reasonably practicable.

Environmental objectives for the Project are as follows:

- Zero pollution incidents;
- Minimal impact to marine ecosystem structure and functionality;
- Protect marine ocean water quality;
- Protect local marine flora and fauna, benthic macrofauna and epifauna; and,
- Use natural resources effectively and efficiently.

2.2 ORGANISATIONAL STRUCTURE, ROLES AND RESPONSIBILITIES

The Proponent shall provide a project team to oversee and undertake the preparation and mining activities, which will be composed of the Proponent's personnel and contractors. A nominated role shall be identified to ensure the management and implementation of this EMP is carried out throughout the Project life .The Proponent shall be responsible for:

- Ensuring all members of the project team, including contractors, comply with the procedures set out in this EMP.
- Ensuring that all persons are provided with sufficient training, supervision and instruction to fulfil this requirement.
- Ensuring that any persons allocated specific environmental responsibilities are notified of their appointment and confirm that their responsibilities are clearly understood.
- Contractors shall be responsible for ensuring and demonstrating that all personnel employed by them are compliant with this EMP and meet the responsibilities listed above.

Table 1 lists the roles and responsibilities allocated to different management levels in the company and specific personnel.

Table 1 – Roles and responsibilities

ROLE	RESPONSIBILITIES AND DUTIES
Proponent	– Responsible for the overall management and implementation of the EMP. – Ensure environmental policies are drafted/updated and communicated to all personnel throughout the company and contractors.

ROLE	RESPONSIBILITIES AND DUTIES
	– Responsible for providing the resources required to effectively run the mine and comply with the EMP. – Appoint all managers needed to ensure effective running of the mine. – Ensure systems for proper induction and training of personnel and contractors are in place.
Mining manager	– Manage all activities on the mine. – Monitor daily operations and ensure systems are in place for implementation of the EMP. – Maintain the community issues and concerns register and keep records of complaints. – Ensure corrective action are taken and communicated to complainants. – Maintain up to date records of employees who have completed training and induction.
Vessel Captain	– Ensure that all contract workers, sub-contractors and visitors to the site are aware of the requirements of this EMP, relevant to their roles and always adhere to this EMP. – Report any non-compliance or accidents. – Receive, recording and responding to complaints. – Ensure adequate resources are available for the implementation of the EMP. – Ensure safe and environmentally sound operations. – Responsible for the management, maintenance and revisions of this EMP.
OOHSE Appointed Person/Environmental Manager	– Maintain the mine's EMS. – Draft and update mine specific environmental procedures. – Ensure on-mine induction training is relevant and address issues from this EMP. – Do all environmental audits and inspections and report findings to relevant personnel. – Check the implementation of corrective action for incidents and complaints. – Ensure all environmental monitoring and reporting is done. – Conduct environmental monitoring, audits and inspections. – Compile draft environmental reports.
Employees	– Adhere to measures set out in the EMP. – Ensure they have undertaken a site induction. – Report any operations or conditions which deviate from the EMP, as well as any non-compliant issues or accidents to the OHSE appointed person/Environmental Manager.

2.3 CONTRACTORS

Any contractors hired during the mining activities for the project duration shall be compliant with this EMP and shall be responsible for the following:

- Undertaking activities in accordance with this EMP as well as relevant policies, procedures, management plans, statutory requirements and contract requirements.
- Implementing appropriate environmental and safety management measures.
- Reporting of environmental issues, including actual or potential environmental incidents and impacts, to the vessel captain.
- Ensuring appropriate corrective or remedial action is taken to address all environmental impacts and incidents reported by employees and subcontractors.

2.4 EMPLOYMENT

The Proponent and all contractors shall comply with the requirements of the Republic of Namibia Regulations for Labour, Health and Safety and any amendments to these regulations. The following shall be complied with:

- In liaison with local government and community authorities, the Proponent shall ensure that local people have access to information about job opportunities and are considered first for construction/maintenance contract employment positions.
- The number of job opportunities shall be made known together with the associated skills and qualifications.
- The maximum length of time the job is likely to last for shall be indicated.
- The international crew working on the vessel shall ensure that they are always in possession of valid travel documentation.
- The Proponent shall ensure that skills transfer is affected toward the local employee base for the duration of the Project.
- Every effort shall be made to recruit from the group of unemployed workers living in the surrounding area.

2.5 REGISTER OF ENVIRONMENTAL ASPECTS AND IMPACTS

An environmental review of the proposed Project has been completed to identify all the commitments and agreements made. A list of environmental commitments and impacts has been produced, which details deliverables including measures identified for the prevention of pollution or damage to the environment during the mining phase.

Table 2 provides a list of environmental aspects and impacts, as well as associated mitigation (as derived from the previous ESIA's) and monitoring measures, and the roles responsible for compliance. It will be subject to regular review by the Environmental Manager and updated when necessary.

The Mining Manager and Occupational Health, Safety and Environmental Manager (OOHSE) will use this register to undertake regular inspections (see next section) to ensure the Project is compliant with this EMP.

Table 2 – A list of environmental aspects and impacts, as well as associated mitigation and monitoring requirements

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
Employee awareness	Improved awareness	All personnel (including contractors) are to be made aware of the contents of the Company Environmental Policy/Procedures.	– OOHSE Audits and inspections.	– Mining Manager – OOHSE Appointed Person /Environmental Manager
		– Define the roles, responsibilities and authorities of employees responsible for implementing this EMP. – Address training needs of staff required to implement specialised aspects of the EMP. – Maintain records of plans, decisions, data collected, communications made and emergency responses, which document the implementation of the EMP.	– OOHSE Audits and inspections.	– OOHSE Appointed Person /Environmental Manager
		– Provide instructions and training to all staff about aspects of the EMP that relate to their work. – Present environmental awareness training courses. – Subcontracting companies are to have specific environmental compliance requirements written into their contracts.	– OOHSE Audits and inspections.	– OOHSE Appointed Person /Environmental Manager
	Safety at sea	Adhere to conventional maritime obligations regarding vessels in distress.	– OOHSE Audits and inspections. – Management review.	– OOHSE Appointed Person /Environmental Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
Policy	Continual improvement and performance tracking	– Annually undertake performance assessments to verify that the requirements of the EMP have been met. – Where compliance has not been achieved, present details of non-compliance and corrective actions taken / to be taken. – Submit the Environmental Performance Reports to MEFT and MME.	– OHSE Audits and inspections.	– OHSE Appointed Person /Environmental Manager
	Improved awareness	– Assess all actions required through the EMP, identify any changes and or new environmental issues arising. – Communicate and consult with authorities and key I&APs informing them of proposed changes to the EMP	– OHSE Audits and inspections.	– OHSE Appointed Person /Environmental Manager
		Ensure that the outcome of specialist studies and the results of monitoring programmes as initiated are incorporated into the company integrated environmental information database/management system.	– OHSE Audits and inspections. – Monitoring database.	– OHSE Appointed Person /Environmental Manager
	Resources	Allocate an operational budget that is adequate to cover all requirements as detailed in the EMP	– Financial Audits	– Proponent
	Financial Surety	– Maintain Protection and Indemnity (P&I) Insurance Cover (initially indicated at US$ 1 billion) – Review the cover amount annually. – Review the scope of the cover is appropriate to the operational activities	– Financial Audits	– Proponent
	Intention of operations –	– In advance of commencement of a dredging campaign, notify the following authorities in	– Business administration	– Proponent

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
Interaction with all marine users	exclusivity of use	writing (location, nature and extent of operations): • The Permanent Secretary: MME; • The Permanent Secretary: MFMR; The Permanent Secretary: MWTC, Department of Maritime Affairs; Other potential user groups (e.g. fishing industry); and • Walvis Bay Radio of intended vessel activities. • Additionally **on** termination of dredging campaign activities of more than one month's duration, inform Walvis Bay Radio.		
		Record observations of and interactions with, other vessels.	– OHSE Audits and inspections.	– Vessel Captain
Safety of passage	Interaction with other vessels	– Display international standard signals when dredging. – De-activate signals when not dredging. – Always maintain visual watch.	– OHSE Audits and inspections.	– Vessel Captain – Mining Manager
		– An exclusive dredging zone is declared over the active dredging block area. – Vessels may transit through the area covered by ML 170 with due consideration of the definded safe working exclusion zone defined for active dredging operations on site and for the internationally applied rules of the road at sea and navigational warning lights / signals.	– OHSE Audits and inspections.	– Vessel Manager – Mining Manager
		– Vessels undertaking fisheries stock assessment and or related scientific surveys	– OHSE Audits and inspections.	– Vessel Captain – Mining Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
		are to request permission to enter ML170 and the declared active dredging exclusion zone. The company / organisation intending to undertake these surveys is required to notify the Company (NMP) 14 days in advance, so that appropriate arrangements can be made.	– Vessel logbook	
Marine Mammals and seabirds	Disturbance from noise/vibration	– Initiate the Marine Sightings Programme (birds, mammals, and jellyfish). – Record the numbers and species sighted during all activities associated with the dredging operation. – Avoid disturbances of whales whilst underway.	– OHSE Audits and inspections. – Marine sightings database	– Vessel Captain – Mining Manager – OHSE Appointed Person /Environmental Manager
Jellyfish	Possible blockages of sea water intakes	– As part of the Marine Sightings Programme when large concentrations of jellyfish are observed, advise the Chief Engineer to maintain watch on seawater intakes to ensure that surface aggregating jellyfish do not block them.	– OHSE Audits and inspections; and – Pre-start checklists on all machines	– Mining Manager – OHSE Appointed Person /Environmental Manager
Ocean, fauna and flora	Pollution of marine flora and fauna	– In the event of Offshore Bunkering - Obtain permission from the Department of Maritime Affairs before refuelling outside of harbour limits and within the Namibian Economic Exclusive Zone. – Confirm the bunkering procedure of the delivery vessel. – Ensure that both delivery and receiving vessels are familiar with each party's	– OHSE Audits and inspections; and – Pre-start checklists on all machines.	– Vessel Captain – OHSE Appointed Person /Environmental Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
		procedures and operational requirements for transfer of bunkers. – Bunkering in areas under the jurisdiction of the Walvis Bay Port Authority is to be carried out according to the requirements as prescribed by NamPort.		
		– Reduce the probabilities of accidental grounding - sinking – collision through enforcement of safe operational vessel systems.	– OHSE Audits and inspections; and – Pre-start checklists on all machines.	– Vessel Captain Mining Manager
		– Maintain all emergency procedures and insurances as legally required. – Ensure that emergency procedures are current and in accordance with established standards of practice – regular exercise / drills.	– OHSE Audits and inspections; and – Pre-start checklists on all machines.	– Vessel Captain – Mining Manager – OHSE Appointed Person /Environmental Manager
		– In the event that an emergency occurs (grounding, sinking, collision and fire) follow procedures in: 1. Shipboard Emergency Response Manual 2. Shipboard Oil Pollution Emergency Plan (SOPEP). 3. Shipboard Hazardous Spill Manual. – In the appropriate manner notify: • MWTC (Department of Maritime Affairs) and as is required, coordinate with them on the activation of the National Oil Spill Response Plan.	– OHSE Audits and inspections; and – Pre-start checklists on all machines. – Incident records management	– Vessel Captain – Mining Manager – OHSE Appointed Person /Environmental Manager – Employees

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
		• MEFT and as required, coordinate with them on the activation of the National Oil Spill Response Plan. • MFMR and as required, coordinate with them on the activation of the National Oil Spill Response Plan. • MME and as required, coordinate with them on the activation of the National Oil Spill Response Plan. • Walvis Bay Harbour Master and as required, coordinate with them on the activation of the National Oil Spill Response Plan. • Advise other parties as may be relevant to minimize damage to their activities. – Provide the following information when reporting a spill: 1. The volume of oil spilled (so MWTC can determine whether or not it is significant). 2. The type and circumstances of incident, ship type, port of registry, nearest agent representing the ship's company. 3. Geographic location of the incident, distance offshore and extent of oil spill. 4. Prevailing weather conditions and sea state in affected area (wind direction and speed, weather and swell) 5. Persons and authorities already informed of the spill.		

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
		6. Estimates of the numbers of different species of mammals and seabirds in the vicinity and of the numbers of each species oiled (if observed). – If feasible, rescue and stabilise oiled seabirds. If feasible, transfer oiled seabirds to MFMR Lüderitz for further rehabilitation.		
	Pollution of seawater	– Use low toxicity biodegradable detergents to clean up spills. • Avoid spilling toxic chemicals but if spillages do occur then clean up spilled chemicals immediately and place absorbent material (rags) used for this purpose in sealed waste containers for safe disposal ashore. • Keep records of spillages and estimate amounts not retrieved by clean up actions.	– OHSE Audits and inspections; – Incident records management.	– Vessel Captain – Mining Manager – OHSE Appointed Person /Environmental Manager
	Pollution of the environment due to improper management of waste (general and hazardous solids and effluents)	– The oil content of any discharge is required to be less than 15 parts per million (MARPOL: Annex 1). – Galley wastes discharged overboard only after maceration through a 25 mm screen (MARPOL: Annex V). – Sewage processed in approved treatment plants (MARPOL: Annex IV). – Do not discharge any treated or untreated sewage from a vessel within 4 nautical miles (nm) of land but comminuted and	– OHSE Audits and inspections; – Incident records management; – Waste management inspections, registers and records; – Monthly report records;	– Vessel Captain – Mining Manager – OHSE Appointed Person /Environmental Manager – Employees

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
		disinfected sewage may be discharged beyond 4 nautical miles. – Only incinerated wastes may be discharged overboard and then only when the vessel is more than 25 nautical miles from shore. – With the exception of macerated galley and incinerated wastes, do not dump or throw solid waste of any kind into the sea. – Do not discharge any hydrocarbon products into the sea. – Maintain a register of all wastes discharged to sea. – Contain all oils, grease or hydraulic fluids spilled on the vessel for disposal at a recognised land-based disposal site. – Do not dump or throw any solid waste of any kind into harbours. – Do not discharge any sewage into harbours. – Do not discharge any oily or waxy effluents into a harbour. – Do not discharge effluent or water from any tank contaminated with greater than 15 parts per million of oil into a harbour. – Separate wastes into recyclable and "other" materials. – Incinerate combustible materials on board. Store the balance in leak-proof skips for safe transfer to a registered waste site on land or contain all in leak-proof containers onboard	– Safe disposal certificates.	

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
		and dispose at a recognised disposal site on a regular basis. – Maintain a waste record book of all discharged/ incinerated food and domestic and operational waste (excluding oil, sewage or noxious liquids listed in other annexes to MARPOL) – Record waste in the record book under the categories of: i) Plastics, ii) Floating dunnage, lining or packaging material, iii) Ground-down paper products, rags, glass, metal, bottles, crockery, etc., iv) Paper products, rags, glass, metal, bottles, crockery, etc., v) Food waste, vi) Incinerator ash. – As per the prescribed form, record estimated amounts (m^3) of each category whenever waste is discharged to sea, or to reception facility ashore or to other ships, or incinerated, or in accidental or other exceptional discharge. Also record date/time of discharge/ occurrence, position of ship, and nature of discharge (incineration/ port/ facility/ name of ship) or circumstances and reasons for accidental or other exceptional discharge. – The officer in charge is to sign each record on the date of incineration or discharge, and the Master of the ship is to sign each completed page of the Waste Record Book.		

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
		– Keep records (vessel logbooks) of quantities and types of all hazardous materials and oils taken onboard vessels and of their method of storage, use and disposal.		
Flora and Fauna	Introduction of alien species	Ballast discharges are controlled through the ISM approved Shipboard Ballast Management Plan (IMO guidelines on ballast water management).	– OHSE Audits and inspections; and – Pre-start checklists on all machines	– Vessel Captain – Mining Manager – OHSE Appointed Person /Environmental Manager
Air quality	Air pollution	– NOx, SOx and VOCs are to be compliant with the requirements of MARPOL: Annex VI. – Only MARPOL approved incinerators may be used, and incineration may only take place according to MARPOL: Annex VI. Use environmentally friendly substitutes for CFCs where feasible.	– OHSE Audits and inspections; and – Pre-start checklists on all machines.	– Vessel Captain – Mining Manager – OHSE Appointed Person /Environmental Manager
Hazardous Substances Management	Pollution of the environment due to a navigation hazard	– Establish hazards database, detailing: item, location, date, and recovery date. – Depending on the size of the loss, advise MWTC (Department of Maritime Affairs) if it may present a navigation hazard.	– Hazard database; – OHSE Audits and inspections; – Incident records management.	– Vessel Captain – OHSE Appointed Person /Environmental Manager
Socio-economic	Creation of jobs during project development	– Ensure that local residents get first opportunity to apply for positions where applicable;	– HR recruitment policies and procedures	– HR Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
	Creation of jobs during operational mining	– Ensure that local residents get first opportunity to apply for positions where applicable;	– HR recruitment policies and procedures	– HR Manager
	Influx of contractor (Workers and families) stimulating the local economy through increased spending	– Engage with the local and regional government to ensure development plans cater for influx; and – Ensure local spend of CSI funding addresses development needs to cater for influx where applicable.	– Annual review of CSI policies and procedures implementation	– Proponent
Archaeological and historical sites and artifacts (chance finds)	Loss of heritage information	– Stop dredging. – Advise the vessel captain. – Reinitiate dredging beyond a perimeter of 500 m from the suspected (identified) wreck location and / or as advised by the mining manager. – The mining manager is to advise the National Heritage Council as to the discovery. – Discontinue operations within the defined perimeter area and recommence only under the instruction of the National Heritage Council. – Retain all correspondence.	– Chance finds procedure and records.	– Vessel Captain – Mining manager

3 ENVIRONMENTAL MANAGEMENT PRINCIPLES

3.1 CONTINUAL IMPROVEMENT

The Proponent's management team is responsible for reviewing and updating this EMP, which will be supported by the regular reports from the dredging contractor. As part of this review process, the regular reports will be reviewed, identifying any trends or significant areas of concern, as well as measures implemented to manage / resolve environmental or social issues. Compliance and legislative changes will be reviewed, and lessons learnt will be captured. The EMP will be amended as required and follow up training, awareness or updates will be provided.

Ongoing hazard identification through the review of the EMP and supporting management plans and SOPs will ensure environmental impacts are avoided or minimised to as low as reasonably practicable as part of the continuous improvement of the EMS.

3.2 BEST PRACTICE

The best practice management measures that will be complied with across the offshore dredging site in accordance with the MARPOL convention are listed in summary in Table 3.

Table 3 – A list of environmental best practice measures to be implemented

ENVIRONMENTAL ASPECT	BEST PRACTICE REQUIREMENT
Pollution Prevention Control	Vessel and equipment to be maintained and serviced regularly; Refuelling at designated or approved locations; Spill kits available wherever the risk of loss of containment is identified; Bunds to be at least 110% of the container; and Good housekeeping.
Solid Waste Management	Good housekeeping (no littering); Designated waste collection areas on vessel and one central location; Bins labelled; Waste to be separated and kept clean and tidy; and Waste bins emptied on regular basis.
Storage of Fuels, Oils, Chemicals and other hazardous liquids	Storage tanks will be suitable and labelled for the liquid being stored; Bunds to be at least 110% of the container; and Daily inspections of tanks.

ENVIRONMENTAL ASPECT	BEST PRACTICE REQUIREMENT
Energy Efficiency	Vessel and equipment to be maintained and serviced regularly; and turn off plant and equipment when not in use.
Air Quality	– Turn off plant and equipment when not in use; and Vessel and equipment to be maintained and serviced regularly. – NOx, SOx and VOCs are to be compliant with the requirements of MARPOL: Annex VI. – Only MARPOL approved incinerators may be used, and incineration may only take place according to MARPOL: Annex VI. – Use environmentally friendly substitutes for CFCs where feasible.

3.3 ENVIRONMENTAL MONITORING

A monitoring and evaluation program will be used in line with internal OHSE standards to evaluate environmental performance and promote continual improvement. Monitoring also supports environmental management on-site to evaluate how effective the environmental management has been, over an extended period of time.

An environmental monitoring schedule will be put in place for the dredging vessel operations based on the recommendations of relevant experts and results of the specialist environmental studies completed as part of this assessment process.

The monitoring program will comprise inter alia:

- Noise and vibration monitoring (e.g. effect on mammals);
- Water quality monitoring (e.g. seawater quality, sediment plume dispersion);
- Benthic and biodiversity monitoring (e.g. benthic macrofauna, epifauna, marine flora and fauna); and
- Air quality monitoring (e.g. onboard air quality)
- Carbon Footprint monitoring

The Environmental Manager will be tasked with conducting the monitoring with the support of the Chief Operating Officer, Mining Manager and relevant staff of the dredging contractor (Vessel Captain, contractor OHSE and operations staff)

4 COMMUNICATION AND TRAINING

To ensure potential aspects and impacts are minimised it is vital that personnel are appropriately informed and trained on how to properly implement the EMP. It is also important that regular communications are maintained with stakeholders (if applicable) and made aware of potential impacts and how to minimise or avoid them. This section sets out the framework for communication and training in relation to the EMP.

4.1 COMMUNICATIONS

During dredging operations, the Environmental Manager or OHSE Manager(s) (NMP and Dredging Contractor vessel captains) shall communicate site-wide environmental issues to employees and contractors through the following means (as and when required):

- Ensure all personal are afforded the opportunity to attend an environmental site induction that sets out their requirements in relation to this EMP;
- Ensuring audits and inspections are undertaken regularly on a risk-based schedule;
- Toolbox talks, including instruction on incident response procedures;
- Deliver -specific environmental briefings where required;
- Ensure all personnel have access to the EMP; and
- Ensure operators of key activities and environmentally sensitive operations are briefed and understand their requirements.

This EMP shall be distributed to the mining/dredging team including all contractors and personnel working in the mining licence to ensure that the environmental requirements are adequately communicated throughout all operational levels. Key activities and environmentally sensitive operations shall be briefed to workers and contractors.

During the mining/dredging activities, communications between the NMP and contractor management teams shall include discussing any complaints received and actions to resolve them; any inspections, audits, or non-conformance with this EMP; and any objectives or target achievements.

4.2 ENVIRONMENTAL EMERGENCY AND RESPONSE

An emergency is any abnormal event, which demands immediate attention. It is any unplanned event, which results in the temporary loss of management control at site but where functional resources can manage the response. An Emergency Response Plan (ERP) document will be put in place that defines and manages the roles, responsibilities and actions to be taken in response to any emergencies including environmental emergencies that may occur onsite. The international dredging company, Jan De Nul, (JDN) which is the preferred contractor for the Project, operates dredging vessels internationally and have established Emergency Response Plans for each vessel. The Project ERP will be integrated with JDN's existing ERP to incorporate local emergency services and contacts.

Table 4– Emergency Contact details

TOWN	AMBULANCE	POLICE	FIRE BRIGADE
Walvis Bay	+264 (0) 64-216-309/ Toll Free 924	+264 (0) 64-219-048	+264 (0) 64-201-3301/+246 (0) 81-122-4653

For large-scale spills and other significant environmental incidents, the fire services should be contacted as required and the Offices of the Ministry of Environment, Forestry and Tourism (MEFT) informed of the incident (telephone +264 61 284 2111) and the Ministry of Fisheries and Marine Resources (MFMR) (telephone +264 61 2053911). All correspondence with MEFT should be undertaken by the vessel captain with support from the OHSE Manager, Vessel Captain, Contractor vessel captain and NMP Managing Director. If a spill occurs within the port boundaries, NamPort OHSE Department will need to be informed.

For the clean-up of smaller spills, the relevant Material Safety Data Sheet (MSDS) should be consulted to determine the appropriate clean-up procedure. Basic spill response training will be provided as part of the site environmental induction, spill response equipment, including relevant MSDS copies, will be provided in areas where potentially environmentally hazardous chemicals may be used.

4.3 COMPLAINTS HANDLING AND RECORDING

Any complaints received verbally by any personnel on the project site shall be recorded by the receiver including:

- The name of the complainant
- The contact details of the complainant
- Date and time of the complaint
- The nature of the complaint

The information shall be given to the vessel captain who is overall responsible for the management of complaints on site. The vessel captain shall do the following:

- Delegate management of complaints to the relevant managers such as the OHSE/Environmental Manager.
- Inform of reported issues, concerns, or complaints.
- The vessel captain must maintain a complaint register that require details of the complaint, investigations and actions to be taken to rectify or address the matter, or where no action is taken and the reasons why.
- The vessel captain will provide a written response to the complainant produced with support from OHSE and HR managers as required and including the results of any investigations and actions to be taken to rectify or address the matter(s) raised. Where no action is taken, the reasons why are to be recorded in the register.

The workforce shall be informed about the complaints register, its location and the person responsible for receiving and responding to formal complaints, The complaints register shall be kept for the duration of the Project and will be available for government or public review upon request.

4.4 TRAINING AND AWARENESS

All personnel working on the Project shall be informed and educated when performing tasks that have the potential to cause an environmental impact. Awareness with be raised through appropriate education and training programmes. Site specific OHSE training and toolbox talks will be undertaken with all employees and contractors working onboard the vessel.

4.5 SITE INDUCTION

All personnel involved in the Project shall be inducted to the site with a specific environmental awareness training and health and safety issues. The environmental awareness training shall ensure that personnel are familiar with the principles of this EMP, and the environmental impacts associated with their activities, the procedures in place to control these impacts and the consequences of departure from these procedures. The vessel captain shall ensure a register of completed inductions and site specific environmental awareness training (if required) is maintained. The site induction should include, but is not limited to the following:
A general site-specific induction that outlines:

- What is meant by “environment” and the EMP?
- Why the environment need to be protected and conserved?
- How can mining activities impact the environment?
- What can be done to mitigate against impacts?
- The inductee's role and responsibilities concerning implementing the EMP;
- The site’s environmental rules;
- Details of how to deal with, and who to contact should any environmental problems occur;
- The potential consequences of non-compliance with this EMP and relevant statutory requirements; and,

- The role of responsible people for the Project.

5 INCIDENT REPORTING

The Proponent and appointed contractors must have an accident and incident reporting system. The section below sets out the minimum requirements for incident reporting and should be used as a basis for incident reporting,.

5.1 MINOR INCIDENT OR "NEAR MISS"

Any incident or "near miss" involving the Proponent, a nominated representative, any contractor, or its subcontractors or any third party's personnel, property, plant or equipment must be:

1) Orally reported to the supervisor or the supervisor's nominated representative:
   a. immediately and without delay.
   b. regardless of whether or not injury to personnel has occurred.
   c. or property or equipment has been damaged.
2) Written up and handed to the supervisor or the supervisors nominated representative by the end of the shift. The written report should:
   a. state all known facts and conditions at the time of the incident and
   b. includes a preliminary assessment of the most likely potential consequences of the incident under the current circumstances.

5.2 SERIOUS INCIDENTS

For any serious incident involving a fatality, or permanent disability, the incident scene must be left untouched until witnessed by a representative of the Namibian police. This requirement does not preclude immediate first aid being administered and the location being made safe.

5.3 INCIDENT REPORT AND CLOSE OUT

The assigned supervisor or manager must investigate the cause of all work accidents and significant incidents and must provide the results of the investigation and recommendations on how to prevent a recurrence of such incidents. A formal root-cause investigation process should be followed.

6 COMPLIANCE AND ENFORCEMENT

6.1 ENVIRONMENTAL INSPECTIONS AND COMPLIANCE MONITORING

Inspections and audits of the site will be managed and undertaken by the environmental manager to check that the standards and procedures set out in this EMP are being complied with and pollution control measures are in place and working correctly. All equipment will be inspected to ensure they are operating as per specification; no damage has been caused and no leaks or spills have occurred. Any non-conformance shall be recorded, including the following details: a brief description of non-conformance; the reason for the non-conformance; the responsible party; the result (consequence); and the corrective action is taken and any necessary follow up measures required. The application documentation for renewal of the environmental clearance certificate (ECC) must include a summary environmental audit report and copies of the six bi-annual reports that will be submitted every six months for the three years that the clearance certificate is valid for.

6.2 REPORTING

Statutory reports shall be submitted to the Mining Commissioner in terms of the Minerals (Mining and Prospecting) Act, No. 33 of 1992 and related conditions of ML170.

Bi-annual environmental reports shall be submitted to the Environmental Commissioner every six months of every year during the ECC validity period. These reports should include records of the monitoring and other deliverables of every aspect or programme described in the EMP. Reports should be submitted within three months of the bi-annual period lapsing.

6.3 NON- COMPLIANCE

Where it has been identified that works are not compliant with this EMP, the Mining Manager and/or Vessel Manager/Captain shall employ corrective actions so that the works return to being compliant as soon as possible. In instances where the requirements of the EMP are not upheld, a non-conformance and corrective action notice shall be produced. The notice shall be generated during the inspections and the vessel manager shall be responsible for ensuring a corrective action plan is established and implemented to address the identified shortcomings.

A non-compliance event / situation is considered if, for example:

- There is evidence of a contravention of this EMP and associated indicators or objectives.
- The vessel captain and or contractor have failed to comply with corrective or other instructions issued by the environmental manager or qualified authority.
- The vessel captain and or contractor failed to respond to complaints from the public.

Activities shall be stopped in the event of a non-compliance until corrective action(s) has been completed.

6.4 DISCIPLINARY ACTION

This EMP is a legally binding document and any wilful non-compliance with it may result in action being taken against the perpetrator(s) within the provisions of company policy, terms of commercial contracts and/or relevant laws in Namibia. Such action may take the form of (but is not limited to):

- Fines / penalties
- Legal action
- penalties imposed by the Proponent on the contractor
- Suspension or withdrawal of authorisations
- Suspension of work
- Non-renewal of environmental clearance certificate

The appropriate action shall be determined according to the nature and extent of the transgression / non-compliance and penalties are to be weighed against the severity of the incident.

7 MARINE BIODIVERSITY MANAGEMENT PROGRAMME

7.1 INTRODUCTION

Dredging operations will include the recovery of sediments, discharge of fine tailings, sediment plume dispersion and related impacts on sea water quality and marine fauna, excluding general vessel activities. It is vital to ensure that all management, monitoring and mitigation actions are adhered to in order to manage and minimise environmental impacts and any potential pollution.

7.2 OBJECTIVES

The EMP objectives are to minimize negative direct effects of the operation on the marine environment. These objectives are:

- Mitigation and monitoring;
- Avoid compromising future exploration of renewable marine resources by managing dredging related impacts and mitigating or minimising these impacts;
- Establish and maintain an information base that will assist in evaluating the cumulative impacts of their operations and establish recovery rates of marine habitats impacted during the dredging;
- Minimise potential conflict with other marine users;
- Promote information exchange with scientific institutions and I&APs;
- Ensure safety of the operation, by applying all relevant safe vessel operations.

7.3 RESPONSIBILITIES

WORKFORCE AND ALL CONTRACTORS

Ensure safe operation protocols of the dredging vessel are enforced. They should optimally manage (reduce and recycle) all wastes generated and discharges to sea, air and land. They should maintain open communication with other marine users and minimise disruption to all other users of the sea by respecting the right of passage. They should always report any issues to the OHSE manager or environmental manager.

ENVIRONMENTAL MANAGER

Will ensure that the objectives listed above are being met and provide performance feedback to the vessel manager and Chief Operations Officer.

7.4 MARINE BIODIVERSITY MANAGEMENT MEASURES

The marine biodiversity management plan measures are designed to mitigate and minimise the negative impacts of dredging on the seabed, ocean and marine flora and fauna. Dredging

activities that could potentially alter the natural seawater quality, air quality and marine biodiversity include:

- Chemical spills
- Refuelling/Bunkering
- Dredger sediment discharge
- Removal of seabed sediment
- Operational noise and light

Table 5 – Dredging Mitigation Measures

Responsibility	– Mining Manager – Vessel Captain – OHSE Appointed Person /Environmental Manager – Employees – Contractors
Potential issues or impacts	– Removal of seabed surficial sediments, destruction of benthos and benthic habitat, – Disturbance to fish and fauna on the seabed and in the water column – Burial of benthic organisms – Biogeochemical impacts on water quality and benthic organisms – Release of Heavy Metals
Protection of Benthos and seafloor in ML170	Mining /dredging operations restricted to the defined 34km^2 area for the 20-year mine plan which represents less than 2 % of the total ML170 area of 2,233km^2. Annual mining/dredging operations cover an average of 1.7km^2 per year which represents 5% of the 20-year mine plan area (34km^2) and 0.08% of ML170 (2,233 km^2) and 0.0003% of the seabed within Namibia's exclusive economic zone. For the target area SP-01 the supplementary sample / data collection and assessments noted below are required to update the existing baseline information and provide a fresh refence data set for reference of the operational monitoring program prior to dredging commencing: Benthic sampling and baseline of additional requirements: For each of the target areas prior to commencement of year 1 dredging activities, the following sample / data collection and or assessments are required: • Collection of a fresh set of representative macrofaunal assemblages • Collection of shell debris for examination for the presence of goby eggs

	• Collection of sediment for the evaluation of grain size, organics, dissolved nutrients and H2S. (surficial and internal samples) • Collection of samples for the establishment of a baseline profile of radionuclides • Distribution of bacterial mats / thiobacteria Fisheries integrated biodiversity survey Marine mammal, seabird and other marine fauna observations • Integrate output information into adjustments of the planned (ecological) recovery surveys; • Revise EIA and assumptions as appropriate. • Retain data and interpretations on an environmental database system The same data would be required in due course prior to any approved dredging in target areas SP-02 & SP-03.
	For each annual target mining area in SP-01, conduct geophysical surveys prior to dredging and post dredging, to determine / provide information on: • Area and volume (thickness) of sediment removed versus predicted; • Residual volume (thickness) of sediment covering the footwall; • Morphological character of the seafloor; • Habitat assessment. • Identify seabed areas within the dredged target area that are undisturbed by the dredging process; • Readjust frequency and scope of further post dredging geophysical surveys; • Integrate output information into adjustments for the next period of dredging; and • Retain data and interpretations on an environmental information database system.
	Using geophysical survey techniques record the morphological characteristics of a completed dredge zone; • Integrate output information into subsequent ecological recovery surveys; and • Retain data and interpretations on an environmental data base system
Protection of Benthos and seafloor for SP-01	Conduct geophysical surveys post dredging on an annual basis, to determine / provide information on: • Area and volume (thickness) of sediment removed versus predicted; • Residual volume (thickness) of sediment covering the footwall • Integrate output information into adjustments for the next period of dredging; and • Retain data and interpretations on an environmental information database system

	To aid recovery of benthic faunal assemblages' recovery: • Leave a residual layer of sediment overlying the clay footwall, to retain a layer of sediment to aid benthic recolonization • Leave undisturbed/pristine areas ('slivers or lanes/corridors') of the sediment to aid benthic recolonization
	To aid recovery of benthic faunal assemblages' recovery: • Leave a residual layer of sediment over the clay footwall • Leave areas ('slivers') of sediment profile un-dredged
Monitoring requirements for surficial sediments – Chemistry, Fauna and Thiobacteria	For the target dredged area: Biogeochemical, macrofauna meiofauna and thiobacteria, sediment sample collection for: • Representative macrofaunal communities • Representative meiofaunal communities • Representative thiobacteria communities • Surficial sediment sample collection; texture and particle size, porosity, particulate organic matter, particulate organic carbon, total nitrogen, total phosphorus. • Identify areas of actual and potentially high sedimentation (inhibiting benthos recovery via smothering or particulate organic matter build up and possible anoxia) • Determining benthos recovery / re-colonisation/ functional recovery rates • Thiobacteria characterisation • Biogeochemical characterisation • Revise future ecological recovery monitoring programmes; • Retain data and interpretations on an environmental database system
Monitoring requirements for SP-01 surficial sediments – Chemistry, Fauna and Thiobacteria	• Determining benthos recovery / re-colonisation/ functional recovery rates • Revise future ecological recovery monitoring programmes; • Retain data and interpretations on an environmental database system
Monitoring requirements for Fish, Mammals, Seabirds, Jellyfish and Biodiversity – Trawl Survey	In the target dredge area, biodiversity survey using monkfish trawl gear, for the collection of: • Demersal commercial and non-commercial fish species • Epifauna • Identification and biological characterisation of the fish and epifauna • Marine mammals, seabirds and jellyfish sightings • Mesopelagic fish and zooplankton presence, determined via acoustics and augmented by satellite imagery • Noise assessment Water column characterisation (CTD) • Fish samples for heavy metal testing

	• General ocean / atmospheric (metocean) conditions
Monitoring: Fish, Mammals, Seabirds, Jellyfish and Biodiversity – Dredge vessel	Appointment of vessel based Environmental Manager From the dredger observe – collect – record: • Noise assessments • General ocean / atmospheric conditions • Marine mammals, seabirds and jellyfish sightings • General operational status of the dredger • Record the number of mammals, species of birds and jellyfish aggregations sighted. • Monitor the affected area using geophysical and/or biogeochemical and benthic sampling techniques to assess recovery / re colonisation and residual sediment distribution • Record general vessel operational activities
Monitoring of biodiversity specific to SP-01	Appointment of vessel based Environmental Manager for the dredger: • Noise assessments • General ocean / atmospheric conditions • General operational status of the dredger • Record the number of mammals, species of birds and jellyfish aggregations sighted. • Monitor the affected area using geophysical and/or biogeochemical and benthic sampling techniques to assess recovery / re-colonisation and residual sediment distribution • Record general vessel operational activities

7.5 MARINE BIODIVERSITY MONITORING

Every effort should be made to ensure that negative impacts to the seabed due to dredging operations are kept to an absolute minimum. A benthic macrofauna monitoring programme is to be established and has been included in the EMP, the principal objective of which is to study the rate of recovery of disturbed macrofaunal communities once the dredging activity has ceased in a particular dredged area.

This can be achieved by implementing strict management and mitigation measure and following up on the immediate impacts through continuous monitoring as outlined. All data collected from continuous monitoring will be retained and issued to all competent authorities and within statutory defined timeframes.

8 WASTE MANAGEMENT PROGRAMME

8.1 INTRODUCTION

Any waste generated in the course of dredging activities on the dredging vessel will be managed in strict compliance with the provisions of the MARPOL convention by the dredging contractor. Non-mineral waste and domestic waste may be produced as by-products of dredging operations and will have to be managed appropriately. All non-mineral waste will eventually be removed when the vessel docks on land and will be disposed of at either the Walvis Bay landfill or hazardous waste site.

Objectives

This waste management programme reflects the provisions of the MARPOL convention designed to ensure the proper storage, transport, treatment and disposal of waste and where possible will also follow a waste hierarchy, which encourages waste avoidance and waste reduction followed by reuse, recycling and reclamation, before waste treatment and waste disposal.

8.2 ROLES AND RESPONSIBILITIES

WORKFORCE AND ALL CONTRACTORS

- Required to ensure that all waste generated during mining activities is handled appropriately onboard, removed and disposed of accordingly including providing evidence in the form of waste transfer receipts for the waste moved off-site.
- Ensure no windblown rubbish pollutes the environment.
- Remove waste on a regular basis to prevent vermin.
- Try to minimize the amount of waste produced as far as possible.

VESSEL CAPTAIN AND ENVIRONMENTAL MANAGER

- Required to inspect receipts and evidence of correct waste handling.
- Review waste management practices regularly during the vessel operations.

8.3 SOLID AND LIQUID NON-MINERAL WASTE

The vessel operations will enforce a recycling system thus reducing its impacts associated with solid waste generation. Where possible the Proponent will implement measures to reduce, reuse and recycle waste generated as part of the operations of the vessel. To achieve this a temporary waste storage facility will be required.

Waste will be controlled through prevention and mitigation measures as follows:

- Reduce, reuse and recycle where possible;
- Storage of domestic waste to be done in accordance with MARPOL requirements, in separate bins for plastic, metal, general/food and recycling on site to avoid the attraction of unwanted scavengers and will be offloaded in port to be disposed of at the accredited sites and,

- Hydrocarbon and chemical contaminated solids will also be stored onboard the vessel in accordance with MARPOL provisions and discharged of in port at designated sites using accredited service providers located through the correct channels and authorities.. Some of these materials can be recycled or used by other facilities.

Table 6- Waste Mitigation Measures

Responsibility	– Mining Manager – Vessel Captain – OHSE Appointed Person /Environmental Manager – Employees – Contractors
Potential issues or impacts	– Ocean water contamination due to spillage – Water pollution – Loss of marine biodiversity – Infectious diseases
Waste Management Plan	The Proponent will compile a Waste Management Plan that complies with the MARPOL convention and based on the principle of "Nothing Overboard" and which should address as a minimum the mitigation measures included below
Proper disposal of waste (solid, oily, sewage – including bilge discharges to the sea)	- The oil content of any discharge is required to be less than 15 parts per million (MARPOL: Annex 1). - Galley wastes discharged overboard only after maceration through a 25 mm screen (MARPOL: Annex V). - Sewage processed in approved treatment plants (MARPOL: Annex IV). - Do not discharge any treated or untreated sewage from a vessel within 4 nautical miles (nm) of land, but comminuted and disinfected sewage may be discharged beyond 4 nautical miles. - Only incinerated wastes may be discharged overboard and then only when the vessel is more than 25 nautical miles from shore. - With the exception of macerated galley and incinerated wastes, do not dump or throw solid waste of any kind into the sea. - Do not discharge any hydrocarbon products into the sea. - Maintain a register of all wastes discharged to sea and audit on a regular basis. - Contain all oils, grease or hydraulic fluids spilled on the vessel for disposal at a recognised land-based disposal site.
Waste disposal within harbour limits	- Do not dump or throw any solid waste of any kind into harbours. - Do not discharge any sewage into harbours. - Do not discharge any oily or waxy effluents into a harbour.

	- Do not discharge effluent or water from any tank contaminated with greater than 15 parts per million of oil into a harbour. - Separate wastes into recyclable and "other" materials. Incinerate combustible materials on board. Store the balance in leak-proof skips for safe transfer to a registered waste site on land or contain all in leak-proof containers onboard and dispose at a recognised disposal site on a regular basis.
Management of hydrocarbons	- Keep records (vessel logbooks) of quantities and types of all hazardous materials and hydrocarbons taken onboard vessels, their method of storage, use and disposal.
Discharge of ballast water	- Ballast discharges are controlled through the ISM approved Shipboard Ballast Management Plan (IMO guidelines on ballast water management).
Discharges to the atmosphere	- NOx, SOx and VOCs are to be compliant with the requirements of MARPOL: Annex VI. - Only MARPOL approved incinerators may be used, and incineration may only take place according to MARPOL: Annex VI. - Use environmentally friendly substitutes for CFCs where feasible.
General waste	The vessel should be always kept tidy. All domestic and general waste produced daily should be contained: – No waste is to be left uncontained, in suitable containers, overnight. – Waste containers (bins) should be emptied regularly and removed from site to the nearest official waste disposal site. All recyclable waste needs to be taken to the nearest recycling depot if available. – A sufficient number of separate waste containers (bins) for hazardous and domestic/general waste must be provided on site. These should be clearly marked as such. – Mining personnel should be sensitised to dispose of waste in a responsible manner and not to litter. – No waste may remain on site after the completion of dredging.
Residual mineral samples	– Samples that will not be used for further analysis or submitted to MME should be taken off site or used.

	– No samples are to be dumped at site or in the vicinity of the site as to not affect rehabilitation efficiency through physical and chemical pollution of weathering samples.
Littering and environmental contamination from waste	– No littering by workers shall be allowed. – All litter on and around the site must be picked up and placed in the bins provided. – The site should be always kept tidy and free of litter. All domestic and general waste produced daily should be cleaned and contained daily. – No waste shall be burned unless permitted to do so. – Waste shall be collected and shall be removed regularly to avoid bad odours. – Hazardous and non-hazardous waste shall be always stored separately.
Environmental contamination from liquid waste	– Hydrocarbon and chemical contaminated solids must be stored correctly and disposed of by registered companies. – Safe disposal certificates must be kept and provided to the vessel captain on request.
Waste management record keeping	– Maintain a waste record book of all discharged/ incinerated food and domestic and operational waste (excluding oil, sewage or noxious liquids listed in other annexes to MARPOL) – Record waste in the record book under the categories of: i) Plastics, ii) Floating dunnage, lining or packaging material, iii) Ground-down paper products, rags, glass, metal, bottles, crockery, etc., iv) Paper products, rags, glass, metal, bottles, crockery, etc., v) Food waste, vi) Incinerator ash. – As per the prescribed form, record estimated amounts (m^3) of each category whenever waste is discharged to sea, or to reception facility ashore or to other ships, or incinerated, or in accidental or other exceptional discharge. Also record date/time of discharge/ occurrence, position of ship, and nature of discharge (incineration/ port/ facility/ name of ship) or circumstances and reasons for accidental or other exceptional discharge. – Environmental manager in charge is to sign each record on the date of incineration or discharge, and the vessel captain of the vessel is to sign each completed page of the Waste Record Book.
Monitoring Requirements	1. Monitor whether the provisions set out in this EMP concerning waste management is being applied as per instructions

	2. Maintain Waste Record Book for all discharges of wastes and incinerations 3. All non-compliances should be recorded and discussed at weekly site meetings and timeous remedial actions taken 4. All guilty parties that are in contravention of the provisions set out for managing waste should be given a penalty and according to the severity of the impact appropriate steps taken

8.4 WASTE DISPOSAL MONITORING

Certificates providing details of the safe disposal of waste from a permitted hazardous waste disposal site must be provided to the vessel captain upon request.

9 SPILL MANAGEMENT PLAN

9.1 INTRODUCTION

The uncontrolled release of fuels and other chemicals has the potential to cause contamination of the ocean which may lead to serious environmental harm. On this basis, the storage and use of fuels or other chemicals must be managed to the strictest compliance to MARPOL standards to minimise the risk of a release and measures must be in place to promptly address impacts should a release occur.

9.2 OBJECTIVES

This spill management plan has been prepared to minimise the potential for the uncontrolled release of fuels, oils and other chemicals. Preventative measures to minimise the potential for a spill are listed. Should a spill occur, this plan provides guidance for the Proponent on the appropriate spill response measures and fall under the provisions of MARPOL. The vessel will also be appropriately equipped to manage any spills and will have an emergency response plan.

9.3 ROLES AND RESPONSIBILITIES

Roles	Responsibility
Vessel Captain/Environmental Manager	Required to ensure that appropriate spill prevention measures are implemented and that any spills have been appropriately managed and reported (see 9.4.)
Workforce and all contractors	Required to implement the spill prevention and response measures listed below.

9.4 SPILL PREVENTION MEASURES

The following management measures are to be implemented by the Proponent:

- Spill kits are to be made available throughout the site. The kits are to include, as a minimum, the following items:
  - Absorbent materials
  - Shovels
  - Heavy-duty plastic bags
  - Protective clothing (e.g., gloves and overalls)

- Major servicing of equipment shall be undertaken off site or in appropriately equipped workshops.

- Provision of adequate and frequent training on spill management, spill response and refuelling must be provided to all onsite staff and contractors.
- Fuels, lubricants, and chemicals are to be stored within appropriately sized, impermeable bunds or trays with a capacity not less than 110% of the total volume of products stored.
- All fuel and chemical storage and handling equipment (including transfer hoses, etc.) shall be well maintained.
- Storage and handling of fuels and chemicals shall be in compliance with relevant legislation and regulations.
- MSDS are to be kept for each chemical used on site. These must be easily accessible to all personnel.

9.5 SPILL RESPONSE MEASURES

The primary concern, in the event of any spill, is the health and safety of any employees and contractors in the vicinity. Of secondary, but highly significant, importance, is the protection of the marine environment.

The following points therefore apply to all areas on the vessel:

- Assess the situation for potential hazards.
- Do not come into contact with the spilled substance until it has been characterised and necessary personal protective equipment (PPE) is provided.
- Isolate the area as required.
- Notify the vessel captain, OHSE manager or environmental manager.

The following measures are to be implemented in response to a spill on the vessel:

- Spills are to be stopped at source as soon as possible (e.g., close valve or upright drum)
- Spilt material is to be contained to the smallest area possible using a combination of absorbent material or other containment methods
- Spilt material is to be recovered as soon as possible using appropriate equipment.
- All contaminated materials recovered subsequent to a spill e.g. absorbent pads are to be disposed to appropriately licenced facilities
- The OHSE manager or environmental manager are to be informed as soon as possible in the event of a spill, and
- A written Incident Report must be submitted to the vessel captain and environmental manager.

The following measures are to be implemented in response to a spill in the ocean:

- The OHSE manager or environmental manager are to be informed as soon as possible in the event of a spill.
- Spills are to be stopped at source as soon as possible (e.g., close valve or upright drum)

- Spilt material is to be contained to the smallest area possible using a combination of absorbent material or other containment methods
- Booms: Long, floating, interconnected barriers are used to minimize the spread of spill
- Sorbents: Specialized absorbent materials act like a sponge to pick up oil but not watered oil.

Table 7- Spill Mitigation Measures

Responsibility	– Vessel Captain – Mining Manager – Employees – Contractors
Potential issues or impacts	– Seawater contamination due to spillage
Stored Hazardous Chemicals	Hazardous chemicals (such as fuels) are to be handled over areas provided with impervious surfaces.
	Spills of hazardous chemicals are to be contained and cleaned-up to ensure protection of the environment.
	All the necessary PPE required for the safe handling and use of petrochemicals and oils shall be provided to and used or worn by, the onsite staff.
Machinery and Equipment Maintenance	Major servicing of equipment shall be undertaken off-site or in appropriately equipped workshops.
	For small repairs and required maintenance activities all reasonable precautions to avoid oil and fuel spills must be taken (e.g., spill trays, impervious sheets).
	All the necessary PPE required for maintenance activities must be issued to staff whose duty it is to manage and maintain the machinery and equipment.
Management of hydrocarbons	Keep records (vessel logbooks) of quantities and types of all hazardous materials and oils taken onboard vessels, their method of storage, use and disposal.
Prevention of small oil or cleaning solvent spills onboard	- Use low toxicity biodegradable detergents to clean up spills. - Avoid spilling toxic chemicals but if spillages occur then clean up spilled chemicals immediately and place adsorbent material (rags) used for this purpose in sealed waste containers for safe disposal ashore. - Keep records of spillages and estimate amounts not retrieved by clean up actions.

The table below shows the environmental aspects and impacts, mitigation and monitoring measures for the spill of hazardous substances.

Table 8- Spill of Hazardous Substances

Responsibility	– Vessel Captain – Mining Manager – Contractors	
Potential issues or impacts	Hydrocarbon, chemical handling and storage can cause spillages that lead to seawater contamination.	
Management/ Mitigation measures	Safe delivery and handling	1. Appropriate Emergency Response Plan and environmental response plan to be in place, per MARPOL requirements 2. Good housekeeping across the site. 3. Fuel and chemicals are handled with care. 4. Spill kits to be at designated areas across the site or available for use during refuelling, fuel/chemical delivery, or use. Absorption material should be available and at hand 5. Any major spill is reported once containment has been achieved. 6. Vessel and equipment to be well maintained and serviced regularly.
	Storage	Spill kits available at storage locations and around the site at suitable locations
Monitoring requirements	Hazardous substances	Maintain records of quantities used and disposed.
	Leaks and Spills	Maintain records of all spills and remedial actions.
	Hydrocarbon consumption	Maintain records of oil and fuel consumption.

For large-scale spills and other significant environmental incidents, the fire services should be contacted as required and the office of the Ministry of Environment and Tourism (MEFT) informed of the incident (telephone +264 61 284 2111) and Marine Resources (MFMR) (telephone +264 61 2053911). All correspondence with MEFT should be undertaken by the vessel captain with support from the OHSE Manager, Vessel Captain, Vessel Manager and Chief Operating Officer, for spillages inside the port, NamPort OHSE Department to be notified.

For the clean-up of smaller spills, the relevant material safety data sheet (MSDS) should be consulted to determine the appropriate clean-up procedure. Basic spill response training will

be provided as part of the site environmental induction, spill response equipment, including relevant MSDS copies, will be provided in areas where potentially environmentally hazardous chemicals may be used.

9.6 SPILL REPORTING

All major petroleum product spills should be reported to the Ministry of Mines and Energy (MME) on Form PP/11 titled “Reporting of major petroleum product spill”, issued by the Ministry.

10 AIR QUALITY MANAGEMENT PLAN

10.1 INTRODUCTION

This air quality management plan describes the strategies and procedures that will be implemented to ensure the prevention of air pollution from elevated concentrations of gaseous emissions (e.g., oxides of nitrogen; nitrogen dioxide, particulate matter; sulphur dioxide and carbon monoxide) resulting from primarily from the exhaust of the vessel main engines. In cases where generators and other machinery are used, there will be some release of exhaust fumes that will impact the immediate vicinity but will be of short duration.

10.2 OBJECTIVES

This air quality management plan has been prepared to monitor and prevent deterioration of air quality and to minimise the potential for airborne pollutants. Preventative measures are listed below.

10.3 RESPONSIBILITIES

WORKFORCE AND ALL CONTRACTORS
To implement the necessary management practices in order to meet the objectives listed above.
/ ENVIRONMENTAL MANAGER
To ensure that the objectives listed above are being met and to provide performance feedback to the mining manager.

10.4 AIR QUALITY MANAGEMENT PROCEDURES

Table 9- Air Quality Mitigation Measures

Responsibility	– Vessel Captain – Mining Manager – Contractors
Potential issues or impacts	– Air pollution
Management of fumes	On-board air quality monitoring during dredging to identify and manage if required, any unexpected hydrogen sulphide concentrations.
	Ensure that vessel undergoes regular maintenance and is serviced when required.

10.5 AIR QUALITY MONITORING

Emissions onboard the vessel will be managed in accordance with the provisions of MARPOL.

10.6 NOISE AND VIBRATION IMPACTS

The sensitive receptors within proximity to the mining/dredging operation will be the marine fauna. Vessel dredging operations have the potential to generate, noise and vibration that can impact marine fauna.

Table 13 below outlines the potential environmental impacts, mitigation and monitoring measures for noise related aspects of the operations:

Table 10–Noise Aspects

Responsibility	- Mining Manager - Vessel captain - Contractors
Potential issues or impacts	Potential disturbance and/or damage to marine mammals and fish hearing organs through sustained exposure
Management/ Mitigation measures	Initiate the Marine Sightings Programme (birds, mammals, and jellyfish).
	Record the numbers and species sighted during all activities associated with the dredging operation.
	Avoid disturbances of whales whilst underway.
Monitoring requirements	Noise assessment modelling of the dredging vessel.
	Noise assessment measurements and profiling during the operational phase from the vessel.
	Sources of excessive noise will be investigated if detected, and recommendations made for mitigation.

10.7 NOISE AND VIBRATION MONITORING

Currently, specifications for international and/or national noise emission limits for dredging operations is limited however there is substantial research available on noise and potential impacts on marine mammals and fish in published literature. The dredging operator, Jan De Nul has compiled detailed sound profiles for the dredge fleet that it operates. While relevant modelling has been done, the requirement remains for operational monitoring to be undertaken. In this regard acoustic measurements and monitoring Passive Acoustic Monitoring (PAM) devices (e.g. hydrophones) should undertaken onsite in prevailing water and seabed conditions once operations commence. Acoustic data should l be collected during three primary operational periods:

- While the vessel is in full dredging operation;
- During the lowering and hoisting of the trailing arm; and,
- While the vessel is sailing to or from site.

This will determine the level of dredging noise and the attenuation from the sound source (e.g., the vessel). This will assist in confirming the findings of the baseline data completed to date in regard to the impact on marine mammals and seabirds and related potential for harm. It is, therefore, recommended that during daylight hours marine mammal sightings and seabird observations within a 500 m radius of the vessel be recorded for six hours per day, irrespective of the operational status.

11 ARCHAEOLOGICAL AND HERITAGE PROGRAMME

The "chance finds" procedure covers the actions to be taken in the event of the discovery of a heritage site or item in regard to its investigation and assessment by a trained archaeologist or other appropriately qualified person. In the case of the marine environment, potential chance finds mostly relate to unidentified shipwrecks. Review of all available archaeological data to date show no records of shipwrecks reported in the define mine plan area or surrounds.

The "chance finds" procedure is intended to ensure compliance with relevant provisions of the National Heritage Act, No. 27 of 2004), especially Section 55 (4): "a person who discovers any archaeological object must as soon as practicable report the discovery to the Council". The procedure of reporting set out below must be observed so that heritage remains reported to the NHC are correctly identified in the field.

Table 14 below shows the environmental aspects and impacts, and mitigation and monitoring measures for archaeological and heritage aspects.

Table 11– Archaeological and Heritage Aspects

Responsibility	– Mining Manager – Vessel Captain – Contractors
Potential issues or impacts	Impact on heritage features
Management/ Mitigation measures	Should a heritage site or archaeological site be uncovered or discovered during dredging activities, a "chance find" procedure should be applied in the order they appear below: – If operating machinery or equipment, stop work – Determine GPS position if possible – Report findings, site location and actions taken to mining and vessel manager – Cease any dredging operations in immediate vicinity – Determine and demarcate the exclusion boundary – Site location and details to be added to the project's Geographic – Information System (GIS) for field confirmation by an archaeologist – Inspect site and confirm addition to project GIS – Advise the National Heritage Council (NHC) and request written permission to remove findings from work area, if possible – Recover, package and label findings for transfer to the National Museum, is possible
	Should human remains be found, the following actions will be required: – Apply the chance find procedure as described above – Schedule a field inspection with an archaeologist to confirm that remains are human

	– Advise and liaise with the NHC and Police – Remains will be recovered and removed to either the National – Museum or the National Forensic Laboratory. Contact person at NHC: Rev. Soloman April; Tel: (061) 244 375/ 385/594
SPECIFIC MITIGATION DETAILS	
Monitoring requirements	1. If a site is discovered, make sure the archaeological site is not disturbed without permission or supervision of NHC 2. If authorised to proceed, make sure everything of importance, as identified by an appropriate specialist, is removed from site (if possible) and declared safe by an archaeologist before nor dredging operation can continue inside the perimeter of the defined archaeological site

11.1 RESPONSIBILITY

Dredging Operator - To exercise due caution if archaeological remains are found
Mining manager- To secure site and advise management timeously
Vessel Manager- To determine safe working boundary and request inspection
Archaeologist - To inspect, identify, advise management and recover remains (if possible)

12 IMPLEMENTATION OF THE EMP

This environmental management plan:

A. Has been prepared according to the scope of work and terms of appointment issued to the EAP by the Proponent;

B. Has been prepared based on information provided to or obtained by ECC up to April 2022;

C. Is for the sole use of the Proponent, for the sole purpose of an EMP;

D. Must not be used (1) by any person other than the Proponent or (2) for a purpose other than an EMP;

E. Must not be copied without the prior written permission of ECC; and

F. Will be updated pending the outcome of the impact assessment report from additional specialist studies undertaken as part of the ESIA and application process for the environmental clearance certificate for the Project.