

# **CHAPTER 8:**

# **ENVIRONMENTAL MANAGEMENT PLAN**

**DRAFT REPORT**

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## CHAPTER 8. ENVIRONMENTAL MANAGEMENT PLAN

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### 8.1 INTRODUCTION

This Environmental Management Plan (EMP) has been established to ensure that the project complies with the Namibian Environmental Management Act (No. 7 of 2007); and to provide a control framework for implementing the management actions described in the Environmental Impact Assessment (EIA), during dredging. The EMP is to be submitted to the Namibian Ministry of Environment and Tourism (MET) as part of the application to receive an Environmental Contract for the proposed project – The Recovery of Marine Phosphates from Mining Licence 170 (ML170).

This framework EMP will be supplemented with the details of the relevant protocols e.g. specific measures, analysis procedures and reporting intervals.

The EMP addresses dredging activities within ML170 and relevant activities of the dredging vessel during non-dredging operations.

### 8.2 THE ENVIRONMENTAL MANAGEMENT PROGRAMME.

Namibian Marine Phosphate (NMP) is committed to the implementation of responsible environmental management of their mining operation, this commitment applies equally to all contractors retained by the Company.

#### 8.2.1 *Environmental Management Programme: Objectives*

*The implementation of the EMP serves to reduce the negative effects and optimize the positive effects of the marine operations.*

The objectives of the EMP are:

- **Processes:** To achieve all requirements outlined in the EMP, including maintaining communication with all Interested and Affected Parties (I&APs) and compilation of Performance Assessments;
- **Management systems:** To establish an integrated safety, health, environment and quality (SHEQ) management system to facilitate the implementation of the EMP;
- **Monitoring Surveys:** To undertake the described monitoring programme;
- **Vessels at sea:** To ensure that the operations at sea are undertaken in accordance with accepted safe and responsible vessel management practices, and
- **Emergencies:** To have appropriate systems of response in place.

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The matrices presented herein provide detail of the *activities, aspects, and impacts* of the project and the *management actions* required to address these impacts arising from the dredging operation and associated activities.

The commitments described here (the EMP) form part of the authorisation agreement between NMP and the Government of the Republic of Namibia, as represented by the Ministry of Environment and Tourism (MET), the Ministry of Mines and Energy (MME), and other Line Ministries as advised. Non-compliance with these commitments may result in approval being withdrawn.

**8.2.2 Monitoring and ongoing assessment of impacts**

The monitoring of activities with significant impacts is detailed in Section 8.5.

**8.2.3 Performance Assessment**

An Environmental Performance Assessment Report will be submitted annually to the Mining Commissioner of the Ministry of Mines and Energy, the Permanent Secretary of the Ministry of Environment and Tourism and other Line Ministries as detailed in the Environmental Contract.

**8.2.4 Financial Provision**

The project holds at all times Protection and Indemnity (P&I) insurance cover at a suitable level, up to a maximum of US\$ 1 billion<sup>1</sup>.

**8.2.5 Responsibilities**

The responsibility for the implementation of the EMP lies with the NMP appointed Environmental Manager, who in turn will appoint line managers who are responsible for the elements of this management plan.

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<sup>1</sup> Proof of insurance coverage. Appendix 2h

### 8.3 COMPANY STANDARDS

| Activity   | Aspect | Impact             | Management Requirements  | Duration                           |
|--|--------|--------------------|--|------------------------------------|
| Internal communication:<br>The Company environmental policy. | Policy | Improved awareness | <ul style="list-style-type: none"> <li>All personnel (including contractors) are to be made aware of the contents of the Company Environmental Policy Statements</li> </ul>  | Life of mine                       |
| Implementation of the EMP                                    | Policy | Improved awareness | <ul style="list-style-type: none"> <li>Define the roles, responsibilities and authorities of employees responsible for implementing this EMP.</li> <li>Address training needs of staff required to implement specialised aspects of the EMP.</li> <li>Maintain records of plans, decisions, data collected, communications made, emergency responses, etc., which document the implementation of the EMP.</li> </ul> | Life of mine                       |
| Instructions to all employees, including contractors         | Policy | Improved awareness | <ul style="list-style-type: none"> <li>Provide instructions and training to all staff about aspects of the EMP that to relate their work.</li> <li>Present environmental awareness training.</li> <li>Subcontracting companies are to have specific environmental compliance requirements written into their contracts.</li> </ul>   | Life of mine                       |
| Environmental Performance Assessment                         | Policy | Improved awareness | <ul style="list-style-type: none"> <li>Annually undertake performance assessments to verify that the requirements of the EMP have been met.</li> <li>Where compliance has not been achieved, present details of non-compliance and corrective actions.</li> <li>Submit the Environmental Performance Reports to MET and MME.</li> </ul>  | Annually – throughout life of mine |
| Amending the EMP   | Policy | Improved awareness | <ul style="list-style-type: none"> <li>Assess all actions required through the EMP, identify any changes and or new environmental issues arising.</li> <li>Communicate and consult with authorities and key I&amp;APs informing them of proposed changes to the EMP.</li> </ul>  | Annually – throughout life of mine |
| I&APs communications   | Policy | Improved awareness | <ul style="list-style-type: none"> <li>Consult / inform I&amp;APs as may be relevant.</li> <li>Retain a register of all communication.</li> <li>Participate in relevant community and industry forums</li> </ul>   | Life of mine                       |

**ENVIRONMENTAL IMPACT ASSESSMENT REPORT**  
*Dredging of marine phosphates from ML 170*

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| <b>Activity</b>            | <b>Aspect</b> | <b>Impact</b>      | <b>Management Requirements</b>   | <b>Duration</b>                    |
|----------------------------|---------------|--------------------|--|------------------------------------|
| Environmental budget       | Policy        | Improved awareness | <ul style="list-style-type: none"> <li>Allocate an operational budget that is adequate to cover all requirements as detailed in the EMP</li> </ul>   | Life of mine                       |
| Environmental Insurance    | Policy        | Improved awareness | <ul style="list-style-type: none"> <li>Maintain Protection and Indemnity (P&amp;I) Insurance Cover (initially indicated at US\$ 1 billion)</li> <li>Review the cover amount annually.</li> <li>Review the scope of the cover is appropriate to the operational activities</li> </ul> | Annually – throughout life of mine |
| Compilation of Information | Communication | Improved awareness | <ul style="list-style-type: none"> <li>Ensure that the outcome of specialist studies, and the results of monitoring programmes as initiated are incorporated into the company integrated environmental (GIS) information database.</li> </ul>  | Life of mine                       |

## 8.4 VESSEL: STANDARD OPERATIONS

Commencement of operations (includes all general ship activities, sailing, bunkering, and discharging of hopper contents, but excludes recovery of sediments)

### Performance Objectives

The management objectives are to:

- Ensure for the safe operation of the vessel.
- Minimise disruption to all other users of the sea by respecting the right of passage.
- Optimally manage (reduce and recycle) all wastes generated and discharged to sea, air, and land.
- Maintaining open communications with other marine users.
- Ensure emergency contingency plans are in place.

### Standards of compliance

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Minerals (Prospecting and Mining) Act (33 of 1992).</li> <li>• MARPOL<sup>2</sup>.</li> <li>• Merchant Shipping Act 57 of 1951.</li> <li>• London Convention 1972/1996.</li> <li>• Wreck and Salvage Act (2004).</li> <li>• United Nation Convention on Law of the Sea.</li> <li>• Territorial Sea and Exclusive Economic Zone of Namibia Act, No. 3 of 1990.</li> <li>• Marine Resources Act 27 of 2000.</li> <li>• Namibian Ports Authority Act 2 of 1994.</li> <li>• Marine Traffic Act, No. 2 of 1981 as amended by the Marine Traffic Amendment Act 15 of 1991.</li> <li>• Prevention and Combating of Pollution of the Sea by Oil Act No 6 of 1981 (as amended by Act 24 of 1991).</li> <li>• Dumping at Sea Control Act 73 of 1980.</li> </ul> | <ul style="list-style-type: none"> <li>• Comply with international recommendations regarding the use of CFCs</li> <li>• Dredging contractor: approved vessel safety certification<sup>3</sup></li> <li>• Dredging contractor: approved International Standard for the safe management and operation of ships and for pollution prevention (ISM) approved waste management plan.</li> <li>• Dredging contractor: approved ISM approved emergency response plan.</li> <li>• Dredging contractor: approved ISM approved safe bunkering plan.</li> <li>• Dredging contractor: approved ISM approved project environmental management plan.</li> <li>• Dredging contractor: approved ISM approved ballast water management plan.</li> <li>• Dredging contractor: approved ISM approved SOPEP plan.</li> <li>• Dredging contractor: approved ISM system.</li> <li>• Environmental Policy – Namibian Marine Phosphate.</li> <li>• Safety, Health, Environmental &amp; Quality Policy – Dredging Contractor</li> </ul> |
|--|--|

<sup>2</sup> The relevant sections of MARPOL are reproduced in the appendix 2h

<sup>3</sup> Dredging contractor certifications reproduced in appendix 2h

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| Activity                   | Aspect                            | Impact  | Management Requirements  | Duration   |
|----------------------------|-----------------------------------|---|--|--|
| Commencement of operations | Interaction with all marine users | Initiation of operations - exclusivity of use     | 14 days in advance of commencement of a continuous dredging campaign, notify: <ul style="list-style-type: none"> <li>The Permanent Secretary: MME in writing providing particulars regarding the location, nature and extent of the operations.</li> <li>The Permanent Secretary: MFMR in writing providing particulars regarding the location, nature and extent of the operations.</li> <li>Other potential user groups (maritime authorities, fishing industry) in the area in writing, providing detail of the location and extent of the operations.</li> <li>Other potential users of zones of exclusive use around the dredging project area for the particular dredging period.</li> <li>Walvis Bay Radio of intended vessel activities.</li> <li>On termination of dredge activities of more than one month duration, inform Walvis Bay Radio.</li> </ul> | Before each dredging campaign during project production ramp up (yrs 1, 2 & 3) |
|                            |                                   |   | <ul style="list-style-type: none"> <li>Record observations of, and interactions with, other vessels.</li> </ul>  | Life of mine during dredging campaigns   |
|                            | Safety of passage                 | Exclusivity of use                                | <ul style="list-style-type: none"> <li>Display signals to indicate right of passage when dredging.</li> <li>De activate right of passage signals when not dredging.</li> <li>Maintain visual watch at all times.</li> </ul>  | Life of mine during dredging campaigns   |
|                            | Exclusion zone extent             | Exclusivity of use                                | <ul style="list-style-type: none"> <li>An exclusive dredging zone is declared over the active dredging block area.</li> <li>The exclusive zone of 23 x 9 km (SP-1, SP-2) is declared as a 'no fishing zone,' - around the <u>active</u> target recovery area.</li> <li>Vessels may transit through this zone, with due consideration to rights of passage and navigational warning lights.</li> </ul>  | Life of mine block   |
|                            |                                   | Research, survey and fisheries assessment vessels | <ul style="list-style-type: none"> <li>Vessels undertaking fisheries stock assessment and or related scientific surveys are to be given navigational rights of passage within the declared zones of exclusion. The company / organisation intending to undertake these surveys is required to notify the company 14 days in advance, so that appropriate arrangements can be made.</li> </ul>  | Life of mine block - duration of survey  |
|                            | Noise / vibration                 | Disturbance of marine                             | <ul style="list-style-type: none"> <li>Initiate the Marine Sightings Programme (birds, mammals, and jellyfish).</li> <li>Record the numbers and species sighted during all activities associated with the</li> </ul>   | Life of mine during dredging   |

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| Activity                                     | Aspect           | Impact  | Management Requirements   | Duration                     |
|--|------------------|---|---|------------------------------|
|  |                  | mammals and seabirds                              | <ul style="list-style-type: none"> <li>dredging operation.</li> <li>Avoid disturbances to whales whilst underway.</li> </ul>  | campaigns                    |
| Refuelling                                   | Pollution        | Potential impact on the ocean and fauna and flora | <ul style="list-style-type: none"> <li>Obtain permission from the Department of Maritime Affairs before refuelling outside of harbour limits and within the Namibian Economic Exclusive Zone.</li> <li>Confirm the bunkering procedure of the delivery vessel.</li> <li>Ensure that both delivery and receiving vessel are familiar with each party's procedures and operational requirements for transfer of bunkers at sea.</li> <li>Bunkering in areas under the jurisdiction of the port's authority is to be carried out under the requirements as prescribed by NamPort.</li> </ul>   | Prior to refuelling at sea   |
| Grounding - sinking – collision of vessel(s) | Marine Pollution | Potential impact on the ocean and fauna and flora | <ul style="list-style-type: none"> <li>Reduce the probabilities of accidental grounding - sinking – collision through enforcement of safe operational vessel systems.</li> </ul>  | Life of mine                 |
|  |                  |   | <ul style="list-style-type: none"> <li>Maintain all emergency procedures and insurances as legally required.</li> <li>Ensure that emergency procedures are current and in accordance with established standards of practice.</li> </ul>   | Life of mine                 |
|  |                  |   | <ul style="list-style-type: none"> <li>In the event that an emergency occurs (grounding, sinking, collision &amp; fire) follow the standards:                             <ol style="list-style-type: none"> <li>Shipboard Emergency Response Manual</li> <li>Shipboard Oil Pollution Emergency Plan (SOPEP).</li> <li>Shipboard Hazardous Spill Manual.</li> </ol> </li> </ul>   | In the event of an emergency |
|  |                  |   | <p>In the appropriate manner notify:</p> <ul style="list-style-type: none"> <li>MWTC (Department of Maritime Affairs) and as is required, coordinate with them on the activation of the National Oils Spill Response Plan.</li> <li>MET and, as required, coordinate with them on the activation of the National Oil Spill Response Plan.</li> <li>MFMR and, as required, coordinate with them on the activation of the National Oil Spill Response Plan.</li> <li>MME and, as required, coordinate with them on the activation of the National Oil Spill Response Plan.</li> <li>Walvis Bay Harbour Master and, as required, coordinate with them on the activation of the National Oil Spill Response Plan.</li> <li>Advise other parties as may be relevant to minimize damage to their activities.</li> </ul> | In the event of an emergency |

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| Activity  | Aspect           | Impact                        | Management Requirements   | Duration                     |
|---|------------------|-------------------------------|---|------------------------------|
|   |                  |                               | Provide the following information when reporting a spill: <ol style="list-style-type: none"> <li>1. The volume of oil spilled (so MWTC can determine whether or not it is significant).</li> <li>2. The type and circumstances of incident, ship type, port of registry, nearest agent representing the ship's company.</li> <li>3. Geographic location of the incident, distance off-shore and extent of oil spill.</li> <li>4. Prevailing weather conditions and sea state in affected area (wind direction and speed, weather and swell)</li> <li>5. Persons and authorities already informed of the spill.</li> <li>6. Estimates of the numbers of different species of mammals and seabirds in the vicinity, and of the numbers of each species oiled.</li> </ol>  | In the event of an emergency |
|   |                  |                               | <ul style="list-style-type: none"> <li>• If feasible, rescue and stabilise oiled seabirds.</li> <li>• If feasible, transfer oiled seabirds to MFMR Walvis Bay for further rehabilitation.</li> </ul>  | In the event of an emergency |
| Small oil or cleaning solvent spills onboard the vessel                             | Marine pollution | Pollution of the water column | <ul style="list-style-type: none"> <li>• Use low toxicity biodegradable detergents to clean up spills.</li> <li>• 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.</li> <li>• Keep records of spillages and estimate amounts not retrieved by clean up actions.</li> </ul>  | Life of mine,                |
| Disposal of wastes (solid, oily and sewage - including bilge discharges to the sea) | Waste            | Pollution of the environment  | <ul style="list-style-type: none"> <li>• The oil content of any discharge is required to be less than 15 parts per million (MARPOL).</li> <li>• Galley wastes discharged overboard only after maceration through a 25 mm screen (MARPOL).</li> <li>• Sewage processed in approved treatment plants (MARPOL).</li> <li>• 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.</li> <li>• Only incinerated wastes may be discharged overboard and then only when the vessel is more than 25 nautical miles from shore.</li> <li>• With the exception of macerated galley and incinerated wastes do not dump or throw solid waste of any kind into the sea.</li> <li>• Do not discharge any hydrocarbon products into the sea.</li> </ul> | Life of mine                 |

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| Activity                             | Aspect            | Impact                       | Management Requirements   | Duration                           |
|--------------------------------------|-------------------|------------------------------|---|------------------------------------|
|                                      |                   |                              | <ul style="list-style-type: none"> <li>Retain a register of all wastes discharged to sea.</li> <li>Contain all oils, grease or hydraulic fluids spilled on the vessel for disposal at a recognised land-based disposal site.</li> </ul>   |                                    |
| Waste disposal within harbour limits | Waste & materials | Pollution of the environment | <ul style="list-style-type: none"> <li>Do not dump or throw any solid waste of any kind into harbours.</li> <li>Do not discharge any sewage into harbours.</li> <li>Do not discharge any oily or waxy effluents into a harbour.</li> <li>Do not discharge effluent or water from any tank contaminated with greater than 15 parts per million of oil into a harbour.</li> <li>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.</li> </ul>  | Life of mine,                      |
| Waste management record keeping      | Waste & materials | Pollution of the environment | <ul style="list-style-type: none"> <li>Maintain a garbage record book of all discharged/ incinerated food and domestic and operational waste (excluding oil, sewage or noxious liquids listed in other annexes to MARPOL)</li> <li>Record garbage 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.</li> <li>As per the prescribed form, record estimated amounts (m<sup>3</sup>) of each category whenever garbage 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.</li> <li>The officer in charge is to sign for each record on the date of incineration or discharge, and the Master of the ship is to sign each completed page of the Garbage Record Book.</li> </ul> |                                    |
| Management of hydrocarbons           | Waste & materials | Pollution of the environment | <ul style="list-style-type: none"> <li>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.</li> </ul>   | Life of mine, duration of dredging |

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| Activity                                 | Aspect                                       | Impact   | Management Requirements  | Duration  |
|--|--|--|--|---|
|  |  |  |  | operations  |
| Discharge of ballast water               | Pollution: Introduction of alien species     | Possible invasive species dominance            | <ul style="list-style-type: none"> <li>Ballast discharges are controlled through the ISM approved Shipboard Ballast Management Plan (IMO guidelines on ballast water management).</li> </ul>   | Life of mine  |
| Discharges to the atmosphere             | Pollution                                    | Pollution of the environment                   | <ul style="list-style-type: none"> <li>NO<sub>x</sub>, SO<sub>x</sub> and VOCs are to be compliant with the requirements of MARPOL.</li> <li>Only MARPOL approved incinerators may be used and incineration may only take place according to MARPOL.</li> <li>Use environmentally friendly substitutes for CFCs where feasible.</li> </ul>   | Life of mine, operation duration of vessel                    |
| Vessel engine cooling seawater intake    | Seawater intake in jellyfish infested waters | Possible block ages of sea water intakes       | <ul style="list-style-type: none"> <li>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.</li> </ul>   | During dredging when high densities of jellyfish are observed |
| Equipment loss at sea                    | Pollution                                    | Pollution of the environment navigation hazard | <ul style="list-style-type: none"> <li>Establish hazards database, detailing: item, location, date, and recovery date.</li> <li>Depending on the size of the loss, advise MWTC (Department of Maritime Affairs) if it may present a navigation hazard.</li> </ul>  | Life of mine  |
| Vessels in distress                      | Safety at sea                                | Prevention of pollution. Saving lives          | <ul style="list-style-type: none"> <li>Adhere to conventional maritime obligations regarding vessels in distress.</li> </ul>   | Life of mine, during vessel campaigns                         |
| Exclusion zone around discharge pipeline | Interaction with co-users                    | Conflict of use                                | <ul style="list-style-type: none"> <li>Provide the authorities with information indicating the location of the pipeline and connection buoy.</li> <li>Provide the fishing industry with information indicating the location of the pipeline and connection buoy.</li> <li>Indicate the extent of the exclusion zones.</li> <li>Clearly mark the exclusion zone using buoys.</li> <li>Ensure the hazard location is listed on navigational charts.</li> </ul> | Before start of operations                                    |
|  | Exclusion zone extent                        | Safety at sea                                  | <ul style="list-style-type: none"> <li>A zone of 500 m radius from the marker buoy is declared as an exclusion zone: 'no vessel zone.'</li> <li>Along the pipeline (approximately one kilometre in length) a zone of 100 m wide is</li> </ul>  | For the life of mine  |

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| Activity                                | Aspect                            | Impact                       | Management Requirements   | Duration  |
|---|-----------------------------------|------------------------------|---|---|
|   |                                   |                              | declared as a 'no fishing zone'.  |   |
| Vessel to shore slurry transfer         | Approaching the connection area   | Conflict of use              | <ul style="list-style-type: none"> <li>Ensure that the approach to the connection point and exclusion zone is clear of marine traffic</li> <li>Ensure that the exclusion zone area is free of marine traffic.</li> <li>Verify that sea conditions are acceptable for ship to shore slurry transfer.</li> <li>Ensure that the support vessel is on station.</li> <li>Notify all relevant parties of intended slurry transfer.</li> </ul>   | For each transfer                                   |
|   | Connecting to the pipeline        | Prevention of pollution.     | <ul style="list-style-type: none"> <li>Deploy anchor.</li> <li>Receive connection cable from the support vessel, support vessel stand clear.</li> <li>Activate the connection process, and verify seal.</li> </ul>  | For each transfer                                   |
|   | Pipeline slurry transfer          | Prevention of pollution.     | <ul style="list-style-type: none"> <li>Pump seawater to flush the line of any residual sediment.</li> <li>Initiate slurry transfer.</li> <li>Pump seawater at the end of the transfer to flush the line of any residual slurry (residual slurry is captured in the holding pond ashore)</li> </ul>  | For each transfer                                   |
|   | Pipeline disconnection            | Prevention of pollution.     | <ul style="list-style-type: none"> <li>De-couple the vessel from the pipeline.</li> <li>Verify that the pipeline returns to the seabed.</li> <li>Engage engines and recover the anchor.</li> <li>Advise the support vessel to return to port.</li> </ul>  | For each transfer                                   |
|   | Pipeline integrity                | Prevention of pollution.     | <ul style="list-style-type: none"> <li>Verify the integrity of the pipeline – pipeline inspection programme</li> </ul>  | Regular intervals according to inspection programme |
| Damage to, or disturbance of shipwrecks | Archaeological and historic sites | Loss of heritage information | <ul style="list-style-type: none"> <li>Stop dredging.</li> <li>Advise the project manager.</li> <li>Reinitiate dredging 1000 m from the suspected (identified) wreck location and or as advised by the project manager.</li> <li>The project manager is to advise the National Monuments Council as relevant to the discovery.</li> <li>Continue operations in that area only under the instruction of the National Monuments Council.</li> <li>Retain all correspondence.</li> </ul> | When a shipwreck is suspected                       |

**8.5 VESSEL: DREDGING OPERATIONS:**

Commencement of dredging operations (includes recovery of sediments, fine tailings return, water column and marine fauna, but excludes all general ship activities, steaming, bunkering, and discharging of hopper contents)

**Performance Objectives**

The management objectives are:

- Through mitigation and monitoring, minimise direct effects of the operation on the marine environment.
- Manage dredging related impacts on the marine environment to avoid compromising future exploitation of renewable marine resources.
- Establish and maintain an information base that will assist in evaluating cumulative impacts.
- Establish recovery rates of marine habitats impacted during the dredging.
- Through communication minimise potential conflict with other marine users.
- Promote information exchange with scientific institutions and I&APs.
- Protect heritage sites (shipwrecks) if encountered.
- Ensure for safety of the operation, by applying all relevant safe vessel operations

**Standards of compliance**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Minerals (Prospecting and Mining) Act (33 of 1992).</li> <li>• Environmental Management Act (Act 7 of 2007).</li> <li>• Marine Resources Act 27 of 2000</li> <li>• MARPOL.</li> <li>• Petroleum products and energy amendment Act (2000).</li> <li>• Draft Pollution Control and Waste Management Bill.</li> <li>• Merchant Shipping Act 57 of 1951.</li> <li>• Wreck and Salvage Act (2004).</li> <li>• United Nation Convention on Law of the Sea.</li> </ul> | <ul style="list-style-type: none"> <li>• The London Convention.</li> <li>• Convention of Biological Diversity.</li> <li>• Territorial Sea and Exclusive Economic Zone of Namibia Act, No. 3 of 1990.</li> <li>• Namibian Ports Authority Act 2 of 1994.</li> <li>• Marine Traffic Act, No. 2 of 1981 as amended by the Marine traffic Amendment Act 15 of 1991.</li> <li>• Prevention and Combating of Pollution of the Sea by Oil Act No 6 of 1981 (as amended by Act 24 of 1991).</li> <li>• Dumping at Sea Control Act 73 of 1980.</li> <li>• Environmental Statement Policy</li> </ul> |
|--|--|

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| Activity                | Aspect       | Impact  | Management Requirement  | Duration   |
|-------------------------|--------------|---|---|--|
| Dredging of the deposit | Biodiversity | Destruction of Sediment profile   | For each target area, conduct geophysical survey prior to dredging and post dredging, to determine / provide information on: <ul style="list-style-type: none"> <li>• Area and volume (thickness) of sediment removed versus predicted;</li> <li>• Residual volume (thickness) of sediment covering the footwall;</li> <li>• Morphological character of the seafloor;</li> <li>• Seabed areas within the dredged target area that are undisturbed by the dredging process;</li> <li>• Readjust frequency and scope of further post dredging geophysical surveys if required as a function of interpreted information against the primary objectives of the survey;</li> <li>• Integrate output information into adjustments for the next period of dredging; and</li> <li>• Retain data and interpretations to a GIS system.</li> </ul> | Before the start of dredging & 2-3 yrs after dredging is completed & thereafter at redefined intervals |
|                         |              |   | <ul style="list-style-type: none"> <li>• Through geophysical techniques record the morphological characteristics of a completed dredge zone;</li> <li>• Integrate output information into subsequent recovery surveys; and</li> <li>• Retain data and interpretations to an environmental GIS system.</li> </ul>  | During dredging  |
|                         |              | Removal of sediments, destruction of benthos and disturbance to the environment | For each of the target areas prior to dredging being undertaken the following initial sample / data collection and or verification assessments are required: <ul style="list-style-type: none"> <li>• Collection of representative macro faunal assemblages</li> <li>• Collection of meiofaunal comparative samples</li> <li>• Collection of sediment for the evaluation of grain size, organics, dissolved nutrients &amp; H<sub>2</sub>S. (surficial and internal samples)</li> <li>• Distribution of bacterial mats</li> <li>• Integrate output information into adjustments of the planned recovery surveys;</li> <li>• Revise EIA assumptions in context accordingly, and</li> <li>• Retain data and interpretations to an environmental GIS system</li> </ul>   | Pre dredging assessment:   |

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| Activity | Aspect  | Impact                              | Management Requirement   | Duration   |
|----------|---|-------------------------------------|--|--|
|          |   | Recovery of benthos and environment | Dependent on the verification assessment, conduct for the target dredge areas: <ul style="list-style-type: none"> <li>• Collection of representative macro faunal assemblage</li> <li>• Collection of meiofaunal comparative samples</li> <li>• Sediment collection for grain size, organics, dissolved nutrients, trace metals &amp; H<sub>2</sub>S. (surficial and internal samples)</li> <li>• Disturbance, distribution, recovery of bacterial mats</li> <li>• Identify areas of actual and potential high sedimentation (inhibiting benthos recovery via smothering or particulate organic matter build up and possible anoxia)</li> <li>• Determine benthos recovery / re-colonisation rates</li> <li>• Revise future recovery monitoring programs in context of the EIA accordingly, and</li> <li>• Retain data and interpretations to an environmental GIS system</li> </ul> | Post dredging, in year 2-3 and thereafter at redefined intervals |
|          | Discharge of 'lean' water overboard: Turbidity plumes | Water column quality                | For each of the target areas prior to dredging being undertaken the following initial sample / data collection and or verification assessments are required: <ul style="list-style-type: none"> <li>• Collection of seabed sediment for the evaluation of grain size, organics, dissolved nutrients, trace metals &amp; H<sub>2</sub>S. (surficial and internal samples)</li> <li>• Integrate the biogeochemical output information into the assumptions and determination of the EIA;</li> <li>• Integrate the biogeochemical output information into adjustments of the planned in-plume verification surveys;</li> <li>• Revise EIA assumptions in context accordingly, and</li> <li>• Retain data and interpretations to an environmental GIS system</li> </ul>  | Pre dredging assessment  |
|          |   |                                     | For each target area undertake in-plume verification surveys designed to: <ul style="list-style-type: none"> <li>• Verify plume behaviour, distribution and impacts determined from EIA, (as revised from site specific collected information);</li> <li>• Integrate in-plume survey output information and determine the need for further / frequency of in-plume evaluation assessments;</li> <li>• Based on output recommend the plan for the next in-plume survey(s); and</li> <li>• Revise EIA assumptions in context accordingly, and</li> <li>• Retain data and interpretations to an environmental GIS system</li> </ul>   | During target area dredging: Year 1                              |

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| Activity | Aspect | Impact | Management Requirement  | Duration  |
|----------|--------|--------|---|---|
|          |        |        | <p>If in-plume verification surveys indicate that plume impacts are more severe than predicted from the EIA, then real time controls on e.g. exceedances of turbidity, dissolved oxygen, H<sub>2</sub>S thresholds etc., should be established to manage the dredging phase.</p> <ul style="list-style-type: none"> <li>• Revise EIA and management criteria;</li> <li>• Conduct appropriate in-plume monitoring;</li> <li>• Based on output recommend the plan for the next in-plume survey(s); and</li> <li>• Revise EIA assumptions in context accordingly, and</li> <li>• Retain data and interpretations to an environmental GIS system</li> </ul> | <p>As may be required, during dredging in following years</p> |

## 8.6 SUPPORT VESSEL

Includes all support activities to the dredging vessel (operations alongside), and matters related to the coupling of the sinker line to the dredger (operations in the pipe coupling area) and operations in the port control area, but excludes all general ship activities, as these are described in section 8.4 above.

### Performance Objectives

The management objectives are to:

- Ensure for the safe operation of the support vessel.
- Minimise disruption to all other users of the sea by respecting the right of passage.
- Maintaining open communications with other marine users.
- Ensure emergency contingency plans are in place.

### Standards of compliance

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Minerals (Prospecting and Mining) Act (33 of 1992).</li> <li>• MARPOL<sup>4</sup>.</li> <li>• Merchant Shipping Act 57 of 1951.</li> <li>• Wreck and Salvage Act (2004).</li> <li>• Territorial Sea and Exclusive Economic Zone of Namibia Act, No. 3 of 1990.</li> <li>• Marine Resources Act 27 of 2000.</li> <li>• Namibian Ports Authority Act 2 of 1994.</li> <li>• Marine Traffic Act, No. 2 of 1981 as amended by the Marine traffic Amendment Act 15 of 1991.</li> <li>• Prevention and Combating of Pollution of the Sea by Oil Act No 6 of 1981 (as amended by Act 24 of 1991).</li> </ul> | <ul style="list-style-type: none"> <li>• Contractor approved waste management plan.</li> <li>• Contractor approved emergency response plan.</li> <li>• Contractor approved bunkering plan</li> <li>• Contractor approved project environmental management plan.</li> <li>• Contractor approved SOPEP plan.</li> <li>• Dredging contractor vessel safety management system.</li> <li>• Environmental Policy – Namibian Marine Phosphate.</li> <li>• Safety, Health, Environmental &amp; Quality Policy – Contractor</li> </ul> |
|---|---|

<sup>4</sup>The relevant sections of MARPOL are reproduced in the appendix 2h

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| Activity   | Aspect                                  | Impact  | Management Requirement  | Duration                     |
|--|---|---|---|------------------------------|
| General operations alongside the dredger, e.g. victualling, crew transfers, etc. | Approaching the dredger                 | Safety of operation – incident / pollution prevention | <ul style="list-style-type: none"> <li>Ensure that the approach to the dredger is clear of marine traffic.</li> <li>Verify that sea conditions are acceptable for ship-to-ship goods (including personnel) transfer.</li> <li>Ensure open communications are established with the dredging vessel.</li> </ul>   | Life of mine – per transfer. |
|  | Transfer of materials                   |   | <ul style="list-style-type: none"> <li>Secure all materials before transfer and confirm all is safe.</li> <li>Deck duty officers to mutually approve materials transfers, initiate transfer.</li> <li>Ensure open communications are established with the dredging vessel.</li> </ul>   | Life of mine – per transfer. |
|  | Transfer of personnel                   |   | <ul style="list-style-type: none"> <li>Verify that the man transfer mechanism is fully functional and approved.</li> <li>Initiate final briefing of parties to be transferred.</li> <li>Deck duty officers to mutually approve personnel transfer, initiate transfer.</li> <li>Ensure open communications are established with the dredging vessel.</li> <li>Ensure that all personnel are equipped with appropriate personal protective gear.</li> </ul> | Life of mine – per transfer. |
| Operations at the pipeline coupling area   | Approaching the connection area         | Safety of operation – incident / pollution prevention | <ul style="list-style-type: none"> <li>Verify that sea conditions are acceptable for ship to shore slurry transfer.</li> <li>Ensure that the approach to the connection point and exclusion zone is clear of marine traffic</li> <li>Ensure that the exclusion zone area is free of marine traffic.</li> <li>Ensure open communications are established with the dredging vessel.</li> </ul>  | For each transfer            |
|  | Retrieving the sinker line leader cable |   | <ul style="list-style-type: none"> <li>Approach the sinker line marker buoy.</li> <li>Deploy mechanism to retrieve the sinker line leader cable.</li> <li>Retrieve sinker line leader cable.</li> <li>Transfer the sinker line leader cable to the dredger.</li> <li>Stand clear.</li> <li>Ensure open communications are established with the dredging vessel.</li> </ul>  | For each transfer            |
|  | Monitor slurry transfer                 |   | <ul style="list-style-type: none"> <li>Observe sea surface for sediment plumes that may indicate pipeline leaks or failure.</li> <li>Advise dredging Master of any questionable observations.</li> <li>Monitor the transfer zone and surrounding area for other vessel activity.</li> <li>Ensure open communications are established with the dredging vessel.</li> </ul>   | For each transfer            |
|  | Pipeline disconnection                  |   | <ul style="list-style-type: none"> <li>Assist as is necessary in the decoupling of the sinker line from the dredger.</li> <li>Verify that the pipeline returns to the seabed.</li> <li>Ensure that the sinker line marker buoy is secure and in working order.</li> </ul>   | For each transfer            |

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| Activity                            | Aspect               | Impact  | Management Requirement   | Duration  |
|-------------------------------------|----------------------|---|--|---|
|                                     |                      |   | <ul style="list-style-type: none"> <li>Await instructions from the dredge vessel, return to port.</li> </ul>   |   |
|                                     | Pipeline integrity   | Pollution prevention                                  | <ul style="list-style-type: none"> <li>Verify the integrity of the pipeline – pipeline inspection programme</li> </ul>   | Regular intervals according to inspection programme |
| Operations in the port control area | Taking bunkers       | Pollution prevention                                  | <ul style="list-style-type: none"> <li>Compliance with the NamPort requirements for the taking of bunkers.</li> <li>Compliance with the requirements of MWTC for the taking of bunkers.</li> <li>Initiate bunker transfer in compliance with ‘standards of transfer.’</li> <li>Standby of emergency protocol.</li> </ul> | For each transfer                                   |
|                                     | Victualling          |   | <ul style="list-style-type: none"> <li>Use of local resources and service providers.</li> <li>Verification of safe staking area on quayside.</li> <li>Immediately transfer goods from the quayside to the vessel.</li> </ul>   | For each transfer                                   |
|                                     | Waste management     |   | <ul style="list-style-type: none"> <li>Compliance to the NamPort requirements for quayside waste transfers.</li> <li>Ensure at all times that wastes are contained and do not spill, leak or blow away.</li> <li>Retain waste transfer / disposal log</li> </ul>   | For each transfer                                   |
| Vessel at standby status            | Emergency assistance | Safety of operation – incident / pollution prevention | <ul style="list-style-type: none"> <li>At all times the support vessel is to be on standby to provide whatever assistance may be required.</li> </ul>  | Life of mine – 24 / 7.                              |

## 8.7 SOCIO-ECONOMICS

### Performance Objectives

- Establish a balance between economic, social and environmental responsibilities.
- Provide training and development opportunities.
- Provide services supply opportunities for local business.
- Consult with the business community.

### Standard of compliance

- Minerals (Prospecting and Mining) Act (33 of 1992).
- Minerals Agreement (1995).
- Labour Act (1992)

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| Activity                                   | Aspect                    | Impact                           | Management Requirement   | Duration     |
|--|---------------------------|----------------------------------|--|--------------|
| Communication                              | Managing perceptions      | Conflict                         | <ul style="list-style-type: none"> <li>Develop I&amp;AP relationships by maintaining communication on relevant issues.</li> <li>Retain records of all I&amp;APs communications.</li> </ul>   | Life of mine |
|  |                           |                                  | <ul style="list-style-type: none"> <li>Participate with relevant established community stakeholder forums.</li> <li>Ensure regular feedback to the Company Steering Committee on environmental performance.</li> </ul>   | Life of mine |
|  |                           |                                  | <ul style="list-style-type: none"> <li>Publicise and make available information on the environmental monitoring programmes and environmental performance.</li> </ul>   | Life of mine |
|  |                           |                                  | <ul style="list-style-type: none"> <li>Participate in the development of the marine SEA.</li> <li>Supply data and reports to the information custodians of the SEA</li> </ul>  | Life of mine |
| Dredging                                   | Economy                   | Namibian economy                 | <ul style="list-style-type: none"> <li>Pay all applicable taxes and royalties to the Government as required.</li> </ul>  | Life of mine |
| Services                                   |                           | Local economy                    | <ul style="list-style-type: none"> <li>Use local suppliers of goods and services where economically practicable.</li> <li>Invite local service providers to the tendering process.</li> </ul>  | Life of mine |
| Harbours                                   |                           | Financial contribution           | <ul style="list-style-type: none"> <li>Pay all relevant harbour fees.</li> <li>Use Walvis Bay harbour infrastructure and services where possible.</li> </ul>   | Life of mine |
| Recruitment                                | Social wellbeing          | Erongo region                    | <ul style="list-style-type: none"> <li>Prioritise employment options to suitably qualified and skilled local citizens.</li> </ul>  | Life of mine |
| Skills Transfer                            | Knowledge transfer        | Training                         | <ul style="list-style-type: none"> <li>Provide employees with development and skills training.</li> <li>Provide environmental awareness programmes.</li> </ul>   | Life of mine |
| Research, education and community projects | Cooperative participation | Improved knowledge and awareness | <ul style="list-style-type: none"> <li>Where relevant, assist research and education to contribute to the general and specific understanding of environmental issues and management practices related to phosphate mining.</li> <li>Where relevant supply monitoring data to the marine science and fisheries communities</li> </ul> | Life of mine |

## 8.8 MONITORING PLAN

| Activity  | Criteria  | Frequency  |
|---|---|--|
| <b>Dredging Operations</b>                                  |   |  |
| Fish (Monk fishery)   | <ul style="list-style-type: none"> <li>Monitor the effectiveness of implementation of cooperation agreement.</li> </ul>   | Per event / annually   |
| Discharge of 'lean' water overboard:<br>Turbidity plumes    | <ul style="list-style-type: none"> <li>Sampling of overspill water for particulates.</li> <li>Photographs of the plume.</li> <li>Monitoring organics, dissolved nutrients, trace metals &amp; H<sub>2</sub>S.</li> <li>Record wind speed, direction, general ocean / climatic conditions</li> </ul>   | Once off verification survey for target mining areas.                  |
| Excavation of dredged seabed /<br>Destruction benthic fauna | <ul style="list-style-type: none"> <li>Conduct a pre-dredging geophysical and benthic macrofaunal (include meiofaunal assessment) survey to record seabed topography and types of marine life present.</li> <li>Monitor the affected area using geophysical and/or benthic sampling techniques to assess recovery / re colonisation and residual sediment distribution</li> </ul> | Post-dredging, year 2 - 3. Re-evaluate the survey frequency thereafter |
| Marine fauna sightings                                      | <ul style="list-style-type: none"> <li>Record the number of mammals, species of birds and jellyfish aggregations and sighted.</li> </ul>  | Daily.   |
| Shipwrecks  | <ul style="list-style-type: none"> <li>Record the date, time and location.</li> <li>Advise the authorities.</li> </ul>  | Per event  |
| Hydrogen sulphide   | <ul style="list-style-type: none"> <li>On-board air quality monitoring.</li> </ul>  | During dredging  |
| <b>Transport and transfer of dredge sediments</b>           |   |  |
| Other vessels in the area                                   | <ul style="list-style-type: none"> <li>Record sightings / interactions with other vessels.</li> <li>Maintain a communications register.</li> </ul>  | Per event  |
| Discharge of dredged sediments                              | <ul style="list-style-type: none"> <li>Retain records of the volumes of sediments discharged to shore.</li> </ul>   | Per event  |
| <b>Waste Management</b>                                     |   |  |
| Wastes  | <ul style="list-style-type: none"> <li>Retain Garbage Record Book for all discharges of wastes and incinerations.</li> </ul>  | Per event  |

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| Activity                | Criteria  | Frequency |
|-------------------------|---|-----------|
| Hazardous substances    | <ul style="list-style-type: none"><li>Retain records of quantities used and disposed.</li></ul>                             | Monthly   |
| Leaks and spills        | <ul style="list-style-type: none"><li>Retain records of all spills and remedial actions</li></ul>                           | Per event |
| Hydrocarbon consumption | <ul style="list-style-type: none"><li>Retain records of oil and fuel consumption.</li></ul>                                 | Monthly   |
| Water consumption       | <ul style="list-style-type: none"><li>Retain records of quantities of fresh water used and the sources of supply.</li></ul> | Monthly   |
| Lost equipment          | <ul style="list-style-type: none"><li>Record the item, location, date time, and recovery status</li></ul>                   | Per event |