Final Rehabilitation, Decommissioning and Mine Closure Plan

Including Environmental Risk Assessment

Nisarox (Pty) Ltd

Proposed Prospecting Right with Bulk Sampling over Sea Concession 12B, Western Cape

DMR REF. NO.: WC 30/5/1/1/2/10424 PR

Contents

1 Environmental Assessment Practitioner (EAP)

1.1 Information

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1.2 Declaration of independence

I, Helene Botha, declare that—

- I act as the independent environmental practitioner in this application I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; I will comply with the Act, Regulations and all other applicable legislation;
- I will consider, to the extent possible, the matters listed in regulation 8 of the Regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing-any decision to be taken with respect to the application by the competent authority: and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will provide the competent authority with access to all information at my disposal regarding the application whether such information is favorable to the applicant or not all the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations

Signature EAP

2 Introduction

2.1 Background

This document serves to comply with regulation 11(1) of the NEMA Financial Regulations that states that the holder of a right or permit must ensure that a review is undertaken of the requirements for final rehabilitation, decommissioning and closure of the prospecting, exploration, mining or production operations at the end of the life of operations as reflected in a Final Rehabilitation, Decommission and Mine Closure Plan ; and remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an Environmental Risk Assessment Report.

The objectives of this Final Rehabilitation, Decommission and Mine Closure Plan is to identify a post-mining land use that is feasible through-

- providing the vision (goals), objectives, targets and criteria for final rehabilitation, decommissioning and closure of the project;
- outlining the design principles for closure;
- explaining the risk assessment approach and outcomes and link closure activities to risk rehabilitation;
- detailing the closure actions that clearly indicate the measures that will be taken to mitigate and/or manage identified risks and describes the nature of residual risks that will need to be monitored and managed post closure;
- committing to a schedule, budget, roles and responsibilities for final rehabilitation, decommissioning and closure of each relevant activity or item of infrastructure;
- identifying knowledge gaps and how these will be addressed and filled;
- detailing the full closure costs for the life of project at increasing levels of accuracy as the project develops and approaches closure in line with the final land use proposed; and
- outlining monitoring, auditing and reporting requirements.

2.2 Issues that have guided the development of the plan

Three approaches were employed to identify the key aims for the closure process that form part of the approved Final Closure Plan submitted and approved in terms of the MPRDA:

- Technical assessments which involved the recording of the project activities over the full life cycle of the prospecting operation (including closure) and the consequent potential impacts on the environment (including cumulative impacts). This resulted in the compilation of a draft closure plan that facilitated discussions with the authorities as well as Interested and Affected Parties (I&APs).
- Identification and consultation with the relevant authorities to record their requirements as well as public meetings with I&APs to solicit/record their suggestions/issues/concerns.
- The collection of available/published environmental data, the review thereof for adequacy and hence the identification of the need for more comprehensive environmental studies/investigations and/or further information gathering.

Subsequent to the above activities/processes, advertisements of the prospecting operation were placed in local newspapers to notify I&AP's about the intended project and invitations to register and participate in the consultation process. A. Public meeting will also be held with nearby settlements.

As a result of the consultation and recommendations from the comprehensive environmental studies/investigations completed the company identified three key closure goals for the final closure of the prospecting operation that are listed below.

- To create a safe and healthy post-mining environment.
- To create a stable, post mining landform, which is compatible with the surrounding landscape.
- To provide optimal post-mining social opportunities.

Each goal is supported by a suite of key objectives and activities which are elaborated on in section 3 of this plan. This plan also describes how these objectives are planned to be met and elaborate on the implementation of certain risk mitigation actions (section 4). With risk assessment and mitigation being integral to the planning and executing of the rehabilitation and closure of the mine. Aftercare and maintenance of rehabilitated sites is often the difference between the ultimate successes or failure of rehabilitation and monitoring of rehabilitation will determine whether rehabilitation objectives and requirements are being achieved (section 5).

2.3 Context of the Prospecting operation

2.3.1 Prospecting rights

This Final Rehabilitation, Decommissioning and Mine Closure Plan that include the environmental risk assessment is applicable to the prospecting right application for Nisarox (Pty) Ltd with reference WC 30/5/1/1/2/10424 PR.

Sea Concession 12(b) is situated approximately 300km north of Cape Town, with the inshore boundary located 1km seaward of the coast between Strandfontein to the south and Namakwa Sands Wet Separation Plant to the north. The offshore boundary is located approximately 4km offshore.

2.4 Project Description

Nisarox (Pty) Ltd is proposing to prospect within Sea Concession area 12B using both non-invasive and invasive sampling activities, none of which require infrastructure. For the purpose of this study, non-invasive means not physically destructive and invasive means physical sampling that is destructive. As the activity is located offshore and comprises prospecting only, no land-based infrastructure will be required.

Prospecting will be vessel-based and will take place during spring and/or summer and when weather conditions are suitable, and seas are calm. It is anticipated to be completed within five (5) years. Sampling will be conducted in four phases and include a combination of non-invasive and invasive activities to detect the presence of paleo-beach deposits, which are known from other concessions to contain diamondiferous gravels. Prospecting operations are expected to occur sporadically within the concession area.

The non-invasive activities will include geophysical exploration (acoustic survey), data acquisition and analysis, while the invasive activities will include physical sampling (collection of core, drill and grab samples). A possible phase of bulk sampling (remote pump and dredge mining) may also be implemented depending on the results of initial sampling. The principal objective of the proposed prospecting activities is to discover and estimate the potential mineral resources for possible future mining.

Prospecting in shallow water up to 50m, that cover most of the concession area, will be conducted by a group owned custom fit survey vessel normally with an overall length of 45.15m and a gross tonnage of 498t. This will be a multipurpose customised survey vessel capable of High-Resolution geophysical surveys (Phase 1) and small-scale boat sampling programs such as Coring and Van Veen Grab Sampling (Phase 2a) and Remote Pump Mining (Phase 3a).

Refer **Figure 1** to **Figure 3** of the sampling techniques possible in shallow water with a single custom fit exploration and mining vessel, the vessel can even be modified to handle small scale Remote Dredge Pump Mining (**Figure 4**).

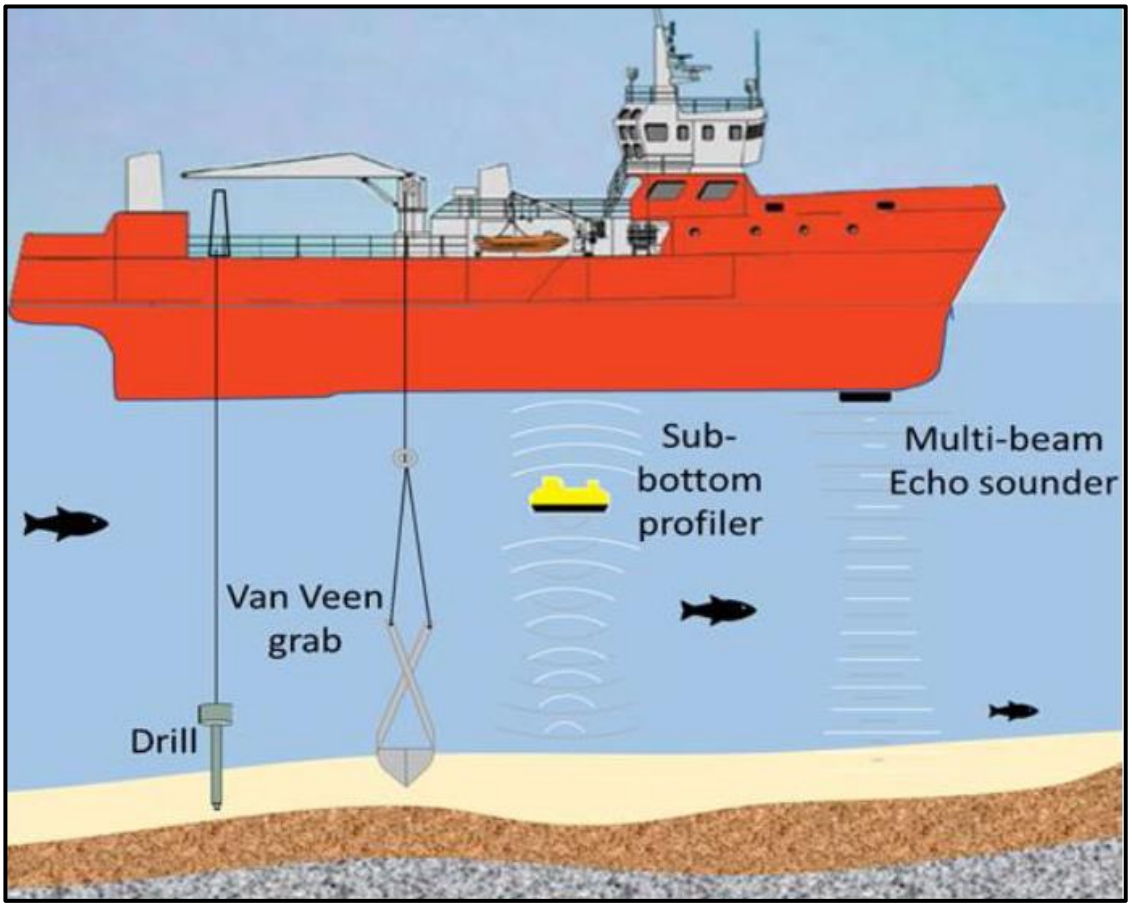

Figure 1: Illustration of sampling techniques possible in shallow water with a single custom fit exploration and mining vessel

Figure 2: An example of a sub-bottom profiler. Source: Seatronics

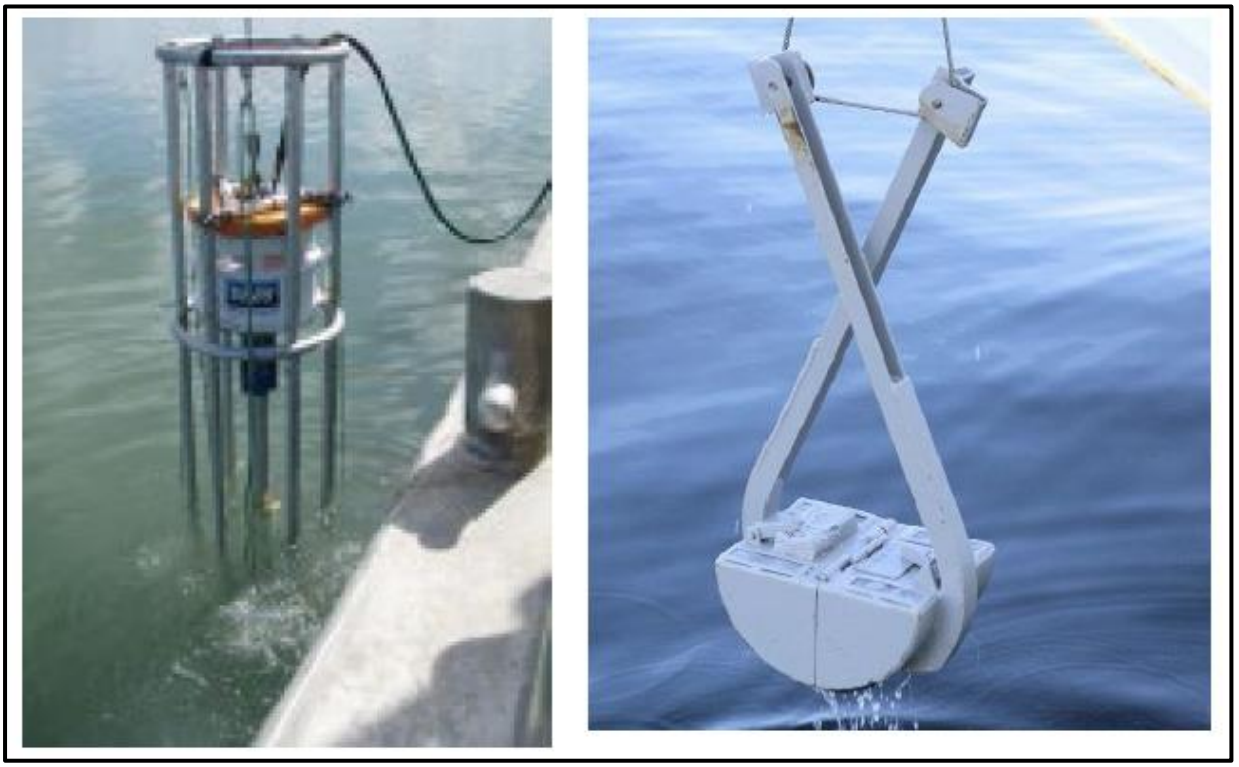

Figure 3: Left Example of a corer and right a Van Veen grab that works like a claw to grab sediment from the seafloor

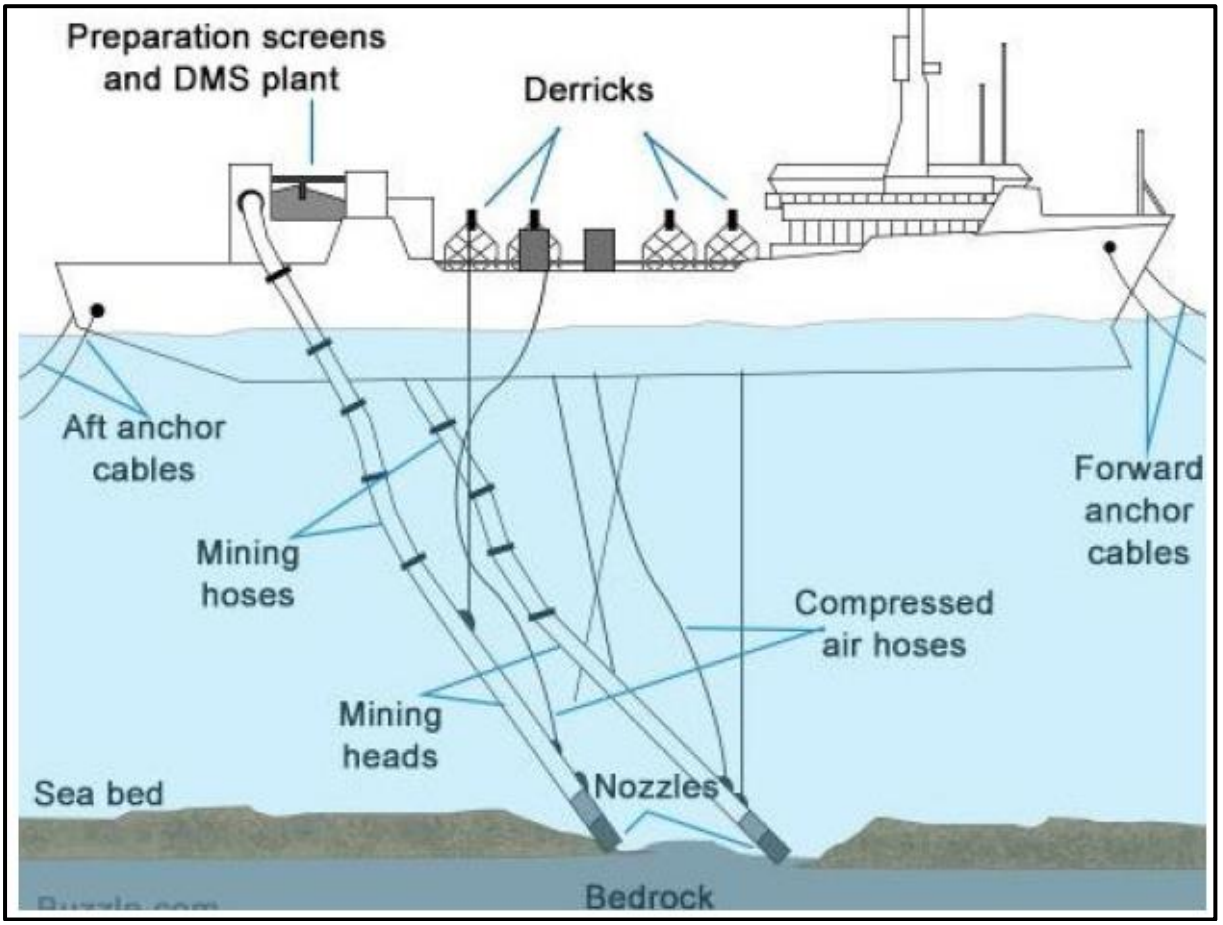

Figure 4: Illustration of remote pump mining (Source: http://globalextractionnetworks.com/about-diamonds/)

Prospecting in water deeper than 50m will be conducted by dedicated sampling vessels. For deeper water drill sampling activities (Phase 2b) a dedicated large diameter drilling sampling vessel, normally with an overall length of 114.4m, and gross tonnage of 4677t (**Figure 5**). Such a vessel is equipped with a subsea

sampling tool, which can be operated in water depths up to 200m. The sampling tool comprises a 2.5m diameter drill bit operated from a drill frame structure (**Figure 6**).

For bulk sampling in deeper areas (Phase 3b) trenching would be undertaken by a seabed crawler, deployed off a dedicated mining vessel, normally with an overall length of 150m and a gross tonnage of 9111t (**Figure 7**). Such a vessel is equipped with a track-mounted subsea crawler (**Figure 8)** capable of working to depths up to 200m below sea level.

Figure 5: Example of a dedicated drill sampling vessel

Figure 6: Example of the 2.5 m diameter drill bit within the drill frame structure

Figure 7: Example of a dedicated sampling vessel

Figure 8: Example of a track-mounted sub-sea crawler

2.4.1 Geophysical Surveys Phase 1

Swath bathymetry and sub-bottom profiling will be the geophysical survey techniques employed during the proposed prospecting operations making use of:

- a multibeam echosounder designed to produce high resolution digital terrain models of the seafloor (**Figure 9**) by transmitting a 30kHz sounding in a wide swath below the vessel; and
- a parametric sub-bottom profiler (Topas system), which uses shallow (35 to 45kHz) and medium penetration (1 to 10kHz) "Chirp" seismic pulses to generate profiles up to 60m beneath the seafloor (**Figure 9**), thereby giving a cross section view of the sediment layers.

Sound levels from the acoustic equipment would range between 190 to 220dB re 1µPa at 1m. The proposed surveys would be undertaken in specific priority areas in the concessions, at water depths of between approximately 15 - 75m. The surveys would have a line spacing of between 100 to 1 000m apart. The total line kilometres to be surveyed is estimated at 600km. The planned duration for the proposed geo-physical surveys would be a total of 20 days per year over a four-year period.

In general terms, sound sources that have high sound pressure and low frequency will travel the greatest distances in the marine environment. Conversely, sources that have high frequency will tend to have greater attenuation over distance due to interference and scattering effects. It is for this reason that the acoustic footprint of the above-mentioned sonar survey tools is considered to be much lower than that of deeper penetration low frequency seismic surveys and in addition have lower sound pressure levels. It should be noted that a decibel is a logarithmic scale of pressure where each unit of increase represents a tenfold increase in the quantity being measured.

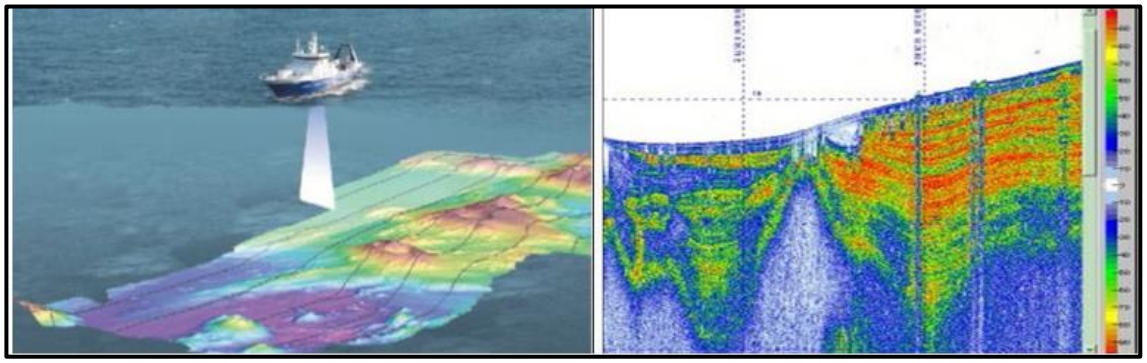

Figure 9: Swath bathymetry (left) and Sub-bottom profiling (right)

2.4.2 Drill Sampling Phase 2

For core samples in water depths less than 30m coring (e.g., vibrocoring) will be done

A vibrocorer consists of a core barrel in a landing frame with a vibrating motor on top.

The vibrocorer is landed on the seafloor, the motor turned on and the barrel penetrates the unconsolidated sediment. Once the core stops penetrating, the motor is turned off and the vibrocorer is raised back up to the deck. A PVC pipe is placed inside the core barrel prior to coring and the core sample is collected in this pipe. Cores can penetrate up to water depths of 50m and core samples up to 3m in length.

Core samples will be collected at 100-200 sites. A corer penetrates the seafloor to collect sediment samples used to determine the structure of the seafloor, sediment layers and types of sediment (i.e., sand, gravel and/ or rock and the hardness of the rock). This information is then used to engineer the drilling tool. Geotechnical sampling is also used to determine whether there are materials that can be mined in the area and whether it will be economically viable. The core samples will disturb a total surface area of 1.57m² and collect a total volume of 4.71m³.

Van Veen Grab sampling may also be used to supplement the vibrocoring: A Van Veen grab (clamshell bucket) collects sediment samples that are analysed to identify sediment types. Sampling will be done at 20-50 sites, disturb a total surface area of 5 square meters (m²) and a total volume of 1.5 cubic meters (m³).

For deeper water drill sampling activities would be undertaken using a dedicated drilling vessel to be sub-contracted. Such a vessel is equipped with a subsea sampling tool that comprises a 2.5m diameter drill bit operated from a drill frame structure, which is launched through the moon pool of the support vessel and positioned on the seabed.

The drill frame structure has a base of 6.5 x 6.5m, stands 23m high and weighs 147tons. The drill bit can penetrate sediments up to 12m depth above the bedrock. The sediments are fluidised with strong water jets and airlifted to the support vessel where they are treated in the onboard mineral recovery plant. All oversized and undersized tailings are discharged back to the sea on site.

A sample spacing of as little as 20m can be achieved by the dynamically positioned vessel. Depending on sea and the sub-seabed geotechnical conditions, up to 60 samples can be successfully taken per day. The samples would be undertaken at intervals of 50 to 500m. The total number of drill samples would be up to a maximum of 4 800. With the drill footprint of 5m², a total area of 2.4ha would be sampled.

2.4.3 Bulk Sampling Phase 3

Following analysis of the drill samples and establishment of a potential resource, bulk trench sampling may be conducted to confirm the economic viability of the resource for mining. It is proposed that up to ten trenches, each 180m long and 20m wide would be excavated within the concession area. Thus, the area to be disturbed would be 3.6 ha. The planned duration of the proposed bulk sampling would be a total of 14 days over a two-year period. It is noted that the trenches will not be contiguous but located in the prospective areas derived from the drill sampling results. The aim of the trench sampling is to determine the geotechnical characteristics of the footwall and overburden which is essential in establishing the optimal approach to mining in these areas.

For trenching in water depths less than 30m Remote Pump Mining may be used. The mining system typically comprises a suspended steel mining tool, suction hoses (10 - 18-inch diameter) and on-board dredge pumps. The mining tool consists of a steel pipe fitted with a mining head (or digging head), which has an opening fitted with grizzly/cross bars to allow sized gravel to pass through and prevent blockages of the suction hose system. The digging head that can also be fitted with high pressure water jetting nozzles to agitate the gravel on the seabed and improve mining efficiency. These jetting nozzles also serve to flush the digging head in the event of it becoming blocked.

The mining tool is suspended from an A-frame situated at the aft end or from davits along either side of the vessel. Some vessels may be fitted with dual mining systems, where mining tools are deployed from both the port and starboard sides. The mining tool suspension cable passes through a hydraulically controlled swell compensator system, which compensates for the vertical movements of the mining tool

caused by the digging action. The vessel moves within a four-point anchor mooring system in order to cover the targeted seabed. Once the dredged material is pumped onboard it undergoes processing.

For trenching in deeper water activities would be undertaken using a dedicated sampling vessel to be sub-contracted. Such a vessel is equipped with a track-mounted subsea crawler capable of working to depths up to 200m below sea level. The crawler, which is fitted with highly accurate acoustic seabed navigation and imaging systems, and equipped with an anterior suction system, is lowered to the seabed and is con-trolled remotely from the surface support vessel through power and signal umbilical cables. Water jets in the crawler's suction loosen seabed sediments, and sorting bars filter out oversize boulders. The sampled sediments are pumped to the surface for shipboard processing. The area of the seabed to be sampled by the crawler can only be determined following analysis of drill samples and development of a resource model.

Shipboard processing consists of Primary Screening, Dense Media Separation (DMS) and Recovery Treatment (**Figure 10**).

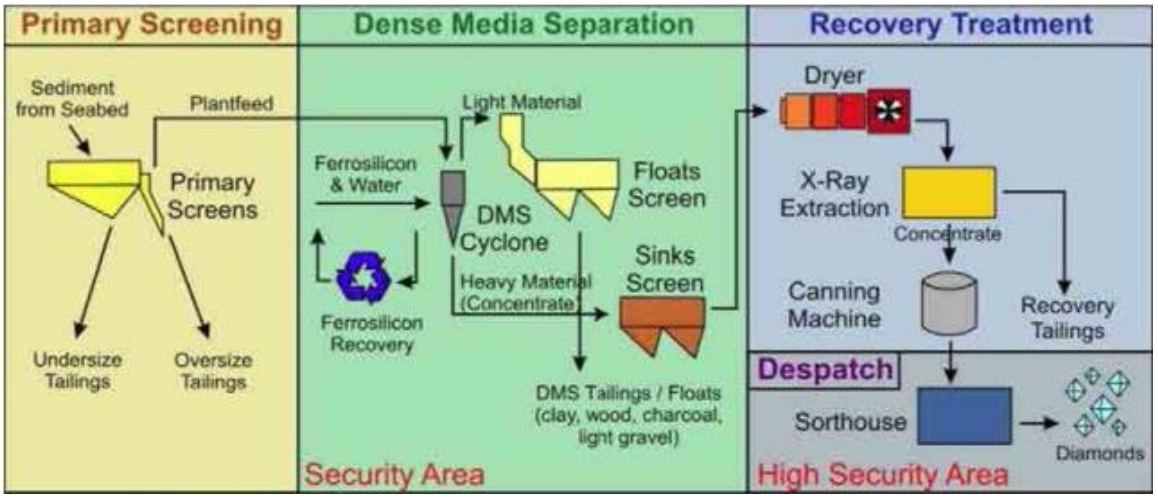

Figure 10: Flowchart of marine diamond gravel processing operations

The incoming slurry from the subsea tool via the slurry hose spooler will end up in the receiving box of the plant, here the velocity and the pressures are reduced, it also starts reducing the water content out of the slurry mass. The slurry mass will then proceed on a primary selection vibrating screen, where the undersize smaller than 1.25mm and particles larger than 19mm is separated.

The under size is transferred directly to the tailings moon-pool, the over size is transferred via a belt feeder which can establish the mass of the oversize if there is no water present in the oversize flow.

The plant feed material is pumped to the storage bins, as from where it can be selectively handled via a belt feeder system to the following treatment options, but depending on the soil conditions:

• Option 1 Transfer direct to the DMS unit.

• Option 2 Transfer to the Barmac crushing system and from there to the DMS unit.

All material from the feed preparation is transferred in the DMS feed hopper, from where it is introduced in the mixing box with the ferrosilicon, passing through the hydro cyclone VC 1220 spigot size 64mm, and the split between the floats and sinks (both over a common wash screen which is treated as restricted area), the floats are routed via a belt feeder to the tailings moon-pool, the sinks are routed to the final recovery section unit.

This final recovery section is a restricted access-controlled area, and only special authorized personnel have access to this area under supervision of security. The material introduced to the recovery module in one batch and passed as a single batch through to the flow sort double pass x-ray machine. Following the x-ray machine treatment, the final high concentrate is guided over a dryer system to the storage container in the glove box container. From here every individual sample is hand sorted, weighed, counted, first appraisal and packed in the drop save. The QA procedure will be followed that for each sample drilled,

tracers larger than 4 mm are introduced in the crusher sump and the samples are not classed as clean and acceptable until 90% tracers been recovered in the glove box.

All tailings from the total mineral separation processes are re-introduced to the sea via the tailings moon-pool or conveyors.

Table 1: Bulk Sampling Activities

ACTIVITY		DETAILS		
Number of pits/trenches planned		10		
Dimensions of excavations	Number of excavations	Length	Breadth	Depth
	10	180m	20m	5m
Locality		Can only be determined following analysis of drill samples and development of a resource model		
Volume Overburden (Waste) per bulk sample area		18 000m³		
Volume Ore per bulk sample area		Estimated 10 carats per 100 tons		
Density Overburden		18 000m³ X SG of 2 = 36 000 tons		
Density Ore		NA for Diamonds		
Phase(s) when bulk sampling will be required		Phase 3 Following analysis of drill samples		
Timeframe(s)		Year 3 and 4		

2.4.4 Pre-/feasibility studies Phase 4

The project manager monitors the programme, consolidates and processes the data and amends the programme depending on the results. This is a continuous process throughout the programme and continues even when no prospecting is done on the ground.

Each physical phase of prospecting is followed by desktop studies involving interpretation and modelling of all data gathered. These studies will determine the manner in which the work programme is to proceed in terms of activity, quantity, resources, expenditure and duration.

2.4.5 Project layout

No onshore infrastructure will be developed and all infrastructure as part of the port authority at Saldanha harbour will be used during prospecting. All processing is done onboard.

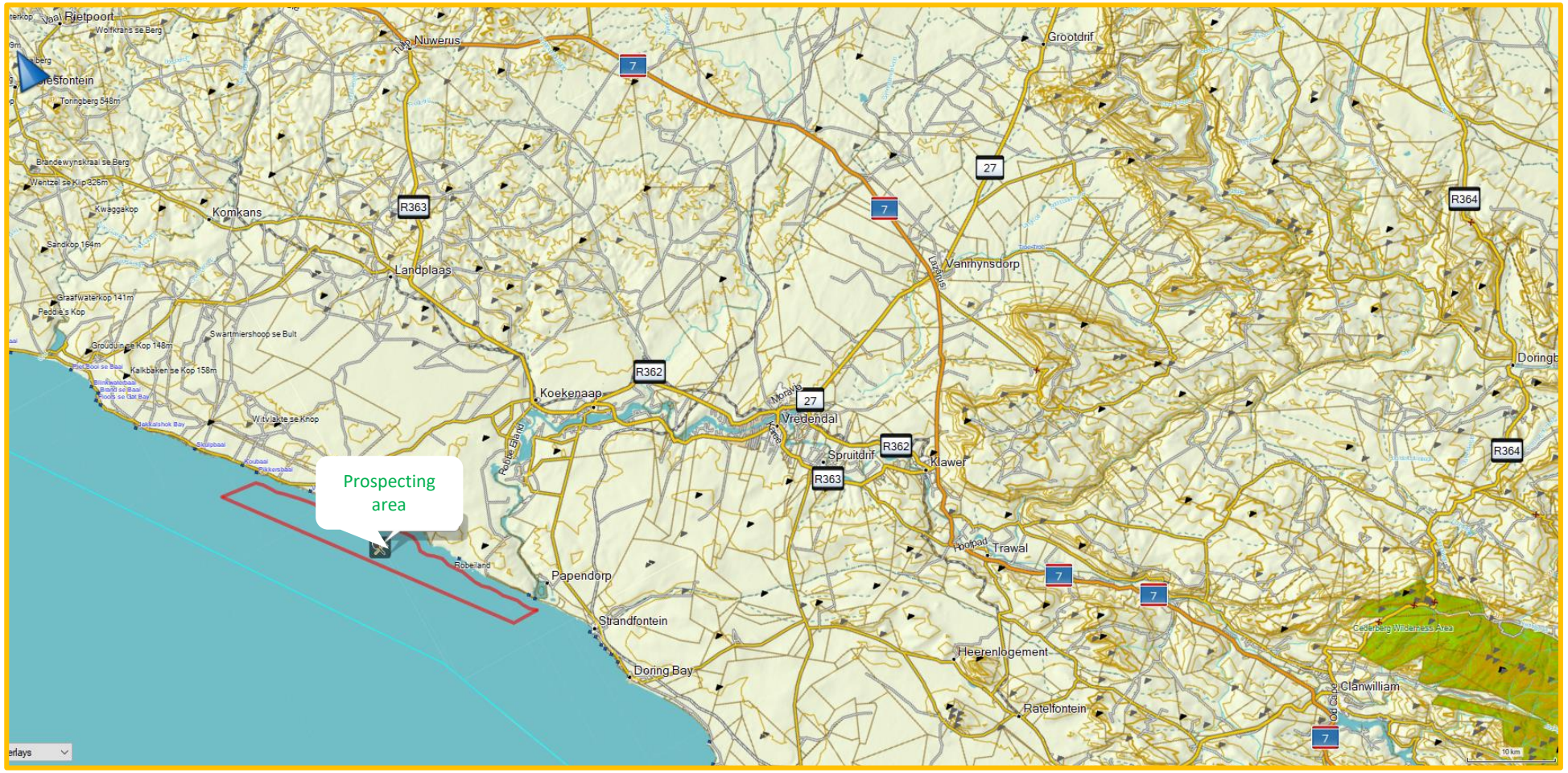

Figure 11: Locality plan with major Towns and Routes

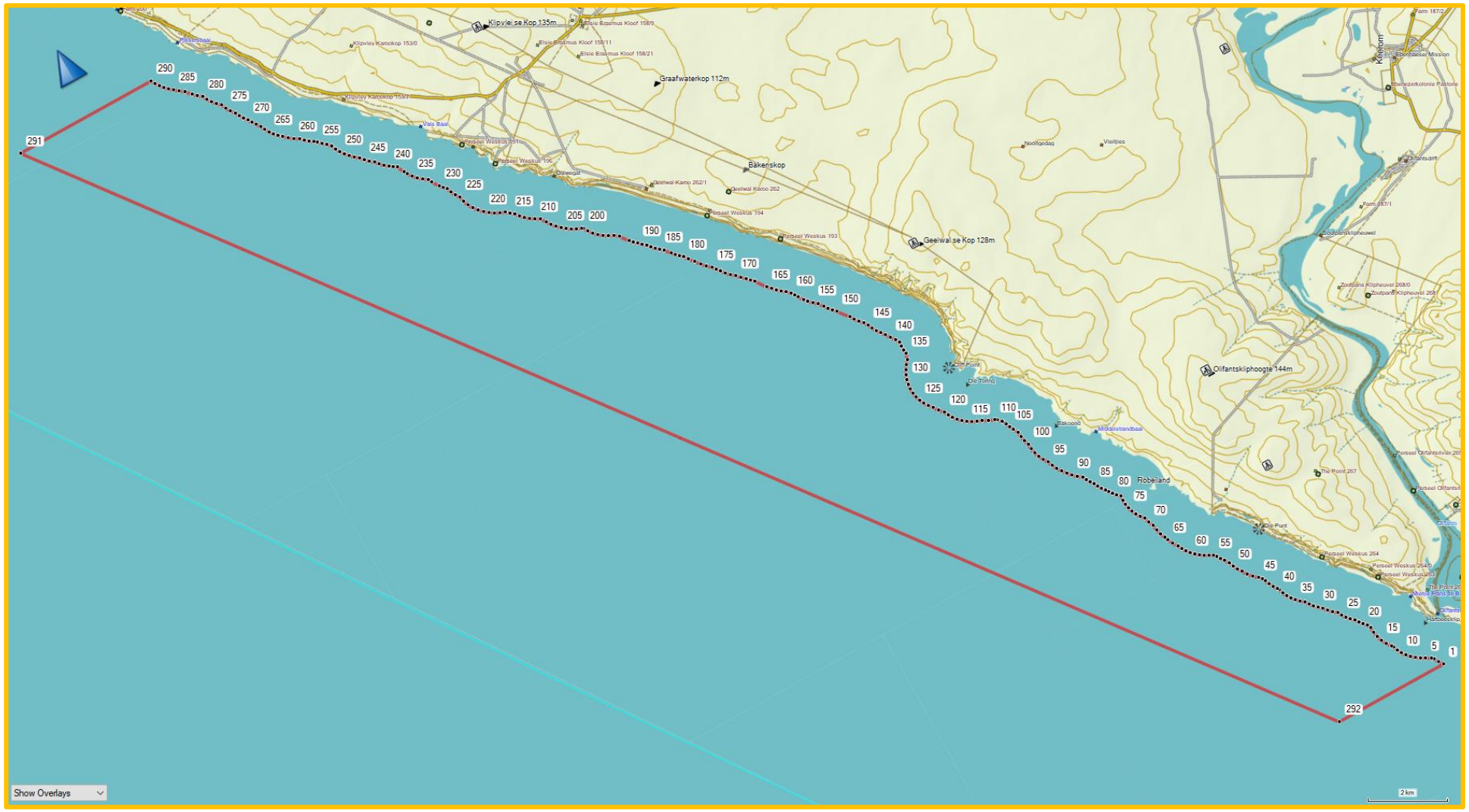

Figure 12: Layout plan Sea Concession 12B

3 Regulatory Requirements

One of the conditions in terms of Regulation 17 (4) is that a holder that operates in terms of a financial provision approved in terms of the Mineral and Petroleum Resources Development Act, 2002 at the time of the coming into operation of the NEMA Financial Regulations, must review and align such approved financial provision with the provisions of the NEMA Financial Regulations on an annual basis as set out in regulations 9 and 11, read with the necessary changes.

3.1.1 The annual rehabilitation plans

The annual rehabilitation plan provide for concurrent or progressive rehabilitation and contain information that defines activities on an annual basis and how these relate to the Final closure vision, as detailed in this final rehabilitation, decommissioning and mine closure plan.

The objective of the annual rehabilitation plan is to–

- review concurrent rehabilitation and remediation activities already implemented;
- establish rehabilitation and remediation goals and outcomes for the forthcoming 12 months, which contribute to the gradual achievement of the post-mining land use, closure vision and objectives identified in the holder's final rehabilitation, decommissioning and mine closure plan;
- establish a plan, schedule and budget for rehabilitation for the forthcoming 12 months;
- identify and address shortcomings experienced in the preceding 12 months of rehabilitation; and
- evaluate and update the cost of rehabilitation for the 12 month period and for closure, for purposes of supplementing the financial provision guarantee or other financial provision instrument.

Taking into acount the objective of the annual rehabilitation plan it is clear that it cannot form part of the environmental management programme to be submitted in terms of section 24N of the Act and the Environmental Impact Assessment Regulations, 2014 but will be submitted on an annual basis as part of the environmental audit report in terms of Regulation 34 (1)(b) of the NEMA EIA Regulations (2014).

3.2 Final rehabilitation, decommissioning and mine closure plan

According to the NEMA Financial Regulations the final rehabilitation, decommissioning and mine closure plan will form a component of the environmental management programme to be submitted in terms of section 24N of the Act and the Environmental Impact Assessment Regulations, 2014 and will be subjected to the same requirements of the environmental management programme with regards opportunities for stakeholder review and comment as well as auditing.

The objectives of this final rehabilitation, decommissioning and mine closure plan is to to identify a post-mining land use that is feasible through-

- providing the vision (goals), objectives, targets and criteria for final rehabilitation, decommissioning and closure of the project;
- outlining the design principles for closure;
- explaining the risk assessment approach and outcomes and link closure activities to risk rehabilitation;
- detailing the closure actions that clearly indicate the measures that will be taken to mitigate and/or manage identified risks and describes the nature of residual risks that will need to be monitored and managed post closure;
- committing to a schedule, budget, roles and responsibilities for final rehabilitation, decommissioning and closure of each relevant activity or item of infrastructure;
- identifying knowledge gaps and how these will be addressed and filled;
- detailing the full closure costs for the life of project at increasing levels of accuracy as the project develops and approaches closure in line with the final land use proposed; and
- outlining monitoring, auditing and reporting requirements.

3.3 Environmental risk assessment report

According to the NEMA Financial Regulations the environmental risk assessment report will also form a component of the environmental management programme to be submitted in terms of section 24N of the Act and the Environmental Impact Assessment Regulations, 2014 and will be subjected to the same requirements of the environmental management programme with regards opportunities for stakeholder review and comment as well as auditing.

The objective of the environmental risk assessment report is to–

- ensure timeous risk reduction through appropriate interventions;
- identify and quantify the potential latent environmental risks related to post closure;
- detail the approach to managing the risks;
- quantify the potential liabilities associated with the management of the risks; and
- outline monitoring, auditing and reporting requirements.

This document then fulfill the requirements of both the Final rehabilitation, decommissioning and mine closure plan and the Environmental risk assessment report

4 Final Decommissioning and Closure of the Sea Concession 12B Prospecting Operation

Concurrent or progressive rehabilitation is good practice and has advantages for the company as it reduces its overall financial exposure. Concurrent rehabilitation and remediation are provided for in the annual rehabilitation plan and contain information that defines activities on an annual basis and how these relate to the Final closure vision, as detailed in this Final Rehabilitation, Decommission and Mine Closure Plan. Annual reviews in terms of regulations 6(a) and 11(1)(a) of the NEMA Financial Regulations, that form part of the Annual Environmental Audit, assesses what closure objectives and criteria are being achieved through the implementation of the plan.

Areas that are not covered during concurrent rehabilitation as described in the Annual Rehabilitation Plan, that require specific intervention as part of this Final Rehabilitation, Decommission and Mine Closure Plan are discussed below.

5 Context Of The Project

5.1 Issues that have guided the development of the plan

Three approaches were employed to identify the key aims for the closure process:

- Technical assessments which involved the recording of the project activities over the full life cycle of the prospecting operation (including closure) and the consequent potential impacts on the environment (including cumulative impacts). This resulted in the compilation of a draft closure plan that facilitated discussions with the authorities as well as Interested and Affected Parties (I&APs).
- Identification and consultation with the relevant authorities to record their requirements as well as public meetings with I&APs to solicit/record their suggestions/issues/concerns.
- The collection of available/published environmental data, the review thereof for adequacy and hence the identification of the need for more comprehensive environmental studies/investigations and/or further information gathering.

As a result of the consultation and recommendations from the EIA report and EMPr completed the company identified three key closure goals for the final closure of the prospecting operation that are listed below.

- To create a safe and healthy post-mining environment with no residual environmental impact.
- To create a stable, free draining post mining landform, which is compatible with the surrounding landscape and which is capable of a productive land use that achieves a land capability equal to that of pre-prospecting conditions
- To provide optimal post-mining social opportunities

Each goal is supported by a suite of key objectives and activities which are elaborated on in section 3 of this report. This report also describes how these objectives are planned to be met and elaborate on the implementation of certain risk mitigation actions (section 5). With risk assessment and mitigation being integral to the planning and executing of the rehabilitation and closure of the mine. Aftercare and maintenance of rehabilitated sites is often the difference between the ultimate successes or failure of rehabilitation and monitoring of rehabilitation will determine whether rehabilitation objectives and requirements are being achieved.

This report fulfils the requirements of both the Final Rehabilitation, Decommissioning and Mine Closure Plan and the Environmental Risk Assessment Report required in terms of the NEMA (Act 107 of 1998) regulations and applicable MPRDA (Act No. 28 of 2002) regulations.

Several pieces of legislation are applicable to mine closure. Importantly, public participation is an integral part of mine closure and the process followed needs to fulfil the requirements of all relevant legislation. The following government departments have been identified amongst others as playing a key role in the closure process:

- Department of Minerals Resources (DMR). Lead agent, facilitator of closure inspections and issues the closure certificate,
- The local municipality and district municipality. Gives input into the mine closure plan and interfacing thereof with their integrated development plan (IDP) of the local area.

6 Mine closure plan and schedule

6.1 EMPr requirements

The requirement proposed to be included as part of the EMPr is that after prospecting, the site must be rehabilitated to its original land use. The objectives to meet the set goals as applied to the final decommissioning and mine closure is discussed in section 5 and can be summarised as follow:

- Objective 1 - To create a safe and healthy post-mining environment
  - Develop a landscape that reduces the requirement for long term monitoring and management
  - Prevent degradation of coastal areas through littering, dumping of scrap mining equipment and scarring of the landscape by the proliferation of beach access roads and tracks, tailings dump etc.
  - Prevent waste discharges leading to pollution of freshwater on land and seawater.
- Objective 2 - To create a stable, post mining landform, which is compatible with the surrounding landscape
  - Economically viable and sustainable offshore area without physical and associated ecological modification as close as possible to its natural state.
  - Prevent disturbance to important biological communities such as seals, birds, whales and dolphins, damage to coastal vegetation and the loss of or damage to cultural and heritage sites.
  - Minimise the compromised water quality and sediment inundation of areas adjacent to those being mined due to mine tailings (oversize and undersize sediments) discharge and disposal.
- Objective 3 – To provide optimal post-mining social opportunities
  - Optimised benefits for the social environment
  - Minimise the operation of exclusion zones around mining operations, both on the coast and at sea, that may preclude or limit access to the areas by other users, e.g. commercial fishermen
  - Prevent over-subscription of the sparse services and infrastructure that exists on the West Coast.

6.2 Final Decommissioning and Closure

6.2.1 Processing and Logistics area

No onshore infrastructure will be developed as part of this exploration operation and all logistics are provided by the port authority at Saldanha.

6.2.2 Offshore Sampling area

6.2.2.1 Basic rehabilitation methodology

Marine diamond mining currently affects a negligible proportion of the concession areas designated for prospecting (<0.1% per year). Given the limitations imposed by the sea conditions and the costs and time required to expand mining capacity it is predicted that this situation will exist for at least the next 5 years and that it may take a further 10 years to increase capacity by a factor of 20. At this time mining may affect approximately 2% of the available area per year. Given the low level of actual mining, the characteristics of the region and its current uses it is considered that the actual and potential negative effects of mining are outweighed by the actual and potential benefits accruing to society.

Research has indicated that recovery rates of the biological communities disturbed by mining in the shallow marine areas is comparatively rapid; recovery periods ranging between 6 and 24 months, after which disturbed sites are statistically indistinguishable from adjacent, undisturbed sites.

The basic rehabilitation methodology would therefore be a hands-off approach whereby the area will rehabilitate itself as long as the following management objectives are met during the operational phase of the operation:

- Employ the EA process so that operations are conducted in an environmentally responsible manner.

- Achieve all action plans outlined in the EA, including continued consultation with all stakeholders and compilation of Environmental Performance Audits.
- Minimise disruption to other legitimate users of the sea by respecting their rights.
- Minimise conflict between the fishing industry and diamond mining by maintaining open and frequent communications.
- Promote information exchange with all relevant stakeholders.
- Instill in all staff and contract workers an ethic of environmental responsibility;
- Maintain good relations with stakeholders on environmental matters of mutual concern;
- Promote industrial relations, and otherwise contribute to socio-economic stability;
- Optimise economic benefits to people of South Africa and particularly coastal communities, where feasible, and
- Minimise direct effects on the marine environment such as damage to, or loss of, benthic habitat.
- Prevent pollution of marine habitats and resources.
- Undertake research and monitoring of the direct impacts of sampling/mining on the environment.
- Manage mining-related impacts on the marine environment to avoid compromising future exploitation of renewable marine resources.
- Monitor the information base that will provide improved insight into the cumulative impacts of mining on marine biota.
- Establish recovery rates of marine habitats impacted or destroyed during mining and allow for recolonisation of areas within a reasonable period.
- Protect key habitats of high ecological sensitivity and importance (e.g. nearshore reef areas and kelp beds).
- Protect archaeological and historic sites thereby preventing the loss of information and research material.
- Minimise disturbance of wildlife.
- Protect key habitats important for wildlife thereby conserving biological diversity.
- Conserve energy and fresh water.
- Reduce wastage and minimise fuel use.
- Plan and make adequate provision for rehabilitation and restoration of impacts.

6.2.2.2 Risk sources

The risk sources within the active mining area with quantification are provided below.

- Shipboard emergency including fire, grounding or sinking, or oil spills.
- Diving and gravel pumping operations - disturbance of the sea bed by excavation (accessing ore bodies requires the removal of overburden (fine sands and/or muds)).
- Disturbance of ecology - noise generation, pollution of marine habitats and resources.

6.2.2.3 Risk Identification

The risks arising from these sources are listed according to closure objectives and the impact rating and mitigation actions of each risk are addressed in the risk assessment section 4.

- Risk of unsafe mining area and residual environmental impact
  - No significant risks were identified.
  - Insignificant risks relate to
    - Equipment lost over side during mining operations such as inter alia large suction pipes and cables/chains, discarded anchor systems and, in extreme circumstances, wrecked mining ships constitute hazards to primarily demersal fishing operations other mining (diamonds and/or oil and gas) and other marine traffic.
    - Discarding Mining wastes, small volume plastic wastes, suction pipes, flanges and other plant - these materials constitute litter if discarded on beaches or anywhere outside of formal landfills. If discarded on beaches they may be hazardous to human and other traffic on beaches. Degradation periods are long (decades).

- Mining vessels, similar to other ships, generate waste streams. Examples are galley and domestic wastes, used oils, various types of garbage etc. generated in normal operations and accidental fuel and/or oil spills. The environmental consequences of uncontrolled or indiscriminate discharges are seen in reduced water quality, affecting pelagic ecology, or, in the case of oils and food wastes, effects on sea bird populations.
- Equipment and other items used during the mining operation left behind.
- Oil fuel leaks into the ocean
- The spillage of fuel during transfer to vessels

- Risks with regard to ecological processes
  - No significant risks were identified.
  - Insignificant risks relate to
    - Post mining landscape that increases the requirement for long term monitoring and management.
    - Disturbance of the sea bed by excavation will have an effect on benthos and lead to modification of sediment distributions and disturbance of the sedimentary record - accessing ore bodies requires the removal of overburden (fine sands and/or muds) that provide the physical habitat for epi- and in-fauna; the distribution of which is controlled largely by the sediment properties themselves.
    - Removing and/or stacking cobbles and boulders to gain access to gravel lying in potholes and/or gullies. These are generally deposited in 'non-gravel' areas in piles or stacks. These actions alter substrate distributions. Stacked boulders may become unstable in high wave conditions and, through movement, crush benthos. Stable stacks, on the other hand, may increase habitat or cover for some species of benthos.
    - Disturbance of ecology - noise generation, pollution (especially oil), trampling, egg collection etc. can disrupt bird breeding and/or feeding success. The presence and activities of miners and other human actions can negatively affect breeding areas on islands specifically. Reduced breeding success can impact entire bird populations.
    - Disturbance of breeding seals by miners can lead to pup mortalities through abandonment or injury by fleeing, frightened adults.
    - Kelp cutting and/or Dragging Pipes through kelp beds or over inter-tidal rocks with associated fauna can directly and indirectly compromise the structure and ecological function of kelp beds and the near shore ecosystem. Kelp itself is a major primary producer in the near shore area and kelp beds shelter commercially important communities such as rock lobster and juveniles of other fished species as well as reducing wave energy reaching the shore. Extensive damage to kelp beds can affect these resources detrimentally.
    - Removing overburden by 'blowing' may lead to modification of substrate, generation of sediment plumes and inundation of reef areas - the 'blowing' process will generate suspended sediment plumes but these will be short lived as mainly fine - coarse sands will be resuspended. The proportions of fine silt and clay particles in the depth zones where 'blowing' may be employed is low due to high wave energy. The displaced sediment may inundate reef areas adjacent to the 'blowing' operations. This is also likely to be short term, as waves will redistribute the sediment back into areas where it is stable under the wave energy regime.
    - Removing sediment can lead to modification of sediment distribution, removal of benthos (in- and epi-fauna) - by definition mining removes and processes sediment. This modifies sediment distributions in that the sediment structure is disturbed and specific size ranges are removed. The exposure of the gravel modifies substrate distributions and can influence the distribution of benthos however, due to the high wave energy characteristic of the region, disturbed sediments will be rapidly resorted and redistributed into potholes, gullies and/or seabed depressions where they are more or less stable in the range of wave generated turbulence they are exposed to.
    - Deposition of oversize (>20mm) size fraction may lead to covering of reef areas and modification of sediment distribution - coarse tailings discharged overboard or from classifiers on beaches may cover exposed reef areas and affect benthos. Coarse tailings deposited below the high-water mark on beaches will modify sediment distributions as it will take a number of

wave events to redistribute these back into gullies and/or potholes and/or sea bed depressions resulting in temporarily modified habitats.
    - Discharge of undersize (<1.6mm) size fraction will lead to fine sediment plume formation - over and above the aesthetic impacts these increase the overall turbidity of the near shore area and may impact both algae and filter feeders by increasing light scattering, altering particle size distributions and modifying ratios of food and non-food particles. The ecological effect is limited as the fine sediment fraction in the region is small due to high wave energy, also the high wave energy itself leads to naturally high turbidity levels.
    - Uncontrolled development of roads and new roads not kept to a minimum - existing farm roads not used for mining operations.
- Risks with regard to benefits for the social environment
  - No significant risks were identified.
  - Insignificant risks relate to
    - Temporary occupation of fixed positions whilst mining and maintenance of exclusion zones impacting on local and international shipping.
    - Recreational and subsistence fishing - there is potential for conflict with users of these resources and their development through limiting access to sites and landing areas for catches.
    - There is potential for conflict with overlapping Oil and gas exploration/exploitation
    - There is potential for conflict with Demersal and Pelagic Fishing due to temporary occupation of fixed positions whilst mining
    - In the sediment removal process the benthos living in and on the sediment (in- and epi-fauna) will also be removed. This may have knock on effects to commercial fish resources in the near shore, e.g., rock lobster.
    - Archaeological sites and ship wrecks - all archaeological sites and shipwrecks older than 50 years are protected by law. Mining activities can destroy any such site causing loss of historical information or culturally important areas.
    - Project closure leading to staff losing their jobs
    - Job losses of secondary industries, businesses and contractors
    - Contractual agreements with service providers surpassing mine closure date
    - No positive and transparent relationships with stakeholders and not maintaining communication channels – not providing stakeholders including government authorities with relevant information as per legislative requirements.
    - Not undertaking environmental management according to approved EMP and plans and no auditing of the environmental management system.
    - Insufficient funds for complete rehabilitation
- Risks with regard to aesthetic impact
  - No risks were identified.

6.2.3 Risk Assessment

6.2.3.1 Risk impact rating

The criteria for the description and assessment of environmental impacts were drawn from the National Environmental Management Act, 1998 (Act No. 107 of 1998).

The level of detail was fine-tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed it is necessary to establish a rating system, which is consistent throughout all criteria. For such purposes, each aspect was assigned a value, ranging from 1-5, depending on its definition.

Potential Impact

This is an appraisal of the type of effect the proposed activity would have on the affected environmental component. Its description should include what is being affected and how it is being affected.

Extent

The physical and spatial scale of the impact is classified as:

- Local

The impacted area extends only as far as the activity, e.g., a footprint.

- Site

The impact could affect the whole or a measurable portion of the site.

- Regional

The impact could affect the area including the neighbouring erven, the transport routes, and the adjoining towns.

- National

Significantly beyond Saldanha Bay and adjacent land areas

Duration

The lifetime of the impact, which is measured in relation to the lifetime of the proposed base:

- Short term

The impact either will disappear with mitigation or will be mitigated through a natural process in a period shorter than any of the phases.

- Medium term

The impact will last up to the end of the phases, whereafter it will be entirely negated.

- Long term

The impact will continue or last for the entire operational lifetime of the Development but will be mitigated by direct human action or by natural processes thereafter.

- Permanent

This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.

Intensity

The intensity of the impact is considered here by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. These are rated as:

- Low

The impact alters the affected environment in such a way that the natural processes or functions are not affected.

- Medium

The affected environment is altered, but functions and processes continue, albeit in a modified way.

- High

Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

This will be a relative evaluation within the context of all the activities and the other impacts within the framework of the project.

Probability

This describes the likelihood of the impacts occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:

- Improbable

The possibility of the impact occurring is none, due either to the circumstances, design or experience.

- Possible/Probable

The possibility of the impact occurring is very low, due either to the circumstances, design or experience.

- Likely

There is a possibility that the impact will occur to the extent that provisions must, therefore, be made.

- Highly Likely

It is most likely that the impacts will occur at some stage of the Development. Plans must be drawn up before conducting the activity.

- Definite

The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on.

Determination of Significance – Without Mitigation

The significance is determined through a synthesis of impact characteristics and is an indication of the importance of the impact in terms of both physical extent and time scale. The significance of the impact "without mitigation" is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, the significance is noted as "positive." The significance is rated on the following scale:

- No significance

The impact is not substantial and does not require any mitigation action.

- Low

The impact is of little importance but may require limited mitigation.

- Medium

The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.

- High

The impact is of significant importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

Determination of Significance – With Mitigation

The significance is determined through a synthesis of impact characteristics. It is an indication of the importance of the impact in terms of both physical extent and time scale and therefore indicates the level of mitigation required. In this case, the prediction refers to the foreseeable significance of the impact after the successful implementation of the suggested mitigation measures. Significance with mitigation is rated on the following scale:

- No significance

The impact will be mitigated to the point where it is regarded to be insubstantial.

- Low

The impact will be mitigated to the point where it is of limited importance.

- Low to medium

The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.

- Medium

Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.

- Medium to high

The impact is of significant importance. Through implementing the correct mitigation measures, the negative impacts will be reduced to acceptable levels.

- High

The impact is of significant importance. Mitigation of the impact is not possible on a cost-effective basis. The impact continues to be of significant importance, and taken within the overall context of the project, is a fatal flaw in the project proposal. This could render the entire development option or the entire project proposal unacceptable.

6.2.4 Risk Mitigation and Closure objectives

Internationally, there seem to be three schools of thought:

- "What the affected community wants, the affected community gets" – that is, the key focus is on providing the end product requested by the affected communities, rather than focusing on the previous status quo of the receiving environment
- "Restoration of previous land use capability" – the original thought process in the South African context, because mining often occurs on land with high agricultural potential
- "No net loss of biodiversity" – the focal point in the ICMM/IUCN dialogue sponsored guidelines for mining and biodiversity, and of many mining corporate policies.

The thought process for the closure of this operation is based on the last two. In addition to the goals and objectives for final decommissioning and mine closure as documented in section 2 the vision for the post closure land form is to leave the site in as safe and self-sustaining a condition as possible and in a situation where no post-closure intervention is required. The vision is to ensure that the affected environment is maintained in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof and that the aesthetic value of the area will be reinstated.

For the vision to be realised the objectives and associated risk management strategies and mitigating measures described below needs to implemented, monitored and evaluated.

Risk management strategies were identified for the potentially significant risks, while data collection and analysis programmes were pursued to evaluate the uncertain risks.

The aim with risk mitigation actions is to over time manage significant (red) and medium (yellow) risks to become insignificant (green), or at least medium and under control with management actions. Once achieved, a risk will continue to be monitored to confirm its insignificance rating of green (1) medium and controlled rating of yellow (2) as part of aftercare and maintenance as discussed in section 5.

The closure process involves a series of actions, executed over a number of years as indicated in the annual closure plans, with continual monitoring, review and remedial actions (if required). Identified and assessed risks feed into mitigation actions (or primary tasks) of which successful implementation result in achievement of the mine closure goals and objectives.

The objectives to meet the set goals as applied to the final decommissioning and mine closure are elaborated on in more detail and in context of the relevant risks below (each of the objectives are supported by several key aims):

- Objective 1 - To create a safe and healthy post-mining environment
  - Develop a landscape that reduces the requirement for long term monitoring and management
  - Prevent degradation of coastal areas through littering, dumping of scrap mining equipment and scarring of the landscape by the proliferation of beach access roads and tracks, tailings dump etc.
  - Prevent waste discharges leading to pollution of freshwater on land and seawater.
- Objective 2 - To create a stable, post mining landform, which is compatible with the surrounding landscape
  - Economically viable and sustainable offshore area without physical and associated ecological modification as close as possible to its natural state.
  - Prevent disturbance to important biological communities such as seals, birds, whales and dolphins, damage to coastal vegetation and the loss of or damage to cultural and heritage sites.
  - Minimise the compromised water quality and sediment inundation of areas adjacent to those being mined due to mine tailings (oversize and undersize sediments) discharge and disposal.
- Objective 3 – To provide optimal post-mining social opportunities
  - Optimised benefits for the social environment
  - Minimise the operation of exclusion zones around mining operations, both on the coast and at sea, that may preclude or limit access to the areas by other users, e.g. commercial fishermen
  - Prevent over-subscription of the sparse services and infrastructure that exists on the West Coast.

The legal framework within which all the above lies entails:

- Defining and meeting closure standards.
- Complying with legislation.
- Sufficient financial provision for mine closure activities.
- Monitoring and plan for latent environmental impact.

The closure process involves a series of actions, with continual monitoring, review and remedial actions (if required). Identified and assessed risks feed into mitigation actions (or primary tasks) of which successful implementation result in achievement of the mine closure objectives and aims. Risk's mitigation actions and believed impact rating at closure associated with each closure objectives are discussed below. In addition, the closure standard for each key aim is listed and quantified. Financial provision is made in section 6 to deal with these mitigating measures in case of temporary closure or sudden closure during the normal operation of the project or at final planned closure.

6.3 Creating a Safe Post-mining environment with no residual environmental impact

6.3.1 Onshore Mitigating measures and management actions:

The following management and mitigating measures form part of the approved EA:

All activities will be vessel based and land-based activities only include the launching of the vessel that will be regulated by the port authority. If infrastructure is however required the following will be applicable

- As far as possible, use only existing infrastructure, facilities and services
  - Develop and use infrastructure that does not degrade terrestrial habitats or the aesthetic values of the coastal region.
  - All offices, housing and processing facilities must comply with building regulations and standards.
  - Compile layout plans demarcating the position of all infrastructure requirements (roads, vehicle maintenance areas and processing areas etc.) and if necessary, submit these to the relevant authority for approval prior to construction.

- Contact the relevant local authority to ascertain what planning regulations apply to the erection of new structures.

- Keep the area required for land-based infrastructure to the absolute minimum required for the planned construction and operations.
- Designate specific areas for parking, storage and work areas during any required construction activities and assembly of equipment. These should be clearly demarcated, and adhered to during construction and operations.
- Prevent pollution by providing and designating adequate facilities for storage and disposal of waste.
- Remove all metal waste from the plant site when no longer needed.
- Recycle metal wastes through resale of scrap metal and keep records of scrap recycled.
- Dispose of non-recyclable metal objects at the municipal waste site.
- Dispose of rubble and other waste construction materials at the nearest designated landfill site.
- Secure storage areas and ensure all hazardous substances and stocks (e.g., diesels, oils, detergents etc) are stored therein.
- Follow service provider guidelines or the SABS Code of Practice for fuel and oil installation. These are drawn up for site-specific installations.
- Ensure emergency response plans are in place for storage and transport of large quantities of oils and fuels.
- Contain all waste oils, grease, hydraulic fluids and other hazardous substances in separate, suitable receptacles and transfer to a recognised land-based hazardous waste disposal facility, or contract a private company to regularly remove and dispose of it.
- Use drip trays and bunding where losses cannot be prevented and are likely to occur.
- 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 rags used for this purpose in a toxic waste container for safe disposal ashore.
- Keep records of spillages and estimate amounts not retrieved by clean up actions.
- Treat polluted soil in situ. In the event of large spills, collect and remove the polluted soil and dispose at a designated bio-remediation site.
- Keep records of hazardous waste management.
- Restrict vehicle movement to the clearly demarcated road network and ensure that all mining staff and contractors adhere to this restriction.

Implementation of the following tasks to manage the risks associated with Final Closure and demolition activities will ensure that waste management practices do not create and/or leave legacies and will limit the residual impact of mine closure. Regular inspections and audits will be used as management system to ensure compliance.

- The infrastructure area will be screened for petrochemical spills and cleaned and waste from the temporary storage facility will be removed and the area cleaned.
- In order to ensure that waste classes are kept in separate streams, communication will be passed on and people will be trained on the different waste classes.
- All temporary waste storage areas need to be cleaned out and waste removed.
- Clean out content of oil traps and dispose of waste at registered and purpose designed landfill sites.
- Decontaminate oil and diesel contaminated soils and structures with biochemical agents prior to removal.
- Unwanted steel, sheet metal and equipment in the salvage yard will be sold or disposed of as scrap metal.
- The compacted salvage yard, lay down and movement areas will be screened for petrochemical spills and cleaned before it is ripped and levelled.
- All equipment and other items used during the mining operation needs to be removed from the site.
- Final walk through of lease area to ensure no mining related waste and of re-usable infrastructure remain on site.

Implementation of the above mitigating measures will ensure a safe post mining environment with waste management practices not creating and/or leaving legacies and that no mitigating measures are required at final closure.

6.3.2 Offshore Mitigating measures and management actions:

The following management and mitigating measures form part of the approved EA:

- Minimise the use of ferrosilicon (FeSi) and retrieve as much as possible so as to reduce the iron levels in discharged water (e.g. use shell crushing equipment to maximise retrieval of FeSi where operating in shelly substrates as this compound accumulates in shells; or a magnet to recycle the FeSi).
- Monitor FeSi consumption on an ongoing basis, set targets and put action plans in place should targets be exceeded.
- Comply with all legal requirements for waste management and pollution control, and employ "good housekeeping" and monitoring practices.
- Follow stringent 'cradle to grave' waste management practices.
- Conduct environmental awareness programmes for waste management.
- As far as possible, separate all wastes.
- Maintain records on the types and amounts of waste disposed.
- Ensure that waste management practices are enforced on all contracted vessels, including:
  - employ "good housekeeping";
  - awareness for waste reduction through re-use and recycling maintained;
  - only water containing <15 ppm oil may be discharged overboard (MARPOL standard);
  - no overboard disposal of any waste or sewage (MARPOL);
  - all scrap metal, cans, paper and cardboard, laser and ink cartridges separated and sent where possible for recycling ashore;
  - use only TBT-free anti-fouling hull paint;
  - other waste stored in appropriate containers or incinerated in IMO-approved shipboard incinerators, and remainder sent by sea to waste sites meeting legal requirements;
  - use of gas oil containing less than 500 ppm sulphur;
  - regular service and repair of all equipment to reduce consumption of fuels and other petrochemical materials, and to minimise the release of greenhouse gases;
  - used oil sent for recycling/disposal;
  - no CFC-based fire-fighting equipment used;
  - phasing out of ozone-depleting products and equipment with alternatives;
  - Official Garbage Record Book for monitoring and recording of all waste types, volumes and wastes sent for recycling.
- Regularly remove all mining or domestic solid wastes (e.g., old piping, plastic sheeting, litter etc.), and dispose of appropriately.
- Prevent pollution during operations by providing suitable containers and designating adequate facilities for storage and disposal of biodegradable and non-biodegradable waste.
- Collect and store biodegradable and non-biodegradable refuse (e.g., glass bottles, plastic bags, metal scrap etc) at a collecting point for collection on a regular basis for disposal at the municipal dump.
- Ensure that all requirements of the Company's Environmental Management System are met, including compliance with legislation, environmental awareness training, environmental monitoring, waste management and pollution control.
- Submit copies of External Environmental Performance Audit Reports to relevant authorities.
- Include environmental management in Strategic Long-term Business Plan, by integrating environmental management through all phases of the life cycle of the mine, starting with the Exploration Phase.
- Integration of future mine plans with proposed Marine Protected Areas in the long-term.
- Ensure compliance of the contracted vessels with the International Maritime Organisation's International Safety Management (ISM) Code developed for the proper development, implementation and assessment of safety and pollution prevention management in accordance with good practice.

- Ensure that the required external assessments of compliance to the ISM Code are conducted. Seek to reduce the probabilities of accidental and/or operational spills through enforcement of stringent oil spill management systems.
- Prepare monthly fuel/oil consumption reports, which provide information on remaining oils onboard each unit.
- Maintain all emergency procedures as required legally.
- In the event of an emergency including fire, grounding or sinking, or oil spill follow procedures in the Shipboard Emergency Response Manual, Shipboard Oil Pollution Emergency Plan, Shipboard Hazardous Spill Manual, and the Fire Attack Plans and Muster Bills.
- In the event of an oil spill:
  - Follow the Shipboard Oil Spill Emergency Response Manual procedure.
  - Notify the Principal Officer of the nearest SAMSA office and the Chief Directorate of Pollution and Waste Management (DEAT) in Cape Town.
- Provide the following information when reporting a spill:
  - The volume of oil spilled (so DEAT can determine whether or not it is significant)
  - The type and circumstances of incident, ship type, port of registry, nearest agent representing the ship's company
  - Geographic location of the incident, distance offshore and extent of oil spill
  - Prevailing weather conditions, sea state in affected area (wind direction and speed, weather and swell)
  - Persons and authorities already informed of the spill
  - Estimates of the numbers of different species of mammals and seabirds in the vicinity, and of the numbers of each species oiled.
- In the event of an oil spill, where feasible, provide facilities to rescue, stabilise, and fly oiled seabirds to SANCCOB for further rehabilitation.
- At least 14 days in advance of commencement of diving and pumping activities:
  - notify the DME in writing providing particulars regarding the location, nature and extent of such operations.
  - notify other potential user groups (maritime authorities, fishing industry) in the area in writing, providing particulars regarding the location, nature and extent of such operations.
  - request in writing the SAN Hydrographic Office at Silvermine to put out Radio Navigation Warnings of intended activities, light buoys and exclusion zones throughout the operational period, and to publish particulars in the Notices to Mariners.
  - Inform the SAN Hydrographic Office on completion of operations.
- Clearly mark any exclusion zones using light buoys and/or radar reflectors.
- Maintain radio communication between the vessel and any lobster vessels in the area whilst the vessel is in inshore waters.
- Undertake oil bunkering and refuelling of contracted vessels under controlled conditions in a harbour only.
- Ballast water may only be released when the vessel is more than 12 miles from land and in water depths greater than 25 m.
- Maintain hazards database listing the type of gear left on the seabed with the dates of loss and locations and where applicable, the dates of retrieval. If requested, report these data to the relevant authorities.

Research has indicated that recovery rates of the biological communities disturbed by mining in the shallow marine areas is comparatively rapid; recovery periods ranging between 6 and 24 months, after which disturbed sites are statistically indistinguishable from adjacent, undisturbed sites. The basic rehabilitation methodology would therefore be a hands-off approach whereby the area will rehabilitate itself.

6.4 Create a stable, post mining landform

6.4.1 Offshore Mitigating measures and management actions:

The following management and mitigating measures form part of the approved EA:

- Implement a Marine Life Sightings Programme (including turtles, jellyfish, rock lobsters and anything else of interest) from the contracted vessel, to record the presence, proximity to and behavior patterns of marine mammals, particularly during operations.
- To avoid disturbance of whales, vessels should not approach within 300 m of a whale whilst underway. If a whale surfaces within this distance of the vessel when at anchor, the vessel should remain stationary until the whale has moved to a distance 300 m away.
- Schedule diving operations to avoid overlap with the presence of whales in the area (June to November).
- Undertake to develop a biological monitoring programme using appropriate sampling techniques to assess recovery rates of impacted communities.
- Undertake to conduct benthic macrofaunal surveys to record seabed topography and types of marine life present to gain an understanding of the marine environment, using a suitable sampling device or combination of devices, which include:
  - Grab sampling or box-coring surveys.
  - Video footage collected.
  - Geophysical (high resolution AUV) surveys.
- Determine areas that could be considered as "conservation corridors" within the Concession area in consultation with the South African government.
- Calculate annual and cumulative mined areas and compare to limit of 1% per year of the total concession area suggested by Currie et al. (2007).
- Report to DME annually areas mined in terms of location and volume of gravel removed.
- Mine target areas to completion and avoid remining for at least five years where possible, to allow communities to recover.
- If requested, provide non-sensitive information on the geological record and sediment structure, derived from sampling, to specialist scientists.
- Conduct high resolution geophysical (SSS, bathymetry and seismic profiling) prior to diving, and of the target areas -1-2 years post- diving to determine the depth, wall steepness and infilling rates of pumping excavations.
- During diving operations:
  - Record wind speed and direction in vessel's bridge log.
  - Conduct visual observations of the plumes.
  - Monitor the proportion of clay (<63 µm) in the overspill.
  - Take photographs of the plume from the vessel.
- Ensure that contractor vessels have appropriate diving technology in place to reduce the generation of suspended sediments, such as the use of dragheads that minimise sediment suspension, use of underwater pumps to maximise solid concentration, and control of the overspill.
- Avoid pumping in the immediate vicinity of emergent rocky outcrops.
- Under no circumstances are overburden spoils to be dumped on, or in the vicinity of, reef habitats.
- Do not disturb in any way a shipwreck older than 60 years without a permit from SAHRA.
- The following actions will be undertaken if shipwreck material is encountered in the course of diving:
  - Immediately inform the Project Manager who will inform the SAHRA;
  - Retain artefacts recovered and, where possible, maintain a photographic record. Note the date, time, location and types of artefacts found in the logbook;
  - Contract a marine archaeologist to survey the site;
  - Avoid mining or prospecting within 500 m from the centre of the site until the area has been surveyed.

Implementation of the above mitigating measures will ensure a stable, free draining post mining landform and that no mitigating measures are required at final closure. Research has indicated that recovery rates of the biological communities disturbed by mining in the shallow marine areas is comparatively rapid; recovery periods ranging between 6 and 24 months, after which disturbed sites are statistically indistinguishable from adjacent, undisturbed sites. The basic rehabilitation methodology would therefore be a hands-off approach whereby the area will rehabilitate itself.

6.5 Provide optimal post-mining social opportunities

The following management and mitigating measures form part of the approved EA:

- In the vessel logbook, record sightings of and interactions with other vessels to note potential conflicts over rites of passage and access to resources.
- If feasible, schedule diving operations to avoid potential conflict during mining discharge with the commercial rock lobster fishery operating in the area between November and April.
- Provide the rock lobster industry with maps indicating the exact location of the discharge pipelines and the extent of the exclusion zones.
- Define the roles, responsibilities and authorities of staff members (and any specialist consultants) responsible for implementation of the various facets of the EMPr, Rehabilitation and Closure Plans.
- Address training needs of staff required to implement specialised aspects of the plans.
- Incorporate environmental impact considerations into criteria for mine planning (including equipment design, operating strategies, procurement of goods and services).
- Establish liaison with marine users and government agencies to inform them of operational plans and ascertain who interested and affected parties may be that should be contacted.
- Plan and make adequate provision for rehabilitation and restoration activities to run concurrently with mining activities.
- Maintain records of plans, decisions, data collected, communications made, emergency responses, etc. which document the implementation of the EMP.
- All personnel and contractors will be made aware of the contents of Environmental Policy Statements.
- All personnel who are in a position to make decisions or take actions that will influence environmental protection and management will be made aware of the contents, and their respective responsibilities for implementation, of the plans.
- Specify the job description and responsibilities of persons involved in environmental management.
- Provide instructions and appropriate training to all staff about aspects of the plans that affect their specific work, including hydrocarbon pollution prevention and clean-up, general waste management, protection of natural resources, and rehabilitation.
- Incorporate environmental aspects and management interventions applicable to particular outsourced tasks into contracts and where applicable in performance appraisals to improve environmental awareness and performance, and specify penalties when necessary for non-compliance.
- Report all environmental incidents.
- Undertake formal performance assessments every 12 months to check progress in meeting the objectives and targets of the EMPr, Rehabilitation Plan and Closure plan.
- Compile and submit annual reports to the Director: Mineral Development, Department of Minerals Resources (DMR) on the implementation of the adopted environmental plan.
- On an ongoing basis, assess the applicability of actions and activities required by the EMPr, identify and address all new environmental issues arising from changed operations and/or communications with interested parties, through amendments to the EMPr if/where necessary.
- Communicate and consult with I&APs to inform them of proposed changes and address any concerns if/when necessary.
- Submit revised and amended Environmental Plans to the DMR as and when required.
- Maintain an up-to-date I&AP database.

- Maintain open communication with relevant stakeholders informing them of proposed changes to the EMPr, addressing any issues of concerns that may arise, maintain records of communications, and where relevant, address their needs.
- Keep a record of all communications with interested parties, the points raised, and how these points have been addressed.
- Participate actively in appropriate fora to share information and co-operate with other stakeholders and resource managers on matters applicable to the marine environment.
- Allocate operational costs to meet EMP objectives, including all associated requirements, e.g., funding of research and monitoring to understand, and where possible, mitigate impacts.
- Maintain Protection and Indemnity (P&I) Insurance Cover to allow for clean-ups in the event of oil spills, and for other eventualities.

Implementation of the above mitigating measures will ensure optimal post-mining social opportunities and will limit the mitigating measures required at final closure. The impact of mine closure is limited and is not expected to alter the socio-economic circumstances of the area significantly however those losing employment will experience significant impacts. Implementation of the following tasks to manage the risks associated with Final Closure and demolition activities will ensure optimal post-mining social opportunities. Regular inspections and audits will be used as management system to ensure compliance.

- Maintain positive and transparent relationships with stakeholders and maintaining communication channels.
- Provide stakeholders including government authorities with relevant information as per legislative requirements.
- Notify the Director: Mineral Development of DMR in writing, at least 14 days in advance of any commencement or cessation of activities, and provide particulars regarding the location, nature and extent of such operations.
- When intending closing an operation as contemplated in the Act, a final EMP performance assessment shall be conducted and a report shall be submitted to the satisfaction of the Director: Mineral Development to ensure that:
  - The requirements of the relevant legislation have been complied with;
  - The closure objectives as described in the EMP have been met;
  - All residual and latent environmental impacts resulting from operations have been identified, and the risks thereof have been identified, quantified and arrangements for the management thereof have been finalised.
  - The applicant will undertake rehabilitation, as required in this Closure Plan, until the Director: Mineral Development of DMR issues a closure certificate.
- Contract durations with service providers will be limited to address the risk of contractual agreements with service providers surpassing the mine closure date.
- Minimise noise disturbance: limiting earth moving to day time.
- Management of air emissions to minimise nuisance effects or health risk; implementation and maintenance of dust monitoring programs accompanied by dust suppression activities by spraying water and/or dust-allaying agents.
- Minimal negative aesthetic impact will be achieved by the implementation of the tasks required to limit residual environmental impact listed above including the following:
  - Identify infrastructure and services to remain after closure.
  - The residential and logistics area will be screened for petrochemical spills and cleaned.
  - Final maintenance of dual use roads to remain after closure.
- All remaining service roads needs to be graded with provision of efficient storm water control to prevent erosion of steep slopes and roadways and elsewhere are required.
- During decommissioning and rehabilitation levels of dust generation need to be monitored and if dust levels rise above acceptable limits dust should be controlled in the interest of improved worker health and safety. In this instance periodic wetting of the maneuvering areas can be considered (No used oil or diesel is to be used for dust suppression).
- Involve all employees/contractors in the speed reduction campaign as road surface condition is more related to speed than to frequency of use.

- Minimise noise and light disturbance: limiting mining and decommissioning actions to day time.
- Minimise visual disturbance: implementation of mitigating measures from the public road views.
- Waste material of any description, including receptacles, scrap, rubble and tyres, must be removed entirely from the mining area and disposed of at a recognised landfill facility. It will not be buried or burned on the site.

6.5.1 Risks, risk levels and mitigating actions

In addition to the goals and objectives for final decommissioning and mine closure the vision for the post closure landform is to leave the site in as safe and self-sustaining a condition as possible and in a situation where no post-closure intervention is required. The vision is to ensure that the affected environment is maintained in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof and that the aesthetic value of the area will be reinstated.

For the vision to be realised the objectives and associated risk management strategies and mitigating measures for the operational phase described in Table 2 below needs to implemented, monitored and evaluated.

The aim with risk mitigation actions is to over time manage significant and medium risks to become insignificant, or at least medium and under control with management actions. Once achieved, a risk will continue to be monitored to confirm its insignificance rating as part of aftercare and maintenance.

The closure process involves a series of actions, executed over a number of years as indicated in the annual Closure Plans, with continual monitoring, review and remedial actions (if required). Identified and assessed risks feed into mitigation actions (or primary tasks) of which successful implementation result in achievement of the mine closure goals and objectives.

Financial provision is made in section 6 to deal with these mitigating measures in case of temporary closure or sudden closure during the normal operation of the project or at final planned closure.

The identified risks and their levels are listed together with their associated mitigating actions for the operational phase in **Table 2** below

Table 2: Risks, risk levels and mitigating actions: Operational Phase

IMPACTS AND ASPECTS	RISK LEVEL AFTER MITIGATION: PREFERRED AND ONLY ALTERNATIVE	MITIGATING ACTIONS
Impact Assessment during Operational Phase		
1. Impacts of multi-beam and sub-bottom profiling sonar on marine fauna	Very Low -	**IMPACT 1: Impacts of multi-beam and sub-bottom profiling sonar on marine fauna** • Despite the low significance of impacts for geophysical surveys, the Joint Nature Conservation Committee (JNCC) provides a list of guidelines to be followed by anyone planning marine sonar operations that could cause acoustic or physical disturbance to marine mammals (JNCC 2017). These have been revised to be more applicable to the southern African situation • Onboard Marine Mammal Observers (MMOs) should conduct visual scans for the presence of cetaceans and penguins around the survey vessel prior to the initiation of any acoustic impulses. • Pre-survey scans should be limited to 15 minutes prior to the start of survey equipment. • "Soft starts" should be carried out for any equipment of source levels greater than 210 dB re 1 µPa

IMPACTS AND ASPECTS	RISK LEVEL AFTER MITIGATION: PREFERRED AND ONLY ALTERNATIVE	MITIGATING ACTIONS
Impact Assessment during Operational Phase		
		at 1 m over a period of 20 minutes to give adequate time for marine mammals and diving seabirds to leave the vicinity. • Terminate the survey if any marine mammals show affected behaviour within 500 m of the survey vessel or equipment until the marine mammal and/or penguin has vacated the area. • Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November), and ensure that migration paths are not blocked by sonar operations. As no seasonal patterns of abundance are known for odontocetes occupying the proposed concession area, a precautionary approach to avoiding impacts throughout the year is recommended. If feasible schedule the survey to take place between February and May thereby avoiding the main seabird breeding seasons (March to October) and penguin summer moult periods (October to January).
2. Impacts of noise from sampling operations on marine fauna	Very Low -	**IMPACT 2: Impacts of noise from sampling operations on marine fauna** • Plan sampling not to co-inside with migratory season of whales Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November), and ensure that migration paths are not blocked by sonar operations. As no seasonal patterns of abundance are known for odontocetes occupying the proposed concession area, a precautionary approach to avoiding impacts throughout the year is recommended.
3. Disturbance and loss of benthic fauna during sampling	Very Low -	**IMPACT 3: Disturbance and loss of benthic fauna during sampling** • No mitigation measures are possible, or considered necessary for the direct loss of macrobenthos due to drill sampling. However, sampling activities of any kind should avoid rocky outcrop areas or other identified sensitive habitats in the concession area.
4. Disturbance to and loss of rock lobsters.	Very Low -	**IMPACT 4: Disturbance to and loss of rock lobsters** • Monitor sorting screens during drill sampling and terminate operations should large numbers of lobsters appear on the screens over a short period of time Avoid sampling in the immediate vicinity of rocky outcrop areas or other identified sensitive habitats in the licence area
5. Crushing of benthic fauna during sampling	Very Low -	**IMPACT 5: Crushing of benthic fauna during sampling** - Sampling activities of any kind must avoid rocky outcrop areas or other identified sensitive habitats

IMPACTS AND ASPECTS	RISK LEVEL AFTER MITIGATION: PREFERRED AND ONLY ALTERNATIVE	MITIGATING ACTIONS
Impact Assessment during Operational Phase		
		in the concession area Implement dynamically positioned sampling vessels in preference to vessels requiring anchorage
6. Increased turbidity in suspended sediment plumes and at the seabed	Very Low -	**IMPACT 6: Increased turbidity in suspended sediment plumes and at the seabed** No mitigation measures are possible, or considered necessary for the discharge of fine tailings from the sampling vessel and the generation of suspended sediments plumes near the seabed by the sampling tools.
7. Remobilisation of contaminants and nutrients.	Very Low -	**IMPACT 7: Remobilisation of contaminants and nutrients** No mitigation measures are possible, or considered necessary for the possible remobilisation of contaminants and nutrients in the sediments
8. Smothering of benthos in redepositing tailings	Very Low -	**IMPACT 8: Smothering of benthos in redepositing tailings** **The following recommendations are made:** • No mitigation measures are possible, or considered necessary for the loss of macrobenthos due to smothering by redepositing sediments. • However, sampling activities of any kind should avoid rocky outcrop areas or other identified sensitive habitats in the concession area Make of geophysical data to conduct a pre-sampling geohazard analysis of the seabed, and near-surface substratum to map potentially vulnerable habitats and prevent potential conflict with the sampling targets.
9. Redeposition of discarded sediments on soft-sediment macrofauna	Very Low -	**IMPACT 9: Redeposition of discarded sediments on soft-sediment macrofauna** No mitigation measures are possible, or considered necessary for the discharge of fine tailings from the sampling vessel and the generation of suspended sediments plumes near the seabed by the sampling tools..
10. Redeposition of discarded sediments: smothering effects on rocky outcrop communities	Low -	**IMPACT 10: Redeposition of discarded sediments: smothering effects on rocky outcrop communities** • No mitigation measures are possible, or considered necessary for the loss of macrobenthos due to smothering by redepositing sediments. • However, sampling activities of any kind should avoid rocky outcrop areas or other identified sensitive habitats in the concession area Make of geophysical data to conduct a pre-sampling geohazard analysis of the seabed, and near-surface substratum to map potentially vulnerable habitats and prevent potential conflict with the sampling targets
11. Loss of Ferrosilicon	Very Low -	**IMPACT 11: Loss of Ferrosilicon**

IMPACTS AND ASPECTS	RISK LEVEL AFTER MITIGATION: PREFERRED AND ONLY ALTERNATIVE	MITIGATING ACTIONS
Impact Assessment during Operational Phase		
		• Reduce FeSi loss through the implementation of shell crushers or ball mills Maintain accurate records of all FeSi used and discarded overboard with tailings
12. Pollution of the marine environment through Operational Discharges from the Sampling Vessel(s)	Very Low -	**IMPACT 12: Pollution of the marine environment through Operational Discharges from the Sampling Vessel(s)** • In addition to compliance with MARPOL 73/78 regulations regarding waste discharges mentioned above, the following measures will be implemented to reduce wastes at the source: • Prohibit operational discharges when transiting through a marine protected area during transit to and from the concession • Use drip trays to collect run-off from equipment that is not contained within a bunded area and route contents to the closed drainage system • Implement leak detection and repair programmes for valves, flanges, fittings, seals, etc. Use a low-toxicity biodegradable detergent for the cleaning of the deck and any spillages
13. Disturbance and behavioural changes in pelagic fauna due to vessel lighting	Very Low -	**IMPACT 13: Disturbance and behavioural changes in pelagic fauna due to vessel lighting** The use of lighting on the project vessels cannot be eliminated due to safety, navigational and operational requirements. Recommendations for mitigation include: • The lighting on the vessel(s) should be reduced to a minimum compatible with safe operations whenever and wherever possible. • Light sources should, if possible and consistent with safe working practices, be positioned in places where emissions to the surrounding environment can be minimised • Keep disorientated, but otherwise unharmed, seabirds in dark containers (e.g. cardboard boxes) for subsequent release during daylight hours. Report ringed/banded birds to the appropriate ringing/banding scheme (details are provided on the ring).
14. Collision of Vessels with Marine Fauna and Entanglement in Gear	Very Low -	**IMPACT 14: Collision of Vessels with Marine Fauna and Entanglement in Gear** • All vessel operators should keep a constant watch for marine mammals and turtles in the path of the vessel. • Ensure vessel transit speed between the concession area and port is a maximum of 12 kts (22 km/hr), except within 25 km of the coast where it is reduced further to 10 kts (18 km/hr) as well as when sensitive marine fauna are present in the vicinity. • Should a cetacean become entangled in mooring buoys or towed gear, contact the South African Whale Disentanglement Network (SAWDN) formed under the auspices of DEA to provide specialist assistance in releasing entangled animals

IMPACTS AND ASPECTS	RISK LEVEL AFTER MITIGATION: PREFERRED AND ONLY ALTERNATIVE	MITIGATING ACTIONS
Impact Assessment during Operational Phase		
		Report any collisions with large whales to the International Whaling Commission (IWC) database, which has been shown to be a valuable tool for identifying the species most affected, vessels involved in collisions, and correlations between vessel speed and collision risk (Jensen & Silber 2003).
15. Equipment lost to the seabed	Very Low -	**IMPACT 15: Equipment lost to the seabed** • Ensure containers are sealed / covered during transport and loads are lifted using the correct lifting procedure and within the maximum lifting capacity of crane system. • Minimise the lifting path between vessels. • Maintain an inventory of all equipment and undertake frequent checks to ensure these items are stored and secured safely on board each vessel. Notify SAN Hydrographer of any hazards left on the seabed or floating in the water column, and request that they send out a Notice to Mariners with this information.
16. Operational Spills and Vessel Accidents	Medium to Low -	**IMPACT 16: Operational Spills and Vessel Accidents** • In addition to the best industry practices and project standards, the following measures must be implemented to manage the impacts associated with small accidental spills • Ensure that vessels operate in accordance with South African Maritime safety regulations to minimise risks of accidents • Refuelling of vessels is to occur under controlled conditions in a harbour only, i.e. bunkering at sea is not permitted • Ensure personnel are adequately trained in both accident prevention and immediate response, and resources are available on each vessel. • Ensure that the vessel operator has prepared and implemented a Shipboard Oil Pollution Emergency Plan and an Oil Spill Contingency Plan. In doing so, take cognisance of the South African Marine Pollution (Control and Civil Liability) Act, 1981 (No. 6 of 1981), Marine Pollution (Prevention of Pollution from Ships) Act, 1986 (No. 2 of 1986) and Marine Pollution (Intervention) Act, 1987 (No. 65 of 1987), which sets out national policies, principles and arrangements for the management of emergencies including oil pollution in the marine environment. • Use low toxicity dispersants cautiously and only with the permission of DFFE. • As far as possible, and whenever the sea state permits, attempt to control and contain the spill at sea with suitable recovery techniques to reduce the spatial and temporal impact of the spill Ensure adequate resources are provided to collect and transport oiled birds to a cleaning station.

<table>
<tr><th>IMPACTS AND ASPECTS</th><th>RISK LEVEL AFTER MITIGATION: PREFERRED AND ONLY ALTERNATIVE</th><th>MITIGATING ACTIONS</th></tr>
<tr><td colspan="3">Impact Assessment during Operational Phase</td></tr>
<tr><td colspan="2">17. Impacts on Underwater Heritage Resources: Pre-Colonial Sites And Artefacts
Low +</td><td rowspan="3">IMPACT 17-19: Impacts on Underwater Heritage Resources
• Induction for site managers on archaeological site and artefact recognition.
• Geophysical surveys would possibly identify wrecks and wreck debris.
• Reporting of sites to the heritage practitioner for assessment and evaluation.
• Avoiding the wrecks would preserve these MUCH resources.
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NO IMPACT</td></tr>
<tr><td colspan="2">18. Impacts on Underwater Heritage Resources: SHIPWRECKS POSSIBLE IN 12B
<table>
<tr><td>SHIPWRECKS WITH NO HERITAGE SIGNIFICANCE</td><td>SHIPWRECKS WITH A LOW HERITAGE SIGNIFICANCE</td><td>SHIPWRECKS WITH A MEDIUM HERITAGE SIGNIFICANCE</td><td>SHIPWRECKS WITH A HIGH HERITAGE SIGNIFICANCE</td></tr>
<tr><td>Very Low +</td><td>Low +</td><td>Low +</td><td>Medium +</td></tr>
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19. Impacts on Underwater Heritage Resources SHIPWRECKS IMPROBABLY IN 12B
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<tr><td>SHIPWRECKS WITH NO HERITAGE SIGNIFICANCE</td><td>SHIPWRECKS WITH LOW HERITAGE SIGNIFICANCE</td><td>SHIPWRECKS WITH MEDIUM HERITAGE SIGNIFICANCE</td><td>SHIPWRECKS WITH HIGH HERITAGE SIGNIFICANCE</td></tr>
<tr><td>Very Low +</td><td>Low +</td><td>Low +</td><td>Medium +</td></tr>
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<tr><td colspan="2">20. Impact on Underwater Palaeontological Resources
<table>
<tr><td>Cretaceous Fossil Wood</td><td>Cenozoic Shelly Macrofauna</td><td>Fossil Bones and Teeth</td><td>Shells from the Last Transgression Sequence</td></tr>
<tr><td>Medium +</td><td>Medium – High +</td><td>Medium – High +</td><td>Medium +</td></tr>
</table></td><td>IMPACT 20: Impacts on Palaeontological Resources
The EMPs for the prospecting and mining rights areas must therefore include provisions for the collection of representative examples of the fossils that occur therein. As part of Environmental Awareness Training, geological staff involved in logging must be informed of the need to watch for fossil material and rescue such from the vibracores, grab samples and the drillship gravel oversize screen.
The prospecting/mining company must apply to SAHRA for a general permit to destroy, damage, excavate, disturb and collect fossils identified during sampling and mining, as per the NHRA.</td></tr>
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1.1 Vibracores and Grab Samples

Fossils may be found during the processing of the vibracores and grab samples. These may be obvious, such as petrified bone and teeth and shell casts, usually phosphatic. All material of potential interest must have the details of context recorded and be kept for identification by an appropriate specialist and if significant, to be deposited in a curatorial institution such as the IZIKO SA Museum.

The identification of extralimital, Agulhas "sub-fossil" shell species in the loose shells of the Last Transgression Sequence requires a level of seashell knowledge. The best outcome for a set of cores from this poorly-known area is that they are the subject of a detailed study, such as for a B.Sc. Honours or M.Sc. project, with radiocarbon dates. It is possible that a core or two might intersect rarely preserved lagoonal deposits which are important for providing points on the sea-level curve applicable to the West Coast (Runds *et al*., 2018).

1.2 Collection of Fossil Material during Prospecting and Mining

As part of the normal sampling and mining process the material crossing the oversize screen (Figure 6) must be monitored for the occurrence of the various fossil types. Potential fossil material should be collected for later identification and evaluation.

For overall monitoring purposes it is suggested that a few small bulk samples of shells (~5 litres) be collected on occasion. The idea is to sample the typical assemblage at a few points in the sampling/mining area. It is possible that an uncommon assemblage may be encountered, such as a shallow-water fauna or a lagoonal fauna, in which case it should also be sampled.

Data to be recorded during fossil collection includes:

- Date
- Company name
- Sample no.
- Collector's name
- Position (co-ordinates)
- Water depth
- Sample subsurface depth
- Vessel
- Brief description and photographs
- A copy of the graphic log of the sample drill hole or mining face showing the vertical sequence of units and the estimated location of the fossil in the sequence.
- A map of the fossil finds in the particular sampling/mining area, such as a contoured multibeam bathymetric image showing the context of samples in relation to the bedrock

IMPACTS AND ASPECTS	RISK LEVEL AFTER MITIGATION: PREFERRED AND ONLY ALTERNATIVE	MITIGATING ACTIONS
Impact Assessment during Operational Phase		
		 topography and sediment bodies. Collected samples are to be temporarily stored by the company. **Figure 6. The gravel oversize screen on a typical diamond mining vessel where the geological personnel monitor the material being dredged and where fossil collection takes place** When a collection of fossil material has been accumulated, the appointed palaeontologist should undertake the identification and evaluation of the fossil material and compile the report for submission to SAHRA. A selection of material could be removed for further study. The Environmental Manager/Officer is to liaise with the appointed palaeontologist on the progress of the fossil collection and the scheduling of the evaluation. During all operations, personnel can send queries and images by email to an appointed palaeontologist for evaluation and prompt feedback.
21. Tuna pole and line fishing	Neglible	**IMPACT 21: Tuna pole and line fishing**

IMPACTS AND ASPECTS	RISK LEVEL AFTER MITIGATION: PREFERRED AND ONLY ALTERNATIVE	MITIGATING ACTIONS
Impact Assessment during Operational Phase		
		An open line of communication will be established with other existing industries operating in the area where sampling is planned to align activities.
22. Traditional Linefish Sector	Very Low -	**IMPACT 22: Traditional Linefish Sector** • An open line of communication will be established with other existing industries operating in the area where sampling is planned to align activities.. • Prior to survey commencement, key stakeholders (see below) should be consulted and informed of the proposed survey activity and the likely implications thereof: o Fishing industry / associations (contactable via liaison@fishsa.org): o South African Pelagic Fishing Industry Association (SAPFIA); o Local fishing communities. • Other associations and organs of state: o DFFE; o SAMSA; o South African Navy Hydrographic office; and o Overlapping and neighbouring right holders. • Appoint a fisheries liaison officer (FLO) to facilitate communication with potentially affected fishing sectors. The FLO should report daily on vessel activity and respond and advise on action to be taken in the event of encountering fishing gear in the survey area. Undertake surveys when fishing effort is lowest i.e., August to December. It is recommended that small pelagic peak fishing seasons (January-July) and snoek line fishing peak seasons (April-May) be avoided as far as possible, feasible and reasonable.
23. Small Pelagic Purse Seine Fisheries	Very Low -	**IMPACT 23: Small Pelagic Purse Seine Fisheries** • Undertake surveys when fishing effort is lower (preferably out of fishing seasons). • Appoint a fisheries liaison officer (FLO) to facilitate communication with the Small Pelagic Fishing Industry Association. The FLO should report daily on vessel activity and respond and advise on action to be taken in the event of encountering purse seine fishing vessels in the survey area An open line of communication will be established with other existing industries operating in the area where sampling is planned to align activities.
24. Prospecting activity on the local tourism and businesses	Very Low -	**IMPACT 24: Prospecting activity on the local tourism and businesses** • Monitor water-quality surrounding the sediment plumes.

IMPACTS AND ASPECTS	RISK LEVEL AFTER MITIGATION: PREFERRED AND ONLY ALTERNATIVE	MITIGATING ACTIONS
Impact Assessment during Operational Phase		
		• Should any negative visual impacts be detectable, restrict prospecting activities during important tourism events and seasons. Should any negative visual impacts be detectable, restrict operational activities to the section of the concession area out of sight from the shore
25. Prospecting activity on the Sense of Place, Health and Wellbeing	Insignificant	**IMPACT 25: Prospecting activity on the Sense of Place, Health and Wellbeing** **IMPACT 26: Prospecting activity on the local households** **IMPACT 27: Prospecting activity on the local crime performance** **IMPACT 28: Prospecting activity on the regional socio-economic performance** No mitigation
26. Prospecting activity on the local households	Insignificant	
27. Prospecting activity on the local crime performance	Insignificant	
28. Prospecting activity on the regional socio-economic performance	Insignificant	
Impact Assessment during Decommissioning and Closure Phase		
1. Survey/Sampling Vessel To Leave Area	Very Low -	**IMPACT 1: SURVEY/SAMPLING VESSEL TO LEAVE AREA** Ensure that no debris or dropped equipment that may be detrimental to environment or other users of the sea is left on the seafloor. The benefits of retrieval of debris or equipment must first be weighed up against the potential health and safety risks.
2. Communication And Information To Relevant Parties Of Mining Completion	Very Low -	**IMPACT 2: COMMUNICATION AND INFORMATION TO RELEVANT PARTIES OF MINING COMPLETION** • Inform all key stakeholders (see Section 7.2.1.2) that the mining vessel is off location. • Notify the SAN Hydrographic office when the programme is complete so that the Navigational Warning can be cancelled. Take steps to share data collected during the sampling programme (e.g. ROV video footage of the benthic environment), if requested, to resource managers (including DEA, South African National Biodiversity Institute and appropriate research institutes).
3. Rehabilitation And Closure	Very Low -	**IMPACT 3: REHABILITATION AND CLOSURE** • Apply for closure, submit the following documentation to the DMR: o A final layout plan; o A Closure Plan; o An Environmental Risk Report; o A Final Audit Report; and

IMPACTS AND ASPECTS	RISK LEVEL AFTER MITIGATION: PREFERRED AND ONLY ALTERNATIVE	MITIGATING ACTIONS
Impact Assessment during Operational Phase		
		A completed application form to transfer environmental responsibilities and liabilities, if such transfer has been applied for.
4. Final Waste Disposal	Very Low	**IMPACT 4: FINAL WASTE DISPOSAL** Dispose all waste retained onboard at a licensed waste site using a licensed waste disposal contractor.

7 Aftercare and Maintenance

Maintenance of rehabilitated sites is often the difference between the ultimate successes or failure of rehabilitation and monitoring of rehabilitation will determine whether rehabilitation objectives and requirements are being achieved.

As the final phase in the project cycle, decommissioning may present positive environmental opportunities associated with the return of the land for alternative use and the cessation of impacts associated with operational activities. However, depending on the nature of the operational activity, the need to manage risks and potential residual impacts may remain well after operations have ceased. Examples of potential residual impacts and risks include stock that has been abandoned (e.g., oil drums, scrap equipment) and old (unserviceable) structures.

The main closure objective is to ensure that the affected environment is maintained in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof. The aim therefore is to leave the site in as safe and self-sustaining a condition as possible and in a situation where no post-closure intervention is required. Due to the specific nature of the mining operation no aftercare and maintenance were identified.

8 Estimated cost for requirements to fully decommission the site

In terms of regulation 11(1) the holder of a right or permit must ensure that a review is undertaken of the requirements for (a) annual rehabilitation, as reflected in an annual rehabilitation plan; (b) final rehabilitation, decommissioning and closure of the prospecting, exploration, mining or production operations at the end of the life of operations as reflected in a final rehabilitation, decommissioning and mine closure plan; and (c) remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an environmental risk assessment report.

In terms of regulation 11(2) the holder of a right or permit must, on completion of the actions contemplated in sub regulation (1), ensure that the adequacy of the financial provision is assessed and any adjustments that need to be made to the financial provision are identified within one year of the commencement of the operations authorised in the right or permit; or where the operations has commenced immediately after its financial year end that follows such commencement.

8.1 Assessment of financial provision

The assessment of the financial provision requirements for annual rehabilitation in terms reg. 6(a) is provided for as part of the annual rehabilitation plan that form part of the annual environmental audit of the implementation of the environmental authorization and closure plan in terms of the NEMA EIA regulations (2014).

No remediation of latent or residual environmental impacts which may become known in the future were identified at this stage. Financial provision in terms of reg. 6(c) are covered by the requirements for the actual costs of implementation of the measures required for final rehabilitation, decommissioning and closure of the mining operations at the end of the life of operations as reflected in this final rehabilitation, decommissioning and mine closure plan in terms of reg. 6(b).

8.2 Quantified Closure elements

8.2.1 Onshore logistical Area

The following risk-based criteria and assumptions were used to calculate the final rehabilitation, decommissioning and closure cost for on shore processing and provision of logistical facilities:

- No mining will take place on shore only provision of logistical facilities.
- Any item that has no salvage value to the mine, but could be of value to individuals, will be sold (zero salvage assumed in cost estimation) and the remaining treated as waste and removed from site
- Removal of all structures and infrastructure except for the infrastructure leased from the landowner.
- Remove all assets
- All vehicles, plant and workshop equipment will be removed for salvage or resale
- All fixed assets that can be profitably removed will be removed for salvage or resale
- A hazardous disposal site will not be constructed and all hazardous waste will be removed from site and transported to the nearest licensed facility

Remove waste from temporary storage and scrap from salvage yard

Clean out Wash/Service Bay, Bunded Fuel Storage and Temporary Waste storage

Final clean-up 2.0Ha

8.2.2 Offshore Exploration

The following risk-based criteria and assumptions were used to calculate the final rehabilitation, decommissioning and closure cost for on offshore exploration operations:

- All prospecting activities including primary processing will take place on the vessel off shore.

- Formal rehabilitation of the sea bed below the low water mark is presently not possible, and in any event at present scales and rates of marine diamond mining not deemed necessary, as sediment and organisms are redistributed effectively by natural water movements particularly in <40 meters depth.
- Return tailings to the sea in the vicinity of their origin,
- No waste or other materials will be dumped on the sea bed or into the water column.
- Facilitate calculation of benthic "rehabilitation" rates through:
  - supply DMR with a map of surface areas, calculations of volumes, records of surficial sediment types disturbed for each year of prospecting, and
  - calculate areas and locations disturbed historically and supply to DMR.
- Restrict the rate of mining to <15% (water depths <40m) or <3% (water depths >40m) per year of the total concession area, until either adequate MPA's are set aside by Government or confidence in estimates of benthic recovery rates (at various depths and sediment types) have been improved by the appropriate scientific research.

8.3 Total estimated cost for requirements to fully decommissioned the mining site at final closure

Offshore sampling areas				
Risk based criteria and assumptions with regard to rehabilitation Research has indicated that recovery rates of the biological communities disturbed by mining in the shallow marine areas is comparatively rapid; recovery periods ranging between 6 and 24 months, after which disturbed sites are statistically indistinguishable from adjacent, undisturbed sites. The basic rehabilitation methodology would therefore be a hands-off approach whereby the area will rehabilitate itself that will only include monitoring and mitigation of potential risks identified below.				
Closure Element Mitigating measures	**Unit**	**No Units**	**Unit Cost**	**Cost per Element**
Aftercare and Maintenance	Ha	300	R65.91	R19 773.00
Sub-Total				**R19 773.00**
Infrastructure Area				
Risk based criteria and assumptions with regard to rehabilitation • Removal of all structures and infrastructure except for the infrastructure leased from the landowner. • Remove all assets • All vehicles, plant and workshop equipment will be removed for salvage or resale • All fixed assets that can be profitably removed will be removed for salvage or resale • All structures will be demolished and terracing and foundations removed to the lesser of 500 mm below the original ground level • Inert waste, which is more than 500 mm underground, such as pipes, will be left in place • A hazardous disposal site will not be constructed and all hazardous waste will be removed from site and transported to the nearest licensed facility • All services related to the operation, water supply lines and storage on site will have to be demolished; the closure cost is therefore included in this estimate				
Closure Element Mitigating measures	**Unit**	**No Units**	**Unit Cost**	**Cost per Element**
Level and reinstate topography level disturbed areas including product stockpile	Ha	2	R243.57	R487.14
Final rehabilitation of haul roads	Km	3	R176.58	R529.74
Demolish plant and subsurface structures	m^3	20	R45.91	R918.20
Remove waste from temporary storage and scrap from salvage yard	*	1	R1 520.70	R1 520.70
Cleanout Wash/Service Bay	*	1	R2 194.72	R2 194.72
Final clean-up	Ha	10	R76.04	R760.40
Aftercare and Maintenance	Ha	10	R65.91	R659.10
Sub-Total				**R7 070.00**
Total financial provision required to fully decommision and rehabilitate the mining operation				**R26 843.00**

9 The Public Participation Process

9.1 Principles and Objectives

The Public Participation Process (PPP) was designed to fulfil the requirements of several pieces of legislation applicable to mine closure. It forms an integral component of the mine closure process by affording Interested and Affected Parties (I&AP) the opportunity to identify environmental issues and concerns relating to the proposed closure, which they feel should be addressed. This is consistent with the provisions of the National Environmental Management Act (Act No. 107 of 1998), Section 2(4)(f), which states that "the participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured".

The objective of the prospecting operation is to develop a working PPP that informs key stakeholders', I&APs and the general public about mine closure objectives and activities during the life of the mine. The PPP was designed to provide sufficient and accessible information to I&APs in an objective manner to assist them to:

- Identify issues of concern, and provide suggestions for enhanced benefits and alternatives associated with mine closure,
- Identify risks not yet identified during the risk assessment exercise,
- Identify risks associated with mine closure and rehabilitation,
- Contribute local knowledge and experience,
- Verify that their issues have been considered.
- Comment on the Risk Assessment and Mine Closure Plan at the time of final decommissioning of the project, including the significance of potential risks that have been identified and associated impacts,
- Play an oversight role in the monitoring and evaluation of mine closure.

9.2 Stakeholder Identification and Project Data Base

Existing data bases were used to inform the list of stakeholders. Special consideration was given to ensure that organizations and individuals that had expressed interest in the activities of the operation, and those who are potentially affected by mine closure, were included on the data base. The following are principles which governed the PPP:

- Key stakeholder groups and the general public comprised the target audience in the development of the PPP.
- Providing information to lay people to allow them to contribute to and participate meaningfully in the process.
- Stakeholder participation is most effective when the proponent and the practitioner recognise, acknowledge and validate stakeholder values when designing a PPP (i.e., there should be no underestimation of the technical and professional competence of citizens).
- The recognition that in the current political climate of South Africa, consultation, empowerment and capacity building is particularly important.

The process of involving stakeholders had three main objectives:

- Steps should be taken to ensure that stakeholder input into the project is relevant and representative.
- Stakeholders should be made aware of their objectives and role in the process,
- An efficient communication and feedback mechanism should be developed during the process to ensure that all stakeholders are kept informed of progress.

Stakeholders were drawn from the sectors outlined below:

- National (DFFE, DEA DMR), Provincial and Local Government (DEA&DP, Local and District Municipalities)
- Industry
- Corporations and businesses (service providers to operation)
- Operations staff

The operation set up a database of I&APs using existing project databases as a starting point. Names of persons and organisations will be added to or deleted from the database where appropriate.

10 Way Forward

This Final Rehabilitation, Decommissioning and Mine Closure Plan will be reviewed on an annual basis to align such approved financial provision set out in regulations 9 and 11 of the NEMA Financial Provisioning Regulations, 2015 as amended. Concurrent rehabilitation and remediation will be provided for in the annual rehabilitation plan and will contain information that defines activities on an annual basis and how these relate to the closure vision, as detailed in this Final Rehabilitation, Decommission and Mine Closure Plan.

When final planned closure is applied for the operation will submit a final Environmental Performance Audit Report to DMR as lead agent for final perusal with the objective to issue a closure certificate. At that point, the closure process, and associated Public Participation Program, will close.