Updated Environmental Management Plan (EMP)

for

The Operation of Mining Activities on Mining License (ML) No. 222 in the Karibib district, Erongo Region, Namibia

ECC Renewals Application No. APP – 006510

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Author: **Ms. Aili Iipinge** Company: **Excel Dynamic Solutions (Pty) Ltd** Telephone: **+264 (0) 61 259 530** Post: **Box 997154 Maerua Mall, Windhoek** Email: **info@edsnamibia.com**	Proponent : **Erongo Marble & Granite (Pty) Ltd**

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Abbreviation	Meaning
DEAF	Department of Environmental Affairs and Forestry
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EDS	Excel Dynamic Solutions
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
ML	Mining License
IAPs	Interested and Affected Parties
MEFT	Ministry of Environment, Forestry and Tourism
MAWLR	Ministry of Agriculture, Water and Land Reform
MME	Ministry of Mines and Energy
NHC	National Heritage Council of Namibia
PPE	Personal Protective Equipment
TA	Traditional Authority

1 INTRODUCTION

1.1 Project Background

Erongo Marble & Granite (Pty) Ltd (*hereinafter referred to as the Proponent in this document*), the holder of the Mining License (ML) No. 222. Erongo Marble and Granite was granted an Environmental Clearence Certificates (ECC) (ECC No. 2462) for the extraction of Dimension Stones (Marbles) as from 29 November 2022 valid until 29 November 2025. The 1 245.717 Hectares ML is located Southwest of Karibib in the Erongo Region as shown in **Figure 1.**

However, to ensure that the mining activities occurring on ML to operate in a sustainable and in compliance with the environmental legislation, the Proponent contracted Excel Dynamic Solutions (Pty) Ltd (EDS) to apply for the ECC renewal on their behalf. Thus, the update EMP is compiled to support the ECC renewal.

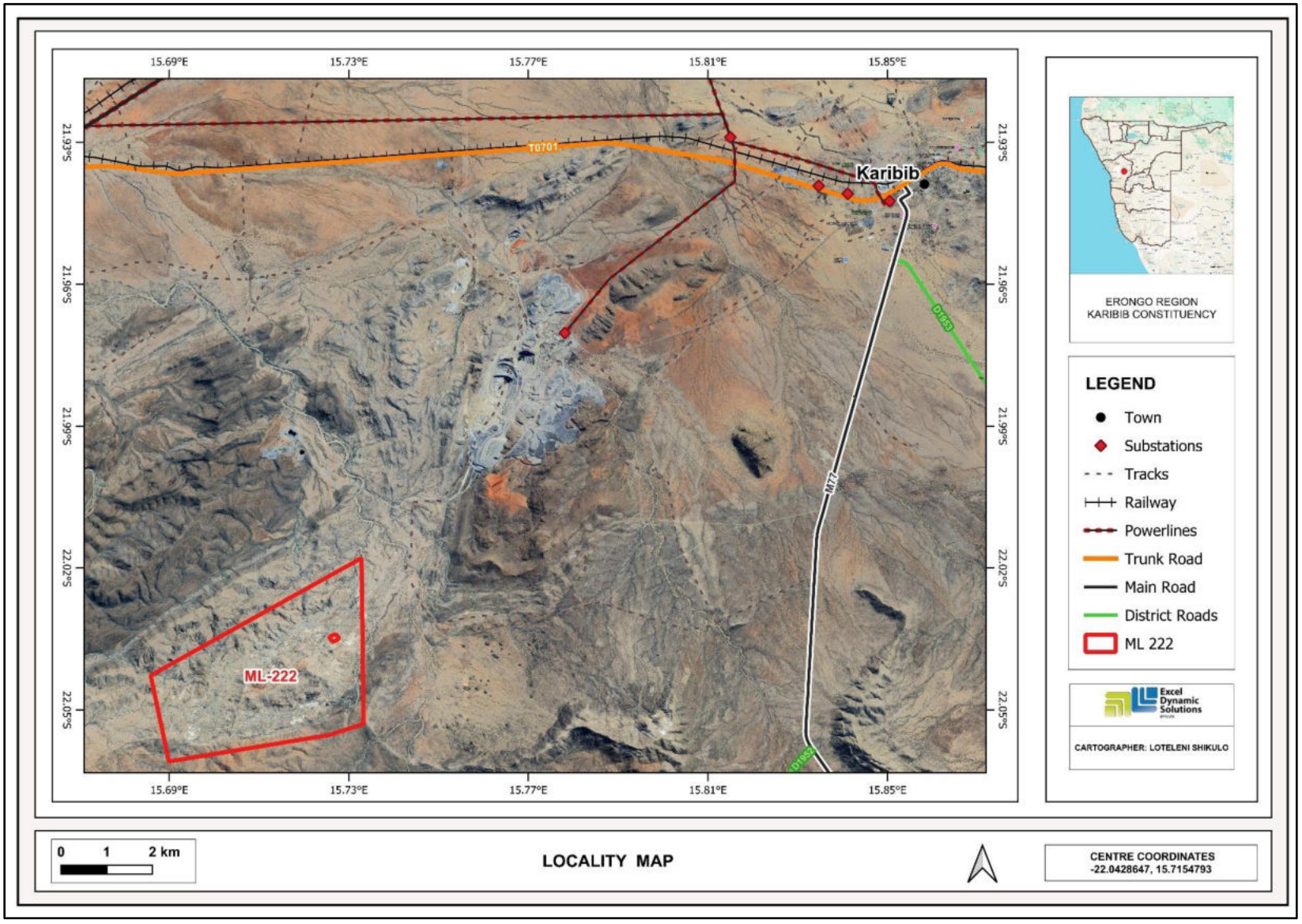

Figure 1: Location of ML – 222 located near Karibib in the Erongo Region

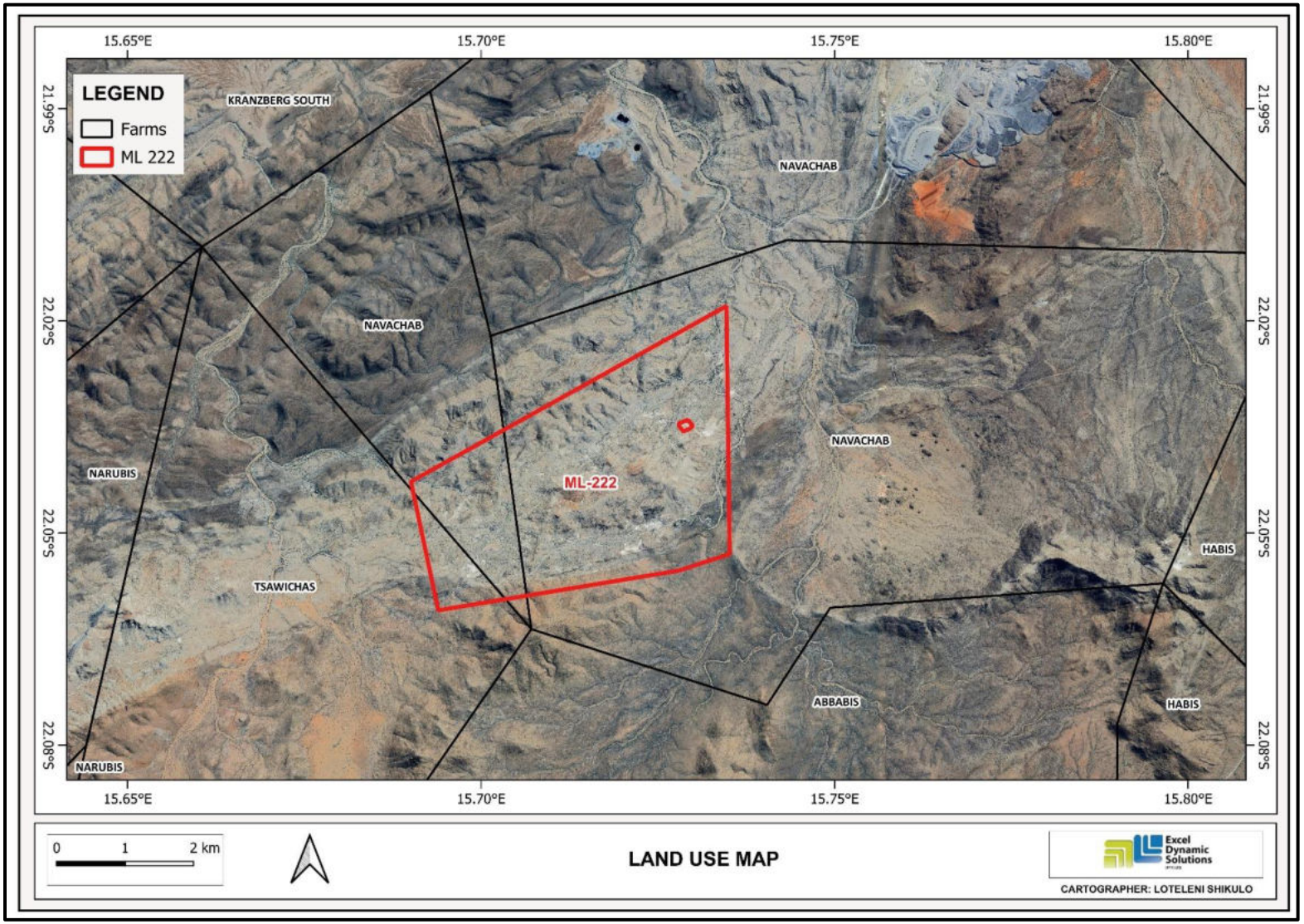

Figure 1 The Land use map around the proposed project

All mining related activities are among listed activities that may not be undertaken without an Environmental Clearance Certificate (ECC) according to Section 27 (1) of the Environmental Management Act (EMA) (2007) and its 2012 Environmental Impact Assessment (EIA) Regulations. The listed activities as per EIA regulations that are relevant to the mining activities are as follows:

- *3.1 The construction of facilities for any process or activities which requires a license, right of other forms of authorization, and the renewal of a license, right or other form of authorization, in terms of the Minerals (Prospecting and Mining Act, 1992).*
- *3.2 other forms of mining or extraction of any natural resources whether regulated by law or not.*
- *3.3 Resource extraction, manipulation, conservation, and related activities.*

To fulfil the requirements of the EMA and its Regulations and ensure the Project's compliance with the national environmental legislation, the Proponent, appointed a team of independent environmental consultants (Excel Dynamic Solutions (Pty) Ltd (EDS)), an independent team of Environmental Consultants to submit the ECC renewal application to the Environmental Commissioner at the Department of Environmental Affairs and Forestry (DEAF) of the Ministry of Environment, Forestry and Tourism (MEFT).

This updated EMP was compiled by Ms. Aili Iipinge.

1.2 The Purpose of the Draft Environmental Management (EMP)

Regulation 8(j) of the EIA Regulations (2012) requires that a draft Environmental Management Plan (EMP) shall be included as part of the Environmental Assessment (EA) report. A '**Management Plan**' is defined as:

> *"…a plan that describes how activities that may have significant environments effects on the environment are to be mitigated, controlled and monitored."*

An EMP provides all the management & mitigation and monitoring actions, set to a timeline and with specific assigned responsibilities. It provides a link between the impacts identified in the EIA process and the required mitigation measures to be implemented during mining. It is important to note that an EMP is a statutory document and a person who contravenes the provisions of this EMP may face imprisonment and/or a fine. This EMP is a living document and can be amended to adapt to address project changes and/or environmental conditions and feedback from compliance monitoring.

The purpose of this document is, therefore, to guide environmental management throughout the different phases of the mining activities, namely: planning, mining / extraction phase, and decommissioning & site rehabilitation phase:

- **Planning phase** - This is the stage of the project during which the Proponent prepare all the administrative and technical requirements needed for the actual works on the ground. The planning includes things like obtaining the necessary permitting and authorization from relevant national and local stakeholders (such as affected communities, traditional authorities, etc.), facilitating the recruitment and procurement processes, etc., in preparation of the mining activities (and site maintenance).
- **Mining and Extraction (quarrying) phase - This is the phase where The Proponent will do mining and all extraction related activities for the targeted commodities groups and undertake related activities on the ML. It is also the phase during which maintenance of the area, equipment and machinery is done by the Proponent.**
- **Decommissioning and Rehabilitation – This is the phase during which the mining activities on the ML cease. The decommissioning of the ML activities may be considered because of poor results or declining in the focus commodity market price. Before the decommissioning phase, the Proponent will need to put site rehabilitation measures in place.**

This Draft EMP will be used by The Proponent, employees and/or contractors to provide management measures to be undertaken during mining activities, to address the environmental impacts identified in the EIA report and ensure that the impacts on the environment are avoided or limited if they cannot be avoided completely.

2 SUMMARY OF THE PROJECT DESCRIPTION AND ACTIVITIES

These activities are anticipated to last for about ten years or more, However, the overall duration for mining would be dependent on the mining programmes and subsequent the market value for the commodity being mined.

Once the Proponent has been issued with the ECC and obtained all relevant and required permitting/licensing, and ready to commence with the actual mining activities (with financial, technical, and human resources in place), the planned activities will commence on the ML.

The Mining phase that are employed areas follows:

- **Phase 1- Reconnaissance prospecting work**: This entails preliminary examination of the general geological features and characteristics of a region. Systematic investigation in the reconnaissance stage comprises of geological mapping, outcrop sampling, wide-spaced geochemical sampling, and preliminary geophysical survey.
- **Phase 2- Test-quarry: Following successful reconnaissance prospecting work, minor test-quarrying, test-processing and initial marketing activities are undertaken.**
- **Phase 3- Development Quarry: Extraction of test-blocks by means of diamond wire cutting, processing tests and notably marketing studies, production of tiles, slabs and finished goods.**
- **Phase 4- Production Quarry: Once positive results are obtained from Phases 2 and 3 and customers place larger orders, then project enters the production phase.**

2.1 Project Resources, Services, and Infrastructure

The resources (in terms of human, vehicles, machinery, and equipment), services and infrastructure required for the mining activities are as presented under the EIA Report.

3 LEGAL FRAMEWORK: PERMITTING AND LICENSING

The Proponent has the responsibility to ensure that all the mining activities conform to the principles of the EMA and must ensure that employees act in accordance with such principles. Table 3-1 below lists the requirements of an EMP as stipulated by Section 8 (e) of the EIA Regulations, primarily on specific approvals and permits that may be required.

Table 3-1: The list of applicable of legal requirements and permits on the ML.

Legislation/Policy/ Guideline: Custodian	Relevant Provisions	Implications for this project
Environmental Management Act (No. 7 of 2007) 2012 Environmental Impact Assessment (EIA) Regulations: **Ministry of Environment, Forestry and Tourism (MEFT)**	The EMA has stipulated requirements to complete the required documentation to obtain an Environmental Clearance Certificate (ECC) for permission to undertake certain listed activities.	The ECC should be renewed every 10 years, counting from the date of issuance. Contact details at the Department of Environmental Affairs and Forestry (DEAF), Ministry of Environment, Forestry and Tourism (MEFT), Office of the Environmental Commissioner **Mr. Timoteus Mufeti** **Tel: +264 61 284 2701**
Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001): **Ministry of Mines and Energy (MME)**	Regulation 3(2)(b) states that "No person shall possess [sic] or store any fuel except under authority of a licence or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 litres or less in any container kept at a place outside a local authority area"	The Proponent should obtain the necessary authorisation form the MME for the storage of fuel on-site. **Mr. Carlo Mcleod (Ministry of Mines and Energy: Acting Director – Petroleum Affairs)** **Tel: +264 61 284 8291**
Water Act 54 of 1956: **Ministry of Agriculture, Water and Land Reform (MAWLR)**	Prohibits the pollution of water and implements the principle that a person disposing of effluent or waste has a duly of care to prevent pollution (S3 (k)). Provides for control and protection of groundwater (S66 (1), (d (ii)).	These permits include Borehole Drilling Permits, Groundwater Abstraction & Use Permits, and when required, the Wastewater / Effluent Discharge Permits).

Legislation/Policy/ Guideline: Custodian	Relevant Provisions	Implications for this project
	Liability of clean-up costs after closure/abandonment of an activity (S3 (l)). (l)).	**Contact: Mr. Franciskus Witbooi Division: Water Policy and Water Law Administration Division** **Tel: +264 61 208 7158** **Water Environment Division** **Contact: Ms. Elise Mbandeka** **Tel: +264 61 208 7167**
Water Resources Management Act (No 11 of 2013): **Ministry of Agriculture, Water and Land Reform (MAWLR)**	Ensure that the water resources of Namibia are managed, developed, used, conserved and protected in a manner consistent with, or conducive to, the fundamental principles set out in Section 66 - protection of aquifers, Subsection 1 (d) (iii) provide for preventing the contamination of the aquifer and water pollution control (S68).	
Forestry Act 12 of 2001, Amended Act 13 of 2005: **Ministry of Environment, Forestry and Tourism (MEFT)**	Prohibits the removal of any vegetation within 100 m from a watercourse (Forestry Act S22 (1)). The Act prohibits the removal of and transport of various protected plant species.	Should there be protected plant species such as camelthorn trees, and need to be removed, a permit should be obtained from the nearest Forestry office (MEFT). **Mr. Johnson Ndokosho (Director of Forestry)** **Tel: +264 61 208 7666**
National Heritage Act No. 27 of 2004: **Ministry of Education, Arts and Culture (MEAC)**	To provide for the protection and conservation of places and objects of heritage significance and the registration of such places and objects; to establish a National Heritage Council; to establish a National Heritage Register; and to provide for incidental matters.	Contact Details at National Heritage Council of Namibia **Mrs. Erica Ndalikokule (NHC Director)** **Ms. Agnes Shiningayamwe (Regional Heritage Officer) – National Heritage Council of Namibia** **Tel: +264 61 301 903**
The National Monuments Act (No. 28 of 1969): **Ministry of Education, Arts and Culture (MEAC)**	The Act enables the proclamation of national monuments and protects archaeological sites.	

4 ENVIRONMENTAL IMPLEMENTATION RESPONSIBILITIES

Africa Big Rhino Mining (Pty) Ltd is ultimately responsible for the implementation of the EMP (management and mitigation measures provided under the next chapter). However, the Proponent may delegate this responsibility or part of it to someone else at any time, as they deem necessary. The roles and responsibilities of all delegates/parties involved in the effective implementation of this EMP are set in Table 4-1.

Table 4-1: The persons and institutions responsible for the Implementation of the Draft EMP

Role (Person and or Institution)	Responsibilities
Erongo Marble & Granite (Pty) Ltd (Proponent)	-Managing the implementation of this EMP and updating and maintaining it when necessary. -Management and monitoring of individuals and/ or equipment on-site in terms of compliance with this EMP and issuing fines for contravening EMP provisions.
Mining Manager	This individual will be responsible to ensure that all mining activities of the project are completed on time. The Manager's duties and responsibilities will include: -Ensure that relevant commitments contained in the EMP Action Plans are adhered to. -Ensure relevant staff is trained in procedures entailed in their duties. -Maintain records of all relevant environmental documentation for the project. -Reviewing the EMP annually and amending the document when necessary. -Issuing fines to individuals who may be in breach of the EMP provision and if necessary, removing such individuals from the site. -Cooperate with all relevant interested and affected parties/stakeholders. -Development and management of schedules for daily activities
Environmental Control Officer (ECO) or Safety, Health & Environmental (SHE) Officer	The Proponent may assign the responsibility of ensuring EMP compliance throughout the project life cycle to a designated member of staff or external qualified and experienced person, referred to in this EMP as the Environmental Control Officer (ECO). The ECO will have the following responsibilities: -Management and facilitation of communication between the Proponent, PR and Interested and Affected Parties (I&APs) regarding this EMP.

Role (Person and or Institution)	Responsibilities
	-Conducting site inspections of all areas with respect to the implementation of this EMP (monitor and audit the implementation of the EMP). -Advising the Proponent or Mining/Site Manager on the removal of person(s) and/or equipment not complying with the provisions of this EMP. -Making recommendations to the PR with respect to the issuing of fines for contraventions of the EMP. -Undertaking an annual review of the EMP and recommending additions and/or changes to this document.
Public Relations Officer (PRO)	The PRO will be responsible for the following tasks: -Liaising between the affected communities and the Proponent. -Ensure effective communication with stakeholders, local communities, traditional authorities, media (if necessary) and the public. -Organising and overseeing public relations activities, Managing public relations issues. -Preparing and submitting public relations reports, if required. -Collaborating with personnel and maintaining project-related open communication among personnel.
Other responsibilities include Archaeology: Chance Finds Procedure (CFP) Implementation Roles	A. Operator: exercise due caution if archaeological remains are found B. Site Manager and ECO: secure site and advise management timeously C. Archaeologist: inspect, identify, advise management, and recover remains.

The key potential impacts identified and management measures that will be implemented by the above-given persons are presented under the next chapter.

5 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1 Identified Key Potential Impacts

The potential positive and negative impacts that have been identified from the mining activities are listed as follow:

Positive impacts:

- Socio-economic development: temporary employment creation and skills transfer.
- Investment opportunities/infrastructure-related development benefits,
- Produce a trained workforce and small businesses that can service the communities.
- Boosting the local economic growth through corporate social responsibility (CSR).
- Increased support for local businesses through the procurement of locally available goods and services.

Negative impacts:

- Physical land/soil disturbance and prone to erosion
- Impact on fauna and flora (habitat disturbance and poaching).
- Water resources (over-abstraction of water) and soils pollution.
- Air quality issue owing to dust generation
- Occupational and community health and safety risks/hazards
- Vehicular traffic safety and services infrastructure (local roads).
- Vibrations and noise associated with drilling and quarrying activities.
- Visual impact owing to the scars left by Dimension Stone mining.
- Environmental pollution from poor waste management,
- Archaeological or cultural heritage impact
- Potential social nuisance.

5.2 The Environmental Management and Mitigation Measures

The management actions are aimed at avoiding the above-listed potential negative impacts, where possible. Where it is impossible to avoid these impacts, measures are provided to reduce the impacts' significance while maximizing the Project benefits (positive impacts).

The management and mitigation measures recommended for the potential impacts described and assessed in the EIA Report were based on the following project stages (phases):

- Planning Phase (Table 5-1), prospecting, Mining and Site Maintenance (Table 5-2), and decommissioning and Rehabilitation presented under section 6.

Table 5-1: The Environmental management and mitigation measures for the Planning Phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
Planning Phase					
EMP implementation and training	Lack of EMP awareness and implications thereof	-A Comprehensive Health and Safety Plan for the Project activities should be compiled. -An EMP non-compliance penalty system should be implemented on site. -The Proponent should appoint an Environmental Control Officer (ECO) to be responsible for managing the EMP implementation and monitoring.	-All required EMP implementation Plans, and Systems are compiled and in place. ECO is appointed	-Proponent - Mining Manager	Pre-mining
Authorizations	Lack of Agreements, Permits/ Licenses	-All the required agreements and licenses or permits should be applied for and signed, respectively before commencement of work on the ML, or as required. -The permits, agreements referred to herein include: (a) Waste management disposal permits (b) Water supply agreements or groundwater abstraction & use permit from MAWLR (if they drill a new borehole and directly abstracting from an existing borehole). (c) Onsite fuel storage permit from MME for any petroleum stored onsite	-Applicable permits and licenses are obtained from relevant authorities. -Agreements/permits signed and obtained from on time, **minimum. 2 months prior to planned commencement date of works.**	-Proponent -Mining Manager	Mining
Socio-economy	Creation of employment opportunities	- Opportunities for the training of unskilled and skilled workers from local communities should be maximized. Should the local municipality have a database of local	-Number of locals employed for mining activities are mainly from the local communities for	-Mining Manager	Pre-Mining and when

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
	The conflicts and tension arising owing to giving employment opportunities to outsiders over locals for work they can perform.	people of various skilled who are looking for work that should be drawn on. -Preference of local people for employment for jobs should be implemented, i.e., permanent residents from the local area (in and around Arandis should be employed for the unskilled labour preferentially to out-of-area people (outsiders) where possible. Out-of-area employment should be justified, for example by the unavailability of local skills only. Equal opportunity should be provided for both men and women, when and where possible. -The Proponent should prioritize the employment of more local people, and only if necessary and due to lack of skills in the area, out-of-area people can be given some of the work. This is to avoid the influx of outsiders into the area for works that can be done by the locals. -The locals to be employed during the project phases should be provided with the necessary training of skills required for the project to avoid bringing in many out-of-area employees. This way, skills development and transfer is ensured in the nearby communities. -Out-of-area workers that may be employed (due to their unique work skills) on site should be sensitized on the importance of respecting the local values and norms, so that they can co-live-in harmony with the local	all the work that they can do.		necessary, throughout

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		communities during the duration of their employment in the local area.			
	Procurement of goods and services: The conflicts arising owing to offering opportunities to outsiders over locals for services and goods they can offer	-Procurements for services and goods that are locally and nationally available should be open only to Namibian companies with strong local participation. -Local sub-contractors may be used where possible and contractors from outside the local area that tender for work should also be considered as required to meet targets for how many locals are given employment. -All services related to mining activities such as drilling that the Proponent may need, preference should be given to local providers of such services. If not available locally, the services search should be extended to a regional level (Erongo Region) and lastly, nationally, or international, if all efforts truly yield no success. Opportunities such as small tenders for instance should be awarded through the established committee	-Number of hired contractors. -Record of hired or contracted companies or services providers	-Proponent - Mining Manager	Pre-mining phase
	Corporate Social Responsibility (CSR)	-The Proponent should explore ways to enhance local community benefits with a focus on well-conceived projects that are clearly aligned with local needs and acceptable to the Town Council. - A Practical Social Plan should be drafted and shared with the local authority (stakeholders) for consultation and review prior to implementation.	-Visible involvement in investing in the communities through community project support	-Proponent -Mining Manager	Throughout the project cycle

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-The Proponent should fulfil their promises of CSR, upon proper consultation with the local development committees to establish what the community really needs. -The Proponent should consider providing and or donating services to communities in need or supporting their community projects. The Proponent should consider frequent maintenance of local roads around their operations to ensure that the roads are in a good condition for other roads users from and outside the area,			

Table 5-2: The Environmental management and mitigation measures for the Prospecting, Mining and Site Maintenance Phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
Prospecting, Mining and Site Maintenance Phase					
EMP implementation and training	Lack of EMP awareness and implications thereof	-EMP trainings should be provided to all workers on site. -All site personnel should be aware of necessary health, safety, and environmental considerations applicable to their respective work. -The implementation of this EMP should be monitored. The site should be inspected, and a compliance audit done throughout **the project activities, monthly.**	-Compliance monitoring conducted bi-annually and should be recorded. -The ECC is renewed every 3 years -Records of EMP training conducted.	-ECO	Throughout the mining phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Implement an EMP non-compliance penalty system.			
Communication between the Proponent and landowners / communities	Lack of communication (proper liaison) between landowners and Proponent with regards to land use/access	-The PRO should be introduced to the land/farm owners and his or her contact details provided to them prior to undertaking activities for easy communication. -The Proponent should compile a clear communication procedure / plan which should include a grievance and response mechanism.	PRO is part of the project personnel. -Records of Community and landowners; consultation -Communities grievances are addressed to satisfaction -Land access agreement conditions and consents respected	- Mining Manager -PRO	Throughout mining
Grazing land	Loss of grazing areas	-Any unnecessary removal or destruction of grazing land, due to mining activities should be avoided. -Vegetation found on the site, but not in the targeted mining areas should not be removed but left to preserve biodiversity and grazing land. -Workers should refrain from driving off road (creating new tracks) that may contribute to the loss of grazing land.	-Limited cleared sites -Less access tracks -No complaints from communities regarding significant land / vegetation clearing	- Mining Manager ECO	Throughout mining
Soils	Physical soil / land disturbance and loss of topsoil	-Stockpiled topsoil and drill materials should be used to backfill the excavated and disturbed site areas/spots.	-No proliferation of informal vehicle tracks. -No new erosion gullies.	-ECO	Throughout mining phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-The topsoil that was stripped from certain site areas to enable project works and can be returned to its initial position, should be returned. -Soils that are not within the intended footprints of the site areas should be left undisturbed and soil conservation implemented as far as possible. -Project vehicles/machinery should stick to access roads provide and not to unnecessarily create further tracks on and around the site by driving offroad→ soil compaction.			
Water Resources Use	Over-abstraction (water demand and availability)	-The Proponent should apply for and obtain a Groundwater Abstraction and Use Permit from MAWLR. Control by Regulation (water abstraction and use permit). The abstracted water will be regulated by the water authorities who will set objectives (abstraction targets), monitor, and enforce compliance, thus ensuring sustainability. -Water should be used efficiently, and reuse/recycling methods should be implemented as far as practicable onsite. The water used to cool off mining equipment should be captured and used for the cleaning of project equipment, where possible. -Avoid the abstraction of more water than what is needed by only pump the water needed for operations and store it in water storage tanks onsite. This is to prevent boreholes pumps running 24/7 and allow boreholes to	-Water supply agreements are in place -Water permits are obtained -inspection of water storage tanks on site	- Mining Manager	Throughout the mining phase Once off supply agreement

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		recover from previous pumping. The modification of the timing of abstraction should also be considered to help stabilizing water levels within the project area and its surroundings. -Baseline water quality monitoring should be conducted (by sampling the boreholes) prior to mining activities, and once these activities kick off, monthly water levels and water quality monitoring should be conducted and recorded throughout the duration of the project. -Water conservation awareness and saving measures training should be provided to all the project workers so that they understand the importance of conserving water and become accountable -Water conservation awareness and saving measures training should be provided to all the project workers in both phases so that they understand the importance of conserving water and become accountable.			
Soils and water resources	Soils and water resources pollution	<u>Soil Pollution</u> -Spill control preventive measures should be in place on site to management soil contamination. -Project personnel should be sensitized on the impacts of soil pollution and advised to follow appropriate fuel delivery and handling procedures.	-No complaints of pollutants on the soils and eventually in the water due to mining activities -No visible oil spills on the ground or pollution spots.	- Mining Manager -ECO	Throughout mining phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Develop and prepare countermeasures to contain, clean up, and mitigate the effects of an oil spill. -Ensure basic Spill Prevention, Control, and Countermeasure (SPCC) Plan training for all personnel. -Project machines and equipment should be equipped with drip trays to contain possible oil spills. -Polluted soil should be removed immediately and put in a designate waste type container for later disposal. -Drip trays must be readily available on fuel trailer and monitored to ensure that accidental fuel spills along the tank trailer path/route around the mining sites are cleaned on time (soon after the spill has happened). -Polluted soil must be collected and transported away from the site to an approved and appropriately classified hazardous waste treatment facility. -Washing of equipment contaminated hydrocarbons, as well as the washing and servicing of vehicles should take place at a dedicated area (impervious surface), where contaminants cannot contaminate soil or water resources. -Toilet water should be treated using chemical portable toilets and periodically emptied out before reaching capacity and transported to a wastewater treatment facility. <u>Water Pollution</u>	-Waste containers provided at mining work sites and campsites -Non-permeable material to cover the ground surface at areas where hydrocarbons and potential pollutants are utilized.		

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-All project phases' wastewater disposal sites should be lined, so that soluble substances from the wastes do not leach into groundwater systems. -Sewage waste should be stored as per the portable chemical toilets' manufacturer's instructions and regularly disposed of at the nearest wastewater treatment facility. -All run off materials such as hydrocarbons, and other potential pollutants associated with the project should be contained on site in designated containers and disposed of at nearby approved wastewater treatment facilities so that they do not get into groundwater bodies (systems). -Site areas where hydrocarbons will be utilized, the surface should be covered with an impermeable plastic liner (e.g., a High-density polyethylene (HDPE) liner), carefully placed to minimize risk of puncturing, to prevent any spillages from getting into direct contact with the soils and prevent eventual infiltration into groundwater. -Spill control preventative measures should be put in place to manage soil contamination, thus minimizing the contamination from reaching water bodies via the leaching of hazardous waste. -Washing of equipment contaminated hydrocarbons, as well as servicing of vehicles should take place at a dedicated area (lined), where such products cannot contaminate soil or water resources.			

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Should the Proponent consider discharging wastewater/effluent into the environment, they should apply for and obtain an Effluent Discharge Permit from the Water Environment Division of the Department of Water Affairs at the Ministry of Agriculture, Water and Land Reform prior to discharging the effluent or wastewater into the environment (whether on or offsite).			
Biodiversity	Loss of Fauna and Flora	<u>Vehicles and Tracks:</u> -Avoid unnecessary affecting areas viewed as important habitat – i.e. rocky outcrops/hills; drainage lines; clumps of protected flora species; etc.; -Make use of existing tracks/roads as much as possible throughout the area; -Do not drive randomly throughout the area (could cause mortalities to vertebrate fauna and unique flora; erosion related problems, etc.). -Avoid offroad driving at night as this increases mortalities of nocturnal species; -Implement and maintain offroad track discipline with maximum speed limits (e.g. 30km/h) as this would result in fewer faunal mortalities and limit dust pollution. -Where tracks have to be made to potential mining sites off the main routes, the routes should be selected causing minimal damage to the environment – e.g. use the same	-No disturbance to unmarked areas. -The permit to remove the necessary protected trees is obtained from the nearest Forestry Directorate prior to removing them (only if obstructing operations) -No complaints from locals regarding unauthorised vegetation removal or cutting down of trees. -No complaints of wildlife hunting by the project personnel.	- Mining Manager -ECO	Throughout the mining phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		tracks; cross drainage lines at right angles; avoid placing tracks within drainage lines; avoid collateral damage (i.e. select routes that do not require the unnecessary removal of vegetation, especially protected species). -Rehabilitate all new tracks created. <u>Camps and Mining Sites:</u> -Select camp sites and other temporary lay over sites with care – i.e. avoid important habitats (e.g. rocky outcrops/hills; ephemeral drainage lines, etc.) – or bus people in daily from Karibib to avoid potential on-site problems; -Use portable toilets to avoid faecal pollution around camp and mining sites; -Initiate a suitable and appropriate refuse removal policy as littering could result in certain animals becoming accustomed to humans and associated activity and result in typical problem animal scenarios – e.g. baboon, black-backed jackal, crows, etc. -Avoid and/or limit the use of lights during nocturnal mining activities as this could influence and/or affect various nocturnal species – e.g. bats and owls, etc. Use focused lighting for least effect. -Prevent the killing of species viewed as dangerous – e.g. various snakes – when on site;	-No intentional disturbance and destruction of site vegetation and faunal species -Barricading tape (to indicate working areas) -Visible preservation of onsite vegetation		

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Prevent the setting of snares for ungulates (i.e. poaching) or collection of veld foods (e.g. tortoises) and unique plants (e.g. various Aloe and Lithop spp.) or any form of illegal hunting activities. -Avoid introducing dogs and cats as pets to camp sites as these can cause significant mortalities to local fauna. -Remove and relocate slow moving vertebrate fauna (e.g. tortoises, chameleon, snakes, etc.) to suitable habitat elsewhere; -Avoid the removal and/or damaging of protected flora potentially occurring in the general area – e.g. various Aloe and Lithop spp., etc.; -Avoid introducing ornamental plants, especially potential invasive alien species, as part of the landscaping of the camp site, etc., but rather use localised indigenous species, should landscaping be attempted, which would also require less maintenance (e.g. water). -Remove all invasive alien species on site – e.g. *Prosopis*, etc. This would not only indicate environmental commitment, but actively contribute to a better landscape; -Inform contractors/workers regarding the above mentioned issues prior to mining activities and monitor for compliance thereof throughout.			

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Rehabilitate all areas disturbed by the mining activities – i.e. camp sites, mining sites, etc.; -Employ an independent environmental auditor to ensure compliance, especially of the rehabilitation of all the affected areas. -If necessary and obstructing the project activities, the permit to remove protected tree species should be obtained from the nearest Forestry Directorate at MEFT in the Erongo Region. -No onsite vegetation should be cut or used for firewood related to the Project's operations. The Proponent should provide firewood for onsite camping workers from authorized firewood producer or seller.			
Illegal hunting	Illegal hunting of wildlife	-The Poaching (illegal hunting) of wildlife on the farms, communal land and surrounding areas is strictly prohibited. -The No tolerance to Poaching Policy should be developed and applicable to all site personnel.	-Incident reports of illegal hunting of wildlife by the Project workers -Contact details of the Anti-poaching Police Unit provided and visible onsite	-ECO	During site set up, and throughout mining
Road use and safety	Comprising of road safety and increase in	The transportation of mining materials, equipment and machinery should be limited to twice a week only to reduce the pressure on local roads.	-No complaints from members of the public regarding vehicular	Proponent ECO	Throughout mining phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
	vehicular traffic flow	-The heavy truck loads should comply with the maximum allowed speed limit for respective vehicles while transporting materials and equipment/machinery on the public and access roads is 30km/h. -Vehicles drivers should be in possession of valid and appropriate driving licenses and adhere to the road safety rules. -Drivers should drive 30km/hour and be on the lookout for livestock and wildlife as well as people on roadsides. -Ensure that access roads are well equipped with temporary road signs conditions to cater for vehicles. -Vehicles should be in a road worthy condition and serviced regularly (accidents from mechanical faults). -Vehicle's drivers should not be allowed to operate vehicles while under the influence of alcohol. -To control traffic movement on site, deliveries from and to site should be carefully scheduled. This should optimally be during weekdays between of 8am and 5pm.	traffic issues related to the project activities. -All personnel operating the project vehicles and machinery are appropriately licensed and possession of valid driving licenses. -No creation of unnecessary tracks on site.		
Local services and infrastructure	Overuse and damaging of roads, and buried services such as cables and pipelines	-The heavy trucks transporting materials and services to site should be scheduled to travel twice a week to avoid daily travelling to site, unless on cases of emergencies. -Frequent maintenance of local roads should be done to ensure that the roads are in a good condition for other	-Visible efforts of maintaining access and community roads by the Proponent	-Proponent - Mining Manager	Throughout mining, when necessary

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		roads users such as locals, and travellers from and outside the area. The heavy trucks transporting materials and services to site should be scheduled to travel at least twice or thrice a week to avoid daily travelling to site, unless on cases of emergencies. -Consult with local communities through their leaders and MAWLR to indicate areas with known buried pipelines or cables so that they are not damaged by mining invasive works such as trenching and drilling.	-Marked routes for buried pipelines and cables -Consultation with service providers and authorities on possible buried services and infrastructure lines		
Occupational and Community Health and safety	General health and safety associated with project activities in both phases	-Project workers should be properly equipped with adequate and appropriate personal protective equipment (PPE) such as coveralls, gloves, safety boots, earplugs, dust masks, safety glasses, etc. -Commit to and make provision for bi-annual full medical check-up for all personnel at site to monitor the impact of Project related activities on them. -Heavy vehicle, equipment and fuel storage site should be properly secured, and appropriate warning signage placed where visible. -The drilled mining holes that will no longer be in use or to be used later after being drilled should be properly marked for visibility and capped/closed off.	-Comprehensive health and safety plan for all mining activities compiled. -Occupational Health and Safety Personnel Health and Safety Trainings -Well-furnished first aid kits -Trained worker to administer first aid	Proponent - Mining Manager -ECO	Throughout mining and trainings offered as and when required

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Trenches should be temporarily fenced off during sampling, and once completed, they should be backfilled thereafter. -Project personnel should be provided with an awareness training of the risks of mishandling equipment and materials on site as well as health and safety risk associated with their respective jobs. -Backfill trenches and fence them off when needed to be open longer than it should be (do not leave unsecured). -Ensure that after completion of mining holes and trenches, drill cuttings are put back into the hole and the holes filled and levelled, and trenches backfilled. -An emergency preparedness plan should be compiled, and all personnel appropriately trained. -Personnel should not be allowed to drink alcohol prior to and during working hours nor allowed on site when under the influence of alcohol as.			

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
	Potential increase of prevalence of HIV and AIDS, as well as other sexually transmitted diseases (STDs) prevalence	-The workers should be engaged in health talks and training about the dangers of engaging in unprotected sexual relations which results in contracting HIV/AIDS and other sexual related infections. -Provision of condoms and sex education through distribution of pamphlets and health trainings. These pamphlets can be obtained from local health facilities.	-No new infections recorded linked to mining workers -Occupational health and safety personnel -Sex and Health Education/Awareness -Provision of condoms at the campsite	- Mining Manager -ECO	Throughout mining
	Accidental fire outbreak	-Portable, and frequently serviced fire extinguishers should be provided on site. -No open fires to be created by project personnel on farms. -Potential flammable areas and structures such as fuel storage tanks should be marked as such with clearly visible signage.	-No wildfires recorded (due to presence of workers) -Fire extinguishers (1 per vehicle), 1 per working site and 2 at the campsite	- Mining Manager -ECO	Throughout mining
Archaeology and heritage	Accidental disturbance of archaeological or heritage objects	-The Proponent and Contractors should adhere to the provisions of Section 55 of the National Heritage Act No. 27 of 2004 in event significant heritage and culture features are discovered while conducting mining works. -On-site personnel and contractor crews must be sensitized to exercise and recognize “Chance Finds Heritage”.	-Preservation of all artefacts and objects that are discovered on and around project site -Salvage equipment -Flag tapes -GPS (site marking)	- Mining Manager -ECO -Operator	As and when required, i.e., prior to site set up, and during mining.

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-During the prospecting and mining works, it is important to take note and recognize any significant material being unearthed and making the correct judgment on which actions should be taken (refer to CFP Appendix 1 attached hereto). -The footprint impact of the mining activities should be kept to minimal to limit the possibility of encountering chance finds within the ML' boundaries. -During the removal of topsoil and subsoil on the site for mining purposes, the site should be monitored for subsurface archaeological materials by a qualified Archaeologist.		-Archaeologist -Archaeologist	
Littering and waste management (general waste and sanitation)	Environmental Pollution	-Project personnel should be sensitized to dispose of waste in a responsible manner and not to litter. -Ensure that there are no wastes left on the sites at the end of each day. -All domestic and general operational waste produced daily should be contained onsite until such that time it will be transported to the nearest designated waste sites. -Do not bury or burn waste onsite or anywhere else. -The mining sites should be equipped with separate waste bins for hazardous and general/domestic waste.	-No visible litter within and around the Project area owing to the Project -Provision of sufficient waste storage containers -Waste management awareness -Waste disposal permits to municipalities Environmental, Health and Safety Statements and Policy	-ECO	Throughout mining phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Sewage waste should be stored as per the portable chemical toilets supplied on site and regularly disposed of at the nearest treatment facility -Oil spills should be taken care of by removing and treating soils affected by the spill. -A penalty system for irresponsible disposal of waste on site and anywhere in the area should be implemented. -An emergency plan should be available for major/minor spills at the site during operation activities and during the transportation of the product(s) such as fuel to site -A penalty system for irresponsible disposal of waste on site and anywhere in the area should be implemented. -Ensure careful storage and handling of fuels on site.	-Waste storage containers		
	Wastewater generated by mining workers living on-site.	-Potential contaminants such as hydrocarbons (fuels) and wastewater should be contained on site and disposed of in accordance with municipal wastewater discharge standards so that they do not contaminate surrounding soils and eventually groundwater -Provision of toilet facilities for workers (mobile/portable chemical toilet if possible). -No open defecation is allowed on the farms and general community areas. Make use of provided toilets.	-Adequate toilet and basic ablution facilities on site. -Sewage removal operator -Waste treatment agents/chemicals	- Mining Manager -ECO	Throughout mining phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Emptying of chemical toilets according to the manufacturer's specifications.			
Air Quality	Dust generation	-Mining vehicles should not drive at a speed more than 30 km/h to avoid dust generation around the area. -Ensure that the mining schedule is limited to the given number of days of the week (weekdays). This will keep the vehicle-related dust level minimal in the area. -When and if the project reaches the advanced stages of mining, a reasonable amount of water should be used on gravel roads, using regular water sprays on gravel routes and near mining sites to suppress the dust that may be emanating from certain mining areas onsite. -Use of dump method to mitigate on dust by sprinkling water on areas to be excavated -Road compaction to reduce dust generation.	-No complaints from the public about vehicle emissions and dust generation. -Visible efforts to curb dust -Dust suppressant (Water)	-Mining Manager -ECO	Throughout mining phase
Noise	Nuisance	-Provision of appropriate Personal Protective equipment to protect workers from occupational noise. -Regular maintenance of plants and equipment -Shutting down of engine vehicles and drilling equipment when not in use to reduce noise levels	-No complaints from communities about excessive noise. -Noise protective equipment for workers	- Mining Manager -ECO	Throughout mining

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Conducting of noise measurements from different prevailing noise levels and recommending appropriate mitigation measures.			
Social nuisance	Local properties disturbance and values	-The Project personnel should be informed of the importance of respecting local properties (not to damage houses, fences or snaring, and killing their livestock and wildlife). -Project personnel found guilty of intruding peoples 'privately owned properties should be called in for disciplinary hearing and/or dealt with as per their employer' (Proponent)'s code of employment conduct -Respect the communal and local private properties, values, and norms. -No one should be allowed to wander in people's private yards or fences without permission. -The killing of or in any way disturbance of local livestock and wildlife in the area (farms or communal area) is prohibited. -Avoid cutting down or damaging of private and community vegetation. -Out-of-area personnel employed (due to their unique work skills) should respect the local values and norms to co-live-in harmony with the local communities.	-No complaints from landowners or community members about property theft, disturbance, or intrusion related to the Project workers -Land access agreement and consents conditions are adhered to	- Mining Manager	Throughout the mining phase

6 REHABILITATION AND POST-MINING USE CONSIDERATION

The rehabilitation of Dimension Stone quarries (mined out) sites is one of the challenges faced by mining companies worldwide. Some of the measures that can be implemented to mitigate the impact (by reducing) are presented herein as sourced from few literature worldwide and documents prepared for similar local projects. The success of any rehabilitation exercise would however, depend on the effort and commitment to effectively implement the measures suitable for the specific site conditions.

It is believed that rehabilitation has not been done on most (if not all) mined out areas in Namibia. This have lead to cumulative environmental impacts that may take long or may not be able to be reversed. To avoid this, it is vital that new rational mitigation measures need to be taken into consideration and effectively implemented by the miners. This could only be achieved through providing awareness training to miners on the environment and progressive rehabilitation of their mined-out areas.

Successful rehabilitation requires careful consideration of the local ecological context in combination with rehabilitation goals. The most important steps in undertaking a successful rehabilitation are planning and environmental awareness (environmental education) on the importance of progressive rehabilitation (or post-mining rehabilitation) and its importance to the environment. Furthermore, to successfully implement the planned rehabilitation, practically, this will depend on a few factors, namely the rehabilitation program, characteristics of a mine, nature of disturbance, rehabilitation methods, as well as resources availability.

6.1 General Planning for Rehabilitation

Each mine will have characteristics that will influence the procedures adopted in the rehabilitation program. These characteristics may be obvious but critical differences are often only identified by careful investigation. The post mining land-use will also influence the procedure and the plant species used for rehabilitation (Minerals Council of Australia, 1998).

The following are the basic rehabilitation practices as summarized after the Minerals Council of Australia (1998), which with appropriate modifications, will apply to most disturbed areas.

1. Making Safe: After planning for rehabilitation, the first step is to clean up and make the area to be rehabilitated, safe. This involves the following:

- Removal of infrastructure and unused or unwanted equipment. No facilities or equipment should remain on site unless with the written approval of the landowner or relevant authority.
- Removal of rubbish for disposal at approved sites. Care is required with residual toxic or hazardous materials including contaminated packaging and containers.
- Removal of all services.
- Removal or burial of concrete slabs, footings, etc.
- Backfilling or securely and permanently covering any shafts, pits, or similar excavations.
- Restricting or preventing public access by removal or closure of access roads and tracks.

2. Landform Design: The re-shaping and grading of a site is an essential aspect of rehabilitation. Unless slopes are stable, the effectiveness of subsequent topsoiling and re-vegetation is greatly reduced, and maintenance may be prolonged. Final discharge points for water leaving the new landform are dependent on the location of suitable watercourses in the surrounding land.
3. Erosion Control: Control of erosion is important, both during mining and rehabilitation. The effects of erosion may require remedial works on sites where soil loss has occurred as well as where the material is deposited as drift, dust, or river sediment. Major objective of most rehabilitation programs is to establish an adequate cover of vegetation to stabilize the site and prevent or control erosion to natural levels. Until a vegetation cover has been established, provision to protect against wind and water erosion will be required.
4. Topsoil Management: Although re-vegetation has been achieved on various substrates, topsoil is almost always an essential factor in successful rehabilitation programs, particularly during the period of initial plant growth. Subsoil conditions become of more importance in the longer term. Topsoil (or weathered surface material) provides a good microenvironment for seed germination and generally contains seeds, nutrients and microorganisms that are necessary for plant growth. If these are lost, then the system will generally take a longer time to re-establish.
5. Soil Properties for Plant Growth: Maintaining or improving the ability of the soil (or other plant growth media) to supply nutrients, to store and supply water and support root growth should be a major consideration during rehabilitation.

6.2 Site Specific Rehabilitation Plan

To ensure that they do their best to rehabilitate the disturbed or mined-out site areas, the Proponent intends to:

- Utilize waste rubble to rock blind exposed rock faces and stockpiled topsoil to partially back fill.
- Make financial provision that will be used for post-mining rehabilitation program.

Some of the post-exploration and mining solutions provided by Lintukangus et al., 2011 and that are also recommended for implementation by the Proponent to rehabilitate the disturbed area include:

6.3 Post-Exploration

Since exploration of sites will lead to the narrowing down of target sites that yielding favourable outcomes for mining and development of the quarry, it will not be possible to implement progressive rehabilitation on all explored sites. The only possible progressive rehabilitation work to be carried out done are as follows:

- Although it is considered impossible to hard to achieve, backfilling of all exploration pits, test quarries, and boreholes that will no longer be required for mining purposes would be suitable.
- Levelling of topsoil that was stockpiled for exploration purposes only.
- Removal or re-location of project structures, vehicles and equipment from areas that will be no longer be required for further work (mining). The areas on which these structures were set up will be rehabilitated to pre-exploration state.

6.4 Post-Mining Rehabilitation

Once the quarry has reached end of its life (cessation of mining activities), the following rehabilitation steps will be taken:

- Step 1: All accumulated waste (hazardous, solid, and general) will be removed from the quarry area and transported to the designated off-site waste facilities.
- Step 2: All waste rock derived from the specific ridge will be spread over the levelled footprint of the mined-out area and topsoil from the area will then be spread on top of the waste rock to give a natural look over the rehabilitated areas.

- Step 3: Access roads to completed/mined out ridges or ridges will be closed off to avoid re-creation of tracks over such areas.
- Step 4: All project, machinery, vehicles and support structures (e.g. ablution container; storage containers; accommodation containers; tanks; concrete slabs shall be demolished and the waste taken to designated sites, etc.).
- Step 4: The once stockpiled topsoil is spread back on the quarry site, blocks of leftover stone can be used as barrier to prevent unauthorized access to the worked-out quarry and before complete rehabilitation is properly done. The natural development can be enhanced by reforestation and so further decrease the visual impact of the quarry (refer to section 6.5 on other possible after-use solutions of the quarry).

Important in the planning of landscaping is to realise that the leftover stone should be available for post-use, such as aggregate or armour-stone.

Once the decommissioning of the mining sites and infrastructure is completed, there is one thing that will not be possible to decommission or close and that is the quarry resulted from the stone mining process. The following section presents some solutions that may be considered to put the quarry to good use, upon its rehabilitation and depending on the after-use type.

6.5 Post-mining Use for Stone Quarries

The solutions in Table 6-1 could be considered for post-mining use of the quarry upon successful rehabilitation or at least until it is made safe for such use(s).

Table 6-1: After-use solutions with potential for natural stone quarries (after Lintukangus et al., 2011)

After-use solution	Suitability for natural (dimension) stone quarries
Aquaculture: crab farming and fish farming	Good suitability for recreational activity but challenging for profitable operations.
Research and education: geological (excursion or education) sites, nature preservation areas, training courses for rescue dogs and rescue personnel, xerothermic areas, and other science use (e.g., astronomy)	Good suitability

After-use solution	Suitability for natural (dimension) stone quarries
Culture: open-air theatres, museums, quarrying heritage, art (sculptures, lighting, painting, rock art, film sets	Good suitability
Hobby activities: diving and climbing	Good suitability and affordable
Recreational activities: parks (recreational areas, build environments), places to swim (summer/winter), paddling, sailing, skating, fishing, leisure house area	Good suitability and local specific
Rock building: housing and storage	Good suitability, but expensive
Storage: water storage, cold storage of timber and landfills	Challenging, except for cold storage.
Forestry: natural and planted	Good suitability, but challenging for profitable forestry
Other solutions: harbours, cooling water for industry, energy production and industrial plants	Challenging, but remarkably interesting, e.g., harbours

6.6 Implications of Post-Mining Quarry Use

Although there is quiet several solutions on how to put the quarry to use after cessation of mining activities, there are certain factors that could implicate the realization of most if not all the solutions presented in Table 6-1 above. The implications or constraints that may affect the after-use of the quarry are given in Table 6-2

Table 6-2: Constraints in selecting an after-use option for a natural stone quarry (after Lintukangus *et al*., 2011)

Quarry and the immediate vicinity	Surroundings
size of the area, **topography of the area**, **water** (quality, depth, and temperature), **quarry faces** (height, and fracturing/soundness), **quarry benches** (width and fracturing/soundness), **piles of leftover stone** (form and height), **ownership**, **points of compass**, **scenery**, **flora and fauna**, **geological values**, **municipal engineering**, **human settlement,** and **status of land use planning**	-transport facilities -structure of population -services -tourist attractions -seasonal variations

7 ENVIRONMENTAL MONITORING AND REPORTING

To ensure that the implementation of recommended environmental management measures is working and produces the desired results (minimizing the "medium" and uphold the "low" significance ratings of impacts), certain key impacts will need to be monitored and reported on. The environmental aspects to be monitored are shown in Table 7-1. The ‘’Observation, compliance status and ‘’Recommended Action’’ columns will be completed for every monitoring done on site.

Monitoring reports are to be compiled by the project ECO, audited by an Independent Environmental Consultant, and submitted to the DEAF for archiving on a bi-annual basis (every 6 months throughout the project operations) or as required by the Environmental Commissioner (as per the ECC conditions). The environmental components or features provided in Table 7-1 will be updated accordingly once the project commences.

Table 7-1: Environmental and Social Monitoring Actions (updated after Resilient Environmental Solutions, 2019)

Impact	Parameter to be Monitored	Monitoring Objective	Key Performance Indicator (KPI)	Methods of Monitoring	Frequency	Responsible Party	Reporting structure	Threshold	Action if threshold is exceeded
Water and soil pollution									
Soil pollution by hydrocarbon (fuel and lubricant spills)	Complaints from landowners or occupiers of land within the project sites	To prevent contamination of site soils	No complaints from landowners or community members about visible oil spills	Inspection of complaints logbooks	Weekly	ECO	ECO-> Mining Manager	A logged complaint	Further consultations with the landowners / communities
Wastewater generated by mining	Open defecation and urination.	To prevent environmental pollution	Adequate toilet facilities on site. Complaints	Visual observation. Inspection of	Weekly	ECO	ECO-> Mining Manager	A logged complaint	Clean-up of affected areas.

Impact	Parameter to be Monitored	Monitoring Objective	Key Performance Indicator (KPI)	Methods of Monitoring	Frequency	Responsible Party	Reporting structure	Threshold	Action if threshold is exceeded
workers living on-site.			from the public about open defecation.	complaints logbook.					
Soils									
Loss of topsoil	Increased loss of soil	To prevent loss of topsoil	No proliferation of informal vehicle tracks. No new erosion gullies	Visual observation	Weekly	ECO	ECO-> Mining Manager	Proliferation of new vehicle tracks Formation of new gullies in work areas	Rehabilitation of affected explored areas
Air quality									
Increase in dust generation, which might negatively affect occupational and residential respiratory health.	Complaints from public about increased in dust generation.	To reduce public complaints and prevent negative changes in air quality due to mining activities	No complaints from the public about increased dust generation.	Inspection of complaints logbook.	Weekly	ECO	ECO-> Mining Manager	A logged complaint	Dust suppression around working areas to reduce fugitive dust
Hydrocarbon emissions from vehicles	Complaints from the public about increased vehicles fumes	Same as above.	No complaints from the public about increased vehicle emissions	Inspection of complaints logbook.	Weekly	ECO	ECO-> Mining Manager	A logged complaint	Servicing of vehicles and machinery by a certified service provider

Impact	Parameter to be Monitored	Monitoring Objective	Key Performance Indicator (KPI)	Methods of Monitoring	Frequency	Responsible Party	Reporting structure	Threshold	Action if threshold is exceeded
Poaching (Illegal hunting)									
Illegal hunting of wildlife	Reported poaching incidents by projects team	To prevent illegal hunting of wildlife	Incidents reports of illegal hunting of wildlife by mining workers.	Consultation with the local Police Service for reported incidents of poaching.	Weekly	ECO	ECO-> Mining Manager > local Police Service (Anti-poaching Unit)	An incidents report logged with the local Police Service	Appropriate action will be decided by the local Police Service
Habitat loss (Biodiversity)									
Localised loss of habitat and vegetation	Loss of habitat	To prevent loss of habitat outside areas of interest	No disturbance to unmarked areas within the project area	Visual observation	Weekly	ECO	ECO -> Mining Manager	Vegetation clearance outside of marked areas.	Rehabilitation of affected areas to the satisfaction of the ECO
Occupational and Community / Public Health and Safety									
No health and safety plan for mining activities.	Compiled health and safety plan for mining activities.	To prevent health and safety impacts	No significant health and safety incidents (i.e., serious injuries or loss of life)	Visual observation Inspection of complaints logbooks	Daily/ weekly	ECO and Mining Manager	ECO-> Mining Manager	Health and safety incident	Remedy the consequences
Potential increase in outbreak of wildfires due to project activities	Occurrence of wildfires	To prevent environment damage caused by wildfires	No wildfires recorded (due to presence of mining workers)	Visual observation	Daily	ECO	ECO -> Mining Manager -> local Police Service	Outbreak of wildfires due to the mining workers	Rehabilitation of affected areas
Archaeology and cultural heritage									

Impact	Parameter to be Monitored	Monitoring Objective	Key Performance Indicator (KPI)	Methods of Monitoring	Frequency	Responsible Party	Reporting structure	Threshold	Action if threshold is exceeded
Potential disturbance of archaeological and cultural heritage resources	Presence or unearthing of archaeological or cultural heritage resources	To prevent destruction of artefacts and sites	Preservation of all artefacts and sites that are discovered within the site boundary or around the project site area	Inspection of records of findings	Daily	ECO Operator / Contractor	Operator->Foreman-> Superintended->ECO- >Project Archaeologist -> National Heritage Council (NHC)	Unearthing of archaeological or cultural heritage resources	Cease all activities on site and wait for NHC to inspect site and give further instructions / actions
Employment creation and Corporate Social Responsibility (CSR)									
Creation of employment, procurement of goods and services	Employment opportunities -Community projects support -Local procurement	To ensure that locals benefit from the Project	Employment, community support and local procurement	Inspection: employed, procurement & community project records	Monthly	Mining Manager	Mining Manager or Proponent	Number of CSR projects	Open communication and reasonable requests / proposals
Noise									
Potential increase in noise	Above ambient noise levels.	To ensure that generated noise does not disturb residents.	Complaints from residents about noise generated.	Inspection of complaints logbook	Weekly	ECO	ECO -> Mining Manager	A logged complaint about above normal noise levels	Revision of site activities
Vehicular Traffic									
Increase in traffic density on declared Roads Authority	Complaints from the public about increase in	To ensure continued ease of access to local roads by	No complaints from the public about increase off	Inspection of logbooks	Weekly	ECO	ECO -> Mining Manager -> Roads Authority	A logged complaint about traffic increase or	Find alternative access roads for the workforce.

Impact	Parameter to be Monitored	Monitoring Objective	Key Performance Indicator (KPI)	Methods of Monitoring	Frequency	Responsible Party	Reporting structure	Threshold	Action if threshold is exceeded
(RA) roads or damage to these.	traffic on the roads. Complaints about damage to RA roads caused by movement of project vehicles and machinery.	residents / communities	traffic due to mining activities					damage to RA roads	Rehabilitation of affected roads
HIV and AIDS									
Potential increase in HIV and AIDS prevalence.	New HIV or sexually transmitted infections (STIs)	To prevent new infections in the area	No new HIV or STIs infections recorded	Liaison with local health facilities	Monthly	ECO	ECO -> Mining Manager -> Ministry of Health and Social Services	Recorded new HIV or STIs linked to mining workers	Continued sex education and provision of condoms
Social nuisance: Property invasion or disturbance and damage									
Potential intrusion or damage/destruction of private or public properties	Unauthorized intrusion and or damage to properties	To prevent crashes and tensions between the Proponent and the landowners	No complaints of property damage or intruding by project personnel	Liaison with property owners or occupiers of land	Monthly	PRO	Mining Manager (or Proponent) -> PRO -> Landowners / occupiers of the land (communities)	Arising new complaints	PRO to warn the personnel on respecting people's properties. If persists, then Code of Conduct to be implemented
Environmental Pollution (Littering)									

Environmental pollution from solid waste during	Scattered litter	To prevent littering of the general project area	No visible litter around the project area	Visual observation	Daily	ECO	ECO -> Mining Manager	Visible littering around project site	Clean-up of the affected areas and ensuring workers utilise

Impact	Parameter to be Monitored	Monitoring Objective	Key Performance Indicator (KPI)	Methods of Monitoring	Frequency	Responsible Party	Reporting structure	Threshold	Action if threshold is exceeded
mining activities.									waste containers provided.
Visual									
Visual impact owing to the project's mining activities	Contrasting landscape (eyesore to travellers on the local roads	To prevent and or reduce the appearance of contrasting land scars	Reduction of and minor contrasting landscape in the project site areas	Visual observation	Weekly	ECO	ECO -> Mining Manager	Major and very visible contrasting land scars on the site areas	Effective implementation of provided measures and continual improvements.
Site Rehabilitation									
Soil and land disturbance because of mining activities.	Stockpiled topsoil and very disturbed site areas	To prevent major soil / land damage by project activities	No major soil and land disturbance	Visual observation	Daily	ECO	ECO -> Mining Manager	Visible soil and land disturbance	Effective progressive levelling of topsoil and backfilling of pits / holes

APPENDIX 1: CHANCE FINDS PROCEDURE (AFTER KINAHAN, 2020)

Areas of development activity are subject to heritage survey and assessment at the planning stage. These surveys are based on surface indications alone, and it is therefore possible that sites or items of heritage significance will be found during development work. The procedure set out here covers the reporting and management of such finds.

Scope: The "*chance finds*" procedure covers the actions to be taken from the discovery of a heritage site or item to its investigation and assessment by a trained archaeologist or other appropriately qualified person.

Compliance: The "chance finds" procedure is intended to ensure compliance with relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): "*a person who discovers any archaeological …. object ……must as soon as practicable report the discovery to the Council*". The procedure of reporting set out below must be observed so that heritage remains reported to the NHC are correctly identified in the field.

Manager/Supervisor must report the finding to the following competent authorities:

- National Heritage Council of Namibia (+264 61 244 375 / Technical Office +264 61 301 903)
- National Museum (+264 61 276 800),
- National Forensic Laboratory (+264 61 240 461).

Archaeological material must NOT be touched. Tempering with the materials is an offence under the heritage act and punishable upon conviction by the law.

Responsibility:

Operator:	To exercise due caution if archaeological remains are found
Foreman:	To secure site and advise management timeously
Superintendent:	To determine safe working boundary and request inspection
Archaeologist:	To inspect, identify, advise management, and recover remains

Procedure:

<u>Action by person identifying archaeological or heritage material:</u>

a) If operating machinery or equipment stop work

b) Identify the site with flag tape

c) Determine GPS position if possible

d) Report findings to foreman

Action by foreman

a) Report findings, site location and actions taken to superintendent

b) Cease any works in immediate vicinity

Action by superintendent

a) Visit site and determine whether work can proceed without damage to findings

b) Determine and mark exclusion boundary

c) Site location and details to be added to project GIS for field confirmation by archaeologist

Action by Archaeologist

a) Inspect site and confirm addition to project GIS

b) Advise NHC and request written permission to remove findings from work area

c) Recovery, packaging and labelling of findings for transfer to National Museum

In the event of discovering human remains

a) Actions as above

b) Field inspection by archaeologist to confirm that remains are human

c) Advise and liaise with NHC and Police

d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.