A SCOPING REPORT ON THE ENVIRONMENTAL IMPACT ASSESSMENTFOR THE FOR PROPOSED ESTABLISHMENT OF A LITHIUM MINE ON EPL 7228 ,MINING LICENSE ML 242, OMARURU, ERONGO REGION

Prepared by:

Minera-XploreConsultancy

Minera-Xplore Consultancy CC
P.O. Box 31671, Windhoek,
Namibia
Tel: (+264)085 761 4750/
/(+264) 81 443 6236

Proponent:

Xinfeng Investment (PTY) Ltd
P.O. Box 41497,
Windhoek, Namibia
+264 81 468 5578

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Title	**ENVIRONMENTAL MANAGEMENT PLAN FOR PROPOSED ESTABLISHMENT OF LITHIUM MINE ON MINING LICENCE (ML242), OMARURU, ERONGO REGION**		
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Proponent	Xinfeng Investment (PTY) Ltd P.O. Box 41497, Windhoek, Namibia Contact Person: Zhou Hao Contact Number:+264 81 468 5578 Email:lixuanfaith@yahoo.com		
Environmental Practitioner	Minera-Xplore Consultancy CC P.O. Box 31671, Pionierspark, Windhoek ,Namibia Contact Person: Ms Nangula Ndakunda Contact Number: (+264)085 761 4750/(+264) 81 443 6236 Email:info@minera-xplore.com		
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	Name	**Signature**	**Date**
Author	Nangula Ndakunda		01 February 2022

EXECUTIVE SUMMARY

Xinfeng Investment (Pty) Ltd hereinafter referred to as the Proponent, holds mineral rights under the Exclusive Prospecting License (EPL) 7228. Mineral rights valid under this EPL are base and rare metals, industrial minerals and precious metals. The project area is located in Western Central Namibia, Erongo Region, and 45 KM WNW of Omaruru town within Omaruru jurisdiction. It the covers the following farms: farm Kohero 113, Goedehoop 157, Gross Okombahe 193, Okombahe 112,Kawab 117, Okarundu Nord West 118, Okarundu North 121and part of Dâures Constituency.

A mining licence (ML 242) application has been launched on the 17th December 2021 by the proponent with the Ministry of Mines and Energy (MME). Therefore, appointed Minera-Xplore Consultancy CC to conduct the necessary assessments including public participation. Xinfeng Investment (Pty) Ltd, has conducted an in depth exploration study and identified a profitable lithium reserve with potentially good returns. Therefore, Xinfeng Investment (Pty) Ltd plans to conduct lithium mining activities on ML 242.

The proposed mining activities and construction of supporting mine infrastructure falls under the activities that are listed in the Environmental Management Act, 2007 (Act No. 7 of 2007) and EIA Regulations (2012). These activities cannot be undertaken without an Environmental Clearance Certificate (ECC). In order to obtain an Environmental Clearance Certificate for the proposed activities, the proponent is required to have undertaken an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports. These reports are a tool to identify, predict and evaluate the economic, environmental and social impact of proposed mining activities. As soon as the mineral rights for ML242 has been granted and the Environmental Clearance Certificate has been issued by Ministry of Environment, Forestry and Tourism (MEFT), then mine development and the subsequent production phase will follow. Proposed project will involve lithium mining, ore processing and basic infrastructure construction on ML 242.

The Project is located in an area of known Nainais - Kohero pegmatite belt which contains both zoned and unzoned cassiterite-bearing rare metal pegmatites. These pegmatites occur in a narrow, northeast-trending belt, up to 8 km wide and some 45 km long, which runs parallel to the Omaruru

River. The project area has been found to host minerals of economic value such as lithium, tin, tantalum, tungsten and REE. The mineralization in the area is known to be associated with late to post tectonic pegmatites of Ordovician age. Deposit types include late- to post-tectonic (~523 – 506 Ma) LCT (Li-Be, Sn-, and miarolitic gem-tourmaline bearing) pegmatites, and uraniferous pegmatitic sheeted leucogranites (SLGs), which have an NYF affinity.

Targeted orebody extends close to the surface which makes open pit (surface) mining feasible in this area. Open pit mining methods are used for deposits that near to the surface (usually 100 metres). This generally involves removing the overburden, digging the ore or blasting with explosives, then removing the ore by trucks, conveyer belts for stockpiling prior to further processing. Material is removed in a series of layers, leaving horizontal benches at the sides of the surface mine to enable vertical faces to be worked at a safe height.

The potential impacts of the proposed mining activities and associated infrastructure and facilities were cumulatively assessed, where relevant, taking the existing environment and all other activities and facilities associated with the proposed mining into consideration. This Scoping Report together with the EMP, will provide sufficient information for the Ministry of Mine and Energy (MME) as the Competent Authority and the MET to make an informed decision regarding the proposed project, and whether an environmental clearance certificate can be issued or not.

The specialist studies that were conducted as part of this EIA process include a:

- ✓ Biodiversity assessment (fauna and flora);
- ✓ groundwater and surface water impact assessment;
- ✓ air quality impact assessment;
- ✓ Socio-economic impact assessment.
- ✓ noise impact assessment;
- ✓ vibrations assessment;

It is hereby recommended that proposed lithium mining, ore processing and basic infrastructure construction on ML 242 be granted an Environmental Clearance Certificate, provided that: All

mitigations provided in this report are implemented as stipulated and where required and emphasized, improvement should be effectively put in place.

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ACRONYMS AND ABBREVIATIONS

Below a list of acronyms and abbreviations used in this report.

Acronyms / Abbreviations	**Definition**
EPL	Exclusive Prospecting License
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
MEFT	Ministry of Environment, Forestry and Tourism
MEFT: DEA	Ministry of Environment, Forestry and Tourism: Department of Environmental Affairs
ML	Mining License
MME	Ministry of Mines and Energy
Target area	The area of the EPL intended for exploration activities

1. Introduction

1.1. Project background

Xinfeng Investment (Pty) Ltd (the proponent) holds mineral rights under the Exclusive Prospecting License (EPL) 7228. The Mining Licence (ML) application area covers an area of 14206.9467 Ha. Mineral rights valid under this EPL are base and rare metals, industrial minerals and precious metals. The applicant has launched a mining licence (ML 242) application on the 17th December 2021 with the Ministry of Mines and Energy (MME). The proponent has conducted extensive exploration over EPL 7228, and the outcome of the programme carried out has indicated the potential for development of an open pit mine and processing plant from which lithium hydroxide will be produced. The proponent intends to carry out Lithium mining operations on the Mining License (ML 242) within Exclusive Prospecting Licence (EPL 7228). As soon as the mineral rights for ML242 has been granted and the Environmental Clearance Certificate has been issued by Ministry of Environment, Forestry and Tourism (MEFT), then mine development and the subsequent production phase and processing will follow.

1.2 Project location

The project area is located in western central Namibia in Erongo Region, Omaruru jurisdiction (Fig. 1), 45 KM WNW of Omaruru town (Fig. 2) and covers the farms farm Kohero 113, Goedehoop 157, Gross Okombahe 193, Okombahe 112,Kawab 117, Okarundu Nord West 118, Okarundu North 121and part of Dâures Constituency. Coordinate from the center of the ML is (-21.294508, 15.462547). Project area host Damara intrusive Leuco-granites are associated with pegmatites that are known to host tin, lithium, niobium and REE in the area. Mineralization in the area is known to be associated with late to post tectonic pegmatites of Ordovician age. The Project area is located in arid to semi-arid shrub land, arid savannah and grassland, and is characterized bymoderate relief with local elevations ranging from 800 m to 1,250 m above sea level. Local elevations or hills in the Project area are generally associated with marble outcrops and granitic intrusions.

Table 1: Mining Licence (ML 242) Boundary

Coordinates covered by Mining Licence area (ML 242)								
	Latitude				Longitude			
1	21°	19'	44.87"		S 15°	33'	09.36"	E
2	21°	19'	36.97"		S 15°	23'	23.57"	E
3	21°	15'	11.18"		S 15°	23'	20.54"	E
4	21°	14'	15.41"		S 15°	28'	51.37"	E
5	21°	15'	48.95"		S 15°	28'	46.45"	E
6	21°	16'	31.59"		S 15°	29'	48.24"	E
7	21°	16'	40.84"		S 15°	34'	50.28"	E
8	21°	18'	24.70"		S 15°	34'	34.22"	E

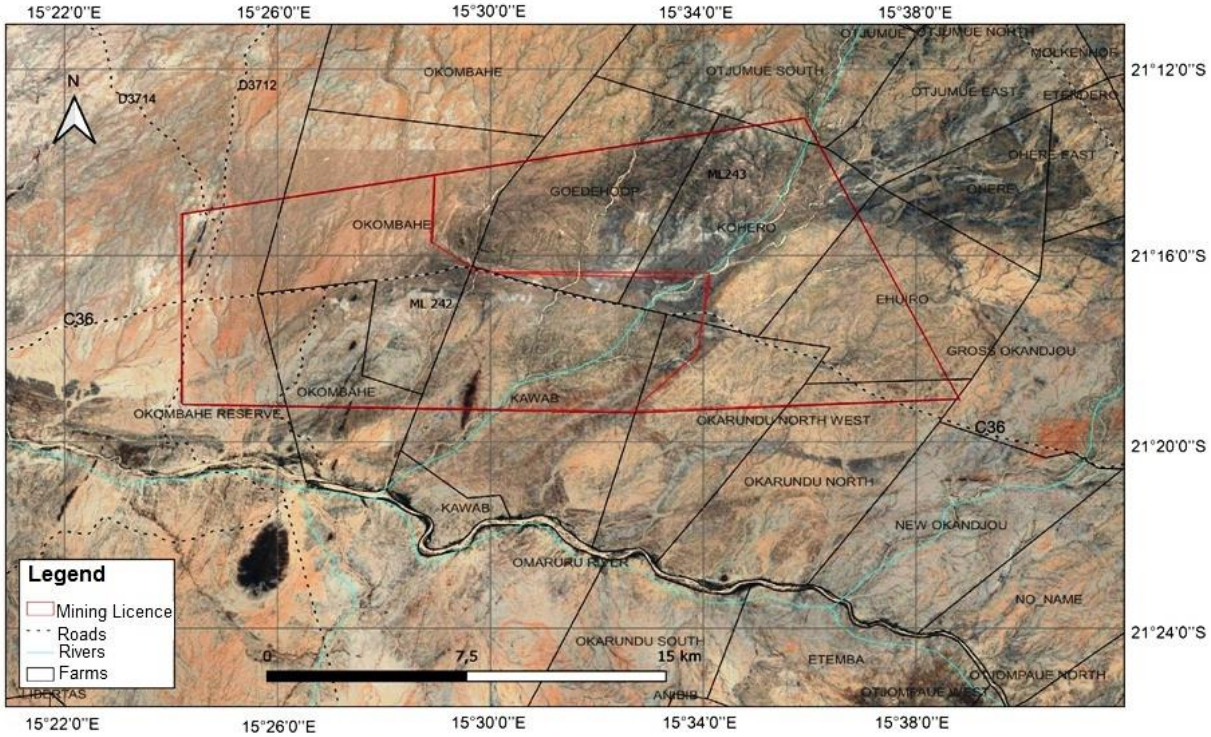

Fig. 1. Google Earth image showing farms that are covered by ML 242 within EPL 7228.

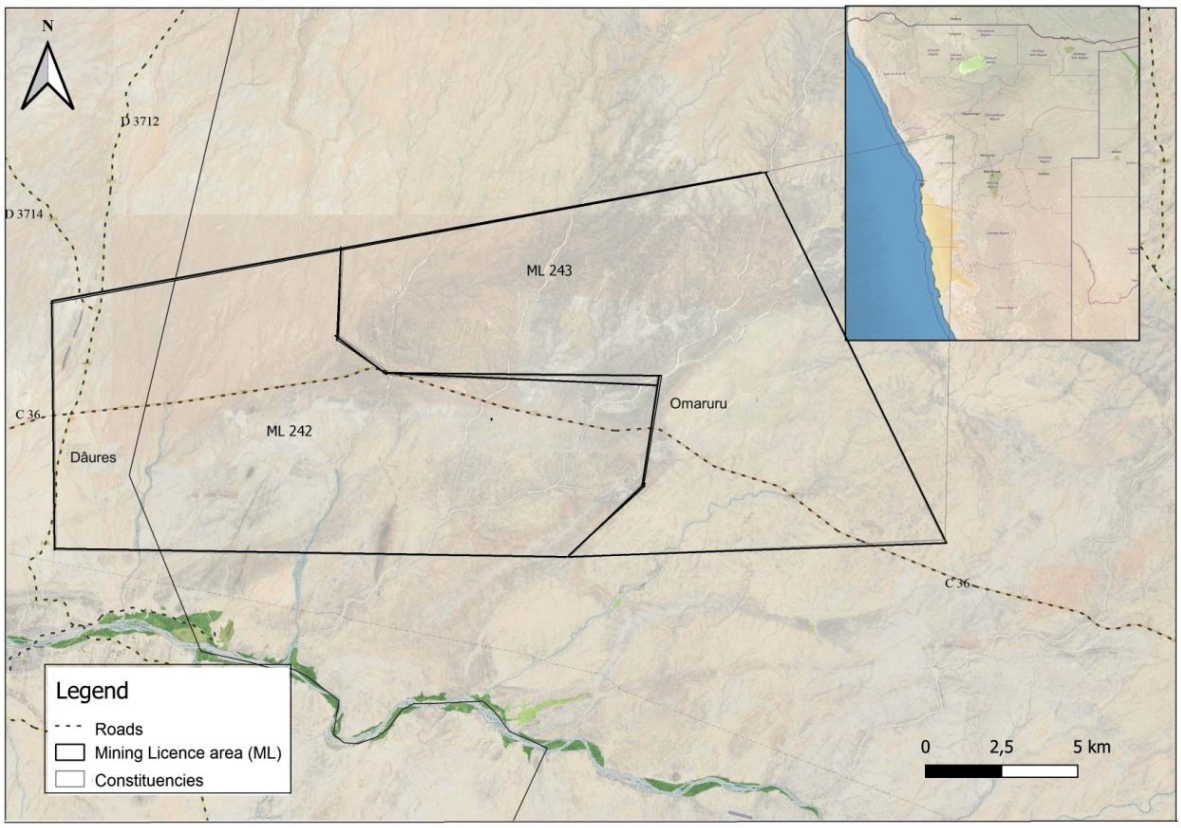

Fig. 2. Locality of ML242 application area in the western central Namibia.

1.3 Project description

Xinfeng Investment (Pty) Ltd (the proponent) holds mineral rights under the Exclusive Prospecting License (EPL) 7228. Mineral rights valid under this EPL are base and rare metals, industrial minerals and precious metals. The applicant has launched a mining licence (ML 242) application on the 17th December 2021 with the Ministry of Mines and Energy (MME) at a size of 13563.1255 Ha. The proponent has conducted extensive exploration over EPL 7228, and the outcome of the programme carried out has indicated the potential for development of an open pit mine and processing plant from which lithium carbonate will be produced. Therefore, as soon as the mineral rights for ML242 has been granted and the Environmental Clearance Certificate has been issued by Ministry of Environment, Forestry and Tourism (MEFT), then mine development and the subsequent production phase and processing will follow.

1.4 Project design/methodology

The proponent intends to carry out Lithium mining operations on the Mining License (ML 242) within Exclusive Prospecting Licence (EPL 7228).

The project requires the formation and operation of an open pit mine comprised of a processing plant, employing conventional crushing, grinding and concentration. With an expected ore concentration rate of about 2 00 000 tons per year. Below is a list of activities which have been assumed to be needed for the full development of the project. The full mining plan is still under development. Risks associated with these activities related to the specific environmental receptors found for the area will be assessed in the Assessment Phase of the EIA.

Primary facilities will probably include the following: -

- ✓ Mining: Open pit(s)
  - Waste rock dump(s) (WRD)
  - ROM (Run of Mine) ore stockpile storage facility

Haul roads and mine access roads

- ✓ Processing plant with :
  - Crushing, grinding and milling circuits
  - Magnetic separator and gravity concentrator
  - Spodumene concentration storage
  - Spodumene flotation circuit
  - Calcination rotary furnace

Tailings thickening and associated pipelines to the TSF

- ✓ Integrated Mine Waste Facility (IMWF) : Tailings storage facility (TSF) and waste management facility
- ✓ Return water dam and pipelines
- ✓ Water abstraction and piping facilities including water storage facilities
- ✓ Bulk fuel storage
- ✓ Internal power generation(Diesel & Solar)
- ✓ External power supply (sub stations, external and internal site powerlines)
- ✓ Administration, laboratory, stores and other buildings
- ✓ Magazine and explosives depot

The end product spodumene concentrated ore will be transported to the Port of Walvis Bay for final processing in China.

1.5 Project motivation

The Ministry of Mines and Energy (MME), through the department of Mines undertakes to exploit the country's mineral resources through issuance of mineral rights and it is through this process that EPL 7228 was issued to Xinfeng Investment (Pty) Ltd. The proponent has conducted an in depth exploration study and identified a profitable lithium reserve on the ML 242 area. Preliminary studies predict a potentially good return on investment and therefore, Xinfeng Investment plans to implement lithium mining activities on ML 242. Mineral Resources can be defined as the concentration of material of economic interest in or on the earth's crust, whereas ore reserves are the parts of a mineral resource that can be mined under current economic conditions. The proposed activities would require minimal establishment as mineral processing will not be done in Namibia, therefore there is no need for construing a processing plant on the project area.

The targeted orebody extends close to the surface in LTC pegmatites which makes open pit (surface) mining feasible in this area. Open pit mining methods are used for deposits that near to the surface (usually 100 metres). This generally involves removing the overburden, digging the ore or blasting with explosives, then removing the ore by trucks, conveyer belts for stockpiling prior to further processing. Material is removed in a series of layers, leaving horizontal benches at the sides of the surface mine to enable vertical faces to be worked at a safe height. The height of working faces depends on the stability of the rocks being worked on. Over the past few years there has been an increasing lithium demand due to the manufacturing of electronic devices such as mobile phones, laptops, rechargeable batteries, and electric vehicle batteries due to its capability to convert chemical energy into electrical energy very efficiently. Upon completion of the Environmental Impact Assessment process and acquiring all the relevant permits and approvals, Xinfeng Investment (Pty) Ltd will proceed with the development of the lithium open pit mine and construction of the supporting infrastructures.

1.6 Regulatory Requirements

1.6.1 Introduction to the Environmental Impact Assessment

The proposed mining and ongoing exploration activities are listed in the Environmental Management Act, 7 of 2007 and the EIA regulations, 2012. Prior to the development of the proposed project, Environmental clearance is required from the Ministry of Environment and Tourism (MET): Department of Environmental Affairs (DEA). In fulfilment of the environmental requirements, the proponent appointed Minera-Xplore Consultancy CC to carry out an Environmental Impact Assessment study and consequently prepare Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports.

1.6.2 Environmental Consultant

Minera-Xplore Consultancy CC has been assigned by Xinfeng Investment (PTY) Ltd to conduct an Environmental Impact Assessment (EIA) and develop and Environmental management plan (EMP) for the proposed establishment of lithium mine and construction of mine supporting infrstructures on Mining Licence (ML 242). The Environmental Assessment Practitioner (EAP) for this study was Ms. Nangula Ndakunda. Her main area of expertise includes Mineral exploration, Environmental Management, Groundwater resource management and groundwater exploration. The appointed EAP has a Master's Degree in Integrated Environmental Management and Sustainable Development, B.Science (honours) Degree in Geology and a B.Science (honours) Degree in Hydrogeology (CV is attached in Appendix B).

1.7 The objectives of the Environmental Assessment Process

The overall goal of an EIA is to achieve better developmental interventions through protecting human, physical, and biotic environments. This is one component in the environmental planning and management of projects, in that it focuses upon the consent stage of the project. The study entails assessments of likely short and long term positive and negative environmental impacts of the activities related to the proposed mining project with the following objectives:

- To prepare a Scoping report including details of the proposed mine and supporting infrastructures.

- To develop an Environmental Management Plan (EMP).

This Scoping Report (including an assessment of impacts), together with the EMP, will provide sufficient information for the Ministry of Mine and Energy (MME) as the Competent Authority and the MET to make an informed decision regarding the proposed project, and whether an environmental clearance certificate can be issued or not.

The assessment covered the proposed lithium mine and supporting infrastructures for the following developmental stages:

- Construction
- Operation
- Ongoing monitoring and rehabilitation
- Decommissioning, closure and aftercare

Archaeology specialist studies, biodiversity assessment, groundwater and surface water impact assessment were undertaken as part of the environmental assessment process.

1.8 Purpose of the Scoping Report

The main purpose of this report is to provide information relating to the proposed mining activities and to indicate which environmental aspects and potential impacts that have been identified during the screening and scoping phases. Therefore the purpose of scoping is to identify issues, impacts and alternatives. Also integral to the Scoping Phase is the initial public participation process (PPP). This process ensures that all possible interested and affected parties (I&APs) are informed of the proposed activity and are provided with an opportunity to comment and identify issues. The main purpose of this scoping report is to provide information pertaining to the proposed mining activities as well as indicate which environmental aspects and potential have been identified during the screening and scoping phases

The project area is located in western central Namibia in Erongo Region, Omaruru jurisdiction, 45 KM WNW of Omaruru town and covers the farms farm Kohero 113, Goedehoop 157, Gross Okombahe 193, Okombahe 112,Kawab 117, Okarundu Nord West 118, Okarundu North 121and part of Dâures Constituency. The project involves lithium mining, ore processing and basic infrastructure construction on ML 242.

The scoping process shall be concluded with the establishment of terms of reference for the preparation of an EIA, as set out by the Ministry of Environment, Forestry and tourism. The purpose of this scoping report is to:

- ❖ Identify any important environmental issues to be considered before the commencement of the proposed mining activities in ML242
- ❖ To identify appropriate time and space boundaries of the EIA study.
- ❖ To identify information required for decision-making.

As such, the key objectives of this scoping study are to:

- ❖ Inform the public about the proposed mining activities.
- ❖ Identify the main stakeholders and incorporate their comments and concerns.
- ❖ Define reasonable and practical alternatives to the proposal.
- ❖ To establish the terms of reference for an EIA study.

The scoping study provides a clear description of the environment that may be affected by the activity and the manner in which the activity may affect the environment. Information relating to the receiving environment and its social surroundings has been sourced through the following methods;

- ❖ Site visits to collect primary data;
- ❖ Legal and policy review;
- ❖ Gathering existing information relating to similar developments and issues;
- ❖ Discussions, meetings and site visits with authorities;
- ❖ Opinions and concerns raised by I&AP's and stakeholders; and
- ❖ Qualified opinions from professional studies.

Furthermore, Environmental Impact Assessment (EIA) is a comprehensive evaluation and study phase that addresses all the issues raised in the Scoping Phase. It is a substantial phase that has seven key objectives:

- Describe the biophysical and socio-economic environment that is likely to be affected by the proposed mining sites.
- Assess the significance of impacts that may occur from the proposed mining sites.
- Assess the alternatives proposed during the Scoping Phase.
- Provide details of mitigation measures and management recommendations to reduce the significance of impacts.
- Provide a framework for the development of the Environmental Management Programme (EMPr).

- Continue with the public participation process.

1.9 Terms of Reference

The terms and reference for the proposed project was set out in accordance with the Environmental Management Act (No. 7 of 2007) and Environmental Regulations of 2012, as well as the Terms of Reference (ToR) which were provided by the proponent). It is a guiding document which forms part of the EIA which indicates the description of the environment that may be affected by the activity and the manner in which the activity may affect the environment. Information relating to the receiving environment and its social surroundings has been sourced through the following methods:

- ❖ Legal and policy review; Identify all legislation and guidelines that have reference to the proposed project.
- ❖ Identify existing environmental (both bio-physical and socio-economic) conditions of the study area.
- ❖ Inform Interested and Affected Parties (I&APs) and relevant authorities of the details of the proposed development and provide them with a reasonable opportunity to participate during the process.
- ❖ Consider the potential (both bio-physical and socio-economic) impacts of the development and assess the significance of the identified impacts.
- ❖ Document opinions and concerns raised by I&AP's and stakeholders.
- ❖ Outline management and mitigation measures in an Environmental Management Plan (EMP) to minimize and/or mitigate potentially negative impacts.
- ❖ Submit the final scoping report to the competent authority and the Environmental Commissioner.

This report is the Scoping Report. Taking the above mentioned into consideration, this report, together with the attached EMP, will provide sufficient information for MEFT to make an informed decision regarding the proposed exploration activities, and whether an environmental clearance certificate can certificate can be issued or not. A schematic representation of the EIA process if given in Fig. 3.

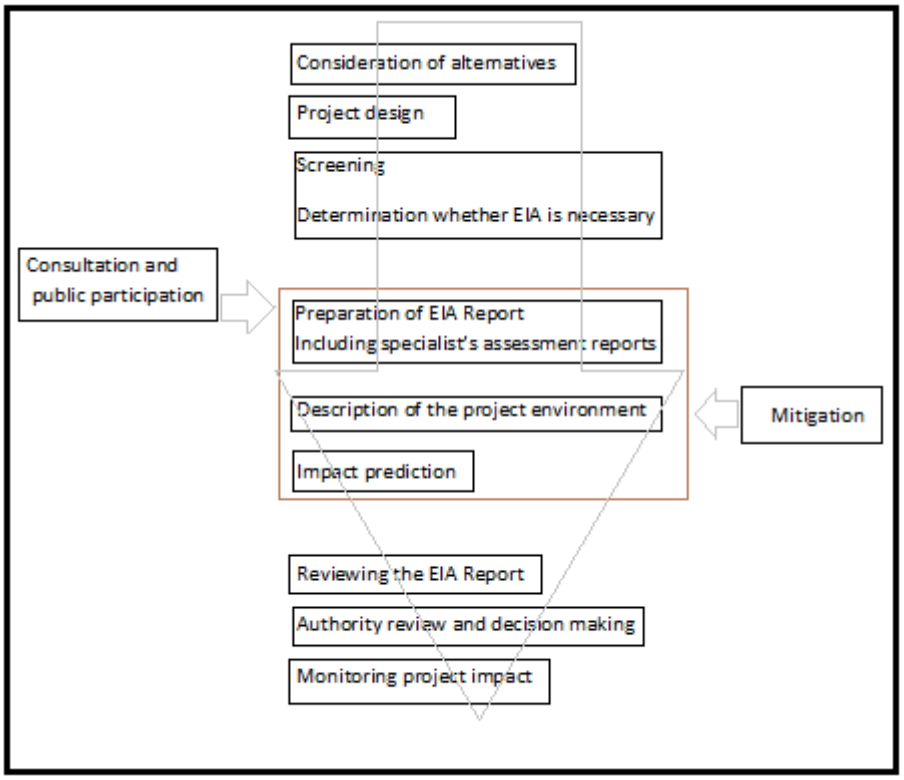

Fig. 3. General schematic presentation of the Environmental Impact Assessment process in Namibia.

1.10 Assumptions and limitations

This EIA report is based on currently available information and, as a result, the following limitations and assumptions are implicit:

- The report is based on project information provided by the proponent.
- The proposed activities as well as all the plans, maps, EPL area, line boundary / coordinates, and appropriate data sets received from the Proponent, project partners, regulators, Competent Authorities, and specialist consultants are assumed to be current and valid at the time of conducting the studies and preparation of this report.
- The impact assessment outcomes, mitigation measures and recommendations to be provided in the EIA/ Scoping and EMP Reports are valid for the lifecycle of the proposed prospecting activities.
- Descriptions of the natural and social environments are based on fieldwork, relevant specialist studies and available literature, where baseline information and impact assessment guidelines were insufficient or unavailable, a precautionary principle approach has been implemented.

1.11 Environmental assessment approach and methodology

Environmental assessment process in Namibia is governed by the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007) and in line with the provisions of the Cabinet approved Environmental Assessment Policy for Sustainable Development and Environmental Conservation of 1995. This report has taken into consideration all the requirements for preparation of all the supporting documents and application for an Environmental Clearance Certificate and lodgments of such application to the Environmental Commissioner (EC), Department of Environmental Affairs (DEA) in the Ministry of Environment, Forestry and Tourism (MEFT). The purpose of the Scoping Phase was to communicate the scope of the proposed project to Interested and Affected Parties (I&APs), to consider project alternatives, to identify the environmental (and social) aspects and potential impacts for further investigation and assessment, and to develop the terms of reference for specialist studies to be conducted in the Impact Assessment Phase if necessary. The steps undertaken during the Scoping Phase are summarized below.

1.11.1 Project initiation and screening

Screening is a key activity to determine whether an EIA is required. The project was registered on the online ECC portal (eia.met.gov.na) in order to provide notification of the commencement of the EIA process and to obtain clarity on the process to be followed.

1.11.2 Initial scoping public participation process

The objective of the public scoping process was to ensure that interested and affected parties (I&APs) were notified about the proposed project, given a reasonable opportunity to register on the project database and to provide initial comments. Steps that were undertaken during this phase are summarized below:

1.11.2.1 I&AP identification:

A project specific I&AP stakeholder database was developed. This database has been maintained and updated as and when required. The farmers' contact details were obtained during site visit and some were provided by the proponent. Contact details of other interested and affected parties that were provided by the proponent. Furthermore, I&APs were added to the database based on responses to the advertisements and notification letters.

1.11.2.2 Notification letter and Background Information Document (BID):

BIDs were distributed via email to relevant authorities and stakeholder on the I&APs database. A notification letter was also distributed for review and comment for a period of 3 weeks after commencement of the project. The purpose of the BID was to inform I&APs about the proposed project, the assessment process being followed. Attached to the BID was a registration and response form, which provided I&APs with an opportunity to submit their names, contact details and comments on the project.

1.11.2.3 Advertisements and site notice:

Advertisements announcing the proposed project, the availability of the BID, public meetings and I&AP registration / comment period were placed in two newspapers namely: Confidénte newspaper and Windhoek Observer newspaper, for two consecutive weeks. Site notices were placed on the boundaries of farm fences, on the notice boards of the Omaruru municipality and around Omaruru town for public viewing. All issues raised were incorporated into the scoping report. These submissions were tabled and responded to as indicated in the public participation section of the scoping report.

1.11.2.4 Compilation and Review of Draft Scoping Report (DSR)

The Draft scoping report (DSR) was prepared in compliance with Section 8 of the EIA Regulations of 2012 and incorporated with comments received during the initial Public Participation Process. The DSR will be distributed for a 14-day review and comment period.

1.11.2.5 Final Scoping Report and Completion of the Scoping Phase

The Final Scoping Report (FSR) summarizes the following: the legal and policy framework; approach to the EIA and process methodology; the project's need and desirability; proposed project activities; key characteristics of the receiving environment; and key issues of concern that will be further investigated and assessed in the next phase of the EIA. The FSR complies with Section 8 of the EIA Regulations 2012. All written submissions received during the DSR review and comment period will be collated and responded to. The FSR will be submitted to the competent authority. In terms of Section 32 of the Environmental Management Act, 2007 (No. 7 of 2007), the competent authority is then required to make a recommendation on the acceptance or rejection of the report to Ministry of Environment, Forestry and Tourism (MEFT): Department of Environmental Affairs (DEA), who will make the final decision.

1.11.3 List of Specialist Studies Undertaken

Section 9(a) of the Environmental Regulations of 2012 requires a disclosure of all the tasks to be undertaken as part of the assessment process, including any specialist to be included if necessary.

The following specialist studies that were conducted as part of this EIA process include:

- ✓ Biodiversity assessment (fauna and flora);
- ✓ groundwater and surface water impact assessment;
- ✓ air quality impact assessment;
- ✓ Socio-economic impact assessment.
- ✓ noise impact assessment;
- ✓ vibrations assessment;
- ✓ Archaeology impact assessment.

2. Supporting infrastructures and service

2.1 Water supply

Most towns within the Omaruru basin, with the exception of Omaruru are supplied with water from groundwater schemes operated and maintained by NamWater. Water supply from the basin extended to users outside the basin that includes the small town of Uis and mines such as Rössing Uranium, Husab Mine and Langer Heinrich Mine. Omaruru Town is supplied by the Omaruru Municipality, one of the few Municipalities that operates and manages their own bulk water supply scheme. Water abstraction in the basin is mainly for irrigation and livestock watering (commercial farms and communal farms), for mining and for rural and urban domestic supply.

Omaruru Municipality Bulk Water Supply Scheme will be supplying water to the proposed project. This scheme is managed and operated by the Municipality, supplies water from two well fields; four boreholes in the immediate vicinity of Omaruru and from three boreholes of the Kranzberg scheme east of the town. Various studies have estimated a 2.5 Mm^3 stored groundwater reserve with an estimated sustainable yield of 2.0 Mm^3/a.

In this proposed project, water will be required for drilling, crushing, mineral processing and for dust suppression. Additional boreholes can be drilled with permission from the Department of Water Affairs in the Ministry of Agriculture, Water and Land Reform. An alternative is to source water from Okombahe bulk water supply scheme. While it would be more efficient to utilize existing boreholes on the property, this would depend on the agreement reached with each landowner. Once production full starts, 90 % processing water will be recycled back into the system.

2.2 Roads

The project area (ML 242) is situated to 45 km NW of Omaruru town and East of Okombahe settlement on the C36 gravel road linking Omaruru and the small mining settlement of Uis. Omaruru is the nearest major town to the EPL area, meanwhile Windhoek, the capital city is located 180 km from study area. Access to the license area is through a well maintained gravel road C36 road cutting across the southern portion of the EPL area (Fig. 2). Within the minerals license area, several minor gravel farm roads and tracks exists and

are linked to the C36 road. This C36 road will have to be diverted to gain access to other parts of the mining licence area consultation with the landowners. Within the Project area, access is provided on a series of four-wheel drive off-road tracks. As noted above, Table 2 shows a summary of the land access agreements currently in place, which provide access to the main areas of interest within the Project at the time of this report, which is presently sufficient for exploration and potential mining operations.

2.3 Land access agreement

Xinfeng Investments (Pty) Ltd, hold mineral rights over the project area (ML 242) for base and rare metals, industrial minerals and precious metals. Surface rights in the Project area all belong to either private farm owners or the Government of Namibia and Xinfeng Investments (Pty) Ltd does not own or hold any title to the surface rights of any land in the area. Therefore, to gain full access to all farmland within the Project area, Xinfeng Investments (Pty) Ltd is required to enter into written land access agreement with each individual farm owner as well as pay land access fee to each respective landowner. Table 2shows a summary of the land access agreements currently in place, which provide access to the relevant farms listed. There are no other significant royalties, payments or agreements or risks that may affect access, title, or the right or ability to execute the proposed mining and exploration work on the project.

Table 2: Farm access agreements

Farmname	**Access status**
Kohero 113	Accessgranted
Goedehoop 157	being negotiated
Gross Okombahe 193	being negotiated
Ehuiro 120	being negotiated
Okarundu Nord West 118	being negotiated
Okarundu North 121	being negotiated
Kawab 117	being negotiated

2.4 Waste management infrastructure

The following waste management procedures will be followed at the operation stage of the mining project

- ✓ Construction wastewater treatment system for sewerage treatment out of the study area,
- ✓ Dumping site for domestic municipal waste (non-hazardous)

- ✓ Storage facility for hazardous waste

Domestic waste (non-hazardous): Domestic waste will be stored in a manner that there can be no contamination to the environment and shall be disposed of correctly.

In choosing a waste dumpsite, the following aspects will be strongly considered:

- Topography
- Land-use in the area
- The presence of any hazardous geological structures
- Groundwater considerations
- The prevailing wind direction in the area
- Visual impacts that the waste dump might have
- Presence of surface water in the vicinity of the area
- Presence of sensitive ecological area

  Since the area is located on privately-owned farms, all waste will be transported and disposed out of the area.

Fig. 4. Waste bins similar to these to be made available on site.

2.5 Project need and desirability

The proposed mining project will have direct and indirect positive contribution to the economic development and will create employment opportunities to the residents of Omaruru and Daures Constituency and Erongo Region. Mining Sector is the backbone of Namibia's economy, since independence mining has been a major contributor in terms of employment, wealth creation and economic

development. Annually, the mining industry pays over N$ 505 million in mining royalties, and N$ 2 million in for licence and export duties, excluding value added tax and pay as you earn. The mining industry contributes over N$300 million dollars to Government revenue annually and around N$ 2.2 billion annually to the national economy. The mining project which is the end result of the proposed ML 242 application, may assist in helping Namibia attain some of the goals set out in National Development Plans such as the Fifth National Development Plan (NDP5) and the Harambee Prosperity Plan (HPP).

2.6 Project alternatives

One of the objectives of an EIA is to investigate alternatives to the proposed project. Alternatives should include consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. The no-go alternative must also in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed.

2.6.1 Location alternatives

After a mineral deposit has been identified through exploration, the proponent must make a considerable investment in ore reserve location before mine development and subsequent production begins. Therefore no location alternative was considered.

2.6.2 Mining Method Alternatives

The location (depth) of the deposit decides which type of mine can be set up. Lithium mining method depends on the lateral and vertical extent of the of the ore body (pegmatites). Intensive exploration carried out indicated that the ore body extends laterally close to the surface. Pegmatites are emplaced at slightly shallower crustal levels than the associated parental granite, which may not be exposed. Open pit (surface) mining using excavators and transporting material using trucks is the most feasible mining method for this project as shallow resources cannot be mined with underground methods .Topography and the physical characteristics of the deposit strongly influence the choice of method. Pegmatite bodies in the study area show structural control, such as being emplaced along faults, lithologic boundaries, and plutonic contacts. Therefore, the proposal is to conduct open pit mining and extend to underground mining in the future when surface orebody gets depleted.

2.6.3 Substitutes/ mineral use alternatives

Substitution for lithium compounds is possible in batteries, ceramics, greases, and manufactured glass. Examples are calcium, magnesium, mercury, and zinc as anode material in primary batteries; calcium and aluminum soaps as substitutes for stearates in greases; and sodic and potassic fluxes in ceramics and glass manufacture

2.7 No-Go Alternatives

A comparative assessment of this option requires a comparison between the alternative of proceeding with the proposed open pit mining operation and ongoing exploration activities, with that of not proceeding with the proposed project. An assessment of the environmental impacts of a future, in which the proposed ML and ongoing exploration does not take place, may be good for the receiving environment because there be no negative environmental impacts due to the proposed mining and exploration operation that may take place in the project area.

The environmental benefits will include no negative environmental impact on the receiving environment. However, it is important to understand that even if the proposed open pit mining operation and ongoing exploration activities do not take place, to which the likely negative environmental impacts is likely to be low and localized, the current and other future land uses such as agriculture will still have some negative impacts on the receiving environment. The likely negative environmental impacts of other current and future land uses may still happen in the absence of the proposed mining activities.

No-go alternative will mean that the current land activities such as farming and important vegetation species will not be disturbed, that is, there will not be disturbance of the flora and fauna. No-go alternative will result in the non-mining of minerals and bring beneficiations to the receiving environment. However, the no-go alternative is not considered since it will lead to negative socio-economic impacts.

Furthermore, proceeding with the proposed project will result in Xinfeng Investment being able to mine the ore body, and in so doing:

- Provide employment opportunities for Namibians;
- Contribute to Namibia's economy and GDP;
- Provide an additional tax base for government revenue, and
- Enable Xinfeng Investment to generate an operating income and earn revenue.

2.8 Potential Land Use Conflicts

Considering the current land use practices (agriculture and mining) it's likely that the development of a mine in the general area can still co-exist with the existing and potential future land use options of the general area. However, much more detail assessment of any likely visual and other socioeconomic impacts will need to be undertaken as part of the EIA. The use of thematic mapping thereby delineating zones for specific uses such as conservation, mining or tourism etc, within the EPL area will greatly improve the multiple land use practices and promote coexistence.

2.9 Potential benefits

2.9.1 Potential Direct Benefits

The following is summary of the positive socioeconomic impacts identified associated with the proposed project development:

- ✓ **Direct capital investment:** The mining project will require a significant capital investment of at least N$ 60 million. This will be used for purchasing machinery required for the project as well as paying workers' salaries.
- ✓ **Stimulation of skills transfer:** Due to the nature of quarrying operations, the proponent will implement ad-hoc training programme for some of its staff members. Training programmes will be well structured and staff members will permanently benefit from these training programmes.

Employment creation

Provision of work provides an income which can potentially boost the quality of life for employees and their families. As a result, this will also reduce unemployment and sustain the Namibian economy. The project has a great potential to improve livelihoods and contribute to sustainable development within the surrounding community. Local recruitment will be encouraged by the proponent with a target of at least 65% locals. This operation thus contributes to the alleviation of unemployment which is severe in the

country. The development of the proposed mining project will create both direct and indirect jobs for at least minimum 200 people

The following procedure will be considered when recruiting

- ✓ It is proposed that local people should be considered first for employed. Especially where no specific skills are required.
- ✓ Town Councilor and community leaders could be requested to assist with the recruitment of workers.
- ✓ Gender equality considerations during recruitment process and employment preference will be afforded to previously disadvantaged Namibians.
- ✓ The proponent will introduce training programs (bursary schemes, on the job training etc) in order to boost the supply of local skills
- ✓ Transfer of knowledge, skills and technology associated with different aspects of the development , the use of new technologies will call for a new skills base which has to be transferred to employees;
- ✓ All employees will undergo a safety induction, first aid training course and wildlife awareness program. The Labour Act of 2007 will always be adhered to.

Export taxes and VAT payments

Gross Domestic Products (GDP) contribution as well as contribution of taxes, royalties and dividends to the national economy. The government will benefit directly in the form of taxes, royalties and dividends. This also includes property and company income taxes to the Namibian Government.

Community development

The Company is committed in investments in community development of the local infrastructure such roads and water supply, education (particularly in the area of science and technology), health, welfare and sustainable income-generating community projects in Namibia. Development will aid in sustaining secondary industries in Karibib, Erongo Region and elsewhere in Namibia

Support to local retailers shop

Mining is the highest foreign currency earner and GDP contributor to the Namibian economy, therefore

the presence of mining activities near local authorities stand to benefit the local economies from project-related purchases, for example, the retail, accommodation and recreation sectors. The proponent and his employees are encouraged to purchase or support local retailers in Karibib town unless the intended material/product to purchase is not available.

Potential Indirect Benefits

- The data generated from the quarrying activities will be made available to the Ministry of Mines and Energy for future research purposes.
- General enhancement of the health conditions and quality of life for a few people in the surrounding settlements.
- Of significance is the prospect of diversification of the surrounding economy, which is presently mainly focused on farming, tourism and small-scale mining of semi-precious stones.

2.10 Applications of Lithium

Lithium is the most familiar metal in everyday use. Lithium-ion batteries power modern society's mobile phones and other portable electronic devices. However, lithium has a wide variety of other uses and historically greater quantities have been used in the ceramics and glass industries.

2.10.1 Ceramics and glass

Lithium oxide is used as a flux in the ceramics and glass industries because it reduces the melting point and viscosity of silica-based compounds, thereby saving energy and reducing costs for producers. As lithium has a low coefficient of thermal, lithium- containing glass or glazes on ceramics are more resistant to higher temperatures and enable products to withstand sudden changes in temperature. Glass containing lithium is also more resistant to chemical attack and has improved hardness and shine. Lithium combined with copper creates blue colored glazes, and when combined with cobalt produces pink glazes for ceramics.

2.9.2 Batteries

Lithium is used in several different types of batteries, both non-rechargeable and rechargeable. In non-rechargeable forms (also known as disposable batteries) lithium metal or compounds are used for the anode. These batteries have a longer life than most other types of disposable battery but tend to be more expensive. They are often used for applications where long-life is important, for example in medical implanted devices such as pacemakers. They are also often used in watches, clocks and cameras where they have the advantage of reduced size compared to other battery types. Lithium-ion batteries have advantages over other types of

rechargeable battery because in general they are lighter, they have a high energy density (i.e. they produce more energy per unit of weight), they hold their charge better and they have no 'memory effect', which means they do not have to be completely discharged before recharging. Lithium-ion batteries are used for numerous applications including mobile phones, laptop computers, cameras, and many other consumer electronics, electric vehicles, electricity grid-scale storage and aerospace.

2.9.10 Lubricating greases

Lubricating grease is a type of lubricating fluid that has been combined with a thickening agent which ensures the lubricant is more easily retained where it is needed. Lithium hydroxide, when heated with a fatty substance, produces lithium soap grease which is one of the most commonly used of all lubricating greases due to its good performance and cost effectiveness.

2.9.10 Metallurgical

Metallic lithium is used as a flux in welding or soldering because it promotes the fusing of other metals and at the same time it absorbs any impurities. Lithium is also alloyed with aluminium, cadmium, copper or manganese in the manufacture of specialized aircraft parts.

3 Summary of applicable legislation

3.1 Overview

All mineral rights in Namibia are regulated by the Ministry of Mines and Energy (MME) whereas environmental regulations are regulated by the Ministry of Environment, Forestry and Tourism (MEFT). The legislation/acts that affect the implementation, operation and management of exploration activities in Namibia are shown below.

Constitution of the Republic of Namibia, 1990

The Constitution is the supreme law in Namibia, providing for the establishment of the main organs of state as well as guaranteeing various fundamental rights and freedoms. Provisions relating to the environment are contained in Chapter 11, article 95, which is entitled "promotion of the Welfare of the People". This article states that the Republic of Namibia shall – "actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for all Namibians, both present and future.

3.1.1 Environmental Management Act of 2007

Line Ministry: Ministry of Environment, Forestry and Tourism

The regulations that accompany this act lists several activities that may not be undertaken without an environmental clearance certificate issued in terms of the Act. The act further states that any clearance certificate issued before the commencement of the act (6 February 2012) remains in force for one year. If a person wishes to continue with activities covered by the act, he or she must apply for a new certificate in terms of the Environmental Management Act.

3.1.2 The Minerals Prospecting and Mining Act of 1992

Line Ministry: Ministry of Mines and Energy

The Minerals Prospecting and Mining Act No.33 of 1992 approves and regulates mineral rights in relation to exploration, reconnaissance, prospecting, small scale mining, mineral exploration, large-scale mining and transfers of mineral licences.

3.1.3 Water Resources Management Act of 2013

Line Ministry: Ministry of Agriculture, Water and Land Reform

The act provides for the management, protection, development, usage and conservation of water resources; to provide for the regulation and monitoring of water resources and to provide for incidental matters.

3.1.4 Nature conservation ordinance, ordinance No. 4 of 1975

Line Ministry: Ministry of Environment, Forestry and Tourism

The Nature Ordinance 4 of 1975 covers game parks and nature reserves, the hunting and protection of wild animals (including reptiles and wild birds), problem animals, fish, and the protection of indigenous plants. It also establishes a nature conservation inland fisheries, keeping game and other wild animals in capturing. In addition, the ordinance also regulates game dealers, game skins, protected plants, birds kept in cages, trophy hunting of hunt-able game, hunting at night, export of game and game meat, sea birds, private game parks, nature reserves, regulations of wildlife associations and registers for coyote getters.

3.1.5 National Heritage Act, 2004 (Act No. 27 of 2004)

Line Ministry/Body: National Heritage Council

The National Heritage Act provides 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.

3.1.6 Petroleum Products and Energy Act No. 13 of 1990

Line Ministry/Body: Ministry of Mines and Energy

The act regulates the importation and usage of petroleum products. The act reads as

"To provide measures for the saving of petroleum products and an economy in the cost of the distribution thereof, and for the maintenance of a price thereof; for control of the furnishing of certain information regarding petroleum products; and for the rendering of services of a particular kind, or services of a particular standard; in connection with motor vehicles; for the establishment of the National Energy Fund and for the utilization thereof; for the establishment of the National Energy Council and the functions thereof; for the imposition of levies on fuel; and to provide for matters incidental thereof".

3.1.7 Forest Act, No. 12 of 2001

Line Ministry/Body: Ministry of Agriculture, Water and Land Reform

The act regulates the cutting down of trees and reads as follows "To provide for the establishment of a Forestry Council and the appointment of certain officials; to consolidate the laws relating to the management and use of forests and forest produce; to provide for the protection of the environment and control and management of forest trees; to repeal the preservation of Bees and Honey proclamation 1923, preservation of Trees and Forests Ordinance, 1952 and the Forest Act, 1968; and to deal with incidental matters".

The constitution defines the function of the Ombudsman and commits the government to sustainable utilization of Namibia's natural resources for the benefit of all Namibians and describes the duty to investigate complaints concerning the over-utilization of living natural resources for the benefit of all Namibians and describes the duties to investigate complaints concerning the over-utilization of living natural resources, the irrational exploitation of non-renewable resources, the degradation and the destruction of ecosystem and failure to protect the beauty and character of Namibia. Article 95 states that "*the state shall actively promote and maintain the welfare of the people by adopting; inter-alia policies aimed at maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and*

utilization of natural resources on a sustainable basis for the benefit of all Namibians both present and future".

3.1.8 Atmospheric Pollution Prevention Ordinance 11 of 1976

Line Ministry/Body: Ministry of Health and Social Services

This ordinance provides for the prevention of air pollution and is affected by the Health Act 21 of 1988. Under this ordinance, the entire area of Namibia, with the exception of East Caprivi, is proclaimed as a controlled area for the purposes of section 4(1) (a) of the ordinance.

3.1.9 Hazardous Substance Ordinance, No. 14 of 1974

Line Ministry/Body: Ministry of Safety and Security

The ordinance provides for the control of toxic substances. It covers manufacture, sale, use, disposal and dumping as well as import and export. Although the environmental aspects are not explicitly stated, the ordinance provides for the importing, storage and handling.

3.1.10 Namibian Water Corporation (Act 12 of 1997)

Line Ministry/Body: Namibian Water Corporation

The act caters for water rehabilitation of prospecting and mining areas, environmental impact assessments and for minimizing or preventing pollution.

3.1.11 Public and Environmental Health Act, 2015

Line Ministry/Body: Ministry of Health and Social Services provide a framework for a structured uniform public and environmental health system in Namibia; and to provide for incidental matters.

3.1.12 Agricultural (Commercial) Land Reform Act 6 of 1995

Line Ministry/Body: Ministry of Lands and Resettlement

To provide for the acquisition of agricultural land by the State for the purposes of land reform and for the allocation of such land to Namibian citizens who do not own or otherwise have the use of any or of adequate agricultural land, and foremost to those Namibian citizens who have been socially, economically or educationally disadvantaged by past discriminatory laws or practices; to vest in the State a preferment right to purchase agricultural land for the purposes of the Act; to provide for the compulsory acquisition of certain agricultural land by the State for the purposes of the Act; to regulate the acquisition of agricultural land by foreign nationals; to establish a Lands Tribunal and determine its jurisdiction; and to provide for matters connected therewith.

List of permits, licences, and clearances that are likely to be required for the Project are provided in Table 4, the estimated time required to secure the necessary approval is also given.

Table 3. Permits, licences and clearances potentially required for the Project and related approval period

Permit or licence	Act/regulation	Related activities requiring permits	Relevant authority	Timeframe for approval
Environmental Clearance Certificate (for Mining Activities)	Environmental Management Act, No. 7 of 2007	Required for all listed activities listed in Table 3.	Ministry of Environment, Forestry and Tourism	Approval timeframes vary depending on government workload and priorities. The typical timeframe is between 3 and 9 months, depending on project complexity. Environmental Clearance Certificates must be renewed after 3 years.
Mining Licence	Section 90 (2) (a)	Written permission from Mining Commissioner.	Ministry of Mines and Energy (MME)	6–12 months
Surface Rights Agreements (mine, infrastructure corridors)	Section 52(1)(a) of the Minerals Act 33 of 1992	Included in the Mining Licence Application. Also required in application of accessory works areas.	MME	Undetermined
Exclusive Prospecting Licences	Section 68 (2) (a) of the Minerals Act	Written permission from Mining Commissioner before	MME	2 months

	33 of 1992	prospecting can commence.		
Accessory Work Permit	Section 90(3) of the Minerals Act 33 of 1992	Written permission from Mining Commissioner before Accessory Works can be erected on an EMP or Mining Licence area.	MME	2–3 months
Permit for boreholes (exploration and water boreholes)	Permit is issued under the Water Act, No. 54 of 1956 (enforced)	Required before the drilling of boreholes for exploration and abstraction of water.	Ministry of Agriculture, Water and Land Reform (MAWLR)	3–4 months

Permit or licence	Act/regulation	Related activities requiring permits	Relevant authority	Timeframe for approval
Tailings Waste Disposal Permit	Permit is issued under the Water Act, No. 54 of 1956 (enforced) The Water Resources Management Act, No. 11 of 2013 (not enacted)	Required for disposal of tailings, effluent and wastewater.	MAWLR	3–4 months
Wastewater Discharge Permit	Permit is issued under the Water Act, No. 54 of 1956 (enforced) but forms of the Water Act, No. 24 of 2004 are used.	Required for discharge of sewage and/or excess industrial or mine wastewater.	MAWLR	3–4 months
Permit for Construction of River Diversion	Permit is issued under the Water Act, No. 54 of 1956 (enforced) The Water Resources Management Act, No. 11 of 2013 (not enacted)	Construction of canals and channels including the diversion of the normal flow of water in a riverbed and water transfer schemes between water catchments and impoundments.	MAWLR	Unknown
Permit for the Clearing of Land	Forest Act, 2001 (Act No. 12 of 2001)	Removal of vegetation within 100 m of a water course, or removal of more than 15 ha of woody vegetation, or Removal of any protected plant species.	MAWLR	Permit only valid for 3 months therefore must be applied for in advance of clearing activities

Permit for Destruction of Heritage Objects and Artefacts	The Heritage Act, No. 27 of 2004.	Interference with heritage artifacts during the project life. Heritage sites could potentially be located within proposed mining landform footprints, or along proposed pipeline or powerline routes.	National Heritage Council	Undetermined
Certificate for Bulk Fuel Storage	Petroleum Products Regulations	Consumer installation certificate for bulk fuel storage and dispensing.	MME	60 days is indicated in the Guideline
Licence for Explosives Magazine	Minerals (Prospecting and Mining) Act 33 of 1992, Mine Safety Regulations	Also covered under accessory works application.	MME	1 Month
Permit for Storage and Use of Explosives, plus burning of packaging	Minerals (Prospecting and Mining) Act 33 of 1992, Mine Safety Regulations	Part X (10), explosives and blasting.	MME	Unknown
Emissions stack(s) and towers	Civil Aviation Act 6 of 2016	55 Regulations relating to safety and security near aerodromes.	Civil Aviation Authority	Unknown

4 Receiving Environment

4.1 Regional and physical geography

4.1.1 Topography

The project area is located in arid to semi-arid thorn bush savanna. Relief is moderate to high with elevation ranging from approximately 900 to 1300 m above sea level. The study area is characterised by mountains and flat topographyphy, with an exeption of local ridges and hills of marble and granite outcrops, forming conspicuous topographic elevated surface expresssions. Omaruru river is located approximately 10 km from the project area southern boundaries, paralel to C36 road. The River is approximately 330 km long and rises in the Otjozondjupa Region in the vicinity of the Etjo Mountains where elevations are up to 2,080 m above sea level, and reaches the sea at Henties Bay. Due to the arid climate of the study area, surface water is only available for a short period of time after rainfall events. Omaruru river is an ephereal river with with a mean runn-off of roughly 40m^3/h.

Fig.5: Marble outcrop in the study area showing moderate relief topography.

4.2 Surface water

The Omaruru River has its headwaters in the area just to the north of the Etjo Mountains, and south-east of Kalkfeld, and flows in a generally south-westward direction until it reaches the sea at Henties Bay, after approximately 300 km and covers a catchment area of approximately 11,870 km^2. The river has generated extensive alluvial deposits, which provide useful aquifers for groundwater abstraction at a number of locations along the river (Omaruru, Okombahe, Nei-Neis, Omdel), which are recharged by infrequent flood events.

4.3 Groundwater

Bulk water supplies within the Omaruru basin are sourced mainly from groundwater; with the main aquifers in the Omaruru Basin being confined to the Omaruru River channel. These are porous primary aquifers that form from alluvial sediments of varying thickness and showing medium to high groundwater potential. Fractured aquifers that have little groundwater and generally low to locally moderate groundwater potential are also found and are the main source for water supply for commercial and communal livestock farms located away from the river. The probability of good borehole yield in a hard rock aquifer is more favorable when targeting water bearing features such as fractures, faults and dykes. In general aquifers are recharged mainly from rainfall resulting in seasonal floods within the Omaruru River.

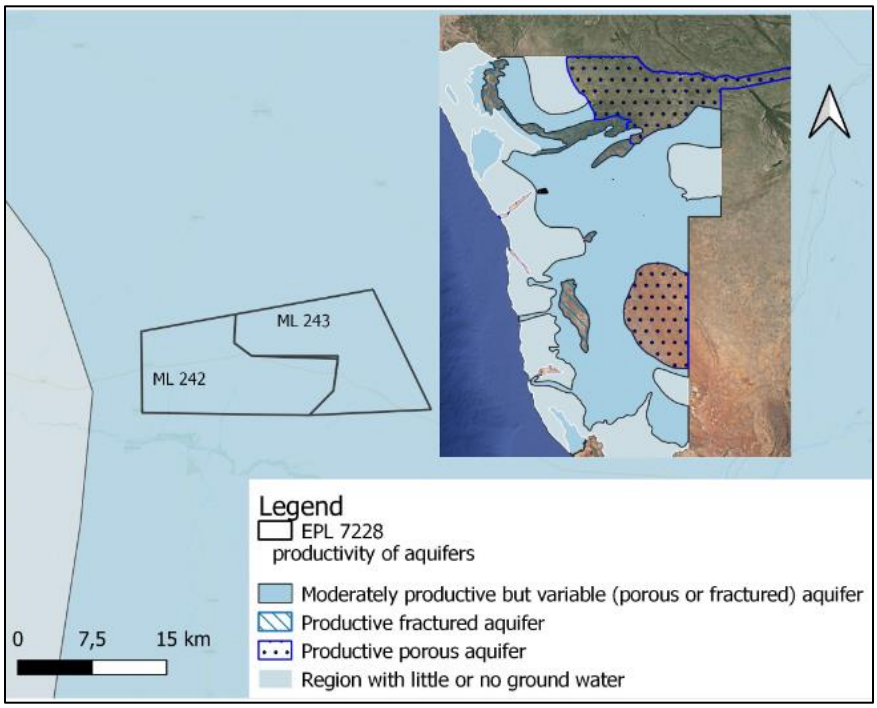

Fig. 6. Groundwater potential of the study area showing moderately productive but variable porous or fractured aquifer.

4.1.2 Climate

The project area is relatively a dry place with a minimum average annual temperature of 23°C and a maximum average annual temperature of 32°C. The area receives little rainfall during the wet season with an average annual rainfall of about 362 mm. The average annual humidity of 33%.

4.1.3 Temperature

The project is located in an arid to semi-arid region. Approximately half of the Omaruru district where project is situated is covered by dry land grasses and the other half by dry land scrub. The coldest temperatures are typically encountered between June and August, ranging from 9.4 – 10.8°C. The highest temperatures are reported between October and February. During this time, temperatures reach up to 33°C (during October - November).

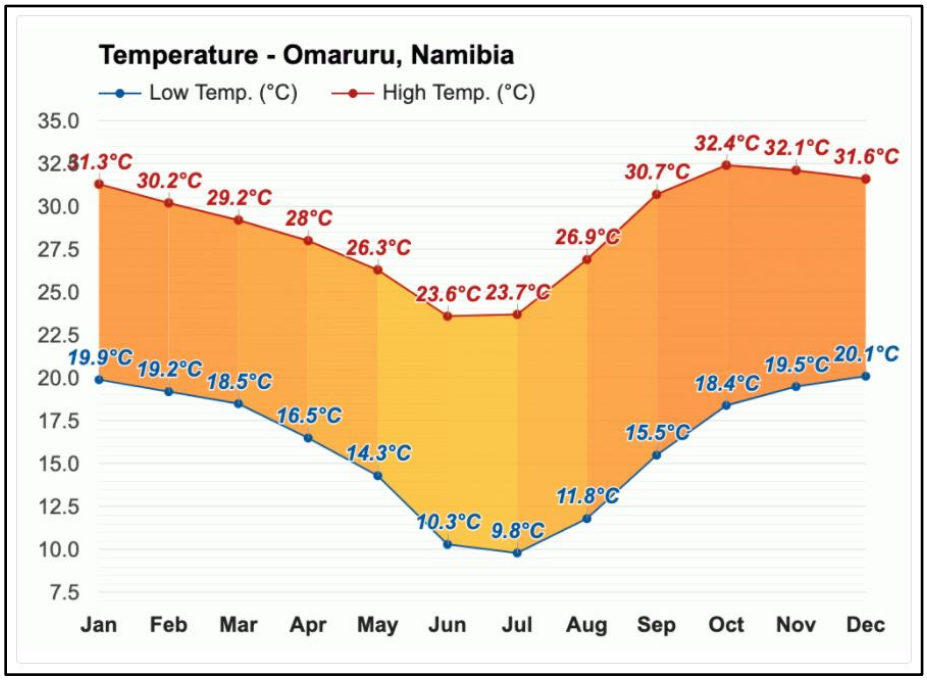

Fig. 7. Temperature graph for Omaruru (weather-atlas, 2021).

4.1.4 Precipitation

The highest precipitation in the area occurs between January to March, with highest rainfall received in February with an average 82mm. The month with the highest number of rainy days is February (16 days). The month with the least rainy days is July (0 days). The graph below shows the rainfall patterns in the proposed project area. The area experiences semi-arid climatic conditions with an average rainfall of 316 mm per annum. Annual average potential evaporation rate far exceeds average annual rainfall and net water deficit conditions prevail. The driest months (with the least rainfall) are June, July and August with 0mm.

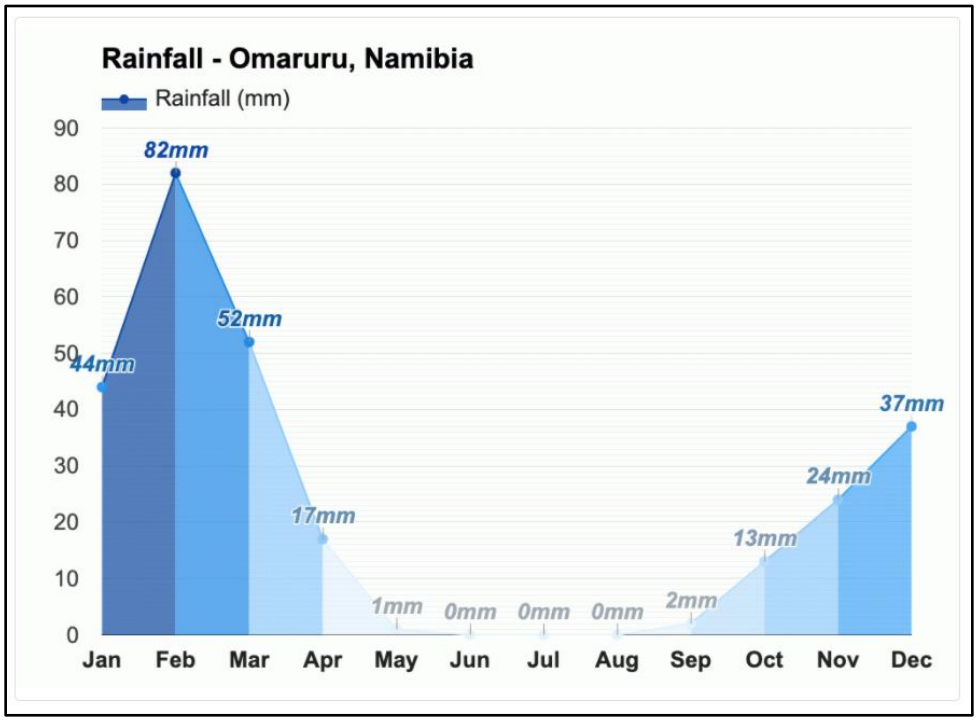

Fig. 8. Rainfall graph for Omaruru (weather-atlas, 2021).

4.1.5 Wind patterns

The predominant average hourly wind direction varies throughout the year in Omaruru district. The wind is most often from the east for 7 months, from late February to early October, with an average peak speed of 13 km/h in July. The wind is most often from the south for 5 months, from early October to late February, with a peak percentage of 10 km/h in December and January. The lowest average wind speed is in February when it averages 9km/h. The coastal winds are driven by the South Atlantic high pressure system, resulting in strong winds prevailing from the south to the south west.

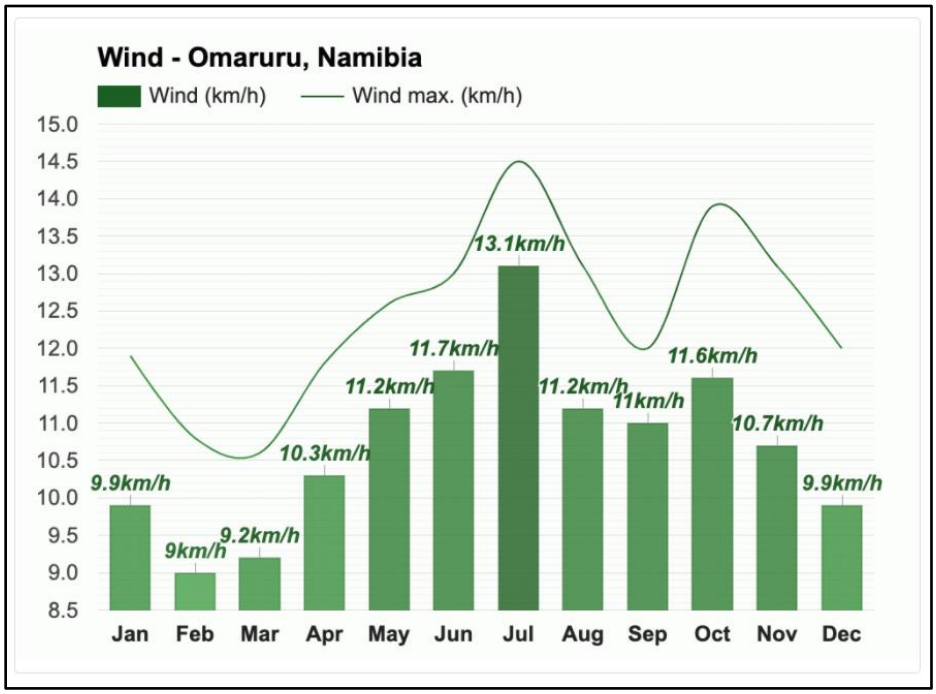

Fig. 9: Wind graph for Omaruru showing maximum and average wind (weather-atlas, 2021).

4.1.6 Humidity

The relative humidity during the least humid months of the year, i.e. August to October, is between 21 and 23 %. Relatively, high humidity is experienced during January to April, when it ranges between 42 and 51% with the most humid month being March with 51% humidity. Namibia has a low humidity in general, and the lack of moisture in the air has a major impact on its climate by reducing cloud cover and rain and increases the rate of evaporation.

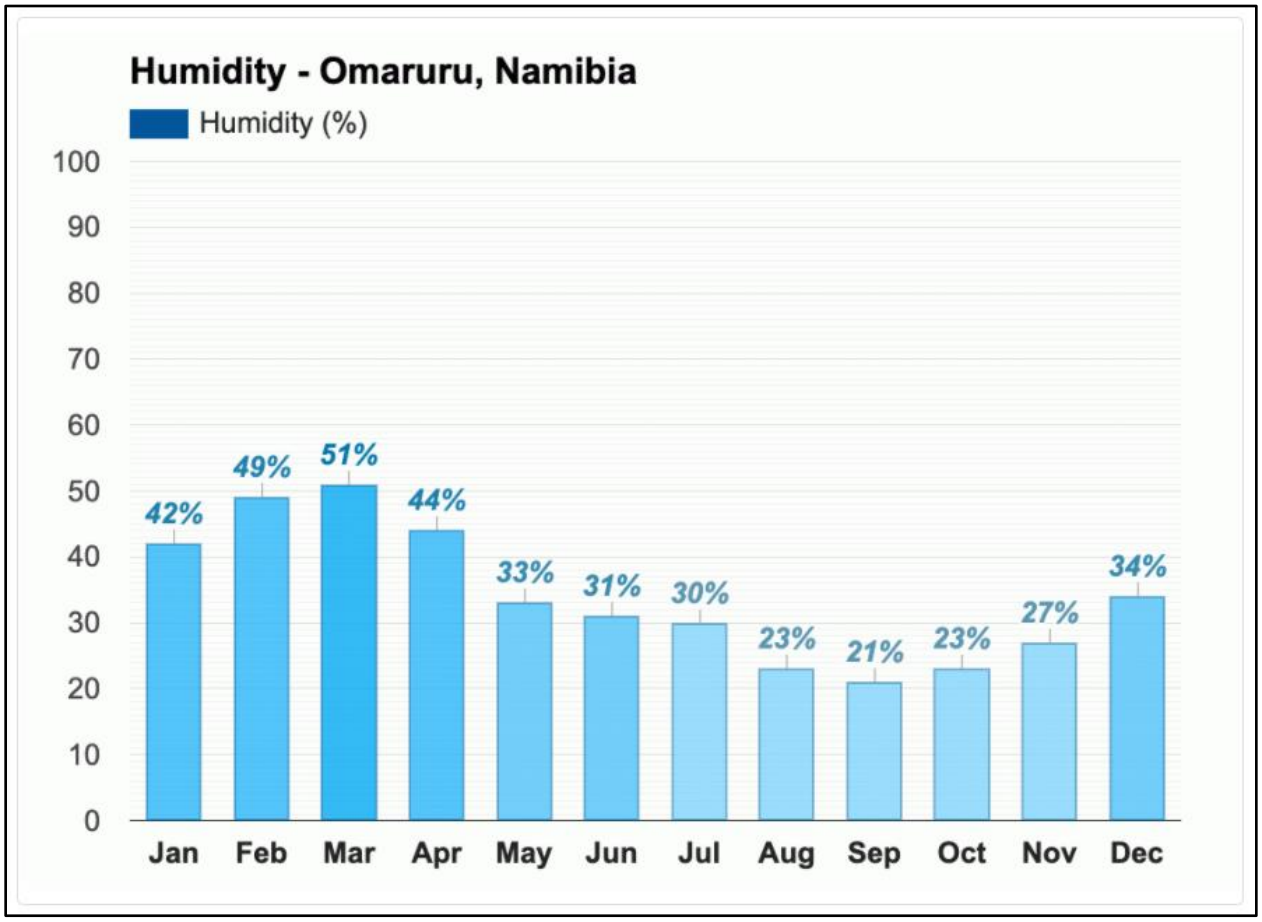

Fig. 10: Humidity graph for Omaruru showing average monthly humidity percentages (weather-atlas, 2021).

4.1.7 Air Quality

Data from accuweather.com shows that the air quality in the area is generally excellent with an air quality index of 16 AQI. The ground-level ozone (O_3) is about 16 µg/m³ which is excellent. The fine particle matter levels (PM 2.5) are about 6 µg/m³. The particle matter (PM_{10}) is about 4 µg/m³. The nitrogen dioxide (NO_2), carbon monoxide (CO), and Sulphur dioxide (SO_2) levels in the area are recorded to be 0 µg/m³. Probable sources of air pollution in the area are emissions and dust from vehicles travelling on gravel roads, dust generated by cattle grazing and wind erosion from the exposed areas.

4.2 Geological setting and mineralization

4.2.1 Regional geology

The project area is within the Damara belt which forms part of the Pan-African collisional belts in southern Africa representing the formation of the Gondwana supercontinent (Miller, 2008). The Damara Orogen is a Neoproterozoic orogen consisting of three arms, the NNW-trending coastal arm (the Kaoko Belt) extending into Angola, the NE-trending arm (the Damara Belt) which extends through central Namibia, across Botswana to the Zambezi belt (Miller, 2008), and the Gariep Belt to the south extending into north-western South Africa. The Kaoko, Damara and Gariep Belts evolved through phases of intracontinental rifting, spreading, subduction and continental collision lasting from approximately 800 or 900 Ma to ~460 Ma. In the Damara Belt, the Kalahari Craton was subducted beneath the Congo/Angola Craton and continental collision is dated at ~542 Ma (Miller, 2008).

The project area is in the NE-trending, Damara orogenic belt which has been divided into several different zones on the basis of stratigraphy, metamorphic grade, structure, geochronology, plutonic rocks and aeromagnetic expression (Miller, 1983, 1998). The zones are separated by tectonic lineaments and these are, from north to south: the Northern Platform (NP), Northern Margin Zone (NMZ), Northern Zone (NZ), Central Zone (CZ), Southern Zone (SZ), Southern Margin Zone (SMZ) and the Southern Foreland (Fig.18). The Central Zone is divided into northern (nCZ) and southern (sCZ) zones. The Okahandja Lineament zone (OLZ) is routinely regarded as part of the SZ (Miller, 2008). EPL 7228 is located in the nCZ, approximately 45 km WNW of the town of Omaruru (Fig. 11).

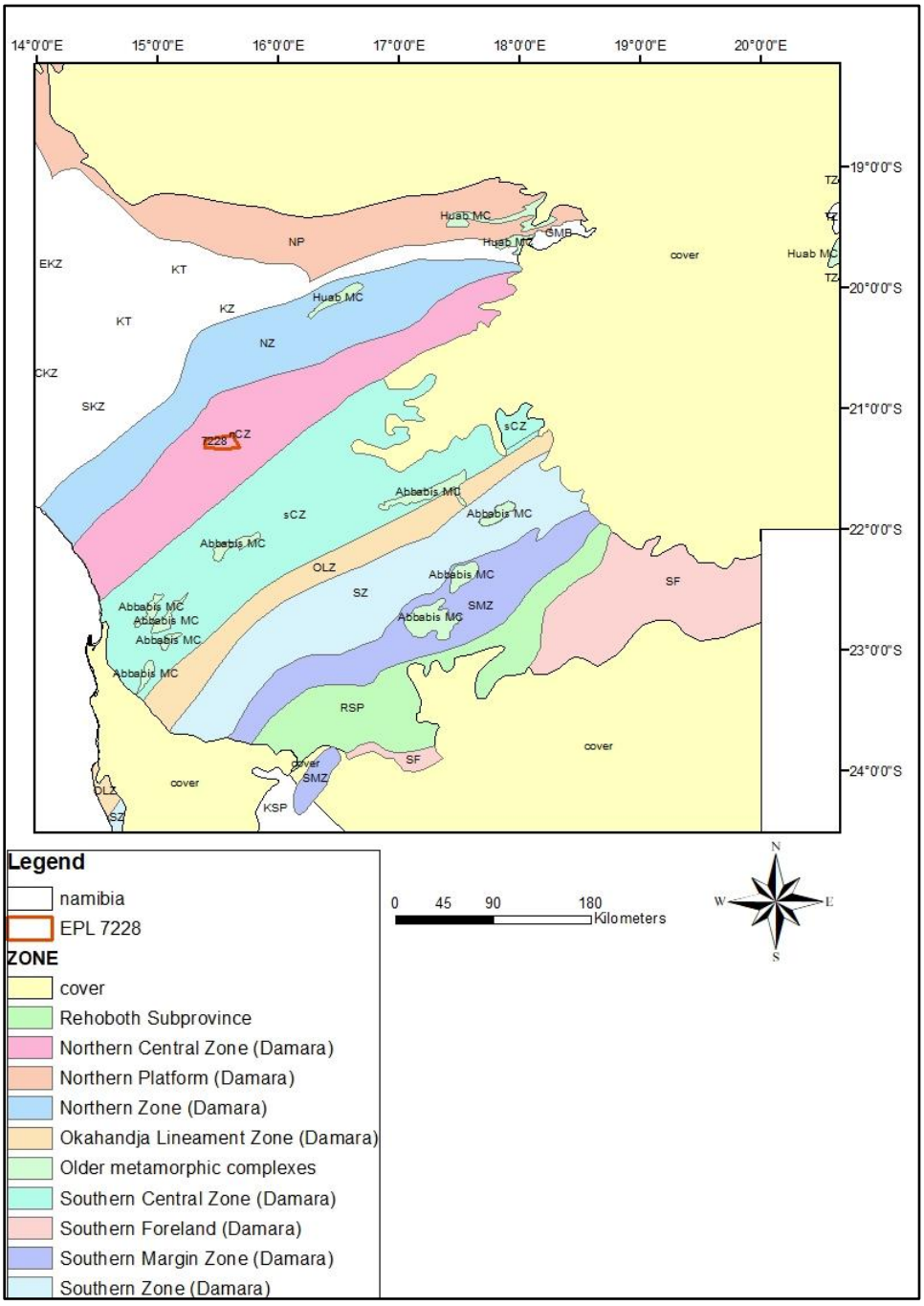

Fig. 11. Tectonic zones of the Damara orogenic belt. (Shape files are from the Geological Survey of Namibia). EPL 7228 is located in the northern central zone (nCZ) of the Damara belt.

The regional geology of the central zone of the Damara belt, where the prospect is located, is characterised by mainly mineral, schist and quartzite of the Swakop and Nosib groups of the Damara Supergroup. The central zone of the Damara Belt is a high-temperature, low-pressure zone with metamorphic grade increasing from middle amphibolite facies in its eastern parts to lower

granulite facies in its western parts (Miller, 2008). The northern (nCZ) and southern central (sCZ) zones are separated by the Omaruru lineament to the west and the Waterberg fault in the east. In terms of lithology, the central zone is characterized by mainly schist, mineral and quartzite of the Swakop and Nosib groups of the Damara sequence with numerous syn- to post-tectonic granitic plutons. The zone is also typified by major magnetic lineaments (Welwitschia and Erongo) and minor magnetic lineaments (Abbabis and Otjikoto). Peak regional metamorphism in the central zone (CZ) is syn-D_2 and occurred at ~520 Ma (Haack *et al.*, 1980; Miller, 1983). On the other hand Miller (2008) places the peak of post-tectonic M_2 regional metamorphism throughout the Damara belt at 535 Ma.

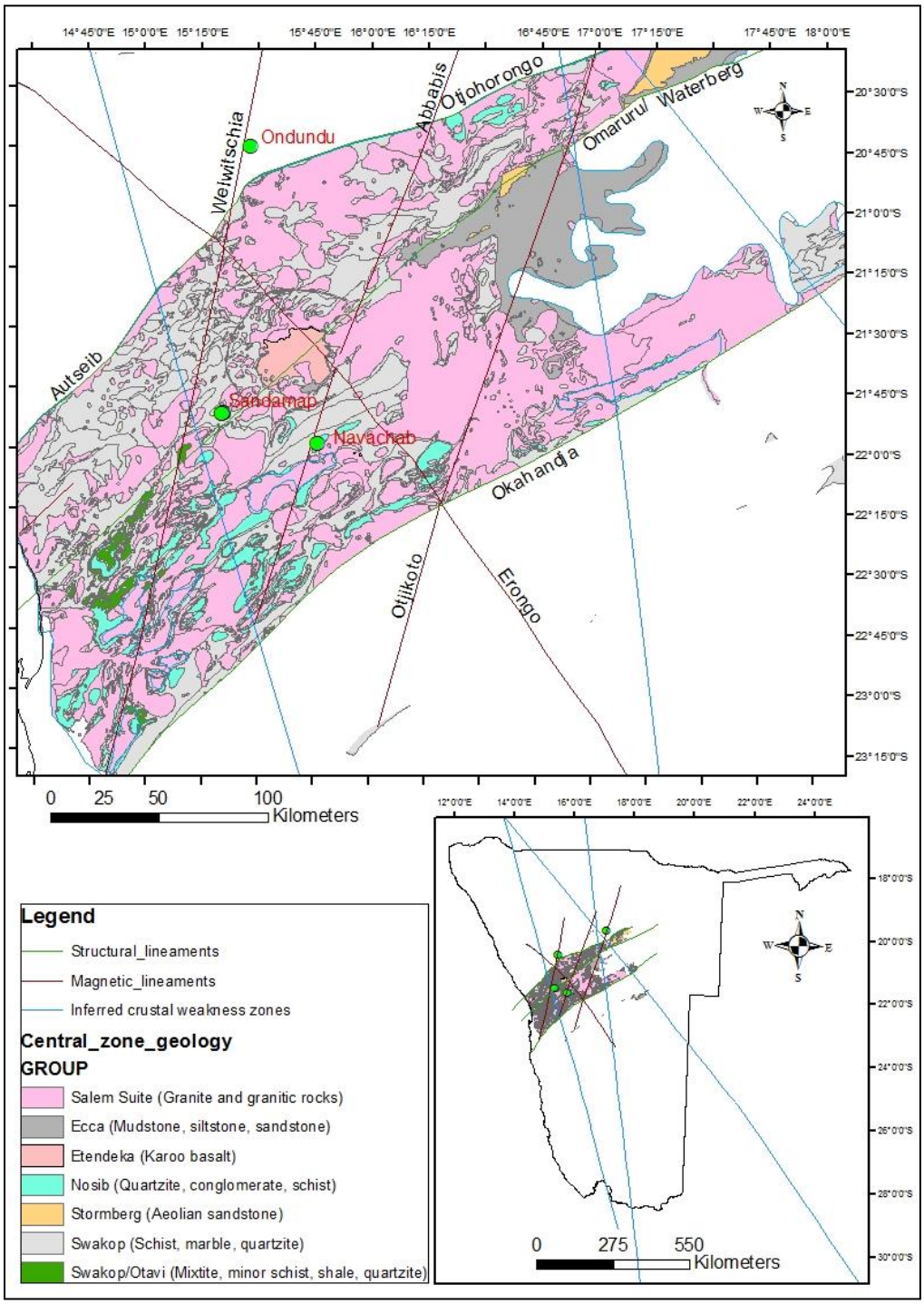

Fig.12. Geology and structural lineaments of the central zone of the Damara orogenic belt. EPL 7228 is located in the nCZ, approximately 45 km WNW of the town of Omaruru.

4.2.2 Stratigraphy

The EPL area falls within the Central Zone of the Damara Sequence (Fig. 18 & 20). The oldest rocks within the Central Zone are the pre-Damaran basement (Nosib Group) was deposited or laid down in marginal to intracontinental rifts, consists of gneiss, quartzite, arkose, conglomerate, phyllite, calc-silicate, subordinate, limestone and evaporitic rocks. The sequence was deposited during successive phases of rifting, spreading, subduction and continental collision (Miller, 2008). Much of the basal succession is Nosib Group, the Omaruru formation which hosts the targeted mineral overlies the Arandis Formation and underlies the Kuiseb Formation (Table 4). The partial stratigraphy of the Central zone as in Miller (2008) as given is given in Table 4

Table 4: Partial Litho stratigraphy of the Damara Sequence in Central Namibia (after Miller, 2008).

Group	Subgroup	Formation	Lithology
Swakop	Navachab	Kuiseb	Mica schist, mineral, quartzite, minor amphibolites schist, biotite schist
		Omaruru	Mineral, schist, calc-silicate, dolostone, limestone, quartzite
	Usakos	Arandis	Schist, calc-silicates
		Chuos	Diamictite, schist, minor quatzite
	Ugab	Rossing	Mineral, biotite schist, quartzite, gneis

Nosib		Khan	Gneiss, quartzite, conglomerate, schist, minor mineral, amphibole, calc-silicate
		Etusis	Quartzite, gneiss, biotite schist, conglomerate

4.2.3 Local Geology

The project area lies within the Damara belt which forms part of the Pan-African collisional belts in southern Africa. In the Damara Belt, the Kalahari Craton was subducted beneath the Congo/Angola Craton and continental collision is dated at ~542 Ma (Miller, 2008). The project area is in the NE-trending, Damara orogenic belt. Meta-sedimentary rocks within ML242 application area are mica schist and phyllites of the Kuiseb Formation and marbles of the Karibib Formation (Fig. 2). Extended portions of ML 242 application area are covered by Damara intrusives and these are the non-foliated leuco-granites of Ordovician age, foliated biotite granite of Ordovician age as well as dolerites of Cretaceous age (Fig. 2). Sand, gravel and calcrete of quaternary age extensively cover the extreme western portions of the EPL. Leuco-granites are associated with pegmatites that are known to host tin, lithium, niobium and REE in the area.

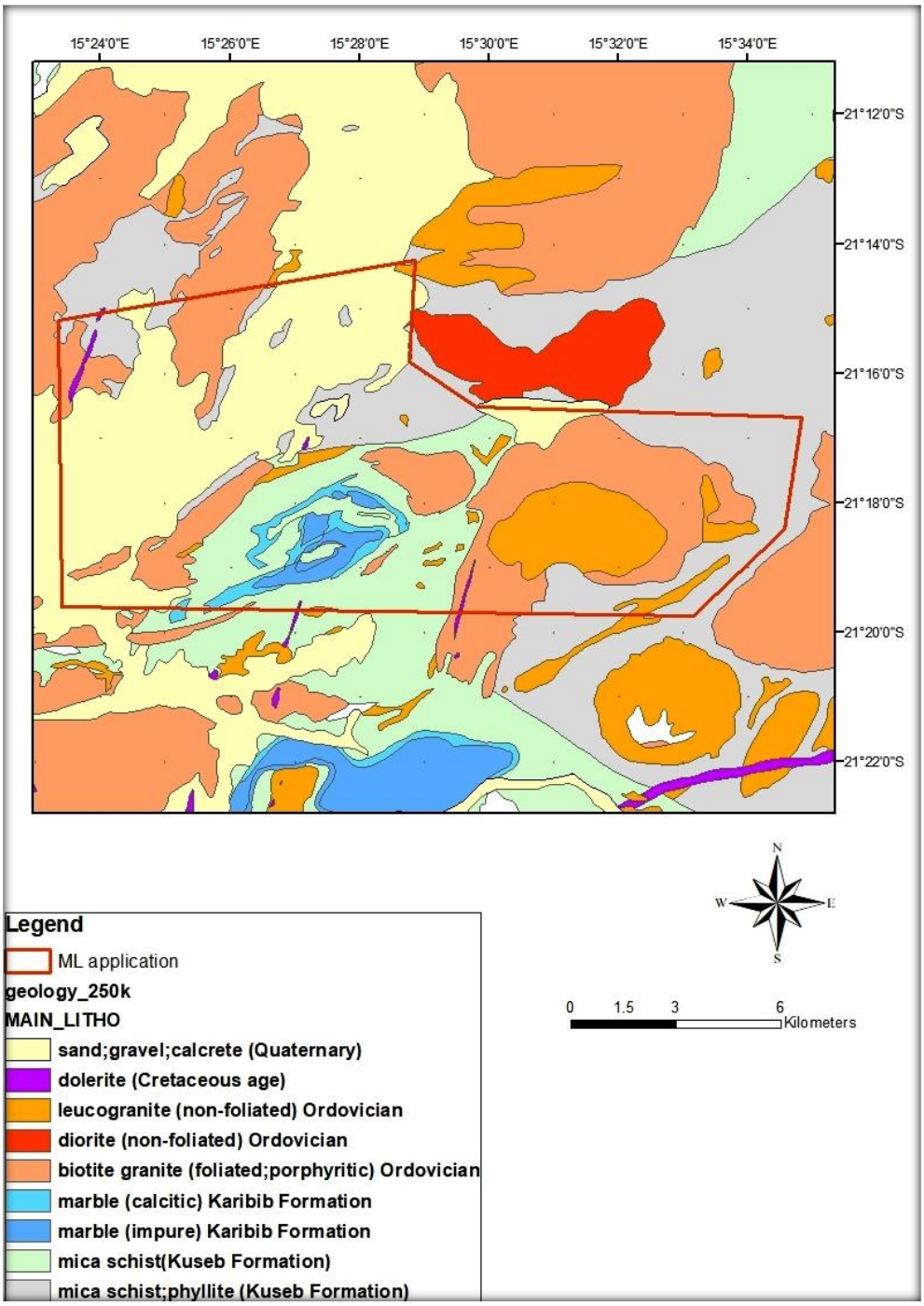

Fig. 13. Detailed local geology of the ML 242.

Table 5: Partial Litho stratigraphy of the Damara Sequence in Central Namibia (after Miller, 2008).

Group	Subgroup	Formation	Lithology
Swakop / Nosib	Navachab	Kuiseb	Mica schist, mineral, quartzite, minor amphibolites schist, biotite schist
		Omaruru	Mineral, schist, calc-silicate, dolostone, limestone, quartzite
	Usakos	Arandis	Schist, calc-silicates
	Ugab	Chuos	Diamictite, schist, minor quatzite
		Rossing	Mineral, biotite schist, quartzite, gneis
		Khan	Gneiss, quartzite, conglomerate, schist, minor mineral, amphibole, calc-silicate
		Etusis	Quartzite, gneiss, biotite schist, conglomerate

4.2.4 Lithium-cesium-tantalum (LCT) pegmatites general description

Lithium-cesium-tantalum pegmatites are extremely coarse-grained granitic rocks that form small but mineralogically spectacular igneous bodies. These rocks account for about one-fourth of the world's lithium production (Naumov and Naumova, 2010), one-tenth of the beryllium, most of the tantalum, and all of the cesium (U.S. Geological Survey, 2011). In addition, LCT pegmatites are mined for tin, high purity quartz, potassium feldspar, albite, kaolinite, white mica, gem beryl, gem tourmaline, and museum-quality specimens of many rare minerals (Glover and others, 2012; Simmons and others, 2012). The main minerals are silicates. Most LCT pegmatites are the differentiated end members of peraluminous, S-type granitic melts. Some are related to metaluminous granites and some to I-type granites (Martin and De Vito, 2005). They are highly enriched in the incompatible elements Li, Cs, and Ta, and are distinguished from other rare-element pegmatites by this diagnostic suite of elements. The melts from which LCT pegmatites crystallize are enriched in fluxing components, including H_2O, F, P, and B, which depress the solidus temperature, lower the density, and increase rates of ionic diffusion (London, 2008). Pegmatites can thus form thin dikes and massive crystals despite their felsic composition and significant sub-liquiduos undercooling.

Lithium-cesium-tantalum pegmatite bodies have various forms including tabular dikes, tabular sills, lenticular bodies, and irregular masses. In some cases, an LCT pegmatites can be spatially and genetically linked to an exposed parental granite; in other cases, no such parent can be observed at present levels of exposure. Most LCT pegmatites are hosted in metasedimentary or metavolcanic (supracrustal) country rocks, which are typically metamorphosed to low-pressure upper greenschist to amphibolite facies (Černý, 1992). Less commonly, LCT bodies intrude granites or gabbros. In some districts, pegmatites show a regional mineralogical and geochemical zoning pattern surrounding an exposed or inferred granitic pluton, with the greatest enrichment in incompatible elements in the more distal pegmatites (Trueman and Černý, 1982).

On the scale of a single pegmatite body, three types of mineralogical and textural zonation are recognized. First, most LCT pegmatites have a distinctive, concentric zonation featuring four zones: border, wall, one or more intermediate zones (where Li, Cs, and Ta are generally concentrated), and core. Second, another textural pattern, which is seen in narrow LCT pegmatite dikes, is layering, with layering more common in the footwall of the pegmatite. Third, a few LCT pegmatites are unzoned.

Pegmatites are mined using a variety of techniques. These include artisanal surface mining (Kibaran Belt, Burundi: Romer and Lehmann, 1995; Brinkmann and others, 2001;Mutima and Li, 2010), open-pit surface mining (Greenbushes, Western Australia: Fetherston, 2004), small underground workings (San Diego County, California, United States: Symons and others, 2009), and large underground operations using room-and-pillar design (Tanco, Manitoba, Canada: Burt and others, 1982).

4.2.5 Pegmatite Swarms of ML 242

The pegmatites on EPL 7228 forms part of the Nainais-Kohero pegmatite belt which contains both zoned and unzoned cassiterite-bearing pegmatites, locally containing accessory columbite-tantalite mineralisation, occur in a narrow, northeast-trending belt, up to 8 km wide and some 45 km long, parallel to the Omaruru River. On the farm Kohero 113, just 5 Km north of the Uis-Omaruru road over 250 t of cassiterite concentrate averaging 68% tin were produced by the Kohero Tin Mine before and shortly after the First World War (Haughton et al., (1939).

The Kohero pegmatite swarm consists of numerous large pegmatites which are closely parallel and cut across the strike of the schist at an angle of 45^{o}. They are sparsely mineralised, and only layered or banded portions of the individual dykes proofed to contain appreciable amounts of cassiterite. Mineralised, banded units of “layered aplite” consist of schlieren-like dark bands of micaceous material separated by lighter coloured areas of albitised feldspars. Other concentrations of cassiterite have also been found along muscovite-rich margins often together with coloured tourmaline.

Thelma pegmatite swarm consists of a set of parallel dykes striking northeast and dipping southeast. One the farm Okombahe 112, just south of the Uis-Omaruru road, a pegmatite, 1 km long and 1.5 m wide, has been explored for cassiterite by means of several shafts. From one of these, a 100 m drive at a depth of 25 m revealed cassiterite mainly in layered replacement units of muscovite greisen and saccharoidal albite masses on both sides of the quartz core. Further eastwards, cassiterite occurs only in greisenised portions on the hanging wall side. A partly albitised and sericitised pegmatite carries fine disseminated columbite-tantalite crystals. Two pegmatites have been mined for cassiterite and columbite-tantalite and produced concentrates grading 31% Ta2O5

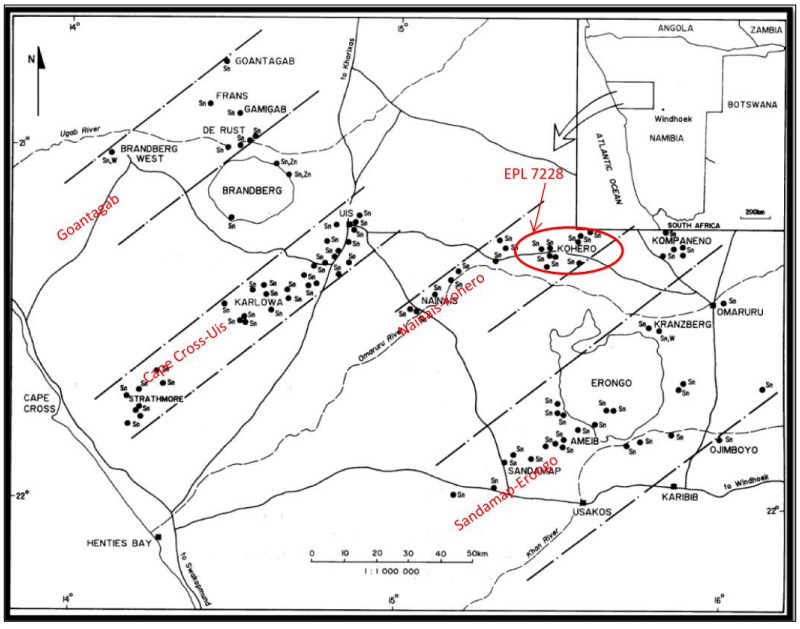

Fig. 22. Pegmatite belts of the Central Damara Orogen showing tin mineralisation.

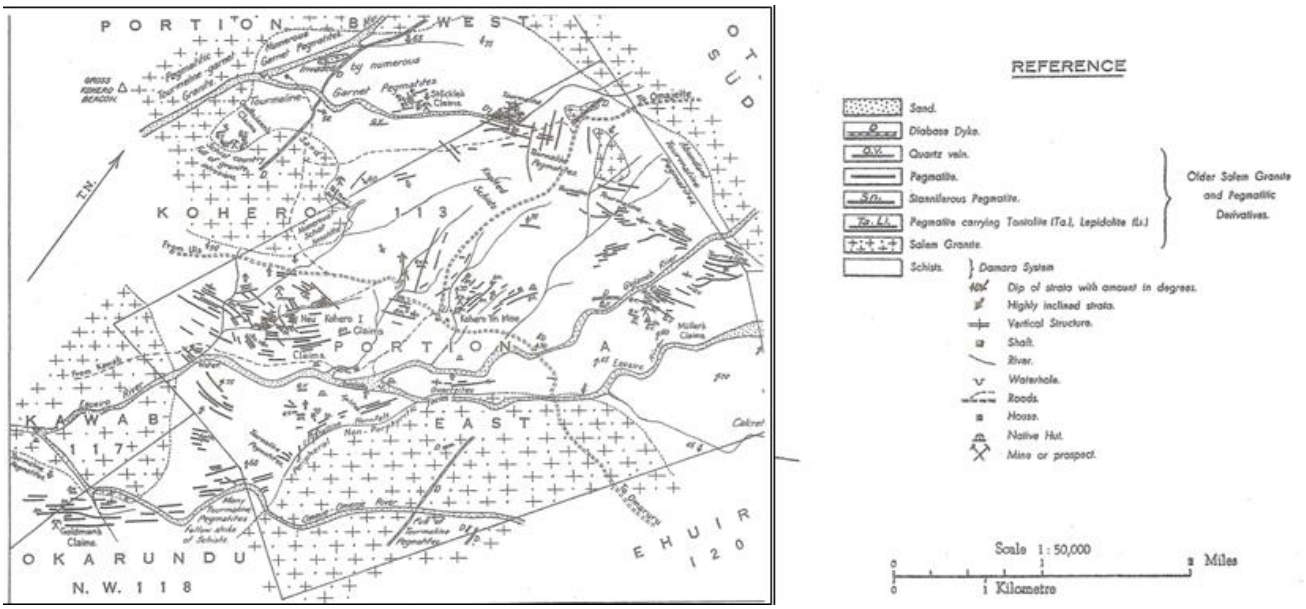

Fig. 14. Tin and lithium pegmatites on farms Kohero 113, Kawab 117 and Okarundu NW 118 (EPL 7228) (after Haughton et al., 1939).

5. Description of the Proposed Project

The project requires the formation and operation of an open pit mine comprised of a processing plant, employing conventional crushing, grinding and concentration with an expected ore treatment rate of about 300 000 tons per year. Below is a list of activities which have been assumed to be needed for the full development of the project. The full mining plan is still under development. Risks associated with these activities related to the specific environmental receptors found for the area will be assessed in the Assessment Phase of the EIA.

Primary facilities will probably include the following:

- ✓ Mining: Open pit(s)
  - Waste rock dump(s) (WRD)
  - Stockpile storage facility
  - Haul roads and mine access roads

- ✓ Processing plant with :
    - Crushing and milling circuits
    - Magnetic separator and gravity concentrator
    - Spodumene concentration storage
    - Spodumene flotation circuit
    - Calcination rotary furnace
    - Tailings thickening and associated pipelines to the TSF
- ✓ Tailings storage facility (TSF) and waste management facility
- ✓ Return water dam and pipelines
- ✓ Water storage facilities
- ✓ Bulk fuel storage
- ✓ Internal power generation(Diesel / HFO / Solar)
- ✓ External power supply (sub stations, external and internal site powerlines)
- ✓ Administration, laboratory, stores and other buildings
- ✓ Magazine and explosives depot

5.2 Targeted ore reserves

The Project is located in an area of known Nainais - Kohero pegmatite belt which contains both zoned and unzoned cassiterite-bearing rare metal pegmatites. These pegmatites occur in a narrow, northeast-trending belt, up to 8 km wide and some 45 km long, which runs parallel to the Omaruru River. The project area has been found to host minerals of economic value such as lithium, tin, tantalum, tungsten and REE. The mineralization in the area is known to be associated with late to post tectonic pegmatites of Ordovician age. Deposit types include late- to post-tectonic (~523 – 506 Ma) LCT (Li-Be, Sn-, and miarolitic gem-tourmaline bearing) pegmatites, and uraniferous pegmatitic sheeted leucogranites (SLGs.

5.3 Mining process and methodology

The mining method to be implemented for this project is conventional open pit miningmethod. Open pit mining is defined as the method of extracting near surface ore deposit using one or more horizontal benches to extract the ore while dumping ore and tailings at a specific disposal site outside the final pit boundary. Open pit mining method is the preferred method for this project due to the shallow location of the ore (0-100 m). Mining will be executed by drilling, blasting and excavation of the pegmatites then transportation of ore and waste rocks by a fleet of mobile equipments. The assessment of the proposed open pit mining activities and supporting infrastructures are described in Chapter 7. Mining methods for LCT pegmatites depend on the structure and vertical extent of the pegmatite Modern, industrial-scale mines of large LCT pegmatites include both open-pit and underground operations, depending on the size and attitude of the intrusive body or bodies.

The proposed open pit mine will be constructed of series of benches that are bisected by mine access and haulage roads angling down from the rim of the pit to the bottom. Planned bench height vary between 10 to 15 metres, optimum bench height design is critical for safety reasons. The mine unit operation consist of ripping, dozing , drilling , blasting and hauling as discussed below. The planned set-up of the mine has a production target of 300 000 tonnes per year

5.3.1 Ripping and dozing

During the construction phase, earth moving equipment arrives on site to clear ground for the various infrastructure required for the mine. Early mining will include the removal of overburden to expose the ore beneath the cover. Bulldozers, wheel dozers and motor graders are the most common equipments used where common equipments used in which material transport distance is short and can be pushed by a blade. The dozer has a large blade capacity and it is designed specifically for bulk material excavation, whereas the grader is used to create flat surface during the grading process.

5.3.2 Drilling and blasting

This process starts with digging blast holes with drill machine followed by blasting with explosives. Drilling and blasting is carried in order to fracture the rock into loadable size. Staggered blast holes is the most preferred pattern as it gives the optimum distribution of explosive energy in the rock.

5.3.3 Loading, hauling and crushing

Rubber tired loaders will be used as it has lower capital cost and are better for loading materials that are low in volume and easy to dig. Loaders are used to load, haul and dump material into crushers from blending stock piles placed near crushers by haul trucks. Transportation of waste rocks to the, and ore to the crushers is also carried out by these mobile equipments.

5.4 Physical concentration (Mineral Processing)

Lithium-cesium-tantalum pegmatite ore-processing methods depend on the minerals being processed and the desired end product grade. Large-scale mining operations employ crushing, grinding, and gravity separation techniques to refine the ore and prepare it for further processing. The first step of treatment is the physical processing, where the lithium minerals are separated from the gangue minerals using crushing and grinding for mineral liberation and gravity and froth flotation processes for mineral separation. Since specific gravity of Lithium minerals is somewhat higher than the bulk of the associated pegmatite minerals (e.g. quartz and feldspar), gravity concentration methods area used. Under optimized conditions spodumene concentration can produce a concentrate with more than 6% of Li_2O from a run of mine ore with1-1.5% of Li_2O. On the other hand, a simple screening operation of the crushed ore allows a preliminary improvement

of the Li grade of lepidolite and froth flotation can be subsequently applied to produce a final enriched concentrate.

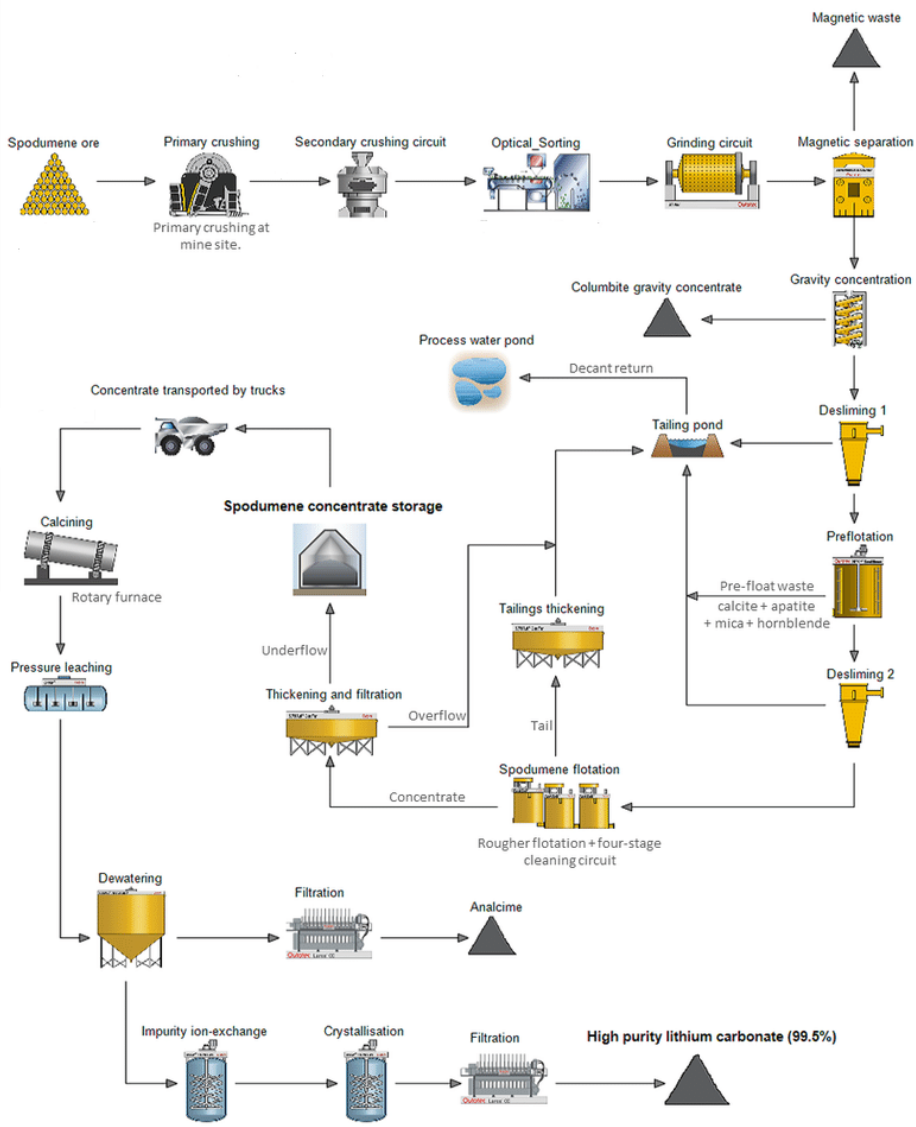

Fig. 15. Simplified flowsheet for spodumene beneficiation and lithium carbonate production (modified from Keliber 2018).

5.5 Thermal treatment by calcination or roasting

Spodumene, which is highly insoluble in its α form (LiAlSi O), must be heated above 1,100 ºC to change intoβ-spodumene ($LiAlSiO_4$).The Li-rich fraction produced in the concentrator is sent toa metallurgical plant for further processing. The furnace thermal treatment of pegmatites is an initial

mandatory step to allow the silicate structure to transform into a more reactive form. Without this step, any subsequent chemical treatment would not be applicable. The calcination can be simply a decomposition (loss of volatile components) and a structural change, but can be also performed in the presence of additives (reagents like limestone, lime or a sulfate donor) being then described as a roasting operation.

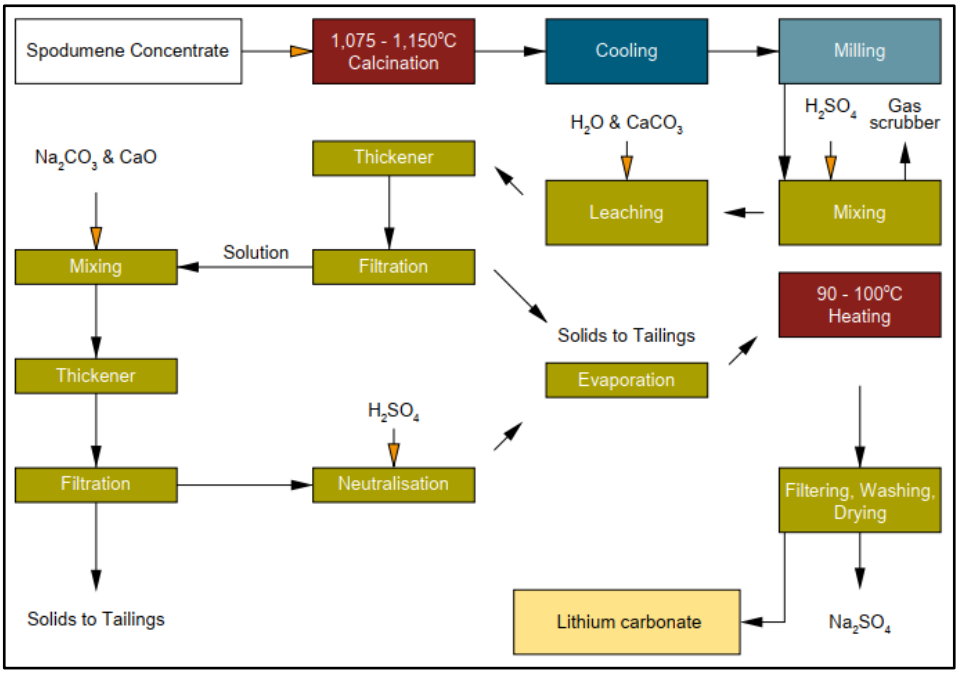

Fig. 16. Simplified production scheme of lithium carbonate derived from spodumene-concentrates via acid-roast-process (modified after Garret 2004).

The conversion from spodumene concentrates into lithium carbonate and/or lithium hydroxide will takes place in China. The most widely used process in the industry is the acid-roast process (Fig. 21). In this process, spodumene-concentrate is ground and heated to 1,075 – 1,150°C in a rotary kiln (Fig. 21). This converts α-spodumene into β-spodumene, which is soluble in hot acids. After mixing with hot sulfuric acid, lithium sulfate solution is mixed with water. The solution is mixed with **calcium carbonate** to remove impurities such as iron, manganese and aluminum. In addition, the pH is raised. After a first filtering process, Na_2CO_3 and CaO are added to obtain an alkaline solution. Impurities such as calcium and manganese are removed. The solution is then neutralized with **sulfuric acid** and heated to increase the concentration of Li_2SO_4 to about 200 – 250 g/l. The addition of Na_2CO_3 and heating the solution to about 100°C triggers the precipitation of lithium

carbonate. The carbonate produced in this way has purities of up to 99.3 %. The battery industry, however, requires purities of min. 99.5 %, obtained through ion exchange and extraction of impurities.

Table 6: Listed activities potentially set-off by the development of a mining operation

Listed activities	Description	Relevance to the Project
Energy Generation, Transmission and Storage activities	• The generation of electricity • the transmission and supply of electricity.	The proposed project will need to generate and/or transmit electricity for its operations.
Waste Management, Treatment, Handling and Disposal Activities	• The construction of facilities for waste sites, treatment and disposal of waste. • Any activity entailing a scheduled process referred to in the Atmospheric Pollution Prevention Ordinance, 1976.	The proposed project will require waste sites for the disposal of mineralized and non- mineralized waste. Hazardous waste may also be disposed of on site in a specifically designed facility. Induction furnace (generally covered under the mine accessory works permit).
Mining and Quarrying Activities	• The construction of facilities for any process or activity which requires a licence, right or other form of authorization, and the renewal of a licence, right or other form of authorization, in terms of the Minerals (Prospecting and Mining Act), 1992.	The potential lithium mine and supporting infrastructures.
Forestry Activities	• The clearance of forest areas, deforestation, afforestation, timber harvesting, or any other related activity that requires authorization in term of the Forest Act, 2001 (Act No. 12 of 2001) or any other law.	Large areas of vegetation will need to be removed prior to earthworks and construction and mining.
Land Use and Development Activities	The rezoning of land from: • Agricultural use to industrial use.	Current land use is predominately agricultural.
Forestry Activities	• The clearance of forest areas, deforestation, afforestation, timber harvesting, or any other related activity that requires authorization in	Land clearing will be necessary for the project infrastructure and mining landforms.

	terms of the Forest Act, 2001 (Act No. 12 of 2001) or any other law.	Protected species that are to be removed will require a permit.
Water Resource Developments	• The abstraction of ground or surface water for industrial or commercial purposes. • The abstraction of groundwater at a volume exceeding the threshold authorized in terms of the law relating to water resources. • Construction of canals and channels including the diversion of the normal flow of water in a riverbed and water transfer schemes between water catchments and impoundments. • Construction of dams, reservoirs, levees, and weirs. • Construction of industrial and domestic wastewater treatment plants and related pipeline systems. • Construction and other activities in watercourses within flood lines. • Construction and other activities within a catchment area.	The proposed project requires water for mining and processing; if either surface or groundwater is to be used, abstraction permits must be obtained. Discharge permits are required for industrial effluent and wastewater discharge. The diversion of the Omaruru River and any other significant streams affected on site needs approval. Dams may be required as part of the water supply and the proposed river diversion. The sewage treatment plant, pollution control dams, processing ponds, etc. require approvals.
Hazardous Substance Treatment, Handling and Storage	• The manufacturing, storage, handling, or processing of hazardous substances defined in the Hazardous Substances Ordinance, 1974. • The storage and handling of dangerous goods, including petrol, diesel, liquid petroleum gas, or paraffin, in containers with the combined capacity of more than 30 cubic metres at one location. • Construction of filling stations or any other facility for the underground and aboveground storage of dangerous goods, including petrol,	The mining operations and proposed process plant trigger this activity as both fuel and hazardous substances are required for mining and processing. Bulk fuel storage facilities will be required for the onsite generation of electricity, and for fuelling the mining fleet. Consumer installation certificates are required for bulk fuel storage and dispensing.

	diesel, liquid, petroleum, gas, or paraffin.	
Infrastructure	The construction of: • Public roads. • Cableways including towers, telecommunication, and marine telecommunication lines and cables. • masts of any material or type and of any height, including those used for telecommunication broadcasting and radio transmission. • The route determination of roads and design of associated physical infrastructure where it is a public road; (b) the road reserve is wider than 30 m; or (c) the road caters for more than one lane of traffic in both directions.	Powerlines and telemetry for water and tailings pumping arrangements will likely be constructed as part of the Project. Cell phone and radio communications towers. Road diversion

6. Identification of environmental aspects

The proposed activities listed above have potential impact on the environment. Environmental aspects and potential impacts were identified during the screening and assessment phases of the EIA, in consultation with authorities, Interested and Affected Parties and the environmental team. As requested from the Ministry of Environment, Forestry and Tourism, an assessment Report with assessment and Environmental Management Plan have been prepared for the proposed activities. The following issues were assessed in this process and the findings are presented in this Assessment Report:

- Air quality (dust and fumes)
- Biodiversity (fauna and flora)
- Socio-economic
- Land-use
- Noise
- Surface water
- Groundwater
- Waste management

6.1 Flora biodiversity

The study area is a home to most endemic species found in Namibia. Based on the literature review, all the vegetation that are found within the vicinity of the area are of “medium” to “high” sensitivity against external conditions Every effort will be made to protect the existing trees and shrubs, as these are very important to the ambience and visual appeal of the exploration site. A vegetation expert will be consulted throughout the lifecycle of the exploration program. The protected plant species in the project area are shown in the table below.

Table 6: lists the different plant species which are most likely to occur within the project area. Plant species highlighted in orange are protected under the Forestry Act.

Scientific name	Local name	Status in Namibia
Acacia erioloba	Camel thorn	Protected
Acacia mellifera	Black thorn	Secure
Acacia reficiens	False umbrella thorn	Secure
Acacia haematoxylon Grey	Grey camel thorn	Protected
Acacia erubescens	Blue thorn	Secure
Acacia karroo	Sweet thorn	Secure
Acacia tortolis	Umbrella thorn	Secure
Acacia hereroensis	False hook-thorn	Secure
Commiphora tenuipetiolata	White-stem corkwood	Secure
Aloe littoralis		Protected
Ozoroacrassinervia	Namibian resin tree Near	endemic, protected
Boscia albitrunca	Shepherd's tree	Protected
Albizia anthelmintica	Worm-bark false-thorn	Protected
Ziziphus mucronata	Buffalo-thorn	Protected
Catophractesalexandri	Trumpet thorn	Secure
Combretum apiculatum	Red bush willow	Secure
Commiphora dinteri		Endemic
Commiphora glandulosa	Tall common corkwood	Secure
Commiphora glaucescens	Blue-leaved corkwood	Nearendemic
Croton gratissimus	Lavender fever-berry	Secure
Cyphostemma bainesii		Endemic, protected
Dichrostachys cinerea	Sickle bush	Secure
Diospyros lycioides	Blue bush	Secure
Dombeya rotundifolia	Common wild pear	Endemic
Ehretia alba		Secure

Elephantorrhiza suffruticosa		Secure
Eucleab pseudebenus	Ebony tree	Protected
Euclea undulata	Common guarri	Secure
Euphorbia guerichiana	Western woody milk bush	Secure
Euphorbia virosa		Secure
Ficus cordata	Namaqua fig	Protected
Ficus ilicina	Laurel fig	Secure
Ficus scomorus	Common cluster fig	Protected
Grewia bicolor	White raisin	Secure
Grewia flava	Velvet raisin	Secure
Grewia flavescens	Sand paper raisin	Secure
Gymnosporiasenegalensis	Red spike-thorn	Secure
Ipomoea adenioides		Secure
Lycium bosciifolium		Secure
Lycium cinereum		Secure
Lycium eenii		Secure
Lycium hirsutum		Secure
Lycium villosum		Secure
Maerua juncea		Secure
Maerua schinzii	Ringwood tree	Protected
Manuleopsis dinteri		Endemic
Melianthus comosus		Secure
Obetia carruthersiana		Near endemic
Pechuel-Loeschealeubnitziae		Secure
Ozoroa crassinervia	Namibian resin tree	Protected
Sterculia africana	African star-chestnut	Protected
Tarchonanthus camiphoratus		Secure

Tetragonia schenckii		Secure
Vernonia cinerascens		Secure
Searsia (Rhus) ciliata		Secure
Searsia (Rhus) lancea	Karree	Protected
Searsia (Rhus) marlothii		Secure

6.1.1 Alien Plants

The alien plants were taken into consideration during the botanical assessment. It was found that there are no alien plants in the proposed area and its immediate surrounding area.

6.2 Fauna

6.2.1 Mammals

Based on the literature review, there are generally about 68 species of mammals expected to occur within the immediate area. There are generally 25 species which rarely occur, 2 species that occur seasonally, 4 that occur occasionally, and 33 that occur abundantly within the project area. Considering the relative size of the exploration area, the mammal fauna will not be affected by the exploration activities of the proponent. Namibia is seemingly well endowed with mammal diversity with around 250 species known to be present within the country (Griffin, 1998). There are currently 14 mammal species which are considered to be endemic to Namibia, including 11 species of rodents and small carnivores which are not well known. Griffin (1998), points out that most of these endemic mammals are associated with the Namib and Escarpment with 60% of these appearing to be rock-dwelling species. The author, Griffin (1998) further highlights that the endemic mammal fauna is best characterized by the endemic rodent family *Petromuridae* (Dassie rat) and the rodent genera *Gerbillurus*and *Petromyscus*.

The table below shows the mammal species which are likely to occur within the study area.
A full list, of mammal species that are likely to occur within the area, is in the appendix section at the end.

Table 7: Mammal species which are likely to occur within the project area.

Scientific name	Common name
Acinonyx jubatus	Cheetah
Antidorcas marsupialis	Springbok
Atelerix frontalis angolae	Southern African Hedgehog
Canis mesomelas	Black-backed Jackal
Caracal caracal	Caracal
Crocuta crocuta	Spotted Hyena
Cynictis penicillata	Yellow Mongoose
Equus zebra hartmannae	Hartmann's Mountain Zebra
Felis nigripes	Black-footed Cat
Felis silvestris/lybica	African Wild Cat
Galerella sanguinea	Slender Mongoose
Genetta genetta	Small Spotted Genet
Ictonyx striatus	Striped Polecat
Lepus capensis	Cape Hare Secure
Lepus saxatilis	Scrub Hare
Manis temminckii	Ground Pangolin
Mellivora capensis	Honey Badger
Oreotragus oreotragus	Klipspringer
Oryx gazella	Gemsbok
Otocyon megalotis	Bat-eared Fox
Panthera pardus	Leopard
Parahyaena (Hyaena) brunnea	Brown Hyena
Phacochoerus africanus	Common Warthog
Proteles cristatus	Aardwolf
Raphiceruscampestris	Steenbok

Suricata suricatta marjoriae	Suricate
Sylvicapra grimmia	Common Duiker
Tragelaphus strepsiceros	Greater Kudu
Vulpes chama	Cape Fox

6.2.2 Reptiles

The literature review showed that there are approximately 60 reptile species that are expected to occur in the site area. According to the Namibia Conservation Ordinance of 1975, there are four reptile species protected, namely:

Table 8: Protected reptile species in the project area

Scientific name	Common name	Status
Psammobates Oculiferus	Kalahari Tent Tortoise	Protected
Geochelone Pardalis	Leopard Tortoise	Protected
Python Natalis	Southern African Python	Protected
Varanus Albigularis	Veld Leguaan	Protected

Griffin (1998) highlighted the presence of 261 species of reptiles which are present in Namibia. These reptiles make up 30% of the reptile species found on the continent. 55 species of Namibian Lizards are classified as endemic (Griffin, 1998). The author, Griffin (1998), describes that more than 60% of the reptiles found in Namibia are protected by the conservation Ordinance. Although exploration activities do affect reptile habitat, the project will not have any significant impact on the reptile species within the proposed exploration area. Namibia, with 129 species of lizards, has one of the continent's richest lizard Fauna. The table in the appendix shows the reptile species which are likely to occur within the vicinity of the exploration area.

6.2.3 Avifauna (Birds)

Simmons et al (2003) points that although Namibia's Avifauna is comparatively sparse compared to the high rainfall equatorial areas elsewhere in Africa, approximately 658species have already been recorded with a diverse unique group of arid endemics. There are approximately 650 species of birds that have been recorded in Namibia, although the country's avifauna is comparatively

sparse compared to the high rainfall equatorial areas in Africa (Brown & Lawson, 1989). Brown et al (1989) mentions that14 species of birds are endemic or near endemic to Namibia with the majority of Namibian endemics occurring in the Savannah of which ten species occur in a north-south belt of dry Savannah in Central Namibia. Simmons (2003) recorded 63 species of birds within the vicinity of the project area. 650 bird species are recorded in Namibia, of which 160 species are present in area, especially after good rains fall (Christian,2005). These birds consist of raptors, chats, larks and karoid species. Christian (2005) recorded the presence of the following bird species in the vicinity of the area, which includes:

Table 9: Bird species which are likely to occur within the site area.

Scientific name	**Common name**
Tockus monteiri	Monteiro's Hornbill
Agapornis roseicollis	Rosy-faced Lovebird
Eupodotis rueppellii	Rüppell's Korhaan
Lanioturdus torquatus	White-tailed Shrike
Parus carpi	Carp's Tit
Phoeniculus damarensis	Violet Wood-Hoopoe
Poicephalus rueppellii	Rüppell's Parrot
Pternistis hartlaubi	Hartlaub's Spurfowl
Tockus damarensis	Damara Hornbill

6.2.4 Amphibians

Based on the literature review, there are generally 14 types of amphibian species that occur in project area. Nine of these amphibian species occur abundantly, two occur rarely and six of them occur uncommonly. Griffin (1998) highlighted that amphibian species are declining throughout

the world due to various factors such as climate change and habitat destruction. There are approximately 4000 species of amphibians worldwide of which over 200 species are present in Southern Africa and 57 in Namibia (Griffin, 1998). However, this low figure may be due to the lack of detailed studies carried out on amphibians. The table below shows the different amphibian species that are likely to occur within the study area.

Table 10: A list of amphibian species which may occur in the project area.

Scientific name	**Common name**	**Status**	**Occurrence**
Sand frogs, Bull frogs, Ridged frogs, Cacos, Puddle frogs			
Cacosternum boettgeri	Common caco	Secure	Abundant
Hildebrandtia ornata	Ornate frog	Secure	Uncommon
Phrynobatrachus mababiensis	Mababe puddle frog	Secure	Uncommon
Phrynobatrachus natalensis	Snoring puddle frog	Secure	Uncommon
Pyxicephalus adspersus	Giant bullfrog	Secure	Abundant
Tomopterna krugerensis	Knocking sand frog	Secure	Rare
Tomopterna tandyi	Tandy's sand frog	Secure	Abundant
Fossorial Frogs			
Phrynomantis affinis	Spotted rubber frog	Ambiguous	Rare
Phrynomantis bifasciatus	Banded rubber frog	Secure	Abundant
Toads			
Brevicepsadspersus	Bushveld rain frog	Secure	Abundant
Bufo dombensis	Dombe dwarf toad	Endemic	Abundant
Bufo poweri	Mottled toad	Secure	Abundant
Platannas			
Xenopus laevis	Common Platanna	Secure	Abundant
TREE FROGS, REED FROGS & KASSINAS			
Kassina senegalensis	Bubbling Kassina	Secure	Abundant

7. Assessment of Impacts

Introduction

The impact assessment methodology used to determine the significance of impacts prior and after mitigation is presented below. The assessment process was describe how the significance, probability, and duration of the afore said identified impacts that were identified through the consultation process, desktop studies of dimension stone mining in the Erongo Region by reviewing previous EIA's and EMP's. The phases covered by this assessment are: construction, operational and closure/decommissioning phase. The environmental assessment section of the scoping report and the consequent EMP shall also be compartmentalized into these phases. This assessment methodology enables the assessment of cumulative impacts, the significance of impacts, the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring and the degree to which the impacts can be mitigated. The methodology for conducting the qualitative impact assessment can be found in Table 7.

Table 11: Impact assessment criteria

PART A: DEFINITION AND CRITERIA		
Definition of SIGNIFICANCE		**Significance = consequence x probability**
Definition of CONSEQUENCE		**Consequence is a function of severity, spatial extent and duration**
Criteria for ranking of the SEVERITY of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action. Irreplaceable loss of resources.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints. Noticeable loss of resources.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints. Limited loss of resources.
	L+	Minor improvement. Change not measurable/ will remain in the current range.

		Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favorable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localized - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national

PART B: DETERMINING CONSEQUENCE					
SEVERITY = L					
DURATION	Long term	**H**	**Medium**	**Medium**	**Medium**
	Medium term	**M**	**Low**	**Low**	**Medium**
	Short term	**L**	**Low**	**Low**	**Medium**

SEVERITY = M					
DURATION	Long term	**H**	**Medium**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	High
	Short term	**L**	**Low**	**Medium**	Medium

SEVERITY = H					
DURATION	Long term	**H**	**High**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Medium**	**Medium**	**High**

	L	M	H
	Localized Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/ national
	SPATIAL SCALE		

PART C: DETERMINING SIGNIFICANCE				
Definite/ Continuous	**H**	**Medium**	**Medium**	**High**
Possible/ frequent	**M**	**Medium**	**High**	**High**
Unlikely/ seldom	**L**	**Low**	**Low**	**Medium**
		L	**M**	**H**
		CONSEQUENCE		

PART C: DETERMINING SIGNIFICANCE					
PROBABILITY (of exposure to impacts)	Definite/ Continuous	**H**	**Medium**	**Medium**	**High**
	Possible/ frequent	**M**	**Medium**	**Medium**	High
	Unlikely/ seldom	**L**	**Low**	**Low**	Medium
			L	**M**	**H**
			CONSEQUENCE		

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

H+ = High positive; H= High; L+ = Low positive; L = Low; M = Medium

7.1 Identified impacts on bio-physical environment

The following potential effects on the environment during the construction, operation and decommissioning phase of the quarrying project have been identified:

7.1.1 Air quality

Emissions of air pollutants can occur from a wide variety of activities during the construction, operation, and decommissioning phases of a project.

Point Sources

Point sources are discrete, stationary, identifiable sources of emissions that release pollutants to the atmosphere. These point sources are typically located in production plants. Point sources are characterized by the release of air pollutants typically associated with the combustion of fossil fuels, such as nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide, (CO), and particulate matter (PM), as well as other air pollutants including certain volatile organic compounds (VOCs) and metals that may also be associated with a wide range of industrial activities. Emissions from point sources should be avoided and controlled according to good international industry practice (GIIP) applicable to the mining industry, depending on ambient conditions, through the combined application of process modifications and emissions controls.

Fugitive Sources

Fugitive source air emissions refer to emissions that are distributed spatially over a wide area and not confined to a specific discharge point. They originate in operations where exhausts are not captured and passed through a stack. Fugitive emissions have the potential for much greater ground-level impacts per unit than stationary source emissions, since they are discharged and dispersed close to the ground. The two main types of fugitive emissions are Volatile Organic Compounds (VOCs) and particulate matter (PM). Other contaminants (NOx, SO2 and CO) are mainly associated with combustion processes, as described above. A mining project has potentially significant fugitive sources of emissions, therefore there is a need to establish the

ambient quality assessment and monitoring practices before mine construction. Open burning of solid wastes, whether hazardous or non-hazardous should be avoided, as the generation of polluting emissions from this type of source cannot be controlled effectively.

Moreover, vehicle exhausts contain a number of pollutants including carbon dioxide (CO_2), carbon monoxide (CO), hydrocarbons, oxides of nitrogen (NO_x), Sulphur and PM10. Tiny amounts of poisonous trace elements such as lead, cadmium and nickel are also present. The quantity of each pollutant emitted depends upon the type and quantity of fuel used, engine size, speed of the vehicle and abatement equipment fitted. Once emitted, the pollutants are diluted and dispersed in the ambient air. Lastly, concerning diesel generators and compressors, the newer models are fitted with suitable exhaust filters. In any case the diesel-powered machines could be replaced by electric engines, which are non-polluting and are more efficient.

Mobile Sources

Excessive dust generation from unpaved mine haul roads is a problem common to surface mining operations and especially in semi-arid and arid areas. During the operation phase dust will be generated onsite by earth moving equipment and also on the gravel road by haul trucks and vehicles. Windblown particulates from natural exposed surfaces, mine waste facilities, and stockpiles can result in significant dust emissions with high particulate concentrations near the source locations.
Continuous movements of people, vehicles and earth moving vehicles on site can loosen and re-suspend the deposited material again into the air.

As mentioned above, emission of dust into the environment is effectively contained by means of damping. Dust may be generated during this phase and might be aggravated during the winter months when strong winds occur (>10 m/s). Fall out dust settling on vegetation is likely to cause local disruptions in herbivorous and predatory complexes and should be minimized as far as possible. Where possible the project should avoid, minimize, and control adverse impacts to

human health, safety, and the environment from emissions to air. Dust generated and air pollutants suspended in the air could be inhaled by the workers leading to respiratory diseases.

7.1.2 Noise pollution

Noise pollution can be defined as any disturbing or unwanted noise that interferes or harms human or wildlife. During the mine lifetime, noise will most likely be generated during overburden removal, drilling, blasting, excavation, ore and waste handling, screening and crushing, vehicular traffic and the use of generators. Continuous exposure to noise leads to multiple adverse effects on physical and mental state of the mining community as a whole. Some of these effects are: tinnitus, and noise induced hearing loss (NIHL), reduced performance, sleeping difficulties, disturbance in conversation, annoyance or stress, anxiety, depression and high blood pressure. Noise pollution has negative impact on wildlife species by reducing habitat quality, increase stress level land masking other sounds

A noise baseline survey is currently underway to assess noise level impacts at designated points of the project site. The study will focus on the area noise monitoring to assess noise level of the study as well as a personal noise dosimetry to measure the percentage of noise dose to which a person is exposed during movements in different noisy or quieter areas during a working shift within the mine.

Noise sources in the proposed project are of various types, identified sources are: point sources, line source, area source, and moving sources. Heavy machines like dozers, dumpers, and loaders, are moving sources of noise. Meanwhile, crusher plants, screening plants, belt conveyors, are stationary/point sources. Distribution of noise levels in any mining area depends not only on the stationary or moving sources but also on the complex geographical conditions, which are mostly responsible for reflection, refraction, or absorption of sound waves. Meteorological factors produce additional effects on the propagation pattern.

7.1.3 Visual Impacts

The Actual receptors for which visibility was verified, include the following towns, settlements, farms and roads Visual Receptors:

- ✓ Surrounding farms
- ✓ Settlements such as Okombahe, Welverdie and Otjongeama.
- ✓ Roads: gravel roads D 3712, D 2344 and C 36.

During mine construction and Operation, the main anthropogenic impact from the implementation of the project will be on the landscape component. The mining pit will be discernible from a distance of 5 km, however it does not significantly affect the overall composition of the view as most of the visual receptors will have a view towards development, although vegetation will screen some receptors. A two-stage process of landscape change will occur during project implementation. The first stage will occur during the construction (operation) of the open pit and the key contributing process will be ore mining, which will change the existing landforms. Another process that is linked with landscape alteration is the construction of site and access roads, stockpiles, waste facilities and production facilities.

An open pit with stepped walls will progressively be developed, therefore existing physical environment will be affected by changing the surface profile and visual perception and aesthetics. The landscape will be modified to some extent in terms of its functions resulting in limited accessibility due to the relatively steep slopes that will remain after shutdown of operations. Natural landscape types will be transformed into technogenic landscapes as the project continues. The proposed closure process will involve a set of activities whose objective will be to improve the environmental and aesthetic value of the affected landscape.

Fig 18: Typical representation of visual impact observed along the B2 road.

7.1.4 Solid Waste

Waste can be generated from contractors, staff members and other visitors to the area. Proper solid waste management will involve full commitment by all the employees and contractors of the site. Solid waste which will be generated from this project if not managed will have an effect on the environment. The types of waste that could be generated during operation include hazardous waste, general industrial waste and domestic waste. Domestic waste will be temporarily handled and stored onsite before being removed for final disposal at permitted waste disposal facilities. A registered Waste Management Company would be contracted to remove all hazardous waste from the site. Furthermore, ablution facilities will use chemical toilets and/or sealed septic tanks and the sewerage taken to the Karibib periodically. No waste will be discharged on site.

7.1.5 Health, safety and security

Mining operations are associated with serious health and safety risks to workers on site. Occupational exposures are normally related to the dermal contact with fuels and inhalation of fuel vapors during handling of such products. The manager is further advised to ensure that adequate emergency facilities, including first aid kits, are available on site. All Health and Safety standards specified in the Labour Act should be complied with

7.1.6 Hazardous waste

Storage and Utilization of Hazardous Substances

Hazardous material can be classified according to the hazard as: explosives, compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; oxidizing substances; toxic materials and corrosive substances. These substances are regarded by the Hazardous Substance Ordinance (No. 14 of 1974) as those substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances.

When a hazardous material is no longer usable for its original purpose and is intended for disposal, but still has hazardous properties, it is considered a hazardous waste. In the proposed mining project, hazardous waste will be collected and sent for treatment before disposal.

The overall objective of hazardous materials management is to avoid or, when avoidance is not feasible, minimize uncontrolled releases of hazardous materials or accidents (including explosion and fire) during their production, handling, storage and use, this objective can be achieved by:

- ✓ Establishing hazardous materials management priorities based on hazard analysis of risky operations identified through Social and Environmental Assessment;
- ✓ Where practicable, avoiding or minimizing the use of hazardous materials
- ✓ Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion;
- ✓ Using engineering controls (containment, automatic alarms, and shut-off systems) commensurate with the nature of hazard;
- ✓ Implementing management controls (procedures, inspections, communications, training, and drills) to address residual risks that have not been prevented or controlled through engineering measures.

7.1.7 Land contamination

Land is considered contaminated when it contains hazardous materials or oil concentrations above background or naturally occurring levels. This may involve surficial soils or subsurface soils that, through leaching and transport, may affect groundwater, surface water, and nearby farms. Where subsurface contaminant sources include volatile substances, soil vapor may also become a transport and exposure medium, and create potential for contaminant infiltration of indoor air spaces of buildings. Contaminated land is a concern because of the potential risks to human health and ecology (e.g. risk of cancer or other human health effects, loss of ecology). The liability that it may pose to the polluter (e.g., cost of remediation, damage of business reputation and/or business-community relations) or affected parties (e.g. workers at the site, nearby farm owners). Contamination of land should be avoided by preventing or controlling the release of hazardous materials, hazardous wastes, or oil to the environment. When contamination of land is suspected or confirmed during any project phase, the cause of the uncontrolled release should be identified and corrected to avoid further releases and associated adverse impacts. Contaminated lands should be managed to avoid the risk to human health and ecological receptors. The preferred strategy for land decontamination is to reduce the level of contamination at the site while preventing the human exposure to contamination.

7.1.8 Liquid waste: oil spillage and wastewater

The proposed mining project has potential to generate process wastewater, sanitary sewage, or storm water, therefore necessary precautions to avoid, minimize, and control adverse impacts to human health, safety, or the environment should be incorporated. The possible presence of these liquid contaminants at the project has the potential of reaching both groundwater and surface water system. Moreover, spillage is a concern although the likelihood of this risk occurrence is low because of the crystalline nature of the study area. During all developmental stages of the project, wastewater treatment is required prior to discharge. National and local standards as reflected in permit requirements and sewer system capacity to convey and treat wastewater if discharge is to

sanitary sewer should be adhered to at all times. Fauna and flora baseline study cover the impact of wastewater on sensitive receptors (e.g., endangered species) or habitats along Omaruru River.

Stormwater Management

Stormwater includes any surface runoff and flows resulting from precipitation, drainage or other sources. Typically stormwater runoff contains suspended sediments, metals, petroleum hydrocarbons, Polycyclic Aromatic Hydrocarbons (PAHs), coliform, etc. Rapid runoff, even of uncontaminated stormwater, also degrades the quality of the receiving water by eroding stream beds and banks.

7.1.9 Groundwater contamination

As a definition, contaminated groundwater is groundwater that has been polluted by human activities to the extent that it has higher concentrations of dissolved or suspended constituents than the maximum admissible concentrations formulated by national or international standards for drinking, industrial or agricultural purposes. The main groundwater contaminants expected from the proposed mining activities and ongoing exploration include chemicals such as heavy metals, organic solvents, mineral oils, and microbiological contaminants such as faecal bacteria and viruses. Due to the crystalline and metamorphic nature of the targeted lithology (marble and granite) as well as the envisaged depth of the open pit, the proposed mining activities on ML area are unlikely to pose any negative impacts on the underground water system. Moreover, Extraction of lithium carbonate from concentrated ore has significant environmental and social impacts, especially due to water pollution from toxic chemicals are needed to process lithium. The release of such chemicals through leaching, spills or air emissions can harm communities, ecosystems and food production. However, lithium processing is not part of the scope of the study as this process will not be carried out in Namibia.

The following main potential groundwater pollution sources are assessed:

- ✓ Seepage from the lined TSF (Tailing Storage Facilities) and WRDs contaminates the groundwater and has a negative impact on the groundwater aquifer system thus affecting production boreholes of neighboring farms.
- ✓ Seepage of process fluids, sewage systems, oil or fuel from the Processing Plant and construction vehicles contaminates the groundwater and has a negative impact on the underground aquifer system.
- ✓ Seepage from the existing non-hazardous waste landfill

Groundwater pollution is imminent during mining due to increased anthropogenic activities.. Sources of pollution can be categorized into two major types: point source pollution and non-point source pollution. Point source pollution (e.g. leaking sewage lines, leaking mobile toilets and fuel, oil, chemical spillage) is a single identify localized source while non-point source pollution (diffuse sources such as petrochemical pollution) is characterized by multiple discharge point.

Project activities during construction and operation have the potential to cause contamination through spillages of hydrocarbons, chemicals, hazardous materials, refueling and maintenance of construction vehicles, sewage as well as through poor management of grey water. Heavy vehicles operating at the mining site should be regularly monitored for leaking hydrocarbon fuels (petrol or diesel) and must be fitted with drip trays while they are parked to avoid contamination of surface and groundwater. Fuel on site will be stored tank mounted on stilts so that any leaks are easily detectable, however if underground fuel storage is to be used it should be lined with heavy duty geo-membranes such as polyvinyl chloride (PVC) or high density polyethylene (HDPE) to prevent groundwater contamination. The total volume of these hazardous materials and chemicals on site is never likely to be substantial and thus the overall risks during construction are not likely to be high. However, groundwater is an important resource and must be protected. The proponent has set out various measures to ensure the protection of groundwater quality

7.1.10 Reduction in Groundwater levels /groundwater depletion

The proposed mine pits will reach a maximum depth of ± 40 to 50 m below surface in the first 3 years of operation, with the groundwater levels currently being at approximately 40 to 70 m below surface. The proposed mining operations require dewatering, treatment and safe disposal of potentially contaminated water. To maintain continuous production water has to be pumped to a dewatering lake/pond which has a dynamic water level that must be raised two or three times a year. Pumped water will be used for community agricultural projects irrigation.

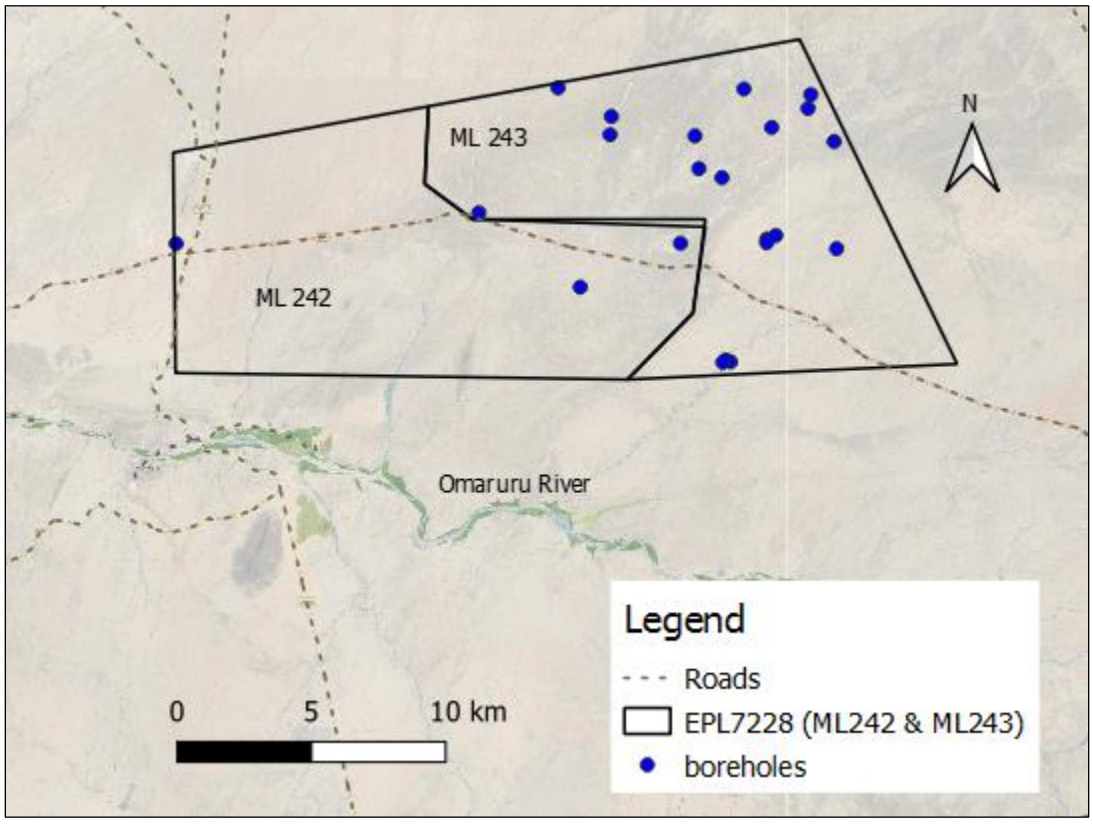

Fig.19. Borehole distribution in the project area.

7.1.12 Biodiversity

The proposed open pit mine has the potential of destroying habitats and the species they support. Even if the habitats are not directly removed by excavation, they can be indirectly affected and damaged by environmental impacts. The transformation of land for any purpose results in the

destruction of the site-specific biodiversity, the fragmentation of habitats, reduces its intrinsic functionality and reduces the linkage role that undeveloped land fulfils between different areas of biodiversity importance. The alteration will occur through physical disturbance and continued human presence and use. Construction and operation activities which are expected to cause destruction of biodiversity and habitats include the movement of vehicles and machinery. Biodiversity impacts resulting from construction and operation activities are likely to include mortality (by earthmoving equipment, vehicles and machinery and due to illegal hunting). Nevertheless, with careful planning and management, it is possible to minimize the effect on biodiversity and in fact, quarries can also provide a good opportunity to create new habitats or to restore existing ones.

Fauna

Quarrying activities may have minor disturbances on the habitat of a few species but no significant impacts on the animals are expected. The proponent shall ensure that no animal shall be captured, killed or harmed by any of the employees in any way. Wildlife poaching will strongly be avoided as this is an offence and anyone caught infringing in this regard will face suspension from the project and will be liable for prosecution.

Avifauna

If care is not taken, possible disturbance of birds or nest on sites by employees is expected. Should the employees observe any bird nesting sites for endangered avifauna such as vultures, they should notify Ministry of Environment, Forestry and Tourism.

Vegetation

The major environmental hazard from the quarry is the effect of dust and this will be dependent on:

- The concentration of the dust particles in the ambient air and its rate of deposition.
- The type of vegetation.
- The leaf surface type of the vegetation.
- Degree of penetration of the dust particles into the vegetation.

- The size distribution of dust particles
- Chemistry of the dust.

Most of the effects of dust particles on plants include the potential to block and damage the stomata such that photosynthesis and respiration are affected. Pollutants such as dust, gaseous emissions and air- borne particulates will be produced and get deposited on the plants. This will no doubt affect the physiological activities of the plants most especially those around the quarry site such as in photosynthesis and respiration. The implication of these is that some of the plants may have retarded growth while others may be eliminated

The natural vegetation is seemingly undisturbed in the project area except for grasses, which have been grazed by livestock and wild animals. Some vegetation species in the area may be adversely impacted by the project. The type of vegetation that might be affected by the project are:

- Bushes
- Ephemeral grasses
- Small trees

Some of the sensitive vegetation types in the area include:

- Shallow drainage line vegetation
- Scrublands surrounding the quarrying area

Certain species regarded as particularly important for conservation may yet be identified and made known via an Addendum to this report. If particularly important species are found, they will be located by GPS and their locations communicated to the Ministry of Environment, Forestry and Tourism. Such locations will then be demarcated and completely avoided.

7.12.4 Alien invasive plants

Alien invasive plants are prevalent in areas affected by land transformation and anthropogenic disturbance. It is a well-known fact that disturbance to the natural environment often encourages the establishment of alien invasive weed species. Surface mines are a major disturbance, and thus

may promote the establishment and expansion of invasive plant communities. Seed or plant material may be imported to site from building materials if the source is contaminated. It is also possible that, plant or seed material may adhere to car tyres or animals. In some cases seeds of alien invasive plants may blow from debris removed at sites.

Some of the plant species that could become invasive in the area are listed below:

- *Prosopis glandulosa*
- *Lantana camara*
- *Cyperus esculentus*
- *Opuntia imbricate*
- *Cereus jamacara*
- *Melia azedarach*
- *Harissia martini*

There are numerous ways in which invasive species can be introduced deliberately or unintentionally.

7.1.13Heritage Impacts

All archaeological remains are protected under the National Heritage Act (2004) and will not be destroyed, disturbed or removed. The Act also requires that any archaeological finds be reported to the Heritage Council Windhoek. In the meantime, there are no declared heritage sites by the National Heritage Council of Namibia on ML242 and EPL7728. Accidental find procedure at the subject site may require appropriate measures to be undertaken upon discovering any new archaeological sites. A separate heritage impact assessment baseline study is annexed to this report

7.1.14 Fire and explosion hazard

Hydrocarbons are volatile under certain conditions and their vapors in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise. All fuel storage and handling facilities in Namibia must however comply with strict safety distances as prescribed by SANS 10089. SANS 10089 is adopted by the Ministry of Mines and Energy as the national standard. It must further be assured that sufficient water is available for

firefighting purposes. In addition to this, all personnel must be sensitized about responsible fire protection measures and good housekeeping such as the removal of flammable materials including rubbish, dry vegetation, and hydrocarbon-soaked soil from the vicinity of the quarrying area. Regular inspections should be carried out to inspect and test firefighting equipment and pollution control materials at the drilling site.

All fire precautions and fire control at the site must be in accordance with SANS 10089- 1:1999, or better. A holistic fire protection and prevention plan is needed. Experience has shown that the best chance to rapidly put out a major fire, is in the first 5 minutes. It is important to recognize that a responsive fire prevention plan does not solely include the availability of firefighting equipment, but more importantly, it involves premeditated measures and activities to timeously prevent, curb and avoid conditions that may result in fires. An integrated fire prevention plan should be drafted before drilling.

7.1.15 Municipal Service Impacts

Proposed mining activities will require provision of the following services:

- Potable water for domestic purposes.
- Temporary toilets during the mining operations.
- Solid waste management
- Bulk water and power supply

Workers will be housed on an identified land parcel for the mining camp to be allocated by the farm owner so as to build temporary houses and provide the necessary amenities for the employees including a renewable source of energy in the form of solar panels to ensure a reasonable standard of living.

7.2 General socio-economic concerns

- As the movement of staff and contractors to and from the area increases, the risk of spread of HIV/AIDS and other STDs increases;
- Increased influx of jobseekers to the area as people come in search of job opportunities during the operational phase of the quarrying project. This could lead to potential increase

in the unemployed people in the area and the establishment/growth in informal settlements which could exacerbate security issues due to increased crime rates.

- Impacts on the size and structure of the population. Increased informal settlement and associated problems;
- Negative impact on the health and safety of the surrounding community and workers.

7.3 Qualitative impact assessment

Table 12: The following is a qualitative impact assessment on the impacts associated with the proposed mining project and ongoing exploration activities.

Impact	Mitigation	Severity	Duration	Spatial scale	Consequence	Probability of occurrence	Significance
Noise	Unmitigated	H	L	L	L	M	M
	Mitigated	L	L	L	L	L	L
Biodiversity	Unmitigated	M	L	L	M	M	L
	Mitigated	L	L	L	L	L	L
Socio-Economic	Unmitigated	M	L	M	M	M	M
	Mitigated	M	L	M	M	L	L
Land-use	Unmitigated	M	H-M	L	M	M	M
	Mitigated	L	L	L	L	L	L
Air quality: Dust and fumes emission	Unmitigated	H	M	L	H	M	M
	Mitigated	L	L	L	L	L	L
Surface water pollution	Unmitigated	M	M	L	M	L	L
	Mitigated	L	L	L	L	L	L
Groundwater pollution	Unmitigated	M	M	H	H	M	L
	Mitigated	L	L	L	L	L	L
	Unmitigated	L	M	L	M	L	L

Wastewater management	Mitigated	L	L	L	L	L	L
Health, safety and security	Unmitigated	M	L	L	L	M	L
	Mitigated	L	L	L	L	L	L
Heritage Impacts	Unmitigated	M	H	L	M	L	M
	Mitigated	L	L	L	L	L	L

Mitigation measures

Where negative impacts are identified, mitigation objectives have been set, and practical, attainable mitigation measures must be recommended that will minimize or eliminate the impacts. Where mitigation is not feasible, this has been stated and reasons given. In the case of positive impacts, enhancement measures are recommended for optimizing the benefit to be derived.

Monitoring

Monitoring requirements with quantifiable standards to assess the effectiveness of mitigation actions have been recommended where appropriate. These must indicate what actions are required, by whom, and the timing and frequency thereof. If further investigations must be undertaken and monitoring programmes implemented before, during and after operations.

8. Environmental Management Plan (EMP)

8.1 Overview

8.1.1. Purpose of this Environmental Management Plan (EMP)

Environmental management plan (EMP) serves as a risk strategy that contains logical framework, monitoring programs, mitigation measures and management control. The aim of an Environmental Management plan (EMP) is to develop procedures to implement project's mitigation measures and monitoring requirements. An EMP ensures the community that the environmental management of the project is acceptable. As well as stipulating the roles and responsibilities of persons involved in the project. It further ensures that legal and policy requirements are well known and understood by the proponent, its employees and contractors and will be strictly enforced by its management team. Issues and concerns identified in the EIA will form a set of environmental specifications that will be implemented on site.

The control measures described in this EMP have been developed following consideration of the findings of the Environmental Impact Study (EIS), which concluded that a number of environmental values would be impacted by the proposed exploration activities. The intent of the proposed control measures is to ensure that project related activities will not negatively affect the environment or the health, welfare and amenity of people and land uses by meeting or exceeding statutory requirements.

This EMP is a live document and shall be reviewed at predetermined intervals, and/or updated during the ESIA process when / if the scope of work alters, or when further data/information is added. All personnel working on the project will be legally required to comply with the requirements set out in the Final Draft EMP that is approved by MEFT

Furthermore, overall objectives of this EMP are:

- To develop measures that will mitigate the adverse impacts of the proposed project
- Ensuring compliance with regulatory authority stipulations and guidelines

- To formulate measures to enhance the value of environmental components where possible.
- To formulate measures to protect environmental resources as well enhance the value of environmental components where possible.
- Responding to unforeseen events and providing feedback for continual improvement in environmental performance.

8.1.2. Summary of the proposed activities

The proponent has applied for a mining licence (ML242) on exclusive prospecting licence (EPL 7228) in order to develop a Lithium Mine. Lithium exploration and mining activities have potential impacts on the following:

- Potential land or soil disturbances,
- Soil and water resources contamination,
- Biodiversity (fauna and flora),
- Air quality,
- Noise,
- Health and safety,
- Vehicular traffic impact,
- Archaeological impact.

8.1.3. Project Phases Covered in the EMP

The following phases are addressed in this EMP:

- Exploration phase: the phase where the lithium mineral resource is established and the quantity of availability.
- **Construction phase:** The initial phase which entails construction of main and supporting mining infrastructures (Mine Development).

- **Operation and maintenance phase:** the phase during which the mining activities are carried out and maintenance of the site, related infrastructure, equipment and machinery is done.
- **The decommissioning phase** is the time during which the targeted ore deposit is depleted or of no longer economic value, leading to the cessation of the mining activities. During the operational phase and before decommissioning, the Proponent will need to put site rehabilitation measures in place. The decommissioning phase is followed by mine closure and aftercare

8.1.4 Legal Implications and obligations under the EMP

The EMP will be sent to the Directorate of Environmental Affairs (DEA) of the Ministry of Environment, Forestry and Tourism (MEFT) for approval. Once the DEA is satisfied with the contents of the EMP, they will issue an Environmental Clearance Certificate (ECC) to the Proponent to commence with the establishment of a lithium mine in the proposed area. The ECC is linked with the recommendations of the Environmental Management Plan. Once the ECC is issued, the EMP becomes a legally binding document and each role-player including contractors and sub-contractors are made responsible to implement the relevant sections of the EMP and is required to abide by the conditions stipulated in this document. This document is a live document, which will be review and updated as needed.

8.1.5 Environmental Management Principles

The proponent will ensure that all parties involved in the project uphold the following broad aims:

1. All persons will be required to conduct all their activities in a manner that is environmentally and socially responsible. This includes all consultants, contractors, and sub-contractors, transport drivers, guests and anyone entering the mining areas in connection with the Lithium mine project.

2. Health, Safety and Social Well Being

- Safeguard the health and safety of project personnel and the public against potential impacts of the project. This includes issues of road safety, precautions against natural dangers on site, and radiation hazards; and,
- Promote good relationships with the local authorities and their staff.

3. Biophysical Environment

- Wise use and conservation of environmental resources, giving due consideration to the use of resources by present and future generations;
- Prevent or minimize environmental impacts;
- Prevent air, water, and soil pollution, Biodiversity conservation and Due respect for the purpose and sanctity of the area.

To achieve these aims, the following principles need to be upheld.

Commitment and Accountability:

The proponent's senior executives and line managers will be held responsible and accountable for: Health and safety of site personnel while on duty, including traveling to and from site in company vehicles and environmental impacts caused by mining or by personnel engaged in the mining activities, including any recreational activities carried out by personnel in the area

Competence

The proponent will ensure a competent work force through appropriate selection, training, and awareness in all safety, health and environmental matters.

Risk Assessment, Prevention and Control

This is to identify, assess and prioritize potential environmental risks associated with the mining activities at EPL 7228. The main objective of is to prevent or minimize priority risks through

careful planning and design, allocation of financial resources, management and workplace procedures. In cases where the event of adverse impacts arises, a prompt intervention by the proponent will be done and a through procedure of how this will be done will be outlined in the safety and management policies of the proponent's profile.

Performance and Evaluation

Set appropriate objectives and performance indicators. Comply with all laws, regulations, policies and the environmental specifications. Implement regular monitoring and reporting of compliance with these requirements.

Stakeholder Consultation

Create and maintain opportunities for constructive consultations with employees, authorities, other interested or affected parties. Seek to achieve open exchange of information and mutual understanding in matters of common concern.

Continual Improvement

This will be done through continual evaluation, feedbacks from the stakeholders, and innovation by the proponent, to seek to improve performance regarding social health and well-being and environmental management throughout the lifespan of the mining project

8.2. Identified impacts, monitoring and proposed mitigation measures

8.2.1. Positive social-economic impacts

8.2.1.1. Job Creation

Local recruitment will be encouraged by the proponent with a target of at least 65% locals. This operation thus contributes to the alleviation of unemployment which is severe in the country. The establishment and operation of the mine will create both direct and indirect jobs to the local people. Employment on the new project will be attractive to the local workforce by virtue of the

comparatively high wages offered, this will result in the local growth in the economy of the Omaruru district.

Enhancement measures

- The proponent will introduce training programs (bursary schemes, on the job training etc) in order to boost the supply of local skills
- It is proposed that local people community members from Omaruru and surrounding areas should be considered first for employed. Especially where no specific skills are required.
- The assistance by the public to assist with the recruitment of workers.
- Gender equality considerations during recruitment process.
- Employment preference will be afforded to previously disadvantaged Namibians.

8.2.1.2. Support to local retailer shop

Mining is the highest foreign currency earner and GDP contributor to the Namibian economy, therefore the presence of mining activities near local authorities stand to benefit the local economies from project-related purchases, for example, the retail, accommodation and recreation sectors. The proponent and his employees are encouraged to purchase or support local retailers in Omaruru town unless the intended material/product to purchase is not available.

8.2.1.3. Export taxes and VAT payments

Export taxes and VAT payments contribute significantly to the national economic contribution. Thus, without these payments our government will not be able to roll out the project on infrastructure, being it water, road or electricity and also sanitation facilities nationwide. The proponent and his employees are encouraged to make these payments when applicable to support the economic growth of the country.

8.2.2. Impacts on bio-physical environment

8.2.2.1. Liquid waste: oil spillage and wastewater

This can be spills from the storage of waste oil or waste water. It can also be due to transportation of this oil spill.

Mitigation Measures to be enforced:

- Ensure adequate storage and handling of liquid waste, fuel, waste water as well as regular maintenance of plant equipment.
- Avail a spill response action plan in case of accident.
- Accessibility to spill prevention and response equipment, such equipment should be visible and accessible to all employees at any given time.
- Spills will be cleaned up immediately to the satisfaction of the Environmental Manager by

  removing the spillage together with the polluted soil and by disposing of them at a recognized facility as stipulated in the spill response action plan.
- Designated waste collection tanks should be available on-site and away from waterways, and such isolation should be maintained at all times.
- Storage of the hazardous substances in a bounded area,
- Refuel vehicles at a designated area that has a protective surface covering/geo-membrane lining and utilize drip trays for stationary plant.

8.2.2.2 Impacts on surface and ground water

Mitigation Measures to be enforced:

- No dumping of waste products of any kind in or in close proximity to surface water bodies and possible recharge areas for groundwater.
- No direct handling of waste in close proximity of such areas.
- Heavy mining vehicles should be kept out of any surface water bodies and the movement of vehicles should be limited where possible to the existing roads and tracks.

- Ensure that oil/ fuel spillages from vehicles transporting the ore and machinery are minimized and that where these occur, that they are appropriately dealt with.
- Drip trays must be placed underneath vehicles when not in use to contain all oil that might be leaking from these vehicles.
- In all areas where there is storage of hazardous substances (i.e. hydrocarbons), there will be containment of spillages on impermeable floors and bund walls that can contain 110%ofthevolume of the hazardous substances.
- All refueling and any maintenance of vehicles will take place on impermeable surfaces.
- Pollution will be prevented through basic infrastructure design and through maintenance of equipment.
- Spill kits will be readily available on site. Employees and/or contractors will be trained to use the spill kits to enable containment and remediation of pollution incidents.
- Environmental awareness for contractor and employees to be included during inductions
- Any spills will be contained and cleaned up immediately
- Non-toxic and biodegradable drilling lubricant will be used

8.2.2.3. Solid waste

Solid waste is a challenge during the ongoing exploration and operational phases. It can be generated from contractors, staff members and other visitors to the area. Proper solid waste management will involve full commitment by all the employees and contractors on site. Solid waste which will be generated from this project if not managed will have effects and will alter the natural environment.

Mitigation Measures to be enforced:

- Sufficient waste storage bins on site.
- Regular emptying of the waste storage bins, a minimum of two (2) times a week.
- Sufficient waste disposal sites should be established on-site were generated waste should be kept during ongoing exploration and operation period.

- The collected solid waste should be disposed at registered and approved disposal site agreed upon by both Omaruru Municipality and the proponent.
- During the construction phase, the mobile toilet should be made available on-site for workers and once these facilities are full, the collected waste should be disposed at the Town Council waste water disposal site.
- It is recommended that waste from the temporary toilets be pumped out and disposed of at the designated waste treatment site in Omaruru or in a nearby approved facility.
- Mandatory waste segregated right at the source of waste generation. The collection of segregated waste would be made from the site and amenity areas.
- Reusable and recyclable waste will be disposed of by selling to scrap dealers and private contractors for resale.
- Non-degradable waste will be transferred to the municipal solid waste management system.
- Waste generated will be handled in accordance with the contract signed with the landowner. This shall include: waste should be separated and recycled / re-used where possible.
- Where waste management procedures do not exist, a procedure should be developed.
- Employees and contractors will be shown the importance of correct waste disposal as well as waste minimization and recycling.

8.2.2.4. Land and soil disturbance

Lithium mining process involve cutting out prismatic blocks from in situ outcrops and therefore disturbing the landform and the soil cover in the immediate surroundings of the mining site. This undertaking has the potential of disturbing the structural composition and biological productivity of topsoil and If not taken care of this can lead to land degradation.

Mitigation Measures to be enforced:

- The access road to the mining site must be established in consultation with the landowner and usage of existing roads shall be enforced.

- The design, construction, and location of access to main roads will be in accordance with the requirements laid down by the controlling authority.
- Land markings, vehicle tracks, trenches and excavations shall be restored to the original landform and, visual state as much as possible.
- In the case of dual or multiple uses of access roads by other users, arrangements for multiple responsibilities must be made with the other users. If not, the maintenance of access roads will be the responsibility of the holder of the mining licence (ML).

8.2.2.5. Biodiversity (fauna and flora)

Mining can be destructive process, changing abiotic and biotic conditions and in some cases singlehandedly causing local decline in rare and threatened species and ecosystems. Some of the activities of the proposed project i.e. vehicles, human movements, excavating pose a risk to the integrity of baseline biodiversity as well as the biological productivity of the site and the immediate proximity. Movement of vehicles in and out of the site and noise produced by moving earth-moving equipment are the major threats to fauna .The following mitigations are to be undertaken to minimize further impact on the existing biodiversity:

Mitigation Measures to be enforced: **flora**

- The footprint of the area to be disturbed will be minimized as far as is practically possible.
- Remove unique fauna and sensitive fauna before commencing with the development activities and relocate to a less sensitive/disturbed site if possible.
- Recommend the planting of local indigenous species of flora as part of the landscaping as these species would require less maintenance than exotic species and have important ecological functions in terms of carbon sequestration from decomposing materials at the site.
- Disturbance of marginal vegetation in the mountains should be limited.
- Where it is clear that certain large species will be destroyed consideration should be given to offering to rescue the individuals involved and relocate them to nearby gardens.

- Transplant removed trees where possible, or plant new trees in lieu of those that have been removed.
- Prevent the destruction of protected tree species.
- No open fires will be permitted on site.

Mitigation Measures to be enforced: **fauna**

- Barriers/barricades confining driving trucks must be erected to avoid stray driving and trampling on habitat. Proper demarcation of the mining and exploration area.
- Honor agreements set out in the site-access contracts, specifically relating to the areas utilized for professional hunting.
- Avoid disturbance on invertebrate on-site and along the gravel road stretch.
- Avoid the creation of multiples roads strips, which could result in the disturbance of breeding sites for various mammals.
- No workers will be allowed to collect any plant or snare, hunt or otherwise capture any wild animal.
- No domestic animals will be permitted on the quarry sites by means of erecting a perimeter fence, small stock should graze at designated areas.
- A fauna survey will be conducted to determine the effect of fragmented habitat on game species should the need arise.
- No foodstuff will be left lying around as these will attract animals which might result in human-animal conflict.
- Care will be taken to ensure that no litter is lying around as these may end up being ingested by wild animals

Methods for monitoring:

- Regular monitoring of any unusual signs of animal habitat.
- There should be limited movement of heavy duty machinery and mining equipment in the area to avoid interference.
- Birds or Nest sites will not be disturbed by any employee, visitor or contractor.

- If possible encountered bird kills and nest removal should be registered in a biodiversity data-base and information should be made available to the general public

8.2.2.6. Impacts of Alien invasive Plants

Alien invasive plants are prevalent in areas affected by land transformation and anthropogenic disturbance. It is a well-known fact that disturbance to the natural environment often encourages the establishment of alien invasive weed species. Surface mines are a major disturbance, and thus may promote the establishment and expansion of invasive plant communities. Seed or plant material may be imported to site from building materials if the source is contaminated. It is also possible that, plant or seed material may adhere to car tyres or animals, in some cases seeds of alien invasive plants may blow from debris removed at sites.

Mitigation Measures to be enforced:

- The site manager will ensure that debris is properly disposed of.

- Vehicle tyres inspections can be carried out although this may not be a practical mitigation measure.

- The proponent should implement an alien plants awareness campaign to educate and sensitize the employees and the local community on the menace of planting alien vegetation in the area.
- Eradicating alien plants by using an Area Management Plan

Methods for monitoring:

- Regular monitoring of any unusual signs of alien species.
- The proponent and local community should establish an alien plant task force to ensure that there is no planting of alien plants species in the area.
- The proponent should adopt and support the implementation of an annual alien plants clearing campaign.

8.2.2.7. Air quality

The proposed mining activities are the potential of fugitive sources for the dust particles as they are easily dispersed and carried away by the winds. During the operation phase dust will be generated onsite by earth moving equipment and also on the gravel road by trucks and vehicles. Continuous movements of people, vehicles and earth moving vehicles on site can thus loosen and re-suspend the deposited material again into the air

Mitigation Measures to be enforced

- Converting high-use vehicles to cleaner fuels, where feasible
- Installing and maintaining emissions control devices, such as catalytic converters
- Implementing a regular vehicle maintenance and repair program
- Dust suppressants shall be applied to all the mining activities as well as all the unpaved/gravel roads.
- The speed of haul trucks and other vehicles must be strictly controlled to excessive dust or excessive deterioration of the road being used.
- All gravel roads in the project area should have a speed limit of 60km/h for light vehicles and 30km/h for heavy vehicles in order to minimize the amount of dust generated by vehicles.
- Regardless of the size or type of vehicle, fleet owners /operators should implement the manufacturer recommended engine maintenance programs.
- Converting high-use vehicles to cleaner fuels, where feasible.
- Implementing a regular vehicle maintenance and repair program.
- Installing and maintaining emissions control devices, such as catalytic converters.
- Transportation of raw materials required for construction will be carried out during non-peak hours.
- Covering scaffolding and cleaning of vehicles that can reduce dust and vapor emissions will be used.
- Cover any stockpiles with plastic to minimize windblown dust.
- During high wind conditions the proponent must make the decision to cease works until the wind has calmed down.

- Use of personal protective equipment for proper dust control for respiratory protection and other necessary PPE (gloves, work suits, sun hats etc.).

Monitoring

Emissions and air quality monitoring programs provide information that can be used to assess the effectiveness of emissions management strategies. The air quality monitoring program should consider the following elements:

- ✓ Monitoring parameters: The monitoring parameters selected should reflect the pollutants of concern associated with project processes.
- ✓ Baseline calculations: Before a project is developed, baseline air quality monitoring at and in the vicinity of the site should be undertaken to assess background levels of key pollutants, in order to differentiate between existing ambient conditions and project-related impacts.
- ✓ Monitoring type and frequency: Data on emissions and ambient air quality generated through the monitoring program should be representative of the emissions discharged by the project over time.
- ✓ Monitoring locations: location of ambient air quality monitoring stations should be established based on baseline study results.

Monitoring frequency

- Daily inspection by the ENC of the gravel roads and quarry site on possible dust creation that requires attention.
- Daily inspection on site by the ENC to ensure that all workers are wearing their protective clothes at all time during the mining process and the dry skin contact with gloves is prevented.
- Annual Stack Emission Testing for NO_x and SO_2.
- Dust fallout buckets and particle matter monitoring will be done to monitor the extent of the dust distribution in the area.

8.2.2.8. Impacts on Archaeological Sites

Potential damage to archaeological sites may be impacted through unintentional destruction or damages are a result of vehicle tracks, footprints and actions of contractors, employees and visitors of the quarry site. Currently, there is no information provided about known heritage or site of cultural values within the project site. Therefore, this impact can be rated medium to low, if there are no mitigation measures in place. At the sites, there are no known heritage areas or artifacts deemed to be impacted by the ongoing exploration and quarrying activities. However, there might be unknown archaeological remains within the Mining Licence area hence the Proponent is required to follow the chance find procedures and consult the Heritage Council immediately. The Proponent should consider having a qualified and experience archaeologist on standby during entire operational phase. This action will be to assist on the possibility of uncovering sub-surface graves or other cultural/heritage objects and advice the Proponent accordingly. Identified graves or any archaeological significant objects on the site should not be disturbed, but are to be reported to the project Environmental officer or National Heritage Council offices.

Mitigation Measures to be enforced

- Buffer zones will be created around the operation site
- Adhere to practical guidelines provided by an archeologist on site to reduce archaeological impacts of quarrying activities.
- All archeological sites to be identified and protected before construction commences.
- Notices/ information boards information will be placed on site.
- Training employees regarding the protection of these sites.
- Obtain appropriate clearance or approval from the competent authority.
- In the event of such finds, mining must stop and the project management or contractors should notify the National Heritage Council of Namibia immediately.

Monitoring

- An archaeologist will inspect any identified archaeological sites before commencing within the mining activities.

8.2.2.9. Noise

Noise emissions on site are mainly generated by earthmoving equipments, drilling rigs, , people and vehicles. The main noise sources are associated with drilling, blasting, loading and transport of equipment or materials to or from the pits and the site. Exposure to loud noises at work can cause irreversible hearing damage, workplace accidents and be a contributing factor to other health problems.

Mitigation Measures to be enforced

Continuous monitoring of noise levels should be conducted to make sure the noise levels at the mining site does not exceed acceptable limits.

- Reduction of noise from drilling rigs by using down hole drilling or hydraulic drilling;
- Installation of proper sound barriers and (or) noise containments, with enclosures and curtains at or near the source equipment.
- Use of rubber-lined or soundproof surfaces on processing equipment (e.g. screens, chutes, transfer points, and buckets);
- Use of rubber-belt transport and conveyors;
- Installation of natural barriers at facility boundaries (e.g. Vegetation curtains or soil berms).
- Notices should be given to the people on site and neighbors on scheduled blasting activities and other noise generating activities.
- Optimization of internal-traffic routing, particularly to minimize vehicle-reversing needs (reducing noise from reversing alarms) and to maximize distances to the closest sensitive receptors.
- No activity having a potential noise impact should be allowed after 18:00 hours if possible.
- In the event that activities continue outside the stipulated hours the contractor will

communicate such occurrences to potentially affected communities prior to commencing such activities.

- Workers working near high noise mining machinery will be provided with wear protective equipment such as ear muffs and earplugs.
- Safe minimum distance from noise generating activities should be introduced.
- Re-locating noise sources to less sensitive areas to take advantage of distance and shielding.
- Taking advantage of the natural topography as a noise buffer during facility design.
- Reducing project traffic routing through community areas wherever possible.

Monitoring

Noise monitoring may be carried out for the purposes of establishing the existing ambient noise levels in the area of the proposed or existing facility, or for verifying operational phase noise levels. Noise monitoring programs should be designed and conducted by trained specialists. The type of acoustic indices recorded depends on the type of noise being monitored, as established by a noise expert. Monitors should be located approximately 1.5 m above the ground and no closer than 3m.

8.2.2.10 erosion Control

Mitigation Measures to be enforced

- Preventative measures such as earth embankments will be put up to prevent erosion will be established where appropriate.
- Pit slopes should be profiled to ensure that they are not subjected to excessive erosion but capable of drainage run-off with minimum risk of scour. A professional mining engineer should be employed to ensure that the slopes created are not endangering the lives and wellbeing of the employees that work directly in the pit.
- If necessary, diversion channels should be constructed ahead of the open cuts as well as above emplacement areas and stockpiles to intercept clean run-off and divert it around disturbed areas into the natural drainage system downstream of the mine.

- All mined areas (where works will take place) will be rehabilitated to control erosion and sedimentation.
- Existing vegetation must be retained as far as possible to minimize erosion.
- Rehabilitation of pits and waste dumps shall be planned and completed on a continuous basis in such a way that the run-off water (if any) will not cause erosion.
- Visual inspections shall be done on a regular basis with regard to the stability of water control structures, erosion and siltation (if required).
- Regular preventative maintenance should be carried out on site to ensure that the infrastructure is well maintained.

8.2.2.11 Topsoil disturbance

Topsoil shall be removed from all areas where physical disturbance of the surface will occur, prior to the disturbance occurring. Topsoil refers to that layer of soil covering the earth and which provides a suitable environment for the germination of seeds, allows the penetration of water, and is a source of micro-organisms, plant nutrients and in some cases seed.

Mitigation Measures to be enforced

- Topsoil shall be stored so that it can be placed on the exposed subsoil as soon as the mining of the excavation or the relevant section of it has been completed and its slopes have been finished off to the acceptable gradient as part of the rehabilitation process.
- Topsoil shall be stockpiled only in the areas dedicated for only that purpose, even if the topsoil is only partially cleared.
- The topsoil removed, shall be stored in a bund wall on the high ground side of the quarry and in such a way that it will not cause damming up of water or wash ways, or wash / blow away itself. Stockpiles will not exceed a height of **two** meters.
- Stockpiles shall be managed so as to maintain the re-growth potential of the topsoil. Should the stockpiles stand for too long (greater than 12 months) it can be considered

barren from a seed bank point of view. In this case reseeding may be required. Stockpiles should ideally be stored for no longer than six months.

- The overburden, i.e., that layer of soil immediately beneath the topsoil, will be removed and stored separately from the topsoil.
- No chemical pollution shall be allowed to contaminate the soils; any plant equipment found to be attributing to this shall be removed from the site and repaired.

8.2.2.12 Negative impacts on landscape

Mitigation Measures to be enforced

- Negative effects on the landscape can further be prevented through mitigations (i.e. keep existing trees, introduce tall indigenous trees).
- Mining pits should be levelled mining activities cease so as to restore the visual sense of place of the area to its natural state.
- The remains of all structures that may have been erected at the mine site shall be demolished and removed on completion of the project.
- Care must be taken to ensure that all rehabilitated areas are similar to the immediate environment in terms of visual character, vegetation cover and topography and any negative visual impacts will be rectified to the satisfaction of the environmental consultant.

Land contamination

Land is considered contaminated when it contains hazardous materials or oil concentrations above background or naturally occurring levels from anthropogenic activities.

Mitigation measures

- Limiting or preventing access to contaminant by receptors (actions targeted at the receptor may include signage with instructions, fencing, or site security)
- Educating receptors (people) to modify behavior in order to reduce exposure (e.g., improved work practices, and use of protective clothing and equipment)
- Providing an alternative water supply to replace, for example, a contaminated groundwater supply well
- Capping contaminated soil with at least 1m of clean soil to prevent human contact, as well as plant root or small mammal penetration into contaminated soils

- Paving over contaminated soil as an interim measure to negate the pathway of direct contact or dust generation and inhalation
- Using an interception trench and pump, and treat technologies to prevent contaminated groundwater from discharging into Omaruru river catchment system

8.2.2.13 Fire and Explosion Hazard

In cases where a fire or an explosion takes place on the mining site, the following mitigation measures should be taken to ensure safety of the people and reduce damage caused by the fire or explosion.

Mitigation Measures to be enforced

- A designated area needs to be identified as an assembly area where personnel meet in case of such incident. All employees, contractors and visitors should be made aware of this area through inductions conducted before entering the site.
- All personnel on duty should be accounted for to make sure that there is no one in direct danger of the incident.
- A fire and explosive management policy and procedures document for the site should be drafted and review on a regular basis and every employee should know the content of this document so that they can act accordingly when a fire or an explosion breaks out.
- Refresher courses on the content of the fire and management policy and procedure document should be given on a regular basis to ensure that the employees aware and are competent in reacting to such incidents.
- Sufficient fire extinguishers will be installed at selected locations such as mine office, garage. Sufficient water hydrants with sufficient water hydrants with sufficient length of hosepipes will be made available on the surface for fire protection.
- Sufficient training should be given to the mine personnel regarding the use of fire extinguishers and identifying the sources of the fires.

8.2.2.14 Health, safety and security

There are number of hazards associated with the movement of equipments and impact on dangerous parts of the equipment. The risk of an accident will be high if the dangerous parts are exposed and operators are poorly trained or supervised. This increases the possibility of injuries

and the responsible manager must ensure that all staff members are briefed about the potential risks of injuries on site.

Mitigation Measures to be enforced:
Safety on site

- All vehicular equipment operators must have valid licence for that particular vehicle class.
- The proponent should also test the competence of the individual drivers before they start operating.
- The mine site should be segregated into sections where only authorized personnel with a permit/pass can have access.
- Adequate lighting should be used during the night shift to provide lighting for the working personnel but not too bight to disturb the neighbors and the natural habitats of the area.
- Ensure that all mining personnel are properly trained for the work that they are responsible for on the mine site.
- The proponent should ensure regular refresher trainings are given to the employees.
- Provide for a first aid kit and a properly trained person to apply first aid when necessary.
- Restrict unauthorized access to the mining claim site and implement access control measures.
- Clearly demarcate the mining claim site boundaries along with signage of "no unauthorized access".
- Clearly demarcate dangerous areas and no go areas on site.
- Staff and visitors to the mining claim site must be fully aware of all health and safety measures and emergency procedures.
- The contractor must comply with all applicable occupational health and safety requirements.
- The workforce should be provided with all necessary Personal Protective Equipment where appropriate.
- Emergency medical treatment should be available on site.

General Health and Wellness of the Employees;

- A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases.
- Encourage HIV counseling and testing and facilitate access to Antiretroviral (ARV) medication.

Hazardous Materials Management

Occupational Health and Safety Management Plan should address applicable, essential elements of occupational health and safety managements applicable in the work place:

- Job safety analysis to identify specific potential occupational hazards and industrial hygiene surveys, as appropriate, to monitor and verify chemical exposure levels, and compare with applicable occupational exposure standards.
- Hazard communication and training programs to prepare workers to recognize and respond to workplace chemical hazards. Programs should include aspects of hazard identification, safe operating and materials handling procedures, safe work practices, basic emergency procedures, and special hazards unique to their jobs Training should incorporate information from Material Safety Data Sheets for hazardous materials being handled. MSDSs should be readily accessible to employees in their local language.
- Provision of suitable personal protection equipment (PPE) (footwear, masks, protective clothing and goggles in appropriate areas), emergency eyewash and shower stations, ventilation systems, and sanitary facilities.
- Monitoring and record-keeping activities, including audit procedures designed to verify and record the effectiveness of prevention and control of exposure to occupational hazards, and maintaining accident and incident investigation reports on file for a period of at least five years.

8.2.3. Negative Impacts on Socio-Economic

The **nature of impact** is outlined below:

- Impact from loss of grazing for domestic livestock in “exclusive use zone”
- Impacts on cultural and spiritual values.
- Demographic factors: Attraction of additional population that cannot benefit from the project.
- Perception of Health and Safety risks associated with lithium mining.
- Excessive noise at unusual times.

Mitigation Measures to be enforced:

- The population change can be mitigated by employing people from the local community and encouraging the contractors to employ local individuals.
- The perception of risks will be mitigated by putting up safety signs wherever possible and ensuring that all employees and visitors to the site undergo a safety induction course.

Methods for monitoring:

- Public meetings will be held by the proponent whenever necessary.
- Regular meeting with the Interested and affected parties, where they can air their concerns should be done four times in a year.
- The outcome of these meeting should be recorded in a form of a report and the proponent needs to address the issues raised in this meeting.

Environmental Management Plan, Organization and Implementation

The environmental aspects which may be affected by the proposed project have been categorized into negative and positive impacts as an extension of the preceding sections. This section summarizes the objectives, indicators to be observed, schedules be adhered to and roles and responsibilities of various stakeholders to the EMP.

Table 13: Roles and responsibilities of various stakeholders to the EMP

Role	Responsibilities and duties
Proponent	− Responsible for the management and implementation of the EMP − Ensure environmental policies are communicated to all personnel throughout the proposed project and that employees understand the guidelines of the EMP − Responsible for providing the resources required to complete the project tasks − Appoint a safety health and environment manager and supporting officers, and − Ensure all workers are inducted on safety measures.
Safety Health nad Environment management	− Oversee safety health and environment related activities − Monitor daily operations and ensure adherence by personnel to the EMP − Maintain the community issues and concerns register and keep records of complaints, and − Maintain an up-to-date register of employees who have completed site induction. − Receive, recording and responding to complaints − Ensure adequate resources are available for the implementation of the EMP − Ensure safe and environmentally sound operations, and − Responsible for the management, maintenance, and revisions of this EMP
Foreman on duty	− Ensure that all contract workers, sub-contractors and visitors to the site are aware of the requirements of this EMP, relevant to their roles and always adhere to this EMP − Report any non-compliance or accidents to the Safety Health and Environment Manager.
Employees	− Adhere to measures set out in the EMP − Ensure they have undertaken a site induction, and − Report any operations or conditions which deviate from the EMP as well as any non-compliant issues or accidents to the environmental manager

The table above is summarized below, with the following parties to aid in overseeing that the overall objective of this document is met;

- Management Committee
- Safety Health and Environment Manager
- Safety and Health Officer
- Environmental Officer
- Foreman on duty
- Personnel on duty/ employees

The following table emphasizes the role of each officer in the different management plans discussed in the previous section.

Table 14: Implementation of the objectives should be adhered to as indicated in the table.

Objectives	Indicators	Responsibility
To avoid any form of hydrocarbon spills on and around the mining site	No hydrocarbon spillage or/and remnants of hydrocarbon spillage shall be visible around the project site	Personnel on duty, Foreman on duty
To avoid any form of liter be it paper, metal, plastic and human waste on and around the mining site	No litter or/and remnants of liter shall be visible around the project site	All employees, Environmental Officer, safety, Health and Environment Manager.
To minimize land and soil disturbance	Driving tracks and excavation shall be restricted and only be visible within the project site.	Personnel on duty, Foreman on duty and Environmental Officer.
To protect and conserve fauna and flora within the project area	Minimum levels of habitat disturbance	Safety, Health and Environment Manager, Environmental Officer and personnel on duty
To minimize dust generation on site and atmospheric pollution	Emissions/generation particulate content of the dust around the site and gravel roads shall not exceed maximum allowable concentration that may affect human being and animals	Foreman on duty, Environmental Officer and Safety Health and Environment Manager.
To ensure compliance with statutory requirements	Assurance measures shall be put in place and Periodic inspections aimed at corrective action undertaken, recorded and documented	Environmental Manager, Safety Health and Environment Manager.

The following tables gives the mitigation measures to be undertaken during construction, operation, closure and decommissioning phases with the proponent responsible for implementation.

Table 10: Summary of Environmental Management Plan during construction, operation and decommissioning phases

Construction phase			
Environmental impacts	**Proposed mitigation measures**	**Responsibility**	**Monitoring plan**
Air pollution	• Regular maintenance of vehicles and equipments. • Brief workers and contractors. • Control speed and operation of construction vehicles. • Regular maintenance of vehicles, construction equipments and heavy machineries. • Provide workers with dust masks.	Personnel on duty, Foreman on duty and Environmental Officer	• Amount of dust produced. • Level of landscaping executed.
Noise pollution	• All noise should be kept within reasonable levels. • Employees and neighbors should be notified of any scheduled unusual noise. • Regular maintenance of vehicles, equipments and heavy machinery. • Workers should be provided with personal hearing protection if working in a noisy environment.	Foreman on duty, Environmental Officer, Safety Health and Environment Manager.	• Amount of noise produced
Solid waste	• Littering should be discouraged by having strategically placed bins and refuse skips on site. • Recycling plastic, paper and cans should be encouraged on site • The bins should be emptied on a regular basis by the proponent or an independent contractor. • The site should have containers with bulk storage facilities at convenient points to prevent littering.	Personnel on duty, Environmental Officer and Safety Health and Environment Manager	• Presence of dust bins/waste collection points.

Oil leaks and spills	• Contactor should have a sealed designated area where maintenance is carried out to prevent percolation of contaminants. • Oil products should be handled carefully on bounded surfaces; in case it leaks. • Vehicles and equipment should be well maintained to prevent oil leaks.	Personnel on duty, Foreman on duty Environmental Officer and Safety Health and Environment Manager	• Absence of oil spills and leaks on site.
First aid	• A well-stocked first aid kit shall be maintained by a qualified personnel.	Safety Health and Environment Manager, Safety and Health Officer.	• Contents of the first aid kits.
Visual	• Environmental considerations will always be adhered to before clearing roads, trenching and excavation.	Safety Health and Environment Manager, Environmental Officer	• Employees to be trained on how to minimize impacts that can easily be identified with the eye.
Archaeological sites	• Buffer zones will be created around the sites. • Adhere to practical guidelines provided by the responsible archaeologist to reduce archaeological impacts of quarrying activities. • All archaeological sites to be identified and protected before development commences.	All personnel on duty, Environmental officer, Safety Health and Environment Manager	• Register of all archaeological sites identified.
Occupational health and safety	• Provide personal protective equipments, train workers on personal safety, and how to handle equipments and machines. • A well-stocked first shall be maintained by qualified personnel. • Report any accidents/ incidences and treat and compensate affected workers. • Provide sufficient and suitable sanitary conveniences	Safety and Health Officer, Safety Health and Environment Manager	• Workers using personal protective equipments. • Availability of a well-stocked first aid box. • Clean sanitary

	which should be kept clean.		facilities.
Fauna	• Some habitat areas such as the river and tunnel outcrops will be avoided wherever possible. • A fauna survey will be conducted to determine the effect of fragmented habitat to game species should the need arise. • No animals shall be killed, capture or harmed in any way. • No food stuff shall be left lying around as this will attract animals which may result in human-animal conflict.	Personnel on duty, Environmental Officer, Safety Health and Environment Manager	• Regular monitoring of any unusual signs of animal habitat.
Alien invasive plants	• Ensure vehicles and equipment are clean of invasive plants and seeds. • Eradicating alien plants using area management plan. • Contain neighboring infestations and restrict movement of invasive plants from adjacent lands • Educating everyone on site on types of invasive plants.	Environmental Officer, Environmental Manager	• Regular monitoring of any signs of alien plants.
Loss of vegetation	• Environmental considerations will be adhered to at all times before clearing roads, trenching and excavating. • The movement of vehicles in riverbeds, rocky outcrops and vegetation sensitive area will be avoided. • The movement of vehicles will be restricted to certain tracks only.	Environmental Officer, Safety Health and Environment Manager	• Warning signs on site • Restored vegetation

Operational Phase			
Environmental /Social Impact	**Proposed mitigation measures**	**Responsibility**	**Monitoring plan**
Noise pollution	• All noise should be kept within reasonable levels. • Employees and neighbors should be notified of any scheduled unusual noise. • Regular maintenance of vehicles, equipment and heavy machinery. • Workers should be provided with personal hearing protection if working in a noisy environment.	All employees, Safety Health and Environment Manager Environmental Officer	• Amount of noise produced
Visual	• Environmental considerations will be adhered to at all times before clearing roads and excavations	Safety Health and Environment Manager Environmental officer	• Employees to be trained on how to minimize visual impacts
Fauna	• Some habitat areas will be avoided where possible. • A fauna survey will be conducted to determine the effects of fragmented habitat game species should the need arise. • No animal shall be kept, captured, killed or harmed in any way. • No food stuff will be left lying around as these will attract animals which may result in human-animal conflict.	All employees, Environmental officer Safety Health and Environment Manager	• Regular monitoring of unusual signs of animal habitat.
Alien invasive plants	• Ensure debris is properly disposed of. • Ensure vehicles and equipment are clean of invasive plants and seeds. • Contain neighboring infestations and restrict movement of invasive plants from adjacent lands • Educating everyone on site on types of invasive plants. Eradicating alien invasive plants by using an area management plan.	Safety Health and Environment Manager Environmental officer Foreman and personnel on duty	• Regular monitoring of any signs of alien invasive plants

Loss of vegetation	• Environmental considerations will be adhered to at all times before clearing roads, trenching and excavations. • Paths and roads will be aligned to avoid root zones. • Permeable materials will be used where ever possible. • Movement of vehicles in riverbeds, rocky outcrops and vegetation sensitive areas will be avoided and restricted to certain tracks only.	Safety Health and Environment Manager	• Restored vegetation
Solid waste	• Minimize solid waste generated on site. • Encourage segregation of waste on site • Debris should be collected by waste collection contractor. • Excavated waste should be piled at a designated approved location.	Safety Health and Environment Manager Environmental Officer All foremen, personnel on duty	• Amount of waste on site. • Availability of dust bins, waste collection point.

Oil leaks and spills	• Machinery should be well maintained to prevent oil leaks. • Contractors should have a designated area where maintenance is carried out and should be underlain by impermeable layer. • Workshops should be bounded by concrete	Environmental Officer, Safety Health and Environment Manager,	• No observed/detected oil spills and leaks on site

		Foremen, personnel duty	
Archaeological sites	• Buffer zones will be created around the sites. • Adhere to practical guidelines provided by an archaeologist to reduce archaeological impact of quarrying activities. • All archaeological sites to be identified and protected before further quarrying commences.	Environmental and safety manager	• Up to date register of all archaeological sites identified in the vicinity.
First aid	• A well-stocked first aid kit shall be maintained by qualified personnel.	Safety and health Officer, Safety Health and Environment Manager	• Contents of the first aid kit.
Fire preparedness	• Fire incidence firefighting emergency response plan. • Ensure all firefighting equipments are always available regularly maintained, serviced and inspected. • Fire hazard signs and directions to emergency exit, route to follow and assembly point in case of any.	Health safety officer Safety Health and Environment Manager	• Fire signs put up in strategic places. • Availability of well-maintained firefighting equipments.

Environmental health and safety	• Train workers on personal safety and disaster preparedness. • Provide sufficient and suitable sanitary conveniences which should be kept clean. • Conduct annual health and safety audits. • Report any accidents/incidences, treat and compensate affected workers. • A well-stocked first aid kit shall be maintained by qualified personnel.	Safety Health and Environment Manager	• Provide sanitary facilities. • Copies of annual audit.

Decommissioning phase			
Impacts	**Proposed mitigation measures**	**Responsibility**	**Monitoring plan/Indicator**
Noise and air pollution	• Personal hearing protection must be worn by workers in noisy section. • Regular maintenance of vehicles, equipments, heavy machinery on regular basis. • Workers should be provided with dust mask to wear at all times.	Health safety and Environment Manager	• Amount of noise and dust generated

	• Decommissioning work can only be carried out during the day.	Environmental Officer	
Disturbed physical environment	• Undertake a complete a complete environmental restoration programme and introducing appropriate vegetation for ground stabilization.	Health safety and Environment Manager Environmental Officer	
Solid waste	• Solid waste should be collected by contracted waste collection company. • Excavation waste should be used or backfilled • Open pit must be fenced of o avoid animals and unauthorized people from entering. • Waste dumps must be sloped and lined with top soil to allow re-germination of grasses	Health safety and Environment Manager Environmental Officer	• Amount of waste on site. • Presence of well-maintained receptacles and central collection point.
Occupational health and safety	• Train workers on personal safety and how to handle equipments and machines. • Provide personal protective equipments (PEE). • A well-stocked first aid kits shall be maintained by qualified personnel. • Demarcate area under decommissioning.	Health and safety officer, Environmental Officer, Health safety and Environment manager	• Workers using protective equipments. • Availability of a first aid box.

Monitoring, reporting and corrective action

8.3.1 Monitoring of EMP

Monitoring of the EMP performance for the proposed project by the Contractor emphasizes early detection, reporting, and corrective action. It is divided into three parts, namely:

- Monitoring of project activities and actions to be undertaken by the Environmental Officer and the Safety Health Manager appointed by the proponent.
- All incidences and situations which have the potential of jeopardizing compliance of statutory provisions as well as provisions of this EMP should be reported to the environmental manager and ultimately the executive management committee.
- The Environmental officer and safety and health manager shall take corrective prompt measures, adequate and long-lasting in addressing non-compliance activities.

To ensure compliance of the implementation of the EMP, it is highly recommended that a safety health and environment manager is appointed by the proponent to ensure the implementation of the EMP.

8.3.2 Inspections and Audits

During the life of the mine, performance against the EMP commitments will need to be monitored and corrective action taken where necessary, in order to ensure compliance with the EMP and relevant environ-legal requirements.

8.3.2.1 Internal Inspections/Audits

The following internal compliance monitoring programme will be implemented:

1. Project kick-off and close-out audits will be conducted on all contractors. This applies to all phases, including drilling contract work during operations:
    - Before a contractor begin any work, an audit will be conducted by the applicable phase site manager to ensure that the EMP commitments are included in Contractors' standard operating procedures (SOPs) and method statements.
    - Following completion of a Contractors work, a final close-out audit of the contractor's performance against the EMP commitments will be conducted by the applicable phase site manager.
2. Monthly internal EMP performance audits will be conducted during the construction, operation and decommissioning phases.

3. Ad hoc internal inspections can be implemented by the applicable manager at his/her discretion, or in follow-up to recommendations from previous inspection/audit findings.

8.3.2.2 External Audits

- At the end of each project phase, and annually during the operational phase, an independently conducted audit of EMP performance will be conducted.
- Specialist monitoring/auditing may be required where specialist expertise are required or in order to respond to grievances or authorities directives.
- Officials from the DEA may at any time conduct a compliance and/or performance inspection of quarrying operations. The proponent will be provided with a written report of the findings of the inspection. These audits assist with the continual improvement of the quarrying project and the proponent will use such feedback to help improve its overall operations.

8.3.3 Documentation

Records of all inspections/audits and monitoring reports will be kept in line with legislation. Actions will be issued on inspection/audit findings. These will be tracked and closed out.

8.3.4 Reporting

Environmental compliance reports will be submitted to the Ministry of Environment, Forestry on a bi-annual basis.

8.3.5 Environmental management system framework

Environmental Management System (EMS) will be established and implemented by the proponent and their Contractors. This subchapter establishes the framework for the compilation of a project EMS. The safety, health and environment manager will maintain a paper based and/or electronic system of all environmental management documentation. These will be divided into policy and performance standards &Enviro legal documentation.

Enviro-Legal Documentation

A copy of the approved environmental assessment and EMP documentation will always be available by the proponent. Copies of the Environment Clearance Certificate and all other associated authorizations and permits will also be kept onsite with the safety, health and environment manager. In addition, a register of the legislation and regulations applicable to the project will be maintained and updated as necessary.

Impact aspect register

A register of all project aspects that could impact the environment, including an assessment of these impacts and relevant measures is to be maintained. This Draft EMP identifies the foreseeable project aspects and related potential impacts of the proposed project, and such forms the basis for the aspect Impact Register with the project activities. It should however be noted that during the life of the project additional project aspects and related impacts may arise which would need to be captured in the Aspect-Impact Register.

8.3.6 Procedures and Method Statements

In order to affect the commitments contained in this EMP, procedures and method statements will be drafted by the relevant proponent (safety health and environment manager) and Contractors. These include, but may not be limited:

- Standard operating procedures for environmental action plan and management programme execution.
- Incident and emergency response procedures.
- Auditing, monitoring and reporting procedures, and
- Method statements for EMP compliance for ad hoc activities not directly addressed in the EMP action plans.

All procedures are to be a version controlled and signed off by the safety health and environment manager. In addition, knowledge of procedures by relevant staff responsible for the execution thereof must be demonstrable and training records maintained.

Site Map

An up to date map of the he mining area indicating all project activities is to be maintained. In addition to the project layout, the following detail must be depicted:

- Materials handling and storage;
- Extent of pit as mining progresses
- Waste management areas (collection, storage, transfer, etc.);
- Sensitive areas;
- Incident and emergency equipment locations; and Location of responsible parties.

Environmental management schedule

A schedule of environmental management actions is to be maintained by the applicable phase site managers and/or relevant Contractors. A master schedule of all such activities is to be kept up to date by the manager. Scheduled environmental actions can include, but are not limited to:

- Environmental risk assessment;
- Environmental management meetings;
- Soil handling, management and rehabilitation;
- Waste collection;
- Incident and emergency response equipment evaluations and maintenance
- Environmental training;
- Stakeholder engagement;
- Environmental inspections and
- Auditing , monitoring and reporting

8.3.7 Change Management

The environmental management schedule must have a procedure in place for change management. In this regard, updating and revision of environmental documentation, of procedures and method statements, actions plants etc. will be conducted as necessary in order to account for the following scenarios:

- Changes to standard operating procedures (SOPs);
- Changes in scope;
- Ad hoc actions;
- Changes in project phase; and
- Changes in responsibilities or roles

All documentation will be version controlled and require sign off by the applicable phase site managers.

8.4 Environmental code of conduct

The Code of Conduct outlined in this section of the EMP applies to, subcontractors, visitors, permanent and temporal workers. Therefore, anybody within the boundaries of the mine site must adhere to the Environmental Code of Conduct as outlined in this section of the EMP.

The safety health and environment manager will implement on-site environmental guidelines and has the authority to issue warnings as well as discipline any person who transgresses environmental rules and procedures. Persistent transgression of environmental rules will result in a disciplinary hearing and thereafter continued noncompliance behavior will result in permanent removal from the construction sites.

8.5 Site closure and rehabilitation

Introduction

The closure period will commence once the last planned blocks of lithium ore has been extracted from the pit, at the end of the active mining period. The scope of the proponent site rehabilitation emphasizes the previously removed top soil and overburden rocks to be gently sloped and distributed evenly so that natural vegetation can regrow. It is also required that pits are properly fenced off to avoid unauthorized entry and incidental fall ins of animals. Mine rehabilitation is the process of repairing the damage done by mining activities. Rehabilitation has been planned with a main aim of returning disturbed environment close to its pre mining state. It is also planned to cater for the access road, vehicle tracks around the site, removal, and restoration of areas covered by stockpile and rock piles. The closure vision for the proposed project is to establish a safe, stable and non-polluting post-prospecting landscape that can facilitate integrated, self-sustaining and value generating opportunities, thereby leave a lasting positive legacy.

8.5.1 Site closure and rehabilitation

All waste (such as hazardous and domestic) waste will be transported offsite for disposal in licensed landfill close to the mining site. Disturbed or/and contaminated areas will be cleaned up, treated where necessary and restored to its pristine state.

- Where access roads have been developed in cases where there are no roads, these will be rehabilitated and closed as part of normal closure actions.
- Rehabilitated area will be re-vegetated with the objective of creating a sustainable ecosystem. Vegetation establishment will be in line with a project area’s indigenous vegetation.

- The recovered topsoil and subsoil should be utilized to reconstruct the original soil profile.
- All rehabilitated areas shall be considered no go areas and the safety health and environment manager shall ensure that none of the staff members enters the area after rehabilitation.
- A site inspection will be held after completion of the mining process to determine the nature and scope of the rehabilitation work to be undertaken. The rehabilitation will be done to the satisfaction of both the proponent and METF.

8.5.3 Closure Assumptions

This closure plan has been developed based on limited available information including environmental data. Some of the information currently available may need to be supplemented during the operational period. Therefore, several assumptions were made about general conditions, and closure and rehabilitation of the facilities at the site to develop the proposed closure actions. As additional information is collected during operations, these assumptions will be reviewed and revised as appropriate.

The assumptions used to prepare this plan include the following:

- The closure period will commence once the last planned weight of minerals has been extracted from the site.
- The proposed mining sites will be adhered to minimize the potential impacts.
- Vegetation establishment will be in line with a project area's indigenous vegetation.
- Water management infrastructure developed for the operational phase will be retained for closure /end of the life of the project as necessary.
- There are limited opportunities for any infrastructure to be built on site and if any infrastructure is built, it will be of limited benefit to the community. Therefore, all buildings will be demolished.
- All hazardous and domestic waste will be transported offsite for disposal in licensed landfills.
- No roads are anticipated to be constructed to access the site; existing roads will be used as far as possible. Where access tracks have been developed in cases where there are no roads, these will be rehabilitated and closed as part of normal closure actions.

8.5.4 Closure and Rehabilitation Activities

The rehabilitation actions intended to be undertaken at the end of the life of the proposed mining activities are described below.

8.5.4.1 Infrastructure

All infrastructures will be decommissioned, and the footprints rehabilitated for the establishment of vegetation. Material inventories will be managed near the end of mining activities to minimize any surplus materials at closure. Where practicable, equipment and materials with value not needed for post-closure operations will be sold and or removed from the site. Equipment with scrap or salvage value will be removed from the site and sold to recyclers.

A soil contamination investigation will be conducted on completion of demolition activities. The purpose of this is to identify areas of possible contamination and design and implement appropriate remedial measures to ensure that the soil contaminants are removed. Closure actions will include:

- All power and water services to be disconnected and certified as safe prior to commencement of any decommissioning works;
- All remaining inert equipment and decommissioning waste will be disposed to the nearest licensed general waste disposal facility;
- Salvageable equipment will be removed and transported offsite prior and during decommissioning;
- All tanks, pipes and sumps containing hydrocarbons to be flushed or emptied prior to removal to ensure no hydrocarbon/chemical residue remains;

8.5.4.2 Roads

Existing roads will be used as far as possible. Closure actions concerning roads and parking areas will include:

- Removal of all signage, fencing, and shade structures, traffic barriers, etc.
- All ‘hard top’ surfaces to be ripped along with any concrete structures.
- All potentially contaminated soils are to be identified and demarcated for later remediation; and
- All haul routes that have been treated with saline dust suppression water need to be treated, with the upper surface ripped and removed to designated contaminant disposal areas.

8.6 Remediation of Contaminated Areas

All soil, contaminated with hydrocarbons, will be identified, excavated, if possible, to at least 200 mm below the contaminated zone and then treated.

- All tanks, pipes and sumps containing hydrocarbons will be flushed or emptied.
- Removed soils will be managed as determined by the nature and extent of the contamination.
- Liquid storage tanks will be emptied, the structure removed/demolished and sub-surface holes filled; and
- All equipment in which chemicals have been stored or transported will be cleaned and disposed of in a suitable disposal facility.

8.6.1 Vegetation

Successful re-vegetation will help control erosion of soil resources, maintain soil productivity and reduce sediment loading in streams utilizing non-invasive plants that fit the criteria of the habitat (e.g. soils, water availability, slope and other appropriate environmental factors). Invasive species will be avoided, and the area will be managed to control the spread of these species. To counter the effects of erosion, naturally occurring grassland species will be planted on slopes. These species will provide soil holding capacity and reduce runoff velocity. The flatter areas will be re-vegetated with the objective of creating a sustainable ecosystem. The occurrence of protected plant species will need to be determined before vegetation is removed and the required permits will be obtained for either destruction or relocation.

8.6.2 Waste Management

Waste management activities will include:

Hazardous waste will be managed handled, classified and disposed.

- Non hazardous substances will be disposed in the nearby landfill sites.
- Scrap and waste steel will be sold to recyclers
- It may be necessary to fence temporary salvage yards for security reasons, particularly where these are located close to public roads.

9. Public Participation Process

The public participation process commenced with a total of 5 newspaper advertisements in two widely distributed newspapers (Windhoek Observer and Confidente) for two consecutive weeks. Known interested and affected parties were notified directly via mail. Registered mail letters were also sent to the farm owners. Interested and affected parties that were notified directly include farmers, government departments, regional council, Namwater, Chamber of Mines and individuals that may be affected by the quarrying activities. No negative concerns were received so far, however should any interested and affected parties raise any

concerns during the ongoing project phase, the Ministry of Environment, Forestry and Tourism will be immediately notified.

10. Conclusion and recommendations

The above Environmental Management Plan, if properly implemented, will help to minimize adverse impacts on the environment. Where impacts occur, immediate action must be taken to reduce the escalation of effects associated with these impacts. The Environmental Management Plan should be used as an on-site reference document during all phases of the proposed project, and auditing should take place in order to determine compliance with the EMP for the proposed site. Parties responsible for transgression of the EMP should be held responsible for any remediation that may need to be undertaken. The EMP Consultants are confident that the potential negative impacts associated with the proposed activities on site can continue to be mitigated by effectively implementing the recommended management action measures and their monitoring.

This report covers the environmental assessment for the construction, operation, operation, ongoing monitoring and rehabilitation and decommissioning, closure and aftercare of the lithium mine and supporting infrastructure. It should be viewed as a framework for integrating mitigation measures and applicable legal tools to ensure both compliance and sustainability. Potential impacts of the proposed mining activities and associated infrastructure and facilities were cumulatively assessed, where relevant, taking the existing environment and all other activities and facilities associated with the proposed mining into consideration. It was however taken into consideration that no mining/processing activities are currently being undertaken it is therefore very important that the proponent provides adequate support for human and financial resources, for the implementation of the proposed mitigations and effective environmental management during the exploration activities. The proponent must implement and adhere to all the provisions of the EMP report and environmental monitoring shall be implemented.

It is hereby recommended that proposed of the lithium mine and supporting infrastructure be granted an Environmental Clearance Certificate, provided that: All mitigations provided in this EMP should are implemented as stipulated and where required and emphasized, improvement should be effectively put in place. The proponent shall prepare address all the impacts identified as medium and high rated impacts. The Proponent and all their workers comply with the legal requirements governing this type of project and its associated activities. The proponent shall negotiate further Lease Agreements with the owners of any farms falling within the ML area.

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Appendix E: Registered IAP's

Name	Organization	Tel	Email
Christian Traupe	Amadeus Pty Ltd-Farm Goedehoop 117		imbusch@hotmail.co.uk
Alex Busch	Projects general mananger- Aqua services& Engineering	061-257 628	Alex Busch.alex @ase.com.na
C Orthman	MAWF- Deputy Director Water Environment	061-2087158	Cynthia.Ortmann@mawf.gov.na
C. Sisamu	Nampower	061-2052350	Calvin.Sisamu@nampower.com.na
C. Tubalike	MURD	061-2975062	ctubalike@murd.gov.na
Rachel Iilonga	Kohero 113 farm		rmiilonga@yahoo.com
E de Paauw	Roads Authority - Specialised road Legislation, Advise & Compliance	061-2847 027	dePaauwe@ra.org.na
E Muremi	Ministry of Health and Social Services Director Khomas Region	061-2035 001	Elizabeth.Muremi@mhss.gov.na
E. Shivolo	Min. of M&E - Mining Commissioner	061-2848111	Erasmus.Shivolo@mme.gov.na
Esmerialda Strauss	CHIEF FORESTER National Botanical Research Institute (NBRI)	061-2022017	Esmerialda.Strauss@mawf.gov.na
Christian Traupe	Traupe farming cc-Farm Okarund N 118, Okarundu NW 121, Kawab 117		imbusch@hotmail.co.uk
F. Sikabongo	MET - Deputy Director of Directorate of Environmental Affairs	061-2842701	frederick.Sikabongo@met.gov.na
Fransiska Nghitila	NWR-Environmental and Compliance Specialist	061-2857190	Fnghitila@nwr.com.na; fnghitila@gmail.com
Gert Fourie	Nampower - Engineering, Planning and Design	061-2054111	gert.fourie@nampower.com.na
M. Amakali	MAWF - Director Water Resource Management	061-208 7266	amakalim@mawf.gov.na; Maria.Amakali@mawf.gov.na
Tanja Dahl	Namibia Agricultural Union	061-237 838	nau@nau.com.na

Appendix C: Registered IAP's

Name	Organization	Tel	Email
B. Korhs	Earth life Namibia	061-2022041	earthl@iway.na
C. Sisamu	Nampower	061-2052350	Calvin.Sisamu@nampower.com.na
C. Tubalike	MURD	061-2975062	ctubalike@murd.gov.na
Coleen Mannheimer	061-2022021	manfam@iafrica.com.na	
E de Paauw	Roads Authority - Specialised road Legislation, Advise & Compliance	061-2847027	dePaauwe@ra.org.na
E Muremi	Ministry of Health and Social Services Director Khomas Region	061-2035001	Elizabeth.Muremi@mhss.gov.na
E. Shivolo	Min. of M&E - Mining Commissioner	061-2848111	Erasmus.Shivolo@mme.gov.na
Esmerialda Strauss	CHIEF FORESTER National Botanical Research Institute (NBRI)	061-2022017	Esmerialda.Strauss@mawf.gov.na
F Kreitz	Namibian Environment and Wildlife Society - Media, website and newsletter	061-306450	Information@NEWS-Namibia.org;
F. Sikabongo	MET - Deputy Director of Directorate ofEnvironmental Affairs	061-2842701	frederick.Sikabongo@meft.gov.na
Fransiska Nghitila	NWR-Environmental and Compliance Specialist	061-2857190	Fnghitila@nwr.com.na; fnghitila@gmail.com
Sonja Loots	Manager: Threatened Plants Programme, National Botanical Research Institute	061-2022014	Sonja.Loots@mawlr.gov.na sonja.loots.solo@gmail.com
MrNoroab	Karibib Town Council	067-331057	