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Title	Environmental Management Plan for the exploration activities for Base & Rare Metals, Dimension Stone, Industrial Minerals & Precious Metals targeting raw lithium ore on EPL; 7248, Uis District, Dâures Constituency, Erongo Region, Namibia.		
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ABBREVIATIONS

AIDS	Acquired Immuno-Deficiency Syndrome
ESA	Environmental & Social Assessment
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
GG	Government Gazette
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
HIV	Human Immuno-deficiency Virus
I&APs	Interested and Affected Parties
NHCN	National Heritage Council of Namibia
PR	Proponent's Representative
Reg.	Regulation
S	Section
TB	Tuberculosis

1. INTRODUCTION

Significant concentrations of lithium mineralisation have been established in Namibia.The proponent intends to explore for raw lithium ore as granitic pegmatite at identified mining sites on the EPL 7248, Uis District, Dâures Constituency, Erongo Region, Namibia. The pegmatites of the Damara Orogen occur in five major belts with those in the Southern Tin and Karibib Pegmatite Belts often being large, well zoned Li-Be- gem tourmaline bearing pegmatites belonging to the Lithium Caesium Tantalite family. The pegmatites on the EPL 7248 form part of the Karibib Pegmatite Belt. Large parts of the area around the EPL 7248 and/or deposit are covered by thick alluvium and calcrete which makes it difficult to ascertain the exact orientation of the main pegmatite. A number of pegmatite bodies have been identified in the hanging wall and footwall to the main pegmatite to form a series of pegmatite sills. A number of other potential mineralised pegmatites have also been identified on the EPL 7248, Uis District, Dâures Constituency, Erongo Region, Namibia. When processed to its pure form Lithium (Li) is the lightest metal on Earth and is used in batteries to power various electrical and electronic goods including mobile phones and electric cars.

The mineralisation of economic interest is found in zoned complex petalite-lepidolite-amblygonite bearing Lithium Caesium Tantalite pegmatite sills. The pegmatites also contain minor amounts of niobium and tantalum, caesium and rubidium mineralisation. At the targetted sites, the main lithium minerals present are lithium micas (comprising lepidolite and/or zinnwaldite) and petalite. Historical mining has also produced waste dumps and slimes dumps that contain potential lithium mineralisation hosted in lepidolite (and possibly petalite).

Mining is an important sector in the Namibian economy. The sector contributes significantly to GDP, export revenues and government tax receipts. The expansion and development of this sector is however constrained by mainly insufficient investment in mineral exploration. Globalisation has impacted on the market for international investments by increasing the levels of competition for financial resources.

The Government of Namibia recognises that the exploration and development of its mineral wealth could best be undertaken by the private sector. Government therefore focuses on creating an enabling environment through appropriate competitive policy and regulatory frameworks for the promotion of private sector investment coupled with the provision of national geo-scientific data bases essential for attracting competitive exploration and mining (Draft Minerals Policy of Namibia, MME).

The EMP will be a living document, developed in consultation with investors, to be reviewed and updated after two years. More broadly, it will provide a blueprint for handling environmental issues related to the exploration activities for Base & Rare Metals, Dimension Stone, Industrial Minerals & Precious Metals targeting raw lithium ore on EPL; 7248, Uis District, Dâures Constituency, Erongo Region, Namibia over the next 25 years, within the broader context of environmental and social sustainability.

1.1 Benefits and target population

Managing and mitigating environmental problems in the mining sector would yield economic benefits from improved human health and ecosystem functions in the Uis area where the EPL 7248 is situated in the Dâures Constituency, Erongo Region, Namibia, approximately 30 Km West of Uis, when using the C35 road from Uis to Henties Bay in Erongo Region. Health benefits will accrue from reduced exposure to environmental pollution and to the risk of accidents. The Project would also indirectly help improve worker health and safety conditions in existing and future mining enterprises, by strengthening the regulatory framework.

The proposed project will indirectly benefit the people of Namibia by removing a potential impediment to new private investments. The proposed project will improve the capacity of mandated national agencies to regulate mining activities. It will strengthen the management and planning capacities of Ms. Tjinouhona Batseba Kavita , and of delegated authorizing agencies such as MEFT:DEA, and improve the skills of staff from these agencies to do strategic planning, monitoring, and to evaluate environmental issues and proposed mitigation measures. The Project would also help strengthen national capacity in environmental management through consultancies, studies and targeted training.

1.2 The main environmental issues related to the exploration activities for Base & Rare Metals, Dimension Stone, Industrial Minerals & Precious Metals targeting raw lithium ore on EPL; 7248, Uis District, Dâures Constituency, Erongo Region, Namibia are:

a) Air Pollution

The major environmental issue on the EPL 7248 is air pollution. The dust generated during exploration and transportation of the lithium ore can severely affect the health of neighboring populations (especially respiratory problems).

b) Soil Contamination

Impacts on soil may result from vehicle traffic, drilling and materials storage resulting in soil erosion; impacts on soil structure (mainly compaction) and soil chemistry (as a result of petrochemical spills). Further soil contamination from exploration operations, chemical and oil spills might also occur. Soil from sites contaminated by oil laced with polychlorinated biphenyl (PCBs), by redundant chemicals or other hazardous waste (including empty explosive cartridges) must be properly removed and disposed of.

c) Water pollution

The quality and quantity of surface or groundwater resources may be impacted by poor storage of chemicals and fuels resulting in spillage; inappropriate waste disposal practices and soil erosion. The pollution has an impact on human health and ecological functions that is not fully determined since they are no any nearby natural water sources at the EPL site. A borehole will be drilled for portable water for the mine exploration staff and water samples will be regularly taken for water quality testing at the Namibian Standards Institution at their Walvis Bay Laboratory. The pollution from the waste rock dumps and the tailings needs to be contained and the sites rehabilitated.

d) **Potential Environmental Impacts**

There will be no processing plant at this exploration site. There will be only the loading bay area of the lithium ore stockpiles. The ore will be loaded with a heavy duty front-end loader into a tipper truck for transportation to Walvis Bay port for export to target markets for further analysis.

The main foreseen environmental problems at the EPL 7248 are loss of biodiversity due to vegetation clearance, air and noise pollution, soil and ground water contamination, poor modern sanitation, change of sense of place for those who live around the exploration sites. In equipment selection, it is necessary to consider the sources of power to be used for the equipment. In lithium mining, drilling is a major part of the production process. Consideration should be given to hydraulic drill rigs, as the energy conversion cycle is far more efficient than with pneumatic drilling. However, due to technical and labour considerations, drilling may be conducted by pneumatic drills, and consideration should be given to using electrical compressors if infrastructure is available. Internal roads leading off the C35 road from Uis to Henties Bay should be designed in such a way as to avoid soil erosion and to cause as little disturbance to

flora as possible. Maintenance workshops should be designed to avoid contamination of soil and water by spilled fuel and lubricants. An important factor is the choice of location of the waste rock dumps, and these will be sited in such a way as to minimise the visual impact where possible, far away from the C35 road.

An Environmental Management Plan (EMP) is one of the most important outputs of the environmental assessment process as it synthesises all of the proposed mitigation and monitoring actions, set to a timeline and with specific assigned responsibilities. This EMP details the mitigation and monitoring actions to be implemented during the following phases of these lithium exploration activities:

- Lithium ore Exploration Phase – the period during which the proponent, having dealt with the necessary legislative and administrative arrangements, appoints a contractor to engage in the exploration of lithium ore from the mining site at EPL 7248 to be transported to the Walvis Bay Port for export purposes & further processing;
- Transportation Phase- the period during which the proponent transports the lithium ore from the mine to Walvis Bay port for export.
- Operation and Maintenance – the period during which the services infrastructure will be fully functional and maintained.

The decommissioning of these developments is not envisaged any time soon; however in the event that this should be considered some recommendations have been outlined in **Table 12.**

1.3 Environmental Management and Monitoring Plan

This EMP presents the various impacts as identified from the site visit (February, 2022) at EPL 7248 situated in the Dâures Constituency, Uis District, Erongo Region, Namibia and the mitigation measures that must be put in place at the lithium ore deposit within EPL 7248 in order to reduce the negative impacts of the project on the environment. The proponent, Ms. Tjinouhona Batseba Kavita is encouraged to implement the recommendations raised herein. It must be noted that environmental management is an on-going process and must be continuously reviewed in order to review and correct other impacts that may arise and may not have been obvious at this preliminary stage of the project.

The EPL 7248 that is owned by Ms. Tjinouhona Batseba Kavita is currently about to start the operational stage of the project cycle at specific sites as exploration continues. There is existing structures left by the exploration team at the proposed sites with viable lithium ore deposits which should be removed and be dumped at the appropriate solid waste recycling facilities before the operational phase of lithium ore mining is engaged. **Table 1** outlines the Environmental Management Plan that must be implemented at lithium exploration site (EPL 7248) and by Ms. Tjinouhona Batseba Kavita in order to promote environmental sustainability.

Table 1: Environmental Management Plan

Mine Operation and rehabilitation phases				
Potential Impact	**Possible Cause**	**Mitigation**	**Monitoring Agent**	**Time Frame**
Physical				
Dust generation	-Grading& gravelling existing access roads -Site clearing for building workers compound, workshop and offices	-Avoid maintaining roads under strong winds -Selective clearing of vegetation -Minimise burning of cleared vegetation -Planting of trees around the exploration site at EPL 7248.	Proponent, Roads Authority, MAW&LR., MEFT:DEA	Daily. Weekly, Quarterly
Disturbance and Contamination of ground water	-Drilling of boreholes	-Engage experts in borehole drilling -Boreholes to be approved by MAW&LR- Hydrology Dept -Water to be put in settling ponds before discharge to the environment -Recycle as much water as possible	MAW&LR	Once off
Biological				
Deforestation and Habitat loss	-Site construction -Noise from heavy equipment	-Selective cutting down of trees -Re-vegetate cleared areas, where necessary -Machines to be fitted with sound silencers -Regular watering of the exploration site to minimise dust	ECO;MAW&LR., MEFT:DEA	Weekly, Quarterly

	-Dust from mining operations and site clearing			
Injury or death of livestock	-Livestock falling in unprotected trenches -Livestock being run over by heavy vehicles	-Fence off the mine workings -No unauthorised entry should be allowed -Put danger warning signs -Barricade the whole project site with a perimeter fence	ECO; MAW&LR., MEFT:DEA; MME	Once off
Fire hazard	-No fire guards in place -Haphazard workings -No explosive box in site	-Establish and maintain fire guards -Establish structures according to the Siting of Works plan approved by the Ministry of Mines & Energy -Engage the Regional Mining Engineer in the licensing of a proper magazine box.	ECO;MEFT:DEA; MME	Biannually
Operational phase				
Physical				
Air and Noise Pollution	-Dust generated from blasting -Dust generated from ore movement activities like loading and transportation -Exhaust fumes from vehicles and other equipment -Noise from drilling and blasting -Noise from heavy vehicles and equipment engines	-Undertake controlled blasting ; -Set enough lead times between blasting and mining -Blasting to be done during the day; -Establish blasting times and erect signs to that effect. -The local community should be notified using the prescribed channels via the Uis Municipality and be aware of the blasting schedule and take all the necessary precautions to avoid the blast sites and also plan their daily activities with the full understanding of the blasting activities and mining operations. -Workers to be equipped with ear muffs and inhalers;	ECO;MEFT:DEA; MME	Daily, weekly, quarterly.

		-Proper vehicle maintenance to reduce exhaust fumes and vehicles should be switched key off when not in operation to reduce noise pollution. -A 10km/hr speed limit should be observed within the vicinity of the lithium mine. -Put speed warning signs around the mining area - Implement procedures to minimise drop height between the tipper and front end loader. -Regular watering of the mining area to suppress dust		
Land degradation & loss of aesthetic value(change of sense of place)	-Oil and diesel spillages from vehicles and equipment -Land clearing for increased mining operations	-Regular servicing of vehicles -Selective land clearing i.e. clearing where necessary -Mining activities to adhere to Minerals (Prospecting & Mining Act, 1992 (Act No. 33 of 1992) -Avoid vehicle overloading -Fit all the stationary plant with drip trays and regularly monitor for fuel leaks.	ECO;MEFT:DEA; Ministry of Mines & Energy(MME)	Daily, Weekly
Soil Erosion& Contamination of Surface Water	-Surface run off from mine waste water -Contamination due to oil and diesel spills -Dust from ore hauling and loading activities	-Recycling of water -Terrace the steep slopes to minimise surface run off -Oil and diesel spillages should be effectively contained by constantly checking the vehicles and machinery and those with leaks should be fitted with drip trays. -Implement procedures to minimise drop height between the tipper and front end loader.	ECO; MAW&LR., MEFT:DEA; Ministry of Mines & Energy(MME)	Daily, Weekly
Biological/ Ecological				

Deforestation and loss of biodiversity	-Vegetation clearing for mining expansion -Dust settling on foliage	-Any expansion to be approved by the Mining Commissioner and the Regional Mining Engineer -Avoid indiscriminate cutting down of trees -Minimise dust emission -Establish vegetation perimeter around the mining area to trap dust	ECO; MAW&LR., MEFT:DEA; Ministry of Mines & Energy(MME)	Daily, weekly, quarterly
Portable Water pollution	-Leaking fuels -Surface run off from exploration site	-Minimise the risk of ground water pollution by lining the ground at the fuel storage area with a geomembrane (e.g. HDPE) -Encourage water demand efficiency for all operations and uses. -Portable Water sampling to test impurities at the Namibia Standards Institute, Walvis Bay Laboratory.	ECO; MAW&LR., MEFT:DEA; Ministry of Mines & Energy(MME)	Daily, Weekly: Quarterly for borehole water testing
Impact to ecosystem food chains	-Birds migration due to noise and dust from blasting and heavy equipment -Land clearing -Dissolved nutrients in water drawn from the mine	-Selective vegetation clearing -Mine water should be recycled -Establish water sampling points around the exploration site on EPL 7248. -Regular monitoring of water quality in nearby ephemeral rivers if any.	ECO; MAW&LR., MEFT:DEA; Ministry of Mines & Energy(MME)	Quarterly
Socio-Economic				
Occupational health and safety hazards	-Poor sanitary conditions -Poor mechanisation of workings -Lack of proper PPE -Dust related illnesses -High risk of STIs, HIV and AIDS	-Construct proper toilets for workers. -Provision of clean and safe water from a borehole. -Adequate lighting and ventilation should be provided in the prefabricated homes. -Adequate PPE to be provided to all employees.	ECO; Ministry of Health & Social Services (MHSS); Social Security Commission (SSC);	Quarterly

		-No machine drilling shall be done dry as per Minerals (Prospecting & Mining) Act, 1992 (Act No. 33 of 1992). -Institute Covid19, HIV & AIDS awareness programs at the mine -Condoms should be easily accessible at the exploration site office. -Provision of a fully equipped First Aid kit with no expired medication.	Ministry of Mines & Energy(MME)	
Injury to people and animals	-Falling into unprotected mine workings -Dangers of flying rocks from blasting -Accidents due to poor OSH procedures	-Establish a perimeter fence around the mine premises -No unauthorised entry into the exploration site at EPL 7248. -Barricade the mine workings -Establish blasting times and erect danger warning signs -Blasting to be carried out during the day. -Only primary blasting to be done. -Local community to be notified and aware of the blasting schedule and associated activities. -Implement proper OSH procedures in line with Minerals (Prospecting & Mining Act, 1992 (Act No. 33 of 1992).	ECO; Ministry of Health & Social Services (MHSS); Ministry of Mines & Energy(MME); Social Security Commission (SSC)	Once off

1.4 Environmental Monitoring Plan

An Environmental monitoring plan has been put in place to check on the effectiveness of the proposed Environmental Management Plan in dealing with the impacts identified in this scoping study. Some of the environmental parameters that need to be monitored (especially in the borehole water that is used for drinking by mine/exploration staff) at the lithium EPL 7248 are:

a) Dissolved Metals and Metals in Sediments:- cadmium, arsenic, chromium, lithium, iron, lead, mercury, nickel, silver and zinc
b) Conductivity
c) Total Suspended Solids
d) pH
e) Safety of workings
f) Employee Health-TB, asthma, lung cancer, hearing ability, sight, backbone
g) Workers' insurance - Social Security Commission (SSC) contributions

Samples of water shall be taken for testing at the Namibia Standards Institute, Walvis Bay Laboratory from the sunk boreholes once operations are about to start, determining the baseline composition of water with respect to dissolved heavy metals like cadmium, lead, lithium, nickel, zinc, chromium, mercury, and arsenic. Quarterly samples must be done so as to determine how the results vary from the baseline studies. The same will be done for conductivity, total suspended solids and pH. Water drawn from boreholes at the EPL7248 shall be subjected to quarterly samples so as to determine the degree of leachates as well the pH and conductivity of water.

Quarterly medical checks should be done on employees who work in the dusty mine environment and those that work with heavy machines and their records should be kept at the mine. Aspects to be checked are tuberculosis, asthma, lung cancer, hearing ability and backache, among other issues. This will determine the effectiveness of the mine's Occupational Safety and Health (OSH) programmes.

Experience has shown that most small mines do not remit moneys they deduct from employees to SSC as per Social Security Act, 1994 (Act No. 34 of 1994), currently read with the Employees' Compensation Act, 1941 (Act No. 30 of 1941) as amended. Due to that, it is now necessary to monitor such mines and make sure that workers are insured against death or injury at work. Contributions must be remitted as and when they are required. Table 2 details the monitoring program that must be followed at the mine.

Table 2: Environmental Monitoring plan

Environmental Aspect	Method of Monitoring	Regulation Body/Org	Frequency
-Dissolved Metals/ Metals in Sediments (cadmium, arsenic, chromium, lithium, iron, lead, mercury, silver and zinc) -Conductivity -pH -Total Suspended Solids	-Water sampling at well points around the exploration sites at EPL 7248 -Borehole water samples	-MAW&LR -MEFT:DEA	Quarterly
Safety of Workings -gases, fumes, blasting equipment	-Monitoring before and after blasting	-ECO -Regional Mining Engineer -SSC	Twice daily
Employee Health -TB, asthma, lung cancer, hearing ability, backbone	Medical checks	-ECO -MHSS, -SSC	Bi-annually
Workers' insurance	Checking with NSSA	-SSC -Namibia Miners Federation	Monthly

1.5 Emergency Response Plan

The Emergency Response Plan is a set of measures that will be implemented, in response to emergency situations that could potentially occur during mining and mining-related activities. The Emergency Response plan addresses emergency response elements including identification of potential emergency scenarios, emergency response organisations and responsibilities, co-ordination with governmental emergency response organisations, emergency alarms and communication, emergency response procedures (including evacuation procedures), emergency response equipment, training and drills for the operation of all Ms. Tjinouhona Batseba Kavita exploration activities at EPL 7248.

1.5.1 Risk Assessment Methodology

For the purposes of this mining exploration project, we will make use of the NOSA HIRA (Hazard Identification and Risk Assessment) methodology. The methodology comprises three parameters, namely:

(a) Severity

This is an evaluation of the worst conceivable SHE consequence of a hazard. An exponential weighting is used in order to reflect a bias towards the consideration of the severity of the consequences as opposed to frequency or exposure when evaluating a hazard. The criteria for rating severity are shown in Table 3.

Table 3: Severity Criteria

Weight Number	Hazard Description	Environment	Safety/ Health
16	CATASTROPHIC	Irreversible ecological damage	Multiple fatalities due to injury or occupational diseases
8	MAJOR	Reversible ecological damage with potential long term impact	Fatality or number of disabilities/ disabling diseases
4	MODERATE	Ecological disturbance, can be rehabilitated	Disabling injuries or occupational illness
2	MINOR	Short-term ecological impacts. Requires intervention	Minor injuries or exposure requiring medical attention
1	INSIGNIFICANT	Low impact, natural rehabilitation	First Aid treatment required

(b) Frequency /Probability

Frequency/ Probability are a linear evaluation of how often a hazard has resulted in a consequence (incident history). In the absence of incident history how often a hazard may result in a known consequence (established through industry standards and research and assumption if needed) may be used. The Frequency/ Probability criteria are shown in the Table 4.

Table 4: Frequency/ Probability Criteria

Weight Number	1	2	3	4	5
Evaluation Description	Rare	Infrequent	Frequent	Often	Consistent
Frequency	Less than once every 5 years	Every 1- 5 years	Multiple times per year	Monthly	Daily/weekly

(c) Exposure

Exposure is the percentage of a workforce exposed to a particular hazard and or the duration of the exposure. Its rating is shown in Table 5.

Table 5: Exposure Criteria

Weight Number	1	2	3	4	5
Evaluation Description	Minimal	Restricted	Local	Widespread	Extensive
Safety/ Health Exposure	A few of the workforce, minimal time	A few of the workforce, some of the time / some of the workforce minimal time	Some of the workforce, some of the time	Most of the workforce, some of the time or / some of the workforce, most of the time	Most of the workforce, most of the time
Environmental Exposure	Incident site	Localised	Plant wide	Immediate neighbours	Community exposure

NB: Risk is calculated as follows: **Risk= Severity × Frequency × Exposure**

Table 6: Emergency Response Plan

Risk	**Contingency Plan**
Fire hazard	-Fire extinguishers to be put in place -Workers training on use of extinguishers -Fire Brigade contact numbers to be clearly displayed -Emergency numbers to be given to every worker -Establish an Assembly point -Fire drills -Fireguards
Power generator failure	-Standby generator to be put in place -Standby fuel storage facility to be kept separately
Outbreak of infectious disease	-Isolate the infected person(s) -Take the person to hospital -Mine vehicle to be on site every time -Calling the ambulance -Emergence numbers to be given to every worker

2 ROLES AND RESPONSIBILITIES

Ms. Tjinouhona Batseba Kavita, who is the proponent, is ultimately responsible for the implementation of the EMP, from the planning and design phase to the decommissioning phase (when these exploration operations are found to be financially unviable). The proponent will delegate this responsibility as the project progresses through its life cycle. The delegated responsibility for the effective implementation of this EMP will rest on the following key individuals:

- Proponent's Representative;
- Environmental Control Officer; and
- Contractor (Ms. Tjinouhona Batseba Kavita).

2.1 PROPONENT'S REPRESENTATIVE

The mining company should assign the responsibility of managing all aspects of these exploration activities for all lifecycle phases (including all contracts for work outsourced) to a designated member of staff, referred to in this EMP as the Proponent's Representative (PR). The mining company may decide to assign this role to one person for the full duration of these exploration activities, or may assign a different PR to each of the lifecycle phases – i.e. one for the lithium ore exploration phase, one for the transportation phase and one for the mine rehabilitation phase. The PR's responsibilities are as follows:

Table 7: Responsibilities of PR

Responsibility	Project Phase
Making sure that the necessary approvals and permissions laid out in **Table 9** below are obtained/adhered to	Throughout the lifecycle of this project.
Suspending/evicting individuals and/or equipment not complying with the EMP	• Lithium ore exploration • Transportation of lithium ore • Mine rehabilitation
Issuing fines for contravening EMP provisions	• Lithium ore exploration • Transportation of lithium ore • Mine rehabilitation

2.2 ENVIRONMENTAL CONTROL OFFICER

The PR should assign the responsibility of overseeing the implementation of the whole EMP on the ground during the lithium ore exploration & mine rehabilitation phases to a designated member of staff, referred to in this EMP as the Environmental Control Officer (ECO). The PR/ Ms. Tjinouhona Batseba Kavita may decide to assign this role to one person for all three activities, or may assign a different ECO for each activity. The ECO will have the following responsibilities during the exploration, mining operation and rehabilitation phases of these developments:

- Management and facilitation of communication between the Proponent, PR, the contractors, and Interested and Affected Parties (I&APs) with regard to this EMP;
- Conducting regular inspections (recommended minimum frequency is once every six months) with respect to the implementation of this EMP (monitor and audit the implementation of the EMP);
- Assisting the Contractor in finding solutions with respect to matters pertaining to the implementation of this EMP;
- Advising the PR on the removal of person(s) and/or equipment not complying with the provisions of this EMP;
- Making recommendations to the PR with respect to the issuing of fines for contraventions of the EMP; and
- Undertaking an annual review of the EMP and recommending additions and/or changes to this document.

2.3 CONTRACTOR

Contractors appointed by the Proponent are automatically responsible for implementing all provisions contained within the relevant chapters of this EMP. Contractors will be responsible for the implementation of this EMP applicable to any work outsourced to subcontractors. **Table 10** applies to contractors appointed during the lithium ore mining phase and **Table 11** to those appointed during the Mine rehabilitation phase. In order to ensure effective environmental management the aforementioned chapters should be included in the applicable contracts for outsourced mining, construction, operation and maintenance work.

The tables in the following chapter (**Chapter 3)** detail the management measures associated with the roles and responsibilities that have been laid out in this chapter.

3.0 MANAGEMENT ACTIONS

The aim of the management actions in this chapter of the EMP is to avoid potential impacts where possible. Where impacts cannot be avoided, measures are provided to reduce the significance of these impacts.

The following tables provide the management actions recommended to manage the potential impacts rated in the scoping-level EA conducted for these activities. These management actions have been organised temporally according to project phase:

- Applicable legislation (**Table 9**);
- Lithium ore exploration Actions (**Table 10**);
- Mine rehabilitation Management Actions (**Table 11**); and
- Decommissioning phase management actions (**Table 12**).

The responsible persons from the proponents' team have assessed these commitments in detail and have committed to the specific management actions where indicated in the tables below.

3.1 ASSUMPTIONS AND LIMITATIONS

This EMP has been drafted with the acknowledgment of the following assumptions and limitations:

- This EMP has been drafted based on the scoping-level Environmental Assessment (EA) conducted for the EPL 7248, Uis District, Dâures Constituency, Erongo Region, Namibia in February 2022. HEEC will not be held responsible for the potential consequences that may result from any alterations to the existing situation on the ground.
- It is assumed that mine labourers will be sourced mostly from the Uis area and that migrant labourers (if applicable) will be housed in established accommodation facilities within Uis.
- The engineering designs carried out for the mine upgrade & of the associated services infrastructure (roads, potable water, storm water, sewerage and electrical reticulations) will be informed by the engineers' plans and designs.

3.2 APPLICABLE LEGISLATION

Legal provisions that have relevance to various aspects of these developments are listed in **Table 9:** Legal provisions relevant to the proposed development below. The legal instrument, applicable corresponding provisions and project relevance details are provided.

3.2.1 Regulatory Framework for Environmental Management in the Mining Sector

The objective of the intended Environmental Management Plan (EMP) is thus needed in order to assess the potential social and environmental impacts associated with the intended exploration activities of lithium ore on EPL 7248, Uis District, Dâures Constituency, Erongo Region, Namibia and also to formulate methods of rehabilitation of the quarries once raw lithium ore has been excavated for further processing offsite, i.e. there will be no processing plant at this site.

The above is a listed activity in terms of the Environmental Management Act (No. 7 of 2007) and Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012). Waste rock dumps, including overburden dumps and tailing dams, are similarly regulated.

In terms of the Environmental Management Act (No. 7 of 2007) and Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012), the following listed activities in **Table 8** were triggered by the proposed project:

Table 8: List of triggered activities identified in the EIA Regulations which apply to the proposed project

Activity description and No(s):	**Description of relevant Activity**	**The portion of the development as per the project description that relates to the applicable listed activity**
Activity 3.1 (Mining and Quarrying Activities)	The construction of facilities for any process or activities which requires a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation,	The proposed project includes the exploration of lithium ore for export purposes/ further processing.

Activity description and No(s):	Description of relevant Activity	The portion of the development as per the project description that relates to the applicable listed activity
	in terms of the Minerals (Prospecting and Mining Act), 1992.	
Activity 3.2 (Mining and Quarrying Activities)	Other forms of mining or extraction of any natural resources whether regulated by law or not.	The proposed project includes the exploration of lithium ore for export purposes/ further processing.
Activity 3.3 (Mining and Quarrying Activities)	Resource extraction, manipulation, conservation and related activities.	The proposed project includes the exploration of lithium ore for export purposes/ further processing.

The above activities will be discussed in more detail in this EMP. Healthy Earth Environmental Consultants CC (HEEC) undertook an independent site specific scoping Environmental & Social Assessment (ESA) in order to formulate detailed mitigation measures for the above activities on behalf of the proponent, Ms. Tjinouhona Batseba Kavita. The competent authority is the Ministry of Environment, Forestry and Tourism: Department of Environmental Affairs (MEFT: DEA).

There are multiple legal instruments that regulate and have a bearing on good environmental management in Namibia. **Table 9** below provides a summary of the legal instruments considered to be relevant to this development and the environmental assessment process.

Table 9: Legislation applicable for the exploration activities for Base & Rare Metals, Dimension Stone, Industrial Minerals & Precious Metals targeting raw lithium ore on EPL; 7248, Uis District, Dâures Constituency, Erongo Region, Namibia.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
The Constitution of the Republic of Namibia as Amended	Article 91 (c) provides for duty to guard against "the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia."	Sustainable development should be at the forefront of management of the intended exploration activities.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
	Article 95(l) deals with the "maintenance of ecosystems, essential ecological processes and biological diversity" and sustainable use of the country's natural resources.	
Environmental Management Act No. 7 of 2007 (EMA)	Section 2 outlines the objective of the Act and the means to achieve that. Section 3 details the principles of Environmental Management	The management of this project should be informed by the EMA.
EIA Regulations GN 28, 29, and 30 of EMA (2012)	GN 29 Identifies and lists certain activities that cannot be undertaken without an environmental clearance certificate. GN 30 provides the regulations governing the environmental assessment (EA) process.	**Activity 3.1 (Mining and Quarrying Activities)** The construction of facilities for any process or activities which requires a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation, in terms of the Minerals (Prospecting and Mining Act), 1992. **Activity 3.2 (Mining and Quarrying Activities)** Other forms of mining or extraction of any natural resources whether regulated by law or not. **Activity 3.3 (Mining and Quarrying Activities)** Resource extraction, manipulation, conservation and related activities.
Convention on Biological Diversity (1992)	Article 1 lists the conservation of biological diversity amongst the objectives of the convention.	The lithium ore exploration activities should consider the impact it will have on the biodiversity of the area.
Draft Procedures and Guidelines for conducting EIAs and compiling EMPs (2008*)*	Part 1, Stage 8 of the guidelines states that if a proposal is likely to affect people, certain guidelines	The ESA process should incorporate the aspects outlined in the guidelines.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
	should be considered by the proponent in the scoping process.	
Namibia Vision 2030	Vision 2030 states that the solitude, silence and natural beauty that many areas in Namibia provide are becoming sought after commodities and must be regarded as valuable natural assets.	Care should be taken that the lithium ore exploration activities do not lead to the degradation of the natural beauty of the area.
Water Act No. 54 of 1956	Section 23(1) deals with the prohibition of pollution of underground and surface water bodies.	The pollution of water resources should be avoided during the lithium ore exploration activities.
The Ministry of Environment and Tourism (MET) Policy on HIV & AIDS	MET has recently developed a policy on HIV and AIDS. In addition it has also initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments.	The proponent and its contractor have to adhere to the guidelines provided to manage the aspects of HIV/AIDS. Experience with similar projects has shown that a significant health risk is created when migrant mine workers/labourers interact with local communities.
Labour Act No. 11 of 2007	Chapter 2 details the fundamental rights and protections. Chapter 3 deals with the basic conditions of employment.	Given the employment opportunities presented by the lithium ore exploration activities, compliance with the law is essential.
Public and Environmental Health Act of 2015	This Act (GG 5740) provides a framework for a structured uniform public and environmental health system in Namibia. It covers notification, prevention and control of diseases and sexually-transmitted infections; maternal, ante-natal and neo-natal care; water and food supplies; infant nutrition; waste management; health nuisances; public and environmental health planning and reporting. It repeals the Public Health Act 36 of 1919 (SA GG 979).	The lithium ore exploration activities are to comply with these legal requirements.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
Nature Conservation Ordinance No. 4 of 1975	Chapter 6 provides for legislation regarding the protection of indigenous plants.	Indigenous and protected plants have to be managed within the legal confines.
Environmental Assessment Policy of Namibia (1995)	The Policy seeks to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process, and that the term ENVIRONMENT is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.	This EMP considers this term of Environment.
Minerals (Prospecting and Mining) Act, 1992 (Act 33 1 of 1992)	To provide for the reconnaissance, prospecting and mining for, and disposal of, and the exercise of control over, minerals in Namibia; and to provide for matters incidental thereto. "mineral" means any substance, whether in solid, liquid or gaseous form, occurring naturally in, on or under any land and having been formed by, or subjected to, a geological process, excluding -(c) subject to the provisions of subsection (2), soil, sand, clay, gravel or stone (other than rock material specified in Part 2 of Schedule 1) if they are bona fide required for purposes of - (i) agriculture, building works, fencing or road making; (ii) the manufacture of bricks and tiles;	The intended activity involves the exploration of lithium ores for export purposes/further processing.
Soil Conservation Act 6 of 1969 Ministry of Agriculture, Water and Forestry	This Act covers the prevention and combating of soil erosion; the conservation, improvement and manner of use of the soil and vegetation; and the protection of water sources	Open pits left behind after lithium ore exploration should not be polluted or left un-rehabilitated.

This EMP was formulated and compiled in accordance with the EIA Regulations.

3.3 PROJECT LOCATION

The proponent intends to undertake exploration activities for Base & Rare Metals, Dimension Stone, Industrial Minerals & Precious Metals targeting raw lithium ore on EPL; 7248, Uis District, Dâures Constituency, Erongo Region, Namibia. EPL 7248 is located approximately 30 Km West of Uis, when using the C35 road from Uis to Henties Bay in Erongo Region. The total area covered is about 21 563.4549 hectares. The GPS coordinates are shown in the legend. Refer to the locality maps in **Figure 1** and **Figure 2** below.

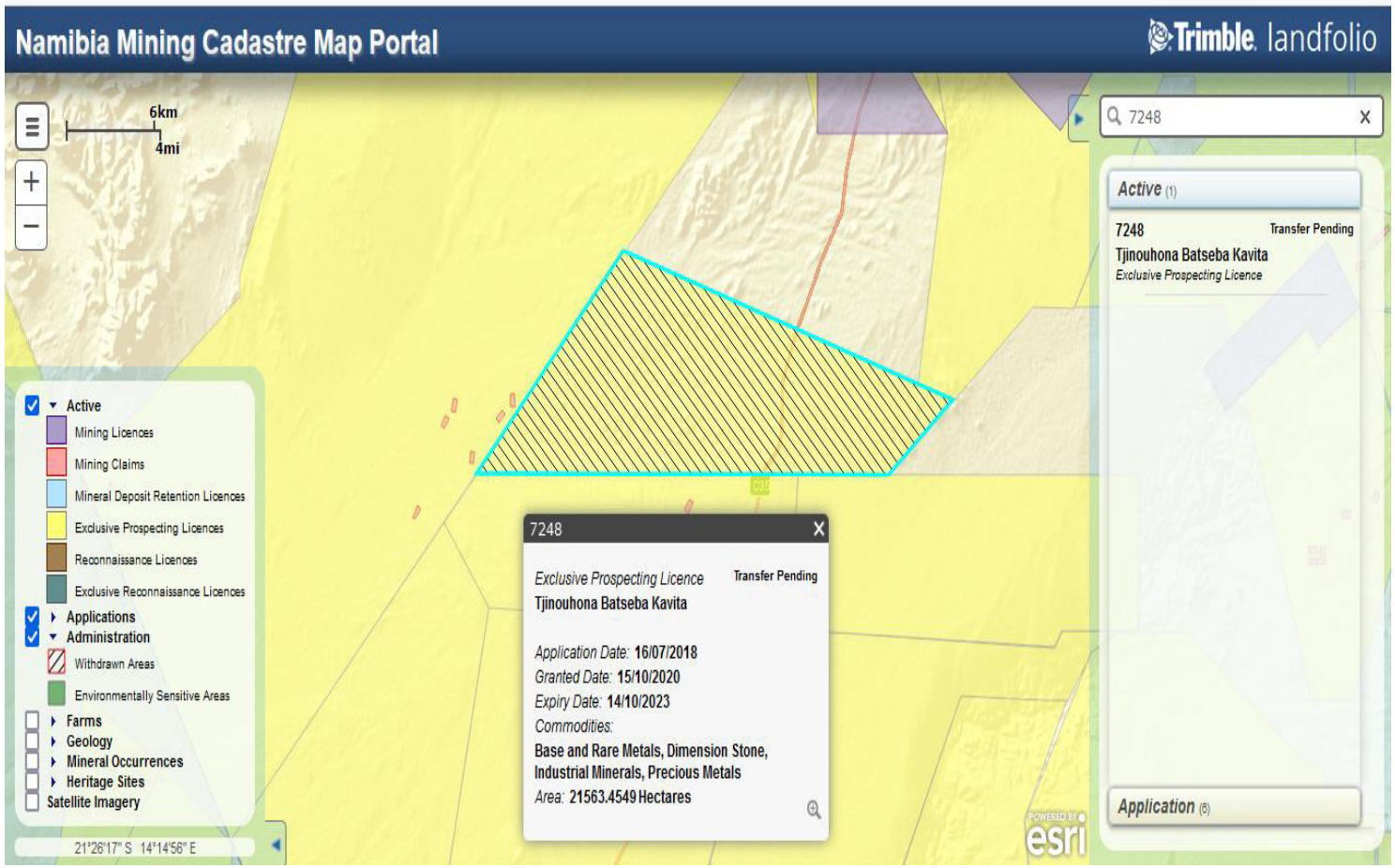
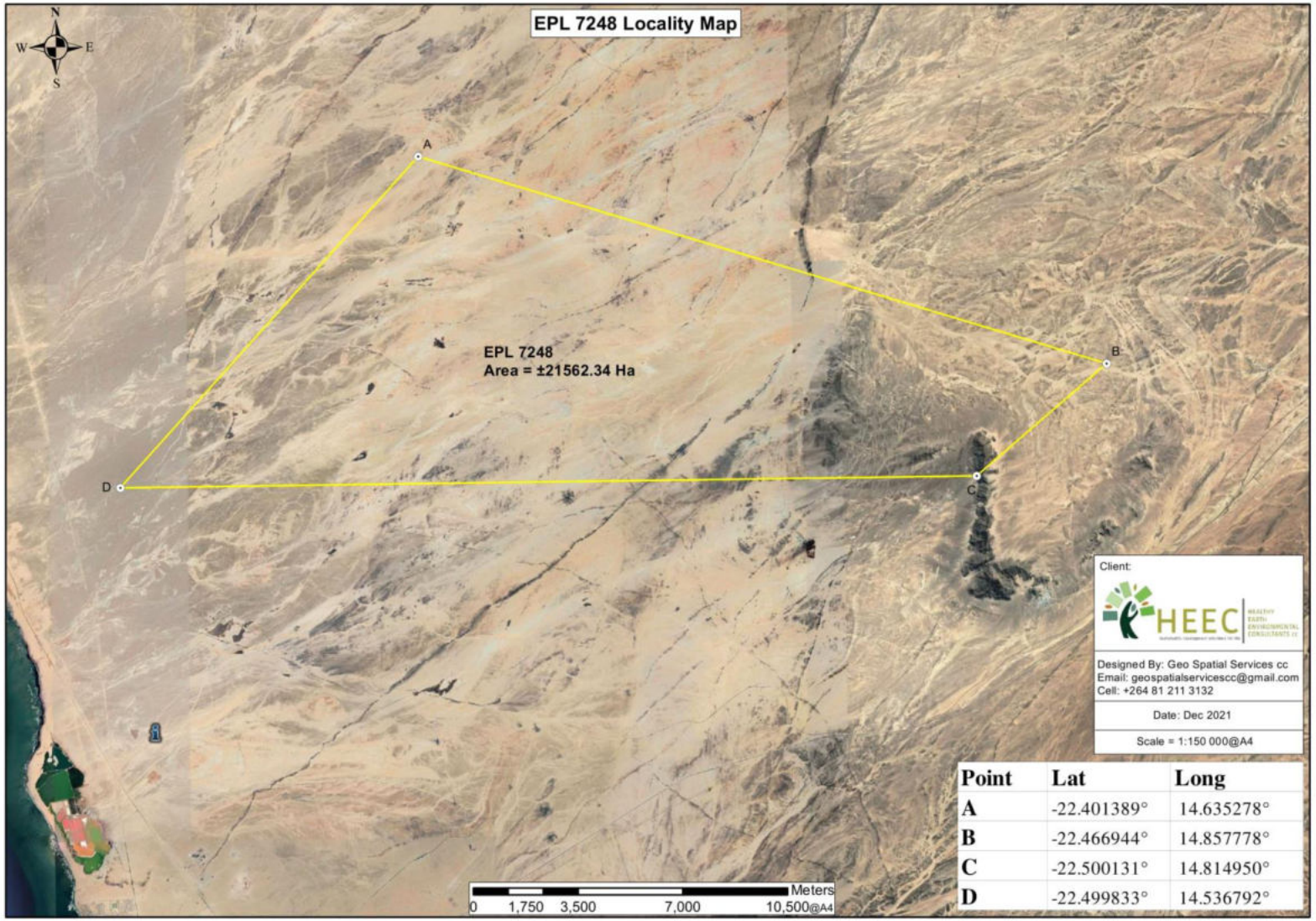


Figure 1: Location of the EPL 7248 site, Uis District, Erongo Region (MME Portal, 2022).



Point	Lat	Long
A	-22.401389°	14.635278°
B	-22.466944°	14.857778°
C	-22.500131°	14.814950°
D	-22.499833°	14.536792°

Figure 2: Location of the exploration site at EPL 7248, Uis District, Dâures Constituency, Erongo Region, Namibia (HEEC, 2022).

3.4 LITHIUM ORE EXPLORATION PHASE

The PR should ensure that the management actions detailed in **Table 10**, below should be adhered to during the operation of the lithium ore mining activities.

Table 10: Lithium ore Exploration Phase Management Actions

Aspect	Management Actions	Responsibility
Environmental Incidents	• The ECO on site shall maintain a register of all environmental incidents occurring as a result of the activities associated with the project. Environmental incidents that shall be recorded include (but are not limited to): ➢ Fires; ➢ Drowning; ➢ Accidents (e.g. traffic); ➢ Spills of hazardous materials, contaminating soil or water resources; ➢ Non-compliances with applicable legislation; and ➢ Non-compliances with this EMP. • Environmental incident reports shall include (as a minimum) a description of the incident, the actions taken to contain any damage to the environment, personnel, or the public, and the actions taken to repair / remediate any such damage. • Additional measures shall be prescribed that may be required to remediate damage resulting from the incident and / or to prevent similar incidents occurring in the future.	ECO
Traffic	• Ensure that road junctions have good sightlines. • Limit the type of vehicle (heavy trucks) allowed on site. • Adhere to the speed limit. If permissible, caution signs and 40 km/hr signs shall be placed at regulation distance from heavy vehicle crossing signs at the intersections of the access tracks and the C35 road. • Designate no-drive zones. • Implement traffic control measures where necessary by keeping a number plate register of all vehicles transporting lithium ores at the site and restricting access to authorised contractors.	ECO

Aspect	Management Actions	Responsibility
Lithium ore exploration areas (EPL 7248).	• Lithium ores should be sourced from EPL 7248 ONLY with a valid ECC. • The lithium ore exploration sites on EPL 7248 must be clearly demarcated by means of a perimeter stock-proof fence with a lockable gated entrance. • Lithium ore exploration and resultant operations shall only take place within this demarcated areas/sites. • A detailed photographic record of the demarcated mining areas, prior to any mining activities, shall be taken. These records are to be kept by the Proponent and PR for reference purposes during the rehabilitation of the sites. • There will be **'No unauthorised access'** signs at the mining site gates until to restrict entry and/or harm to people not involved in the lithium ore mining operations.	ECO
EMP training	• All workers at the site are to undergo EMP training that should include as a minimum the following: • Explanation of the importance of complying with the EMP. • Discussion of the potential environmental impacts of the intended lithium ore mining and mine rehabilitation activities. • Employees' roles and responsibilities, including emergency preparedness and response requirements. • Explanation of the mitigation measures that must be implemented when particular work groups carry out their respective activities. • The potential consequences of departure from specified operating procedures; and rewards for enhancing mitigation measures or avoiding negative environmental effects.	ECO & Contractor
Fauna and Flora	• Prevent the destruction of protected tree species. • Encourage the regrowth and regeneration of trees with exposed roots at the site. • The excavation of the lithium ores should incorporate existing trees[1]. • The Contractor should compile a Tree Management Plan which should include the following as a minimum:	ECO & Contractor

[1]a "tree" is defined as an indigenous woody perennial plant with a trunk diameter ≥150 mm

Aspect	Management Actions	Responsibility
	• Trees if not already accounted for in an existing Geographic Information System (GIS), should be surveyed, co-ordinates/location incorporated into the Contractor's GIS, marked with paint (or other means so as to be readily visible) and protected; • Trees, which are impossible to conserve, need to be identified and their location recorded on a map; • The Contractor should apply to the relevant authority (Ministry of Environment, Forestry & Tourism) for a permit to remove these trees. • A list should be compiled of all trees to be removed detailing the location of the tree, the species as well as which trees will be planted to replace these. The nursery where these trees will be sourced from should also be included; • Each tree that is removed needs to be replaced with an indigenous tree species; • Some of these trees can be obtained at the nearest forestry office or at a commercial nursery such as the Forestry office in Uis. Assistance can be sought from the nearest forestry office regarding nearby nurseries where additional trees may be bought and advice sought. • Only a limited width +/- 5 m on the side of the access roads may be partially cleared of vegetation. • Workers are prohibited from collecting wood or other plant products on or near the site. • No alien species may be planted on or within the existing site. • Prevent contractors from collecting wood and veld food such as amphibians, migrating birds, etc. during the lithium ore exploration phase. • Prevent contractors from fishing in the nearby ephemeral rivers or catching aquatic species.	
Lay-down areas and materials camp	• Suitable locations for the contractors lay-down areas and materials camp should be identified with the assistance of the PR and the following should be considered in selecting these sites: • The areas designated for the services infrastructure should be used as far as possible. • Second option should be degraded land.	ECO & Contractor

Aspect	Management Actions	Responsibility
	• Avoid sensitive areas (e.g. wetlands/rivers/drainage lines)	
Hazardous waste	• All heavy duty vehicles and equipment on site should be provided with a drip tray. • All heavy duty delivery vehicles should be maintained regularly to prevent oil leakages. • Maintenance and washing of vehicles should take place only at a designated workshop area. • Spilled cement and/or concrete (wet or dry) should be treated as hazardous waste and disposed of by the end of each day in the appropriate hazardous waste containers. • All hazardous substances (e.g. fuel etc.) or chemicals should be stored in a specific location on an impermeable surface that is bunded - with a volume of 120 % of the largest single storage container or 25 % of the total storage containers, whichever is greater.	ECO & Contractor
Surface and Ground Water Impacts	• It is recommended that lithium ore exploration takes place outside of the rainy season in order to limit erosion & flooding on site and surface water pollution. • No dumping of waste products of any kind in or in close proximity to surface water bodies. • Heavy duty vehicles should be kept out of any surface water bodies and the movement of vehicles should be limited where possible to the existing access roads and tracks. • Contaminated runoff from the sites should be prevented from entering the surface water bodies. • Workers should be given ablution facilities at the sites that are located at least **30 m** away from any surface water and regularly serviced. • Washing of personnel or any equipment should not be allowed on site.	ECO & Contractor
Topsoil	• When excavations are carried out, topsoil[2] should be stockpiled in a demarcated area and used in profiling and rehabilitating of the depleted, open pits around the exploration sites. • Stockpiled topsoil should be used to rehabilitate post-harvesting degraded areas and/or other nearby degraded areas within the Uis Municipality area in consultation with the affected residents.	ECO & Contractor

[2] Topsoil is defined here as the top 150mm of surface material, which accounts for the seedbank.

Aspect	Management Actions	Responsibility
Soil Erosion	• Clear the vegetation of the project area in phases during the lithium ore exploration period in order to keep the soil more compacted as well as to limit overall disturbance to the area over time. • It is recommended that most lithium ore mining takes place outside of the rainy season in order to limit potential flooding and the run off of loose soil causing further erosion. • Appropriate erosion control structures must be put in place where soil may be prone to erosion. • Checks must be carried out at regular intervals to identify areas within the exploration site where erosion is occurring. Appropriate remedial actions are to be undertaken wherever erosion is evident.	ECO & Contractor
Rehabilitation	• Upon completion of the lithium ore exploration phase consultations should be held with the local community/property owner(s) regarding the post-lithium ore mining use of remaining excavated areas (if applicable) and to identify priority areas. • Sand/waste rock at the site should be levelled so it can be reclaimed for other purposes once the lithium ore mining has ceased and rather than leaving the mines open which will pose a threat to people and animals in the area. • In the event that no post-operation uses are requested, all excavated/degraded areas need to be rehabilitated as follows: • Excavated areas may only be backfilled with clean or inert fill. No material of hazardous nature (e.g. sand removed with an oil spill) may be dumped as backfill. • Rehabilitated excavated areas need to match the contours of the existing landscape. • The rehabilitated area should not be higher (or lower) than nearby drainage channels. This ensures the efficiency of re-vegetation and reduces the chances of potential erosion. • Topsoil is to be spread across excavated areas evenly. • Deep ripping of areas to be rehabilitated is required, not just simple scarification, so as to enable rip lines to hold water after heavy rainfall.	ECO & Contractor

Aspect	Management Actions	Responsibility
	• Ripping should be done along slopes, not up and down a slope, which could lead to enhanced erosion.	
HIV/AIDS and TB awareness	• The Contractor should approach the Ministry of Health and Social Services to co-opt a health officer to facilitate COVID19, HIV/AIDS and TB education programmes periodically on site during the project operation. • A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases. • Provide free condoms in the workplace and to local community throughout project operation. • Facilitate access to Antiretroviral medication • Personnel should not overnight at the lithium ore mining sites, but only the security personnel.	ECO & Contractor
Road safety	• Demarcate roads clearly. • Off-road driving should not be allowed. • All vehicles that transport materials to and from the site must be roadworthy. • Drivers that transport materials should have a valid driver's license and should adhere to all traffic rules. • Loads upon vehicles should be properly secured to avoid items falling off the vehicle. • Limit and control the number of access points to the mining sites. • The C35 road leading to the EPL 7248 should be properly maintained so as to reduce dust emissions when heavy vehicles travel on them.	ECO & Contractor
Safety around work sites	• Excavations/pits should be left open for the shortest time possible. • Excavate short lengths of trenches and box areas for services or foundations in a manner that will not leave the trench unattended for more than 24 hours. • Demarcate excavated areas and topsoil stockpiles with danger tape. • Provide additional warning signage in areas of movement and in "no personnel" areas where workers are not active. • Exploration pits are to be fenced-off with stock-proof perimeter fencing. • Work areas must be set out and isolated with danger tape on a daily basis.	ECO & Contractor

Aspect	Management Actions	Responsibility
	• All materials and equipment are to be stored only within set out and demarcated work areas. • Only lithium ore mining personnel will be allowed within these work areas. • 2 fire extinguishers should be available at fuel storage areas. • Comply with all waste related management actions stated above in this table.	
Ablutions	• Separate toilets should be available for men and women and should clearly be indicated as such. • Portable toilets (i.e. easily transportable) should be available at the Mine site: • 1 toilet for every 15 females. • 1 toilet for every 30 males. • Sewage needs to be removed on a regular basis to an approved (municipal) sewage disposal site. Alternatively, sewage may be pumped into sealable containers and stored until it can be removed. • Workers responsible for cleaning the toilets should be provided with latex gloves and masks.	ECO & Contractor
Open fires	• No open fires may be made anywhere on the exploration site.	ECO
General health and safety	• A fully stocked first aid kit should permanently be available on-site as well as an adequately trained member of staff capable of administering first aid. • All workers should have access to the relevant personal protective equipment (overalls, hard toe boots, goggles, dust masks, sun hats heavy duty gloves etc.). • Sufficient potable water reserves should be available to workers at all times. • No person should be allowed to smoke close to fuel storage facilities or portable toilets (if toilets are chemical toilets – the chemicals are flammable). • No workers should be allowed to drink alcohol during work hours. • No workers should be allowed on the exploration site if under the influence of alcohol.	ECO & Contractor

Aspect	Management Actions	Responsibility
Dust	• A watering truck should be used on gravel roads with the most heavy vehicle movement especially during dry and windy conditions. However, due consideration should be given to water restrictions during times of drought. • The use of waterless dust suppression means (e.g. lignosulphonate products such as Dustex) should be considered. • Cover any stockpiles with plastic to minimise windblown dust. • Dust protection masks should be provided to workers if they complain about dust. • During high wind conditions the contractor must make the decision to cease works until the wind has calmed down.	ECO & Contractor
Noise	• Work hours should be restricted to between **08h00 and 17h00** where excavation involving the use of heavy equipment, power tools and the movement of heavy vehicles is less than 500 m from residential areas. If an exception to this provision is required, all residents and business owners within the **500 m** radius should be given 1 week's written notice. • If workers are to be exposed to noise levels above 85dB for continuous extended periods of more than two hours, they are to be provided with ear muffs and allowed to take 10-15 minute breaks away from the noise source.	ECO & Contractor
Recruitment of labourers	• The Contractor should compile a formal recruitment process including the following provisions as a minimum: • Adhere to the legal provisions in the Labour Act No. 11 of 2007 for the recruitment of labour (target percentages for gender balance, optimal use of local labour and SME's, etc.). • Recruitment should not take place at the lithium ore exploration site. • Ensure that all sub-contractors are aware of recommended recruitment procedures and discourage any recruitment of labour outside these agreed upon procedures. • All contractors should give preference in terms of recruitment of sub-contractors and individual labourers to those who are qualified and from the project area and only then look to surrounding towns.	ECO & Contractor

Aspect	Management Actions	Responsibility
	• Clearly explain to all job-seekers the terms and conditions of their respective employment contracts (e.g. period of employment etc.) – make use of interpreters where necessary.	
Communication plan	• The Contractor or PR should draft a Communication Plan, which should outline as a minimum the following: • How Interested and Affected Parties (I&APs), who require on-going communication for the duration of the operation period, will be identified and recorded and who will manage and update these records; • How these I&APs will be consulted on an on-going basis; • Make provision for grievance mechanisms – i.e. how concerns can be lodged/ recorded and how feedback will be delivered as well as further steps of arbitration in the event that feedback is deemed unsatisfactory.	ECO & Contractor
General communication	• The PR must appoint an ECO to liaise between the Contractor, I&APs and Ms. Tjinouhona Batseba Kavita' s management. • The Contractor shall at every bi-monthly site meeting report on the status of the implementation of all provisions of the EMP. • The Contractor should implement the EMP awareness training as stipulated above in this table. • The Contractor must list the I&APs of the project and their contact details with whom on-going communication would be required for the duration of the contract. This list, together with the Communication Plan must be agreed upon and given to the PR before operation commences/resumes. • The Communication Plan, once agreed upon by the Developer, shall be legally binding. • A copy of the EMP must be available at the site office and should be accessible to all I&APs. • Key representatives from the above mentioned list need to be invited to attend monthly site meetings to raise any concerns and issues regarding progress to rehabilitate the excavated areas and surrounding quarries/ pits. • The Contractor should liaise with the proponent regarding all issues related to community consultation and negotiation before operation commences/resumes.	ECO & Contractor

Aspect	Management Actions	Responsibility
	• A procedure should be put in place to ensure that concerns raised have been followed-up and addressed. • All people on the I&APs list should be informed about the availability of the complaints register and associated grievance mechanisms in writing by the PR prior to the commencement of site activities.	
Archaeology	• Should a heritage site or archaeological site be uncovered or discovered during the mining phase of the project, a "chance find" procedure should be applied in the order they appear below: • If operating machinery or equipment stop work; • Demarcate the exploration site with danger tape; • Determine GPS position if possible; • Report findings to the site foreman; • Report findings, site location and actions taken to superintendent; • Cease any works in immediate vicinity; • Visit find site and determine whether work can proceed without damage to findings; • Determine and demarcate exclusion boundary; • Site location and details to be added to a Geographic Information System (GIS) for field confirmation by archaeologist; • Inspect site and confirm addition to raw lithium ore mining site GIS; • Advise the National Heritage Council (NHC) and request written permission to remove findings from work area; and • Recovery, packaging and labelling of findings for transfer to National Museum. • Should human remains be found, the following actions will be required: • Apply the chance find procedure as described above; • Schedule a field inspection with an archaeologist to confirm that remains are human; • Advise and liaise with the NHC and Police; and • Remains will be recovered and removed either to the National Museum or the National Forensic Laboratory.	ECO & Contractor

3.5 MINE REHABILITATION PHASE (Continuous)

The management actions included in **Table 11** below applies during the continuous mine rehabilitation phase of the exploration operations.

Table 11: Mine Rehabilitation Phase Management actions

Environmental Feature	Management Actions	Responsibility
EMP training	All contractors appointed for the transportation of the lithium ores at exploration sites on EPL 7248 must ensure that all personnel are aware of necessary health, safety and environmental considerations applicable to their respective work.	ECO & Contractor
Monitoring	The ECO should monitor the implementation of the EMP: • The ECO should regularly inspect the conditions around the lithium ore exploration sites before work starts; and • The ECO should inspect the exploration sites at the end of the extraction period.	ECO
Water and waste management	• Ensure that the infrastructure at the lithium ore exploration site is connected to the mine drainage and wastewater reticulation. • Regular preventative maintenance should be carried out on the infrastructure to ensure that risks of overspills are minimised. • A no-go buffer area of at least **30 m** should be allocated to any water bodies in the area. • No dumping of waste products of any kind in or in close proximity to any surface water bodies. • Sufficient weather and scavenger-proof bins (with lids, to prevent the escape of litter) shall be provided, and be easily accessible at all points where wastes are generated. • The site shall be kept clean and free of litter and no litter from the site shall be allowed to disperse to surrounding areas. • All personnel shall be instructed to dispose of all waste in the proper manner.	ECO & Contractor

Environmental Feature	Management Actions	Responsibility
	• The Contractor shall identify and separate materials that can be reused or recycled to minimise waste e.g. metals, packaging and plastics, and provide separate marked bins for these items. • All materials (e.g. bags of cement) must be suitably stored and protected, so that they do not become damaged and unusable. • The Contractor shall be responsible for the regular disposal (at suitable and licensed municipal waste disposal facilities) of all waste generated as a result of the lithium ore exploration activities. • Contaminated runoff from the various operational activities should be prevented from entering any surface water bodies. • Ensure that surface water accumulating on-site are channelled and captured through a proper storm water management system to be treated in an appropriate manner before disposal into the environment. • Disposal of waste from the properties should be properly managed. • No waste may be burned on site. • General waste is to be collected either by the local Municipality or removed by the proponent. • The frequency of collections will be such that waste containment receptacles do not unduly accumulate or overflow.	
Energy efficiency	• The use of solar energy should be encouraged to provide for general lighting and heating of water and the pre-fabricated buildings/workers camp to be built near the exploration site. • The use of water saving initiatives should be incorporated within the mine workers' housing design in order to reduce water demand.	Contractor

3.6 DECOMMISSIONING PHASE

With time all mines will close. This phase normally presents a complete new set of impacts to the environment that require serious attention of the mining company and other local authorities. To that effect a well-planned mine closure programme should be put in place.

It is recommended that in the event of mine closure, decommissioning be carried as per guidelines stated in relevant extracts of the Minerals (Prospecting & Mining) Act, 1992 (Act No. 33 of 1992). Rehabilitation must be taken as an on-going process to ensure that corrective measures are implemented on time. **Table 12** is a guideline to the decommissioning plan, whereby an active care mine closure is going to be implemented.

Table 12: Decommissioning plan

Decommissioning Phase			
Possible Impact	**Mitigation**	**Responsibility**	**Monitoring Agent**
Physical/Biological -Land degradation& loss of aesthetic value	-Establish a vegetation cover as soon as possible (stabilization) -Vegetate cleared area with indigenous trees -Fencing of the dangerous areas	MINE OWNER	-ECO -MEFT, -MAW&LR
-Injury to people and livestock	-Complete filling up of the trenches -Barricade the old workings with concrete -Fencing of the dangerous areas	MINE OWNER	-ECO -MEFT, -MAW&LR
-Contaminated surface and underground water. -Soil pollution. -Acid water drainage	-clean up spills (chemicals, diesel and oil) -Water quality analysis. -Monitor soil and water quality for a specified time after closure.	MINE OWNER	-ECO -MEFT, -MAW&LR
Resurgence of hazardous chemicals	-Treatment of hazardous chemicals (if any) -Neutralization -Precipitation, oxidation, reduction and acid/alkali hydrolysis	MINE OWNER	-ECO -MEFT, -MAW&LR -MHSS
Accumulated solid waste	-Disposal of solid waste through source sorting, recycling, aerobic decomposition (composition), incineration or depositing in land fill and covering of land fill	MINE OWNER	-ECO -MEFT, -MAW&LR -MHSS

Loss of biodiversity	-Eliminate environmental damage through reclamation. -Site restoration through regeneration of woodland. -Restore chemical, biological and physical stability of site. -Allow productive land use.	MINE OWNER	-ECO -MEFT, -MAW&LR
Compacted soil	-Rehabilitate areas affected by excessive soil compaction and oil spillage	MINE OWNER	-ECO -MEFT, -MAW&LR -MME
Social/Economic -Laying off workers -Loss of income -Drop in the standard of living	-Catering of welfare of laid off workers -Pension schemes -Creation of income generating projects for laid off workers -Secure alternative employment for workers	MINE OWNER	-ECO -SSC
-Infrastructure may become derelict -Derelict building may detract from the value of surrounding properties	-Return of community access to infrastructure -Educate locals on the utilization of the infrastructure -Considering promoting water reservoir for aquaculture	MINE OWNER	Ministry of Works and Transport
-Possible outbreaks of diseases	Educate communities on dangers of STIs and waterborne diseases	MINE OWNER	Ministry of Health & Social Services(MHSS)
Damaged roads	Repair damaged roads	MINE OWNER	-Roads Authority

In addition to the plan above, decommissioning should also be carried out as per the following guidelines:

- The Proponent/Owners and Managers of the mines should be capable of implementing responsible environmental management practices. The preparation of environmental management plans will facilitate this process and is strongly encouraged.
- All explored sites should be rehabilitated either progressively or at the end of mining. Each mining site should be left in a safe well drained and maintenance-free state, blending in as much as possible with the surrounding landscape.
- Mine operators should ensure that funds are available for progressive and final site (closure) rehabilitation.
- Unless otherwise approved (by an Inspector of mines) at mining closure, all machinery structures and buildings should be removed from the site and concentrate slabs broken up and buried. The site should be ripped; top soiled (if available),

fertilized and re-vegetated using indigenous plant species. Alternatively, if approved, certain structures can remain for the benefit of the next land user.

- Surface and ground waters should be effectively managed to prevent contamination of exploration operations.
- Effluent from exploration and transport operations should be effectively contained and only released into river systems if the water quality satisfies the standards of the **Water Quality Guidelines (Annexure B)**.
- Measures to be taken to control noise and dust from exploration/hauling operations to ensure a comfortable and health working environment as specified in the **Labour Act No. 11 of 2007.**
- Measures should be taken to minimise excessive ground vibrations and air-blasts over pressure due to blasting. Peak particle velocities of 5 mm/sec and air-blasts over pressures of 120 dB (peak) should not be exceeded at the boundaries of the mining area.
- Mine operators should ensure that refuse is deposited in proper containers and disposed of responsibly. Fuel and oil spills should be effectively contained.
- Where practical, buildings, processing plant, stockpiles and waste dumps should be designed and located to reduce visual impact. Advantage should be taken of natural topography and exciting vegetation and if this not a practical option, a screen of trees should be established.
- Measures should be taken to prevent or minimise soil erosion.
- As far as is practical, top soil should be stripped from all areas to be distributed by mining operations/milling and used immediately if possible or preserved for later rehabilitation.
- Areas disturbed by mining should be re-vegetated as far as is practical using indigenous grass or tree species. However, on sites such as tailings/waste dumps, where it is important to establish a vegetative cover as soon as possible on difficult growing mediums, the use of fast growing exotic species is acceptable .Care should be taken to prevent the entry and spread of noxious plants.
- Diversion channels or river diversion should be constructed in accordance with sound engineering principles to ensure that soil erosion is minimised.
- Explosives, hydrocarbon fuels and other toxic materials should be transported stored and handled in a safe and acceptable manner. They should be stored in safe place, fenced to prevent entry of unauthorised persons. The owner /manager should ensure that toxic materials do not escape into the surrounding rivers/ground waters.
- Mine operators should strive to conserve local flora and fauna species and avoid unnecessary destruction of both.
- Unique archaeological, historical, geological and scenic features should be protected at all mining and exploration sites.
- Residents in the vicinity of a mine should not be subjected to excessive airborne emissions (including dust, gases and smokes), liquid effluent, noise, ground vibrations and air blast from mining /haulage operations.

- Mine tailings and slimes should be disposed of/stored in impoundments constructed in accordance with sound engineering principles. The dams should be sited to avoid the encountering of permeable sub-soil and/or fracture systems and an adequate drainage system should be incorporated in the design. They should be sited so that their catchments are minimal and should be designed to withstand significant rainfall events.
- Unless otherwise approved, at the cessation of mining, or earlier if practical, waste rock dumps should be stabilized by reducing the slope angle and re-vegetated. Topsoil should be used if practicable.
- All shafts not being used should be securely capped/otherwise made safe to prevent the entry of persons/livestock.
- The final land use of open cast mine /quarry should be determined prior to the cessation of mining. For example, if the site is to be used for water storage, then at the end of the mine life, drainage could be directed into the pit. If the pit/quarry is to be used for any other purpose then drainage should not be diverted around the site.
- The final land use will dictate the amount of reshaping required on the pit faces. Where practical the slope of the steep faces should be reduced and benches top soiled (if available) to facilitate re-vegetation and blending with the surrounding landscape.
- If practical quarry faces should be oriented to minimise their visual impact from public areas.
- Dangerous excavations should be made safe to prevent entry of persons/livestock.
- In strip mining operations, overburden material, which is adverse to plant growth, should be buried and every effort should be made to recover and store top soil from mining path for later rehabilitation.
- Heap leach operations should be designed to ensure that there is zero discharge of process fluid on surface waters or ground waters.
- Unless otherwise approved, heap leach pads should be rehabilitated after leaching by detoxification, re-contouring, re-top soiling and re-vegetation so that they will be in stable maintenance free condition. Alternatively the heaps could be used to backfill nearby pits.
- Mine rehabilitation should be carried out progressively to ensure that a minimum of ground is disturbed at any one time. A maximum of 2 hectares shall be un-rehabilitated at any one time unless otherwise approved.
- The mining and rehabilitation method should ensure each layer disturbed should be replaced to its original sequence at topsoil as its final layer. All disturbed areas should be progressively rehabilitated.
- Tailings and Slimes from wasting plants should be expounded in properly constructed dams unless otherwise approved.
- All exploration drill holes should be capped, plugged/filled in, either progressively or at the end of the program.

- All drilling sites, trenches and pits should be rehabilitated (i.e. backfilled and re-vegetated) after the cessation of exploration.
- Each site should be left in a clean and tidy condition with all refuse removed.

Mine closures can be planned for and should form part of an integrated land use strategy that involves the community and surrounding farm owners. The decommissioning of the lithium ore mining at the sites is envisaged in the future. Planned closure, in consultation with the affected residents, Uis Municipality and the community at large, provides the opportunity to develop alternative land uses through rehabilitation, and to use the remaining infrastructure for other economic purposes such as livestock farming. When the event occurs some recommendations have been outlined in **Table 13**.

Table 13: Decommissioning phase management actions

Environmental Feature	Management Actions
Deconstruction activity	Many of the mitigation measures prescribed for the lithium ore mining & mine rehabilitation activities (**Table 10 & 11** above**)** would be applicable to some of the decommissioning activities. These should be adhered to where applicable.
Rehabilitation	In the event that decommissioning is deemed necessary, excavations need to be rehabilitated according to the management actions laid out in **Table 10 & 11** above.

4.0 CONCLUSION AND RECOMMENDATIONS

The proposed exploration sites on EPL 7248 for lithium ore located approximately 30 Km West of Uis, when using the C35 road from Uis to Henties Bay in Erongo Region will bring both positive and negative impacts. If implemented, the proposed lithium mine will benefit and bring development to the surrounding communities. Some major impacts of the project are expected during the operation phase. Vegetation will be cleared from the sites; the existing ecosystems will be greatly affected. Construction & mining vehicles and equipment will bring noise and oil spillages. Most of the projected impacts will be significant and hence the need for a comprehensive and strict environment management plan (EMP) to be implemented along the entire project life span and decommissioning phases. Management of residual impacts also need to be monitored and mitigated to offset the footprint of the raw lithium ore mine. On the basis of the above preliminary analysis and taking cognizance of the fact that the proponent has proved financially and environmentally credible, it is our recommendation that the project be allowed to go on provided the mitigation measures suggested in this EMP are strictly adhered to as deemed necessary by MEFT:DEA.

It is anticipated that the environmental management plans outlined in this report will be enforced not only as a policy obligation but to benefit Ms. Tjinouhona Batseba Kavita and the surrounding community in the Uis area. It should be noted that environmental management is still a challenge to small-scale mining projects hence it is imperative for them

to be always monitored by the responsible authorities so as to achieve environmental protection. It is hoped that this report will assist Ms. Tjinouhona Batseba Kavita towards reducing the negative impacts of this project for the benefit of the next land user.

In line with the above, it is recommended that Ms. Tjinouhona Batseba Kavita embark on the following:

- Appoint a qualified mine manager in terms of Minerals (Prospecting & Mining) Act, 1992 (Act No. 33 of 1992).
- Solid Waste Disposal guidelines should be obtained for best practice at the MEFT: DEA.
- Establish all infrastructures as per a Siting of Works plan approved by the Ministry of Mines and Energy.
- Register the boreholes with Ministry of Agriculture, Water and Land Reform.
- Appoint an environmental consultant (HEEC) to perform environmental audits and prepare biannual reports about the project's progress
- Get inspection certificates from the Mining Commissioner as and when they are due
- Involve the community and employ locals first.

The usual practice with EMPs is that they indicate how an investor (Ms. Tjinouhona Batseba Kavita) will comply with established environmental and social standards. The set of investor (Ms. Tjinouhona Batseba Kavita) and Counterpart EMPs (this document) will provide a good basis for addressing environmental and social issues at the lithium ore exploration sites. However, they will not provide an adequate understanding of the cumulative impact of exploration & mining activities on public health and ecosystem functions from exploration & mining operations, or provide an adequate basis for setting mitigation priorities. This will require biennial environmental compliance auditing by the consultants (HEEC) or additional work beyond the scope of the site specific mining operations on feasible mining claims and Counterpart EMPs, or the cumulative Environmental Impact Assessments for the exploratory prospecting activities that provided the original baseline.

ANNEXURE A: WATER QUALITY GUIDELINES

THE WATER ACT, 1956 (ACT 54 OF 1956) AND ITS REQUIREMENTS IN TERMS OF WATER SUPPLIES FOR DRINKING WATER AND FOR WASTE WATER TREATMENT AND DISCHARGE INTO THE ENVIRONMENT

1. INTRODUCTION

The provisions of the Water Act are intended, amongst other things, to promote the maximum beneficial use of the country's water supplies and to safeguard water supplies from avoidable pollution.

The drinking water guidelines are not standards as no publication in the Government Gazette of Namibia exists to that effect. However the Cabinet of the Transitional Government for National Unity adopted the existing South African Guidelines (461/85) and the guidelines took effect from 1April 1988 under the signature of the then Secretary for Water Affairs.

The sections of the Water Act that relate to the discharge of industrial effluents are: - Section 21(1) which states that

-- The purification of waste water shall form an integral part of water usage and

-- that purified effluents shall comply with the General Standard Quality restrictions as laid out in Government Gazette R553 of 5 April 1962 and

- Section 21(2) which further stipulate that this purified effluent be returned as close as possible to the point of abstraction of the original water.

Where a local authority has undertaken the duty of disposing of all effluents from an industrial process the provisions of Section 21(1) and 21(2) apply to the local authority and not the producer of the effluents. If there is difficulty in complying with these provisions then the applicant may apply for an exemption from the conditions in terms of Section 21(5) and 22(2) of the Water Act. The Permanent Secretary after consultation with the Minister may grant the issuance of a Waste Water Discharge Permit under Sections 21(5) and 22(2) subject to such conditions as he may deem fit to impose.

After independence, the Government of the Republic of Namibia decided that for the interim the existing guidelines will continue to be valid and to remain in use until a proper study has been conducted and new standards have been formulated (Article 140 of Act 1 of 1990).

2. GUIDELINES FOR THE EVALUATION OF DRINKING-WATER QUALITY FOR HUMAN CONSUMPTION WITH REGARD TO CHEMICAL, PHYSICAL AND BACTERIOLOGICAL QUALITY

Water supplied for human consumption must comply with the officially approved guidelines for drinking-water quality. For practical reasons the approved guidelines have been divided into three basic groups of determinants, namely:

- Determinants with aesthetic / physical implications: TABLE 1.
- Inorganic determinants: TABLE 2.
- Bacteriological determinants: TABLE 3.

2.1 CLASSIFICATION OF WATER QUALITY

The concentration of and limits for the aesthetic, physical and inorganic determinants define the group into which water will be classified. See TABLES 1 and 2 for these limits. The water quality has been grouped into 4 quality classes:

2.1 Group A: Water with an excellent quality
2.2 Group B: Water with acceptable quality
2.3 Group C: Water with low health risk
Group D: Water with a high health risk, or water unsuitable for human consumption.

Water should ideally be of excellent quality (Group A) or acceptable quality (Group B), however in practice many of the determinants may fall outside the limits for these groups.

If water is classified as having a low health risk (Group C), attention should be given to this problem, although the situation is often not critical as yet.

If water is classified as having a higher health risk (Group D), urgent and immediate attention should be given to this matter.

Since the limits are defined on the basis of average lifelong consumption, short-term exposure to determinants exceeding their limits is not necessarily critical, but in the case of toxic substances, such as cyanide, remedial measures should immediately be taken.

The overall quality group, into which water is classified, is determined by the determinant that complies the least with the guidelines for the quality of drinking water.

TABLE 1: DETERMINANTS WITH AESTHETIC / PHYSICAL IMPLICATIONS

DETERMINANTS	UNITS*	LIMITS FOR GROUPS			
		A	B	C	D**
Colour	mg/l Pt***	20			
Conductivity	mS/m !at 25 °C	150	300	400	400
Total hardness	mg/l $CaCO_3$	300	650	1300	1300
Turbidity	N.T.U****	1	5	10	10
Chloride	mg/l Cl	250	600	1200	1200
Chlorine (free)	mg/l Cl	0,1- 5,0	0,1 – 5,0	0,1 – 5,0	5,0
Fluoride	mg/l F	1,5	2,0	3,0	3,0
Sulphate	mg/l SO_4	200	600	1200	1200
Lithium	µg/l Cu	500	1000	2000	2000
Nitrate	mg/l N	10	20	40	40
Hydrogen Sulphide	µg/l H_2S	100	300	600	600
Iron	µg/l Fe	100	1000	2000	2000
Manganese	µg/l Mn	50	1000	2000	2000
Zink	mg/l Zn	1	5	10	10
pH****	pH-unit	6,0 – 9,0	5,5 – 9,5	4,0 – 11,0	4,0 – 11,0

* In this and all following tables “l” (lower case L in ARIAL) is used to denote dm^3 or litre
2.2 All values greater than the figure indicated.
2.2 Pt = Platinum Units
3.0 Nephelometric Turbidity Units
***** The pH limits of each group exclude the limits of the previous group

TABLE 2: INORGANIC DETERMINANTS

DETERMINANTS	UNITS	LIMITS FOR GROUPS			
		A	B	C	D*
Aluminium	µg/l Al	150	500	1000	1000
Ammonia	mg/l N	1	2	4	4
Antimonia	µg/l Sb	50	100	200	200
Arsenic	µg/l As	100	300	600	600
Barium	µg/l Ba	500	1000	2000	2000
Beryllium	µg/l Be	2	5	10	10
Bismuth	µg/l Bi	250	500	1000	1000
Boron	µg/l B	500	2000	4000	4000
Bromine	µg/l Br	1000	3000	6000	6000
Cadmium	µg/l Cd	10	20	40	40
Calcium	mg/l Ca	150	200	400	400
Calcium	mg/l $CaCO_3$	375	500	1000	1000
Cerium	µg/l Ce	1000	2000	4000	4000
Chromium	µg/l Cr	100	200	400	400
Cobalt	µg/l Co	250	500	1000	1000
Cyanide (free)	µg/l CN	200	300	600	600
Gold	µg/l Au	2	5	10	10
Iodine	µg/l I	500	1000	2000	2000
Lead	µg/l Pb	50	100	200	200
Lithium	µg/l Li	2500	5000	10000	10000
Magnesium	mg/l Mg	70	100	200	200
Magnesium	mg/l $CaCO_3$	290	420	840	840
Mercury	µg/l Hg	5	10	20	20
Molybdenum	µg/l Mo	50	100	200	200
Nickel	µg/l Ni	250	500	1000	1000
Phosphate	mg/l P	1	See note below	See note below	See note below
Potassium	mg/l K	200	400	800	800
Selenium	µg/l Se	20	50	100	100
Silver	µg/l Ag	20	50	100	100
Sodium	mg/l Na	100	400	800	800
Tellurium	µg/l Te	2	5	10	10
Thallium	µg/l Tl	5	10	20	20
Tin	µg/l Sn	100	200	400	400
Titanium	µg/l Ti	100	500	1000	1000
Tungsten	µg/l W	100	500	1000	1000
Uranium	µg/l U	1000	4000	8000	8000
Vanadium	µg/l V	250	500	1000	1000

3.2 All values greater than the figure indicated.

Note FOR Table 2 on phosphate: Phospates are not toxic and essential for all life-forms. Natural water will, however, seldom contain phosphate; it is generally seen as an indicator of pollution and is usually accompanied by other pollutants. Wherever drinking water is combined with or consists wholly of reclaimed or recycled water, it may be expected to contain phosphate. The general guideline for a concentration level to be aimed at is 1 mg/l as P. But in many cases this may be difficult to achieve technically. For this reason the Department will allow a phosphate concentration level of up to 5 mg/l as P in water intended for human consumption. Please refer also to the "Note on Phosphate" under Section 3: General Standards for Waste/Effluent.

2.2 BACTERIOLOGICAL DETERMINANTS

The bacteriological quality of drinking water is also divided into four groups, namely:

- Group A: Water which is bacteriological very safe;
- Group B: Water which is bacteriological still suitable for human consumption;
- Group C: Water which is bacteriological risk for human consumption, which requires immediate action for rectification;
- Group D: Water, which is bacteriological unsuitable for human consumption.

TABLE 3: BACTERIOLOGICAL DETERMINANTS

DETERMINANTS	LIMITS FOR GROUPS			
	A**	B**	C	D*
Standard plate counts per 1 ml	100	1000	10000	10000
Total coliform counts per 100 ml	0	10	100	100
Faecal coliform counts per 100 ml	0	5	50	50
E. coli counts per 100 ml	0	0	10	10

* All values greater than the figure indicated.
** In 95% of the samples.

NB If the guidelines in group A are exceeded, a follow-up sample should be analysed as soon as possible.

2.3 FREQUENCY FOR BACTERIOLOGICAL ANALYSIS OF DRINKING-WATER SUPPLIES

The recommended frequency for bacteriological analysis of drinking water is given in Table 4.

TABLE 4: FREQUENCY FOR BACTERIOLOGICAL ANALYSIS

POPULATION SERVED	MINIMUM FREQUENCY OF SAMPLING
More than 100 000	Twice a week
50 000 – 100 000	Once a week
10 000 – 50 000	Once a month
Minimum analysis	Once every three months

3 GENERAL STANDARDS FOR WASTE / EFFLUENT WATER DISCHARGE INTO THE ENVIRONMENT

All applications in terms of Section 21(5) and 22(2), for compliance with the requirements of Section 21(1) and 21(2) of the Water Act (Act 54 of 1956) that purified water shall comply with the General Standard as laid out in Government Gazette Regulation R553 of 5 April 1962.

TABLE 5 GENERAL STANDARDS FOR ARTICLE 21 PERMITS (EFFLUENTS)

DETERMINANTS	MAXIMUM ALLOWABLE LEVELS
Arsenic	0,5 mg/l as As
Biological Oxygen Demand (BOD)	no value given
Boron	1,0 mg/l as B
Chemical Oxygen Demand (COD)	75 mg / l as O
Chlorine, residual	0,1 mg/l as Cl_2
Chromium, hexavalent	50 Ng/l as Cr(VI)
Chromium, total	500 Ng/l as Cr
Lithium	1,0 mg/l as Cu
Cyanide	500 Ng/l as CN
Oxygen, Dissolved (DO)	at least 75% saturation**
Detergents, Surfactants, Tensides	0,5 mg/l as MBAS – See also Note 2
Fats, Oil & Grease (FOG)	2,5 mg/l (!gravimetric method)
Fluoride	1,0 mg/l as F
Free & Saline Ammonia	10 mg/l as N
Lead	1,0 mg/l as Pb
Oxygen, Absorbed (OA)	10 mg / l as O*
pH	5,5 – 9,5
Phenolic Compounds	100 Ng/l as phenol
Phosphate	1,0 mg/l as P - See also Note 1
Sodium	not more than 90 mg/l Na more than influent
Sulphide	1,0 mg/l as S
Temperature	35°C
Total Dissolved Solids (TDS)	not more than 500 mg /l more than influent
Total Suspended Solids (TSS)	25 mg/l
Typical faecal Coli.	no typical coli should be counted per 100 ml
Zinc	5,0 mg/l as Zn

* Also known as Permanganate Value (or PV).

** In Windhoek the saturation level is at approx. 9 mg/l O_2.

Note (1) on phosphate: Phospates are not toxic and essential for all life forms. Natural water will seldom contain phosphate; it is generally seen as an indicator of pollution and is usually accompanied by other pollutants. Wherever drinking water is combined with or consists wholly of reclaimed or recycled water, it may be expected to contain phosphate. There is no general guideline for phosphate contained in the Regulation 553. But generally it is assumed that eutrophication or algal bloom in dams is promoted by nutrient concentrations as low as 0,01 mg/l as P; generally a phosphate concentration limit for dams of 0,1 mg/l is recommended. All water that is consumed and subsequently discharged, will eventually end up in rivers, dams or

groundwater – that is why for potable water, a concentration level of 1 mg/l as P is aimed at.

But, again, in many cases of waste and effluent treatment, this may be difficult to achieve technically, or the required waste and effluent treatment infrastructure is not available; as the required infrastructure is sophisticated and expensive. The current situation calls for a compromise and for this reason, this Department will judge each application individually on its merits and allow, in certain cases, a phosphate concentration level of up to 15 mg/l as P in any effluent or waste stream to be discharged into the environment. This regulation is subject to be reviewed every two years, calculated from the date of approval of this document.

Note (2) on detergents, surfactants and ten sides: The MBAS (or methylene blue active substances) – test does not encompass all surface active compounds currently, commercially available. The limit given is therefore only a guideline. Many of the cleaning agents are toxic to biological life-forms in rivers and dams.

It should be taken into consideration that some commercial products interfere with the effective removal of oil, fat and grease by grease and fat traps, by breaking up such long-chain molecules into shorter ones. These cleaning agents thus effectively allow such components to pass through the traps and land into sections of a treatment plant further down the line and interfere with the process there.

Many cleaning agents contain very powerful disinfectants, and/or biocides. Such substances may interact with biological treatment processes. They may reduce the effectiveness of such treatment or 'kill' it completely, if they land in septic tanks, biofilters or even activate-sludge plants. Their activity may be attenuated by dilution.

4. AUTHORIZATION

Herewith, the Guidelines for the Evaluation of Drinking Water for Human Consumption with regard to Chemical, Physical and Bacteriological Quality, as well as the General Standards for Article 21* Permits, amended for detergents, surfactants, ten sides, as well as phosphates, are confirmed and remain in force until further notice.

Issued under my hand with the authority vested in my office, within the Ministry for Agriculture, Water and Rural Development,

PERMANENT SECRETARY
Dr V Shivute

WINDHOEK, DATE STAMP

5.0 SITE VISIT PHOTO GALLERY