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Okorusu Fluorspar Mine

Amended Environmental Management Plan for the Okorusu
Fluorspar Mine

SLR Project No.: 734.07010.00001

Report No.: 1

April 2016

OKORUSU FLUORSPAR (PTY) LTD

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AMENDED ENVIRONMENTAL MANAGEMENT PLAN FOR THE OKORUSU FLUORSPAR MINE

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ACRONYMS AND ABBREVIATIONS

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

Acronyms / Abbreviations	Definition
DWA	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management System
EPL	Exclusive Prospecting License
Ha	Hectare
ISO	International Standard Organisation
LoM	Life of Mine
MAWF	Ministry of Agriculture Water and Forestry
MC	Mining Commissioner
MET	Ministry of Environment and Tourism
MME	Ministry of Mines and Energy
MS	Method Statement
MP	Management Programme
NSD	Noise Sensitive Development
PM10	Particular Matter less than 10 micrometre
RoM	Run of Mine
SANS	South African National Standards
SHE	Safety Health and Environment
SME	Small-Medium Enterprise
STP	Sewerage Treatment Plant
Tpa	Tons per annum
TSF	Tailings Storage Facility
WRD	Waste Rock Dump

AMENDED ENVIRONMENTAL MANAGEMENT PLAN FOR THE OKORUSU FLUORSPAR MINE

1 INTRODUCTION

This Environmental Management Plan (EMP) documents a series of individual management programmes (MPs) which are designed to meet legal requirements and avoid or minimise the impacts associated with the Okorusu Fluorspar Mine (Okorusu).

An EIA Scoping process, which included the assessment of proposed amendments to the mining operations and the re-assessment of cumulative impacts associated with the Okorusu Mine, was conducted in 2016. This EMP takes the management and mitigation requirements from the existing (approved) EMP into consideration as well as the findings of the 2016 EIA. It therefore supersedes the previously approved EMP.

The MPs have therefore been compiled based on the existing EMP requirements as well as the EIA Report for the proposed Okorusu Fluorspar Mine amendments (SLR, 2016).

TABLE 1-1: SUMMARY OF ISSUES IDENTIFIED IN THE EMP AND CORRESPONDING MANAGEMENT PROGRAMMES

Environmental component (reference to the Scoping Assessment Report)	Issue (reference to the Scoping Assessment Report)	Relevant MP (reference to Section 6 of the EMP)
Topography (7.2)	Surface excavations and infrastructure (7.2)	MP7.1 – Stakeholder consultation MP7.2 – Safety & Security
Soils and land capability (7.2)	Loss of soil resources from soil pollution (7.2)	MP7.14 – Waste management
	Loss of soils resource through physical disturbance (7.2)	MP 13 – Soil management
Biodiversity – Natural vegetation and animal life (7.2 & 8.3)	Physical impacts on biodiversity (7.2 & 8.3.1)	MP7.7 – Biodiversity
	Noise impacts on biodiversity (7.2 & 8.3.3)	MP7.7 – Biodiversity MP7.3 – Surface Water MP7.4 – Groundwater
	Poaching and harvesting (7.2 & 8.3.2)	MP7.7 – Biodiversity MP7.14 – Waste

Environmental component (reference to the Scoping Assessment Report)	Issue (reference to the Scoping Assessment Report)	Relevant MP (reference to Section 6 of the EMP)
		management
Surface water (7.2 & 8.5)	Altering drainage patterns (7.2 & 8.5.1)	MP7.3 – Surface Water
	Impacts on surface water quality (7.2 & 8.5.2)	MP7.3 – Surface Water MP7.14 – Waste Management
Groundwater (7.2 & 8.6)	Dewatering and groundwater abstraction (7.2, 8.6.1 & 8.6.3)	MP7.4 – Groundwater MP7.11 – Socio-Economic
	Impacts on groundwater quality (7.2, 8.6.2 & 8.6.3)	MP7.4 – Groundwater MP7.14 – Waste management
Air quality (7.2 & 8.1)	Air pollution (7.2 & 8.1.1)	MP7.5 – Air quality
Noise and Vibration (7.2)	Noise pollution and vibration (Section 7.2)	MP7.6 – Noise & Vibrations
Blasting (7.2)	Blasting (Section 7.2)	MP7.2 – Safety & Security MP7.6 – Noise & Vibrations
Archaeology (7.2 & 8.4)	Impacts on archaeological resources (7.2 & 8.4.1)	MP7.9 – Archaeology
Visual (7.2)	Visual impact (7.2 & 8.2)	MP7.8 – Visual
Socio-economic (7.2)	Economic (income and employment) impact due to change of land use (7.2)	MP7.1 – Stakeholder consultation
	Impact on surrounding land users (7.2)	MP7.2 – Safety & Security
	Employment and skills development (7.2)	MP7.11 – Socio-Economic
	Community health, safety and security (7.2)	
Traffic (7.2)	Traffic Impact (7.2 & 8.7)	MP7.10 - Traffic

1.1 KEEPING EMPs UP TO DATE

It is the intention that this EMP should be seen as a “living document” which will be amended during the operation, as the activities might change or new ones be introduced.

This is in accordance with Section 50 (g) of the Minerals (Mining and Prospecting) Act, 33 of 1992, which states that the holder of a mining licence shall undertake the periodic review of the EMP(s) should circumstances change.

Should a listed activity(s) as defined in the Environmental Impact Assessment Regulations: Environmental Management Act, 2007 (Government Gazette No. 4878) be triggered (as a result of future modifications/changes at the mine), this EMP will be updated as a result of another EIA process as stipulated in the regulations.

Taking the above mentioned requirements into consideration, the existing EMP was updated as a result of the proposed Okorusu Mine amendments and the resulting (2016) EIA process.

1.2 DETAILS OF THE PERSONS WHO PREPARED THIS EMP

SLR Namibia (Pty) Ltd (SLR), the independent firm of consultants who undertook the EIAs has compiled this EMP.

Simon Charter, with the assistance of Werner Petrick, who are both Environmental Practitioners from SLR, prepared this EMP. Simon Charter, the EIA project manager, has 10 years of experience of EIA preparation, compilation of EMPs, conducting audits and reviewing relevant reports. Werner Petrick has over 18 years of relevant experience in conducting/managing EIAs, compiling EMPs and implementing EMPs and Environmental Management Systems.

2 SCOPE OF EMP

The components of the EMP are included in table 2-1 below.

TABLE 2-1: CONTENT OF THE EMP

EIA Regulation requirement	Reference in the EMP
Details of the persons who prepared the EMP and the expertise of those persons to prepare an environmental management plan.	Section 1.2
Information on any proposed management or mitigation measures to address the environmental impacts that have been identified in a report contemplated by these regulations, including environmental impacts or objectives in respect of – <ul style="list-style-type: none"> i. Planning and design ii. Construction activities iii. Operation or undertaking of the activity iv. Rehabilitation of the environment v. Closure, where relevant 	Section 7
A detailed description of the aspects of the activity that are covered by the EMP.	Sections 4 & 5
An identification of the persons to be responsible for the implementation of the mitigation measures.	Sections 5 & 8
Where appropriate, time frames within which the measures contemplated in the EMP must be implemented.	Section 8
Proposed mechanisms for monitoring compliance with the EMP and reporting on it.	Sections 7 & 9

3 ENVIRONMENTAL LEGISLATION

3.1 INTRODUCTION

Okorusu complies with all Namibian legislation, and where legislation is lacking the company will comply with international best practice procedures.

Table 3-1 provides a summary list of the relevant legislation.

TABLE 3-1: LIST OF LEGISLATION RELEVANT TO MINING IN NAMIBIA

Year	Name
Current Namibian legislation & Bills	
1990	Petroleum Products and Energy Act No. 13 of 1990, as amended
1990	The Constitution of the Republic of Namibia of 1990
1992	The Labour Act, No. 6 of 1992
1992	The Minerals (Prospecting and Mining) Act No. 13 of 1992
1997	Regulations relating to the Health and Safety of Employees at Work (promulgated in terms of Section 101 of the Labour Act, No. 6 of 1992 (GN156, GG 1617 of 1 August 1997)
1998	Affirmative Action (Employment) Act No. 29 of 1998
1997	Namibian Water Corporation Act, No. 12 of 1997
1998	The Health Act No. 21 of 1998
1999	Road Traffic and Transport Act No. 22 of 1999
2000	Petroleum Products regulations
2000	Electricity Act No. 2 of 2000
2000	Explosives Act of 2000
2001	The Forestry Act No. 12 of 2001
2003	Pollution control and waste management bill, 2004
2004	Water Resources Management Act, 2004
2004	National Heritage Act No. 27 of 2004
2007	Labour Act No. 11 of 2007
2005	Atomic Energy and Radiation Protection Act No. 5 of 2005
2007	Electricity Act, No, 4 of 2007
2007	Environmental Management Act No. 7 of 2007
Former South African and SWA legislation still applicable in Namibia	
1919	Public Health Act No. 36 of 1919
1956	Water Act No. 54 of 1956
1956	Explosives Act No. 26 of 1956

Year	Name
	Regulations promulgated in terms of the Explosives Act No. 26 of 1956
1968	Regulations made under the provisions of the Mines, Works and Minerals ordinance, 1968 (Ordinance 20 of 1968)
1969	Soil Conservation Act No. 76 of 1969
1974	Hazardous Substances Ordinance No. 14 of 1974
1975	Nature Conservation Ordinance No. 14 of 1975
1976	Atmospheric Pollution Prevention Ordinance No. 11 of 1976
Namibian policy	
1994	Policy for the Conservation of Biotic Diversity and Habitat Protection
1995	Namibia's Environmental Assessment Policy for Sustainable Development and Environmental Conservation
1998	Draft White Paper on the Energy Policy of Namibia
1999	Policy for Prospecting and Mining in Protected Areas and National Monuments
2000	National Water Policy White Paper
2004	Minerals Policy for Namibia
International law to which Namibia is a signatory	
1985	Vienna Convention for the Protection of the Ozone Layer
1987	Montreal Protocol on substances that deplete the Ozone Layer
1989	The Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal
1989	The Rotterdam convention on the Prior Informed Consent Procedure for Certain Hazardous chemicals and Pesticides in International Trade
1992	The Rio de Janeiro Convention on Biological Diversity
1992	United Nations Framework Convention on Climate Change

4 PROJECT OVERVIEW

The Okorusu Fluorspar Mine is an open pit fluorite mine located roughly 60 km by road northwest of Otjiwarongo in the Otjozondjupa region. Production was recently stopped at the Okorusu Fluorspar Mine and it is now on “Care and Maintenance” to ensure that it remains in a safe and stable condition. In order to keep utilising the available infrastructure at Okorusu, Okorusu Fluorspar (Pty) Ltd (Okorusu) is now proposing to adapt a part of the existing processing plant for the processing of graphite ore from the Okanjande Graphite Mine, owned by Gecko Graphite (Pty) Ltd, approximately 14 km south of Otjiwarongo. In addition, it is also proposed to mine for magnetite within ML-90 and ML-179, the two approved mining licence areas at the Okorusu mine as well as to rework the existing Tailings Storage Facility (TSF) and to produce metallurgical grade fluorspar concentrates (metspar) at the existing processing plant.

Both the Okanjande and Okorusu mines currently hold Environmental Clearance Certificates (ECC) in terms of the Environmental Management Act (No. 7 of 2007) (EMA). The Okanjande Mine ECC allows for the construction and operation of a processing plant comprising of crushing, milling, heavy mineral separation, flotation, filtration, drying, screening and bagging. A largely similar fluoride processing facility is located at Okorusu. The ECC for the Okanjande Mine also included the transport of graphite ore from the Okanjande Graphite Mine to the town of Otjiwarongo. It is now proposed to transport the graphite ore from the Okanjande Mine by road to the Okorusu Mine for processing at an adapted processing facility. The distance between the two mines is approximately 86 km by road.

An amendment of the Okorusu Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) is therefore required to include the following:

- the transport of graphite from Otjiwarongo to the Okorusu Mine;
- the construction of a new access road on the Okorusu Mine site;
- the processing of graphite at the existing processing plant;
- the development of a new TSF cell within the approved Okorusu TSF footprint in order to dispose of graphite ore processing tailings;
- mining of magnetite within the ML-90 and ML-179 mining licence areas; and
- reworking of the Okorusu mine tailings for the production of metspar at the existing Okorusu processing facility

For further details regarding the proposed activities and more detailed maps indicating their locations and extents, refer to the Scoping Report (with Assessment) for the Proposed Okorusu Mine Amendment (SLR, 2016).

5 ENVIRONMENTAL MANAGEMENT PLAN (ASPECTS AND IMPACTS)

Table 5.1 provides a description of the environmental aspects that are associated with Okorusu and how they impact the biophysical and human environments.

TABLE 5-1: DESCRIPTION OF ENVIRONMENTAL ASPECTS AND POTENTIAL IMPACTS ASSOCIATED WITH OKORUSU MINING OPERATIONS

Environmental aspects	Potential impact
Aspects associated with consumption of resources	
Energy use	<ul style="list-style-type: none"> Energy Resource Depletion, remote impacts
Use of natural resources	<ul style="list-style-type: none"> Natural Resource Depletion, loss of land (habitat), change in land-use potential, loss of future economic opportunities.
Use of manufactured materials	<ul style="list-style-type: none"> Natural Resource Depletion, loss of land (habitat), change in land-use potential, loss of future economic opportunities.
Aspects associated with waste/pollution generation	
Emissions to air: -Fall-out dust -PM ₁₀ -PM _{2.5}	<ul style="list-style-type: none"> Reduce visibility. Nuisance impact and Health impact. Impact on flora (cover of foliage in dust which reduces growth, health of plant, etc.)
Emission to land (solid and liquid non-hazardous waste)	<ul style="list-style-type: none"> Visual pollution (e.g. littering). Pollution of water. Alteration of soil chemistry and/or composition.
Emission to land (solid and liquid hazardous waste)	<ul style="list-style-type: none"> Safety and health. Scavenging by animals.
Emission to water (domestic)	<ul style="list-style-type: none"> Contamination of streams, dams and groundwater. Alteration of soil chemistry and/or composition.
Emission to water (industrial)	<ul style="list-style-type: none"> Impact on fauna and flora living in aquatic environments. Safety and health.
Emissions to land and water (medical waste)	<ul style="list-style-type: none"> Impact on surface water flow.
Sound or visual pollutants	
Noise	<ul style="list-style-type: none"> Negative public perception – Nuisance impact. Change in animal behaviour.
Visual	<ul style="list-style-type: none"> Change to the visual landscape Visual impact (aesthetic quality of environment) - Negative public perception

Environmental aspects	Potential impact
	<ul style="list-style-type: none"> Alteration in nocturnal activities of fauna and flora to be removed.
Blasting & Vibrations	<ul style="list-style-type: none"> Impact on safety of third parties. Impact on property – buildings and other infrastructure. Impact on biodiversity.
Disturbance or alteration of ecosystems	
Disturbance of land	<ul style="list-style-type: none"> Visual change in surroundings, scars, loss of biodiversity, damage to ecosystems, altered soil potential, change in land- use potential, loss of future economic opportunities.
Disturbance of biodiversity	<ul style="list-style-type: none"> Impact on biodiversity (physical disturbance or general disturbance). Reduction of water resource as an ecological driver.
Disturbance of water courses or groundwater	<ul style="list-style-type: none"> Alteration of drainage patterns. Surface and groundwater pollution. Alteration of groundwater levels due to over pumping. Depletion of community supply boreholes.
Disturbance or alteration of archaeology	
Disturbance of archaeological sites	<ul style="list-style-type: none"> Damage to archaeological sites.
Socio-economic aspects	
Economic	<ul style="list-style-type: none"> Direct contribution to Gross Namibian Income (GNI) of the mine during LoM Reducing income inequality, increasing job creation and economic growth.
Inward migration	<ul style="list-style-type: none"> Community health & safety and security impacts. Stimulating the local economy and community organization Increasing pressure on government services Informal settlements
Change of land use	<ul style="list-style-type: none"> Land may devalue due to mine development Lowering of the groundwater and consequent long-term threat to sustainable farming Loss of sense of place and subsequent loss of livelihoods from tourism during construction and operations. Squatter camps and reduction of safety.
Traffic	<ul style="list-style-type: none"> Increased traffic using the road and the potential for road traffic accidents; Road deterioration due to road use by mine-related vehicles. Loose gravel can lead to cracked windscreens; and

Environmental aspects	Potential impact
	<ul style="list-style-type: none"><li data-bbox="528 295 1157 327">• The presence of animals and the risk of collision.
Other (any aspect not considered to fall into the defined aspect categories)	
Emergency situation	<ul style="list-style-type: none"><li data-bbox="528 407 1493 533">• There are a number of different situations which could arise, each with its own suite of impacts, e.g. fire will have an impact on air quality, health and safety, property, fauna and flora.

6 OVERALL ENVIRONMENTAL OBJECTIVES FOR THE EMP

The following overall environmental objectives have been set for ongoing operations and new project components at the Okorusu Fluorspar Mine:

- To comply with national legislation and standards for the protection of the environment.
- To limit potential impacts on biodiversity through the minimisation of the footprint and the conservation of residual habitat within the mine area.
- To investigate and exploit measures to reduce resource and energy consumption.
- To keep surrounding communities informed of mining activities through the implementation of forums for communication and constructive dialogue.
- To limit contaminated effluent discharge into the environment through the containment, recycling or removal of contaminated water.
- To conserve soil resources by stripping, stockpiling and managing topsoil.
- To protect soils and groundwater resources through the implementation of measures for spill prevention and clean-up.
- To ensure the legal and appropriate management and disposal of general and hazardous waste, through the implementation of a strategy for the minimisation, recycling, management, temporary storage and removal of waste.
- To minimise the potential for dust emissions through the implementation of dust control measures.
- To minimise the potential for noise and vibration disturbance in surrounding areas.
- To protect cultural heritage by avoiding sites of significance, or, if this cannot be done, to ensure thorough documentation and the obtaining of necessary legal approvals thereof prior to destruction.
- To undertake rehabilitation wherever possible during the life of the mine.
- To incorporate final closure objectives in construction and mine planning.
- To develop, implement and manage monitoring systems to ensure good environmental performance in respect of the following: ground and surface water, air quality, noise and vibration, biodiversity and rehabilitation.
- To ensure the health and safety of surrounding communities through access control.
- To support and encourage environmental awareness and responsibility amongst all employees and service providers.
- To provide appropriate environmental education and training for all employees and service providers.
- Prevent and minimise pollution.
- To incorporate the relevant requirements stipulated in this EMP into the design.
- Ensure that all the contractors adhere to the construction related management commitments.
- Ensure compliance to the EMP.

7 MANAGEMENT PROGRAMMES

The management programmes (MPs), listed in the table below, are applicable to all the relevant activities and facilities of the Okorusu Mine. (The MPs follow in the subsequent sections).

TABLE 7-1: VARIOUS MPS AND NUMBERS

Number	Management Programme (MP)
7.1	Stakeholder Consultation/Communication MP
7.2	Safety and Security MP
7.3	Surface water/storm water MP
7.4	Groundwater MP
7.5	Air Quality MP
7.6	Noise & Vibrations MP
7.7	Biodiversity MP
7.8	Visual MP
7.9	Archaeology MP
7.10	Traffic MP
7.11	Socio-Economic MP
7.12	Resource MP
7.13	Soil MP
7.14	Waste Management MP

7.1 STAKEHOLDER CONSULTATION/COMMUNICATION MANAGEMENT PROGRAMME

It is important that channels of communication are maintained over the life of the project for surrounding landowners and other relevant stakeholders. **Error! Reference source not found.** shows the stakeholder communication management programme.

7.1.1 COMPONENTS

This plan is made up of the following components:

- General Stakeholder communication.

7.1.2 MANAGEMENT AND MITIGATION

7.1.2.1 General Stakeholder communication

Objectives

To ensure that ongoing feedback is provided on the relevant mining activities, together with feedback on the environmental management performance of the mine and that opportunity is provided for interested and affected parties to raise comments and concerns (complaints) on the same. Also, to ensure communication/ engagement strategies meet the needs of stakeholders.

Actions

TABLE 7-1: ACTIONS RELATING TO STAKEHOLDER COMMUNICATION

No	Issue	Management commitment
These commitments apply to <u>all phases</u> of the mining operation		
1	Understanding who the stakeholders are	Maintain and update the stakeholder register, including stakeholders' needs and expectations. Ensure that all relevant stakeholder groups are included.
2		A representative database would include government, employees, service providers, contractors, indigenous populations, local communities, NGOs, shareholders, customers, the investment sector, community-based organizations, suppliers and the media.
3		Ensure that marginalised and vulnerable groups are also considered in the stakeholder communication process.
4		Record partnerships as well as their roles, responsibilities, capacity and contribution to development.
5	Liaising with interested and affected parties at all phases in the mine life	Devise and implement a stakeholder communication and engagement strategy

No	Issue	Management commitment
6	Cooperative working	As far as is feasible, fully inform identified stakeholders about the mine's activities.
7	relationship with stakeholders	Use appropriate communication channels to consult with and disseminate information to the public, and for this purpose should develop a communication procedure.
8		Communication channels could include: open days, with particular attention being paid to the accessibility of venues, newsletters for both employees and the public, national and local newspapers, television, radio, email, telecommunication (via sms) and the internet, an annual sustainable development report.
9	Managing perceptions and issues/complaints	Develop and implement a concerns/complaints (grievance) process for the public and publicise the channels through which complaints and comments can be submitted to the company. Respond immediately to all complaints and comments on receipt, introduce a "Third Party" if the grievance / complaint cannot be resolved between Okorusu and the affected party and keep complete records of complaints, responses and actions taken. Document all complaints in the external communications register. Investigate and respond to the complainant.
10	Safety of 3 rd parties	Through appropriate communication and inductions, provide information to educate third parties about the dangers associated with hazardous excavations and infrastructure.
11	Monitoring	Monitor changes in the communities of interest.
12		Develop audit criteria for monitoring the performance of its stakeholder engagement and communication strategies as well as relations between the company and its stakeholders.

7.2 SAFETY AND SECURITY MANAGEMENT PROGRAMME

It is essential that safety and security measures are defined and implemented to adequately protect the mine site from being accessed by unauthorized people. An emergency response plan for incidents is also essential.

Note that a separate Occupational Health and Safety Plan must be developed for the mining activities and does not form part of this EMP.

7.2.1 COMPONENTS

This plan is made up of the following components:

- General (third party) safety and security.
- Occupational Health & Safety.

7.2.2 MANAGEMENT

7.2.2.1 General (third party) safety and security

Objectives

The objective of the management measures is to prevent physical harm to third parties and animals from potentially hazardous excavations and infrastructure.

Actions

TABLE 7-2: ACTIONS RELATING TO GENERAL (THIRD PARTY) SAFETY AND SECURITY

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommission</u> phases		
1	Access of unauthorised people	Warning signs will be erected and maintained at the site boundary and the working area of the mine will be fenced.
2		Security control points will be in place, to prevent uncontrolled vehicle access to existing and future mining, stockpile and waste facility areas during the construction, operation and decommissioning phases.
3		Any person entering the mine area (pit & plant) will only be allowed after formal induction.
4	Emergency	Develop and implement an emergency response plan for third parties falling into or off hazardous excavations and causing injury.
These commitments apply to <u>operation and decommission</u> phases		
5	Safety Risks	Permanent aboveground waste facilities and stockpiles will be rehabilitated in a manner that they present land forms that will be stable, protected from flood damage, and slopes will be re-vegetated.

6		Any mining voids that remain open will be made safe to ensure that there is no risk to the safety of people and animals.
These commitments apply to <u>design, construction and operation</u> phases		
7	Safety Risks	The permanent above ground waste facilities will be designed, constructed and operated in a manner that stability is a priority, flood protection is provided and the risk of failure is limited to acceptable levels.

7.2.3 OCCUPATIONAL HEALTH & SAFETY

Occupational health and safety aspects of the Okorusu Fluorspar Mine do not form part of this EMP. Okorusu will adhere to all the relevant Namibian Legislation regarding health and safety and implement a formal health and safety management system. The main components which should be included in such a management system are summarised below.

The objectives of the health and safety management system will be to ensure:

- A healthy and safe work environment.
- Safe systems of work.
- Safe plant and equipment.
- The availability of such information, instruction, and training as required for worker health and safety.

Health and safety induction will be a requirement for all employees and contractors. All visitors will be required to attend a site induction prior to accessing the mine site. Specific training sessions will be developed and provided to employees requiring specific health and safety skill sets.

Health and safety audits will be routinely scheduled. Ad hoc audits will be done more frequently to follow up on concerns and/or non-compliances. Incident reporting and management augments the audits.

All hazardous chemicals used on site will have readily available Material Safety Data Sheets (MSDSs). Chemical hazards training will be an integral part of safety training and induction. Procedures will be developed for the use and handling of all dangerous chemicals. Correct personal protective equipment will be supplied.

7.3 SURFACE WATER MANAGEMENT PROGRAMME

Water is a scarce resource in Namibia, Okorusu will undertake its operations to maximise the recycling and reuse of water.

Industrial effluent (from the plant, laboratory, wash bay and storm water drains) will be recycled into the plant if it is suitable for use in the process. The aim is to have a facility that does not discharge effluent into the environment. Treated effluent from the sewage plant and decant water from the tailings disposal facilities will also be re-used in the plant.

Domestic effluent includes grey water from the laundries, shower blocks and kitchens and sewage from the ablution facilities. Sewerage from septic tanks will be disposed of at the existing sewerage facility on site. Sewage water is collected and discharged into septic tanks followed by French drains and evaporation ponds.

Tailings Slurry is another industrial effluent and will be pumped to the TSF via slurry pipelines. TSF management is dealt with in the groundwater section.

Hydrocarbons

Hydrocarbons are hazardous liquid wastes and will be disposed of in compliance with Namibian legislation.

There are a number of sources in all project phases that have the potential to pollute surface water, particularly in the unmanaged scenario. In the construction and decommissioning phases these potential pollution sources are temporary in nature, usually existing for a few weeks to a few months. Although these sources may be temporary, the potential pollution may be long term. The operational phase will present more long term potential sources and the closure phase will present final land forms that may have the potential to contaminate surface water through long term seepage and/or run-off.

The commitments derived from the 2016 Scoping Report and 2013 EIA with regards to surface water, form the basis of this MP:

7.3.1 COMPONENTS

This plan is made up of the following components:

- Altering drainage patterns.
- Pollution of surface water – general.
- Industrial effluent.
- Domestic effluent.
- Spills.

7.3.2 MANAGEMENT

7.3.2.1 Altering drainage patterns

Objectives

The objective of the management measures is to minimise mixing of clean and dirty water systems.

Actions

TABLE 7-3: ACTIONS RELATING TO THE ALTERING OF DRAINAGE PATTERNS

No	Issue	Management commitment
These commitments apply to all <u>phases</u>		
1	Natural flow of storm water (clean and dirty) flowing from surrounding areas into and around the operations.	Design all storm water interventions in such a way that storm water can bypass the major structures such as the TSF, pits and the WRD and low grade stockpiles. Ensure that these facilities are designed, constructed and operated that flood protection is provided.
2		Minimise the overall mining footprint, thereby limiting the runoff reduction.
These commitments apply to <u>construction and operation</u> only		
3	Flow of dirty storm water (rain water that falls onto and flows across the site)	Construct engineered structures to direct contaminated water from the processing areas, roads and office areas to the return water dam circuit for storage and re-use.
These commitments apply to mine <u>closure and decommissioning</u> only		
4	Natural flow of storm water	The refilled excavations are contoured and vegetated to reduce the likelihood of runoff causing erosion of the compacted ground.

2.3.2.2 Impacts on surface water quality - general

Objectives

The objective of the management measures is to prevent pollution of surface water run-off.

Actions

TABLE 7-4: ACTIONS RELATING TO THE MANAGEMENT OF SURFACE WATER – GENERAL

No	Issue	Management commitment
These commitments apply to <u>design, construction and operation</u> phases		
1	Clean & dirty water separation	Where possible, surface water management facilities will be designed, constructed and operated so that dirty water is kept separate from clean water run-off through a system of berms, channels, trenches, flood protection measures, erosion protection or dams. The need for long term controls around

No	Issue	Management commitment
		the waste rock dump will be determined as part of closure planning
These commitments apply to <u>construction, operation and decommissioning</u> phases		
2	General surface water pollution/spills	All hazardous chemicals (new and used), dirty water, mineralised wastes, concrete batching activities and non-mineralised wastes are handled in a manner that they do not contaminate surface water run-off or where this is not possible, demonstrate (through monitoring) that the potential contamination is within acceptable limits from a human health and related risk perspective.
3		Prevent pollution through infrastructure design and through education and training of workers (permanent and temporary)
4		The required steps to enable fast reaction to contain and remediate pollution incidents. In this regard the remediation options include in situ treatment or disposal of contaminated soils as hazardous waste. The former is generally considered to be the preferred option because with successful in situ remediation the soil resource will be retained in the correct place. The <i>in situ</i> options include bioremediation at the point of pollution, or removal of soils for washing and/or bio remediation at a designated area after which the soils are replaced
5		Ensure that on-site contractors have all the necessary hazardous protection equipment for people and the environment in the advent of a spill.
6		Verify fuel transport company's spill containment (emergency clean up) plan and spill clean-up agreement is in place. Ensure that fuel transporting companies adhere to the Petroleum Products and Energy Act (13 of 1990) and Regulations
7		Establish and maintain concrete bunded areas around all diesel generators, where required.
8		Maintain and implement spill management procedure, including the clean-up of hydro-carbon spills.
9		Ad hoc spills will be cleaned up/remediated immediately in line with spillage management procedure.
10		Place spill kits in all areas where hazardous substances are dispensed and stored and train staff to use it.
11		Specifications for post rehabilitation audit criteria to ascertain whether the remediation has been successful.
12	Magnetite mine site	A small settlement dam will be constructed just below the confluence of the two drainage lines below the magnetite deposits, to capture the runoff from the disturbed area which could be carrying an elevated silt load.

No	Issue	Management commitment
13		Surface water sampling after storm events should also be undertaken where possible, to enable a database to be compiled of water quality, which would indicate if a deterioration occurs during the mining.
14	Mine infrastructure	Ensure that where mine infrastructure becomes damaged or causes surface water contamination, this is adequately repaired and maintained.
15	Emergency	Major spillage incidents that contaminate flood waters will be handled in accordance with the Okorusu emergency response procedure and reported to the authorities as stipulated in the Namibian legislation.
16	Training and awareness	Induct all employees and contractors in Okorusu's spillage management procedure.
17		Train selected staff in the remediation of soils or water contaminated by hydrocarbon spills.
18	Safe disposal and rehabilitation of hydrocarbon contaminated soils and water	Develop and implement a hydrocarbon remediation procedure that explains how to deal with the treatment of contaminated environments (soil and water).
19	Monitoring of hydrocarbon spills	Ensure that checking for hydrocarbon spills is included as part of the regular inspections.
20		Report spillages as per the incident management procedure and Namibian legislation.

2.3.2.3 Industrial effluent

Objectives

The objective of the management measures is to prevent pollution of surface water, etc. due to industrial effluent.

Actions

TABLE 7-5: ACTIONS RELATING TO INDUSTRIAL EFFLUENT

No	Issue	Management commitment
These commitments apply to <u>operation phase only</u>		
1	Discharge	Ensure that no discharge takes place (closed system).
2	Spillage of	Prevent spillages of industrial effluent. Where spillage does occur, ensure it is

No	Issue	Management commitment
	industrial effluent	properly contained.
3		Ensure that checking for industrial effluent spills is included in the daily inspection checklist.
4		Report spillages as per the incident management procedure and clean up spills within 24 hours of the incident occurring.
5	Pollution of soil and / or water	In the event of industrial effluent discharge into the environment, stop the incident as soon as possible and then find the root cause.
6	when spillage or discharge occurs.	In the event of soil or water pollution, spills will be cleaned up/remediated immediately (within 24 hours) in line with spillage management procedure.
These commitments apply to <u>construction, operation and decommissioning</u>		
7	Prevent industrial effluent from polluting the environment (return water dam)	Ensure that the various effluent streams (tailings decant, treated effluent dirty storm water, process effluent) are managed to prevent overflow of the return water dam.
8		Ensure that a freeboard is maintained to accommodate run-off during a 1:50 year storm event.
9		Monitor the effectiveness of the mitigation measures (e.g. liner) for damage to ensure that seepage does not occur.
10		Ensure that storage/containment facilities have sufficient capacity to cater for the various sources of water including rainfall.
11	Discharge of industrial effluent to the return water dam and TSF	Ensure that all the industrial effluent is discharged into the return water dam and the TSF (slurry).
12		Install oil separators at all wash bays to separate hydrocarbons from the water. Send the water to the return water dam.
13		Skim separator regularly and dispose of hydrocarbons as per the waste management procedure.
14	Spillage of industrial effluent	Maintain pipes, drains, pumps, valves, etc. to minimise the likelihood of leaks.
These commitments apply to <u>construction and operation only</u>		
15	Prevent industrial effluent from polluting the environment	Recycle all process water from the process dam back into the plant as per design specifications.
16	Storage and disposal of liquid	All liquid hydrocarbon waste will be collected, safely stored in sealed drums on impermeable surfaces within bunded areas. These areas will be designed to

No	Issue	Management commitment
	waste (hydrocarbons)	contain 110% of the volume of one or the largest (in a multi drum setup) drum and will be equipped with traps and oil separators to contain spilled hydrocarbons. The used hydrocarbon liquid waste will be provided to third parties for recycling. Related records will be kept.

2.3.2.4 Domestic effluent

Objectives

The objective of the management measures is to prevent pollution of surface water, etc. due to domestic effluent.

Actions

TABLE 7-6: ACTIONS RELATING TO DOMESTIC EFFLUENT

No	Issue	Management commitment
These commitments apply to <u>construction, operations and decommissioning</u>		
1	Discharge of raw sewerage and grey water	Conduct regular monitoring to ensure that effluent is not being discharged into the environment.
2	Spillage of domestic and treated effluent	Report spillages as per the incident management procedure and clean up spills within 24 hours of the incident occurring in line with the spillage management procedure.
3	Pollution of soil and / or ground water when spillage occurs.	In the event of domestic effluent discharge into the environment, stop the incident as soon as possible and find the root cause.
4		In the event of soil or water pollution, decontaminate the polluted area(s) using an appropriate methodology. Once clean, rehabilitate the area.
5	Awareness and Training	Train operators to understand the legal requirements and how to achieve compliance.
6		Induct Okorusu Employees and Contractors in the use of the spill management procedure.
These commitments apply to the <u>construction</u> phase		
7	Discharge of raw sewerage and grey water into appropriate sewage	Ensure that portable facilities / septic tanks constructed during the construction and decommission phases are managed until such time as they are no longer used and can be decommissioned.

No	Issue	Management commitment
	treatment facilities	
8	Spillage of domestic and treated effluent	Maintain portable facilities, pipes, drains, pumps, valves, etc. to minimise the likelihood of leaks.
9		Ensure that checking for domestic and treated effluent spills is included in the daily inspection checklist.
10	Ablution facilities	Ensure that portable toilets are working properly and are cleaned at least weekly, so they do not pollute the surrounding environment or create hygiene problems.
11		Ensure that sewerage from the portable toilets is disposed of at the nearest sewerage works.
These commitments apply to <u>operation and decommissioning</u> only		
12	Treatment of sewerage	Regularly service and maintain sewerage facility to keep it in proper working condition.

2.3.2.5 Spills

Objectives

The objective of the management measures is to prevent pollution of surface water, etc. due to spillages.

Actions

TABLE 7-7: ACTIONS RELATING TO SPILLAGES

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u>		
1	Emergency situations – very large spills	Maintain and implement the emergency response procedure to address large scale hydrocarbon or reagent spills on and off site.
2	Hydrocarbon spills	Ensure that the company is in possession of the relevant licences and can provide reports that both surface and underground storage tanks are in good condition (as per legal requirements).
3		Ensure that hydrocarbon (used and new fuel and oil) tanks and drums are stored inside bunded areas on impermeable floors with traps and separators for containing spillages. These areas are designed to contain 110% of the volume of one or the largest (in a multi tank setup) tank and that pumps and pipes are maintained in good working order.
4		All wash bays will be equipped with oil traps and separators. All collected oil will be stored as above.

No	Issue	Management commitment
5		Ensure that all fuel and oil storage facilities (farms) and transport tankers have spill kits.
6		Ensure that the fuel transport company has a system in place to deal with hydrocarbon spills and subsequent clean-up thereof.
7		Contain the spill and commence with remediation within 24 hours and report as per the incident management procedure. In this regard the remediation options include in situ treatment or disposal of contaminated soils as hazardous waste. The former is generally considered to be the preferred option because with successful in situ remediation the soil resource will be retained in the correct place. The in situ options include bioremediation at the point of pollution, or removal of soils for washing and/or bio remediation at a designated area after which the soils are replaced.
8		If contamination of water occurs separate hydrocarbons from water and treat water before recycling and re-use.
9	Domestic and Industrial effluent	Prevent effluent spills by ensuring that treatment and storage facilities are adequate and pipes in good condition.
10		Ensure that capacities of the various facilities and pipes are not exceeded.
11		All vehicles and equipment will be serviced in workshops and wash bays with contained impermeable, floors, dirty water collection facilities and oil traps.
12		Contain the spill and as clean up within 24 hours and report as per the incident management procedure.
13		Mine processing slurry spilled on the ground is to be picked up and transported, in sealed containers, to the TSF or emergency stockpile for disposal.
14		Contain sewage and industrial effluent spills. The first management priority is to treat the pollution by means of in situ bio-remediation in consultation with an expert.
15		If <i>in situ</i> treatment is not possible or acceptable then the pollution must be excavated, classified as waste and treated as per the waste management procedure.
16	Legal Compliance – all spills	Comply with all legal requirements regarding spills and containment structures.
17		Hydrocarbon spills of 200l or more must be reported to MME in terms of Section 49 of the Petroleum Products Regulations 2000 as well as the MAWF.
18	Monitoring of spills – all spills	Ensure that the monitoring of all tanks, pipelines and bunds are included in the daily inspection programme to develop an early detection system for leaks.
19		Update, maintain and implement a maintenance plan for tanks, tankers,

No	Issue	Management commitment
		pipelines and bunds.
20		Identify post rehabilitation audit criteria for verifying that remediation has been successful.
21		Conduct periodic audits of facilities to ensure compliance with legal and company standards.
22	Awareness and training – all spills	Induct all Okorusu employees and contractors in the Environmental Policy, spillage management and incident management procedures.
23		Train selected employees in the containment, and handling of spills and in the de-contamination and rehabilitation of affected environments.
24	Emergency situations – all	Major spillage incidents must be handled in accordance with the emergency response procedure.
25	large or remote spills	Identify and contract a service provider/specialist to assist with the handling and clean-up of emergency spills off site.
26		Periodically test the emergency response.
27	Discharge of dewatering from mine pits may cause pollution of surface water	The risk of dewatering discharge transporting contaminants could be minimized by dewatering from boreholes and not the pit itself.
28		Ensuring that all discharges of dewatering water are contained for re-use in mine processes.
29		Analyse water quality to ensure that if it is to be discharge into the surrounding drainage systems then it can only be done if it meets the quality guidelines of Department of Water Affairs.
30	Rainfall runoff mobilizes contamination from site and pollutes surface water	Divert clean offsite runoff water around potential contaminant sources with drainage ditches.
31		Collect runoff from potential seepage sources to containment dams for reuse within mine.
32		Design of diversion berms or channels and containment dams to deal with 1:100 year storm.
33		Rehabilitation (concurrent) of waste rock dumps with vegetation
These commitments apply to <u>operation</u> only		
34	Reagent spills	Ensure that the reagent supply and/or transportation company is in possession of the relevant licences (legal requirements) and can provide reports that transport and storage tanks are in good condition.
35		Ensure that reagent tanks are housed inside concrete bunds and that dispensing takes place on an impermeable surface.

No	Issue	Management commitment
36		Ensure that bunds are designed to contain 110% of the volume of one or the largest (in a multi tank setup) tank and that pumps and pipes are maintained in good working order.
37		Ensure that the reagent supply and/or transportation company has a system in place to deal with the variety of spills that might occur and the subsequent clean-up thereof.
38	Process solution spills (unplanned events – release of large volumes of process solution)	Ensure that bunds have been designed to capture any release of solution to the extent of 110 % of the largest tank constructed inside the bunded area.
39		As far as possible keep bunds clean and empty.
40		Ensure that pumps and pipelines are in place to pump solutions from the bunds back into the process.
41		Maintain and implement an emergency procedure for the containment and clean-up of process solutions if bunds are breached and treatment of contaminated areas.
These commitments apply to <u>operation and decommissioning</u> only		
42	Reagent spills	Contain the spill using appropriate spill kits, as far as possible clean up within 24 hours as per the MSDS specification and report as per the incident management procedure.
43		All solid reagents to be picked up and placed in the relevant reagent tank for use in the plant. If the reagent is polluted it must be disposed of in a safe disposal site.
44		Commence with remediation within 24 hours and report as per the incident management procedure. In this regard the remediation options include in situ treatment or disposal of contaminated soils as hazardous waste. The former is generally considered to be the preferred option because with successful in situ remediation the soil resource will be retained in the correct place. The in situ options include bioremediation at the point of pollution, or removal of soils for washing and/or bio remediation at a designated area after which the soils are replaced.
45		If contamination of water occurs, contain the water and treat it, or direct it into the process dam for use into the process plant.
46		Identify and utilise a service provider to assist with the clean-up of very large reagent spills (emergency situations) as required.
47		All major spills (>200l) will be reported to the MAWF.

7.4 GROUNDWATER MANAGEMENT PROGRAMME

Potential groundwater quality and quantity impacts are an issue during the construction and operation of the various mine activities and infrastructure unless measures are undertaken to prevent and mitigate such impacts. The purpose of this groundwater management and mitigation plan is to provide for methods to be followed to achieve such mitigation.

The commitments derived from the 2016 Scoping Report and 2013 EIA with regards to groundwater management form the basis of this MP.

7.4.1 COMPONENTS

This plan is made up of the following components:

- Water abstraction and dewatering of mine pits.
- Contamination of groundwater.

7.4.2 MANAGEMENT

7.4.2.1 Dewatering of Mine Pit and water supply

Objectives

The objective of the management measures is to minimise the impact of the proposed water supply and prevent the loss of groundwater to other users in the area.

Actions

TABLE 7-8: ACTIONS RELATING TO WATER ABSTRACTION AND DEWATERING OF THE MINE PITS

No	Issue	Management commitment
1	Water abstraction and dewatering of mine pit	Drill monitoring boreholes at strategic localities and institute a groundwater monitoring plan.
2		Measure water levels at regular intervals and meter all groundwater abstraction.
3		Okorusu will make sure that only permitted abstraction rates are applied and production boreholes are not over pumped.
4		Water saving measures in mining, operational and tailings deposition processes should be implemented to further reduce the use of groundwater resources for make-up water.
5		If community supply boreholes are dewatered, they will be provided with an alternative water source.
6		Groundwater levels should be monitored in all pumping wells throughout the life of

No	Issue	Management commitment
		the mine.
7		Groundwater levels should be monitored at all monitoring boreholes.
8	Legal aspects	Ensure that permits for abstraction and pit dewatering are renewed as required.
9		Conduct regular audits to ensure that the conditions of the permits are being met.

Refer to the Biodiversity MP for management requirements relating to the reduction of water resources as an ecological driver.

7.4.2.2 Impacts on Groundwater Quality

Objectives

The objective of the management measures is to prevent unacceptable groundwater pollution related impacts.

Actions

TABLE 7-9: ACTIONS RELATING TO GROUNDWATER CONTAMINATION

No	Issue	Management commitment
These commitments apply to <u>construction phase only</u>		
1	Groundwater contamination from construction activities	Adequate fuel containment facilities to be used during construction phase.
2		The use of all materials, fuels and chemicals which could potentially leach into groundwater must be controlled.
3		All materials, fuels and chemicals must be stored in a specific and secured area to prevent pollution from spillages and leakages.
4		All vehicles and machines must be maintained properly to ensure that oil spillages are kept at a minimum.
5		Spill trays must be provided if refuelling of construction vehicles are done on site.
6		Chemical storage areas should be sufficiently contained, and the use of chemicals should be controlled.
These commitments apply to the <u>operational phase only</u>		
7	Groundwater contamination from the mining operation	Line the refueling area to prevent any fuel spillages from entering the groundwater system.
8		The use of all materials, fuels and chemicals which could potentially leach into groundwater must be controlled.
9		All materials, fuels and chemicals must be stored in a bunded and secured area to prevent pollution from spillages and leakages.
10		Mine vehicles and machines must be maintained properly to ensure that oil spillages are kept at a minimum.

No	Issue	Management commitment
11		Spill trays must be provided for refuelling of mine vehicles.
12		Proper sanitary facilities must be provided for mine workers. Frequent maintenance should include the removal without spillages.
13		No uncontrolled discharges resulting in pollution of the receiving environment and aquifer shall be permitted.
14		Chemical storage areas must be sufficiently contained, and the use of chemicals should be controlled.
15		Water seeping into the open pits during mining should be directed into a sump and pumped to surface.
16		Water pumped from the open pit mine during mining should be pumped into a dirty water system and should not be allowed to enter any clean water system, natural drainage line, or the aquifer.
17		Potable water must be made available to neighbours who can prove that their water supply is affected by mine dewatering and/or water abstraction.
18		A groundwater monitoring plan must be designed with dedicated boreholes drilled to monitor water quality at regular intervals. The parameters analysed for, sampling interval and distribution of monitoring boreholes must be agreed on with the Department of Water Affairs.
19		Drill monitoring boreholes at strategic localities and institute a groundwater monitoring plan.
20		All water retention structures, including tailings disposal facilities, return water dams, storm water dams, retention ponds etc. should be constructed to have adequate freeboard to be able to contain water from 1:50 year rain events.
21		When mining is undertaken, the water-table should always be kept lower than the bottom of the pit to prevent direct contact of contaminants with the groundwater.
22	Groundwater contamination from the TSF	It is recommended that a geochemical assessment is undertaken to assess the following: <ul style="list-style-type: none"> • The acid mine draining (AMD) potential from the new TSF. • The metal leaching potential from the new TSF.
23		Toe-drain water from the existing TSF will be collected and submitted to a laboratory for analysis. The results will allow the current "baseline" seepage concentrations, prior to the disposal of graphite tailings, to be determined. Should toe-drain water be unavailable, geochemical work will need to be conducted.
24		Geochemical work of 'graphite tailings' should be undertaken to geochemically characterise the new tailings.
25		An inventory should be undertaken on the boreholes in the vicinity of the old TSF to

No	Issue	Management commitment
		assess the suitability of existing boreholes for future monitoring purposes. Additional boreholes may need drilling to ensure an effective monitoring network is created to monitor both the old and new TSFs.
26		A groundwater monitoring plan must should be compiled with dedicated boreholes to monitor groundwater levels and water quality at regular intervals. Boreholes will be located up-gradient and down-gradient of the TSF to monitor any potential groundwater contamination from the TSF. An adequate baseline monitoring (6 months) must be undertaken to understand the current groundwater conditions, prior to disposal of graphite tailings in the new TSF area.
27		Water quality analysis should consider both toe drain water from the existing TSF and the geochemical work to be undertaken on the proposed new tailings material.. Pre-treatment of tailings material will only be necessary should the analysis provide any alarming results that could affect water quality negatively.
28		Numerical groundwater flow and transport modelling must be compiled for the purpose of groundwater management and so determine the time and spatial extent of potential contamination from either of the TSFs. The groundwater model could also provide insight into the potential effects of a mixed plume of fluorspar and graphite waste over time.
29		An abstraction permit must be obtained from the Department of Water Affairs and Forestry for all water used from boreholes.
30		A discharge permit will be required from the Department of Water Affairs and Forestry would it be required to discharge any surplus ground or surface water that the mine cannot consume.
31		A seepage recovery system must be installed at the new TSF cell and the design of a suitable TSF waste rock and top soil cover after decommissioning must take place.
32	Emergency	Major spillage incidents will be handled in accordance with the Okorusu emergency response procedure. The DWA and surrounding farmers (considering the potential of contaminating farm boreholes) will be informed of major spillages.

7.5 AIR QUALITY MANAGEMENT PROGRAMME

There are a number of sources in all project phases that have the potential to pollute the air. In the construction and decommissioning phases these potential pollution sources are temporary in nature, usually existing for a few weeks to a few months. The operational phase will present more long term potential sources and the closure phase will present final land forms that may have the potential to pollute the air through long term wind erosion.

The air quality assessment focused on airborne particulates (PM₁₀ and PM_{2.5} emissions and total suspended particles). Gaseous pollutants (such as sulphur dioxide, oxides of nitrogen, carbon monoxide etc.) deriving from mine vehicles and equipment could not be assessed but were regarded by the specialist as potentially negligible in comparison to particulate emissions.

The commitments derived from the 2016 Scoping Report and 2013 EIA with regards to Air Quality forms the basis of this MP.

7.5.1 COMPONENTS

This plan is made up of the following components:

- Total suspended particles
- PM₁₀
- PM_{2.5}

7.5.2 MANAGEMENT

Objectives

The objective of the management measures is to prevent unacceptable air quality related pollution impacts.

Actions

TABLE 7-10: ACTIONS RELATING TO AIR QUALITY

No	Issue	Management commitment
These commitments apply to the <u>construction</u> phase		
1	Dust, PM ₁₀ and PM _{2.5}	Undertake to do the following: <ul style="list-style-type: none"> • Spray water on the areas to be cleared should significant amounts of dust be generated. The moist topsoil will reduce the potential for dust generation when tipped onto stockpiles. • Ensure travelling distance between clearing area and topsoil stockpiles are minimised. • Ensure exposed areas remain moist through regular water spraying during dry, windy periods.
These commitments apply to <u>operation</u> phase		
2	Dust, PM ₁₀ and PM _{2.5}	Undertake to do the following <ul style="list-style-type: none"> • Open pits:

No	Issue	Management commitment
		<ul style="list-style-type: none"> ○ Control dust from drilling through water sprays to ensure 70% control efficiency. ○ Use controlled blasting techniques to ensure minimal dust generation. ○ Conduct blasting only on cloudless days. ● Vehicle activity on unpaved haul roads: <ul style="list-style-type: none"> ○ Regular water sprays preferably combined with chemicals on unpaved haul roads. ○ Speed limit on unpaved roads not to exceed 40 km/hr. ○ Cover product trucks to minimise spillages on paved road. ● Materials transfer points: <ul style="list-style-type: none"> ○ Keep drop height from excavator into haul trucks at a minimum for ore and waste rock. ○ Tipping onto ore stockpiles to be controlled through water sprays should significant amounts of dust be generated ● Crushing and screening operations: <ul style="list-style-type: none"> ○ Water sprays combined with chemicals at the crushers to ensure dust control of 50% if the processes result in significant dust generation. Dust generation from moist ore can be up to 20 times lower than dry ore. ● TSF: <ul style="list-style-type: none"> ○ Progressive vegetation of side walls of unused tailings storage facilities to ensure 80% cover up to 1 m from the top. ● The air quality specialist suggested a number of locations for the dust fallout buckets. Figure 9.1 renders a map with the suggested positions. ● The specialist recommended monthly analysis of the dust fallout. The maximum fallout rate of 1200 mg/m²/day should not be exceeded. An inventory of the current conditions prior to activities resuming will provide an ambient air quality for the mine and road. The relevance of the limit must be assessed in light of the ambient dry conditions which prevail during winter time.
These commitments apply to the <u>decommission and closure</u> phases		
3	Dust, PM ₁₀ and PM _{2.5}	<p>Undertake to do the following:</p> <ul style="list-style-type: none"> ● Recover the soil from stockpiles for rehabilitation and revegetation of surroundings. ● Place topsoil cover onto TSF and vegetate with native grass and tree species as per the rehabilitation plans. ● Contour berm at pits and vegetate with native grass and tree species as per the rehabilitation plans. ● Reduce significant dust when removing infrastructure at the processing plant

No	Issue	Management commitment
		<p>site.</p> <ul style="list-style-type: none">• Undertake demolition of infrastructure that necessitates blasting only during daytime hours.• Re-establish any previously removed native plant species in disturbed areas.• Indigenous plant species should be used in the final landscaping of the rehabilitated mine site.• Ensure a dense vegetation cover on WRD and TSF as defined by the final closure and decommissioning plan.• Demolition of infrastructure to have water sprays where a lot of vehicle activity is required.• Ensure full vegetation cover on tailings storage facilities (this should be done throughout the life of mine where possible).

7.6 NOISE AND VIBRATION MANAGEMENT PROGRAMME

There is a range of construction, operation and decommissioning activities that have the potential to generate noise and cause related pollution. Noise pollution will have different impacts on different receptors because some are very sensitive to noise and others are not. For example, mine workers in general do not expect an environment free of mine related noise and so they will not be sensitive to environmental noise pollution at work. In contrast, local residents are likely to be more sensitive to unnatural noises and so any change to ambient noise levels because of mine related noise will have a negative impact on them, although studies have shown that only one residence is likely to be affected.

The commitments derived from the 2016 Scoping Report and 2013 EIA with regards to noise and vibrations forms the basis of this MP.

7.6.1 COMPONENTS

This plan is made up of the following components:

- Noise pollution
- Blast impacts

7.6.2 MANAGEMENT

7.6.2.1 Noise Pollution

Objectives

The objective of the management measures is to limit excessive noise pollution

Actions

TABLE 7-11: ACTIONS RELATING TO NOISE POLLUTION

No	Issue	Management Commitment
These commitments apply to <u>construction, operation and decommissioning</u>		
1	Impact of noise on the environment/	Document and investigate all registered complaints and make efforts made to address the area of concern where possible.
2	sensitive receptors	<p>Communication channels are established to ensure prior notice to the sensitive receptor if work is to take place close to them. Information that should be provided to the potential sensitive receptor(s) include:</p> <ul style="list-style-type: none"> • proposed working times; • how long the activity is anticipated to take place; • what is being done; • contact details of a responsible person where any complaints can be lodged

No	Issue	Management Commitment
		should there be an issue of concern.
3		Ensure that plant and equipment is well-maintained and fitted with the correct and appropriate noise abatement measures.
4		All diesel powered equipment must be regularly maintained and kept at a high level of maintenance. This must particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment must serve as trigger for withdrawing it for maintenance.
5		By enclosing the tipper discharge and lowering the conveyor drop heights, noise emissions may be reduced. Mechanical and electrical design also influences the amount of noise from stacking and reclaiming operations.
6		Vibrating structures are known to be noisy and good design philosophies should be followed for equipment of this nature. The mentioned equipment must be installed on vibration isolating mountings.
7	Monitoring	A proposed noise monitoring programme has been developed and is described in Table 4-1. Legal compliance to the Namibian Law is to be the minimum requirement.

7.6.2.2 Blast Impacts

Objectives

The objective of the management measures is to limit excessive blast vibration and fly rock.

Actions

TABLE 7-12: ACTIONS RELATING TO BLAST IMPACTS

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u>		
1	Minimise impacts of blasting	<p>The blast design, implementation and monitoring will, as a general rule, ensure that:</p> <ul style="list-style-type: none"> fly rock is contained within a maximum of 500m of the blast site; Prior to each blast the blast area will be cleared of third parties to a safe distance determined by appropriate legislation and safe working procedures. Prior to each blast an audible warning will be sounded; ground vibration at the closest third party structures is less than 12mm/s peak particle velocity; air blast at the closest third party structures is less than 130dB; and all registered complaints will be documented, investigated and efforts made to address the area of concern where possible.

7.7 BIODIVERSITY MANAGEMENT PROGRAMME

To understand biodiversity one must appreciate all of its components. It is not just about the species of plants and animals and the different habitats in which they live (biodiversity patterns) but the way that factors, such as wind, water, steepness of slope and presence of pollinators, affect the habitats and the species living in them (ecosystem processes).

The commitments derived from the 2016 Scoping Report and 2013 EIA with regards to Biodiversity forms the basis of this MP.

7.7.1 COMPONENTS

This plan is made up of the following components:

- Managing the physical destruction of biodiversity.
- Reduction of water resource as an ecological driver.
- Managing general disturbance.

7.7.2 MANAGEMENT

7.7.2.1 Physical destruction of biodiversity

Objectives

The objective of the management measures is to prevent or limit the unacceptable loss of biodiversity and related functionality through physical disturbance.

Actions

TABLE 7-13: ACTIONS RELATING TO THE PHYSICAL DESTRUCTION OF BIODIVERSITY

No	Issue	Management commitment
These commitments apply to <u>design phase</u>		
1	Physical destruction of biodiversity	Design footprints of all facilities as small as possible and generally limit mine infrastructure, activities and related disturbance to those specifically identified and described in this EIA report
These commitments apply to <u>construction phase</u>		
2	Physical destruction of biodiversity	<ul style="list-style-type: none"> • As far as possible, avoid areas identified as ecologically or biologically sensitive. • Design footprints of roads to be as small as is legally and practically possible. • Mark out all construction footprints and clearly convey the rule of staying inside these boundaries to all staff.

No	Issue	Management commitment
		<ul style="list-style-type: none"> • Enforce speed limits. • Implement a scientifically based ecological restoration plan for all disturbed areas as soon as possible. • Protect undisturbed areas outside planned mining operations from all forms of disturbance (these must serve as future source areas for re-colonisation after mining). • Prior to construction and in consultation with an environmental control officer, scan proposed construction sites for any more sensitive flora and fauna and implement the recommendations of the specialist – these could include but not be limited to: a search and rescue of dens, crèches, and burrows, relocating/demarcating nests, demarcating flora (protected trees) to either be conserved within the construction site or relocated.
These commitments apply to <u>construction and operation phase</u>		
3		<ul style="list-style-type: none"> • Clearly demarcate boundaries of the proposed expansion activities; • Where possible avoid cutting or relocating protected trees and develop plans to care for them during the life of mine until their surroundings have been restored • Where disturbance of protected trees is unavoidable, apply for the necessary permits in a timely manner. • As much as possible and as is feasible, evacuate any animals of conservation significance from the mining area before disturbance • Remove and stockpile topsoil, along with its soil fauna and seed banks, and devise plans for its management during stockpiling and redeployment for restoration • Where feasible, remove other organic material, including litter and dead wood, and stockpile separately for future use in restoration. Investigate appropriate stockpiling methods promote the viability of the communities they contain. • Mining staff should be held to the rule of staying inside the demarcated boundaries of the construction and mining site areas • Increase environmental awareness through training of key staff, including their ability to handle animals during evacuation; and • Rigorously police the construction crews' and mining staff's adherence to the rules and do not hesitate to invoke penalty clause/s

7.7.2.2 Managing general disturbance

Objectives

The objective of the management measures is to prevent disturbance to biodiversity.

Actions

TABLE 7-14: ACTIONS RELATING TO THE GENERAL DISTURBANCE TO BIODIVERSITY

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning phases</u>		
1	General disturbance of biodiversity	The working area will be fenced.
2		Develop a policy that limits independent movements by staff into the veld outside the fenced-in mining site. Strictly prevent poaching and harvesting, including of firewood, or possession of any such natural materials. Enforce rules with "zero tolerance"
3		Provide or ensure that there is adequate food for workers on site
4		Allow only mining personnel, service providers and construction staff, as well as registered mine visitors on site
5		Train all mine staff to appreciate the natural non-consumptive values of biodiversity, as well as legislation relating to protected species
6		Raise awareness concerning recognising venomous snakes/invertebrates from non-dangerous ones, and ensure that sufficient personnel are trained to handle snakes/invertebrates so as to move them away from the mine without killing them
7		Compensate farmers for livestock losses, based on valid claims.
8		Train all drivers of vehicles in the necessary procedures for the safe operation of all vehicles and to maintain regulated speed
9		Carry out regular training to instil appropriate vehicle control and a high degree of professional road conduct
10		Enforce speed limits, including using speed-reducing methods and speed-monitoring devices
11		As much as operationally feasible, driving to and from the mining sites should be avoided at night and limited, if possible, only to within the mining area
12		Use yellow outdoor lights (sodium vapour floodlights with orange covers, or yellow bulbs/tubes for incandescent and fluorescent lights) wherever possible as this is less glaring to invertebrates while serving human requirements
13		Reduce the attraction to invertebrates to indoor lights by installing self-closing doors and non-opening windows in night-time operations buildings
14		Ensure that animals have no access to contaminated water sources
15		Fence in TSF and other areas that are regularly artificially wetted and use other proven means to deter birds from reaching them; wetted areas should be kept to a minimum

No	Issue	Management commitment
16		All chemicals, emissions, and leaching products as well as tailings must be strictly contained and regularly timely cleaned or neutralised, adhering to best practises
17		Develop a site waste management policy and actively enforce it.
18		Develop policy for the management of hazardous materials and actively enforce it.
19		Provide temporary waste deposition facilities on site (rubbish bins, skips), which are secure from scavengers, storms, or other disturbance.
20		Provide adequate toilet facilities for all workers at work sites and enforce a strict policy of not defecating in the field.
21		Apply appropriate hydrocarbon-handling principles (storage tanks should have bunding and be regularly inspected, lubricants should be stored in properly designated and appointed facilities, spillages should be cleaned up immediately, adequate control over use of fuels).
22		Contain all contaminated water and purify it to potable quality before reuse, or release into the environment.
23		Where possible, avoid destroying trees or disturbing their proximity, so that animals can continue to use them.
24		Rehabilitate areas around linear infrastructure after installing it such that they minimise habitat fragmentation, allowing populations to be connected across them
25		Implementing strict controls over the movement of materials onto and off the site to minimise the spread of invasive species; if this becomes a problem monitor the occurrence and spread of invasive species so as to instigate steps for their control, following expert advice
26	Emergency	Major spillage incidents will be handled in accordance with the Okorusu emergency response procedure.
27		Certain instances of injury to animals may be considered emergency situations. These will be managed in accordance with the Okorusu emergency response procedure.
These commitments apply to <u>decommissioning & closure phases</u>		
28	Closure planning	As part of closure planning, the designs of any permanent and potentially polluting structures will take consideration of the requirements for long term pollution prevention and confirmatory monitoring.
29		Dispose of re-usable waste (such as power cables, pipelines and building material) in the appropriate manner.
30		Formulate a scientific-based restoration plan.

7.8 VISUAL MANAGEMENT PROGRAMME

Predicted negative visual impacts would result from the construction, operational and decommissioning phases of the proposed Project. During the closure phase, the site will be rehabilitated but the pits, waste dumps and the tailings storage facility will remain and will therefore contribute to the long-term negative visual impact of the Project.

The commitments derived from the EIA Report with regards to visual impacts form the basis of this MP.

7.8.1 COMPONENTS

This plan is made up of the following components:

- Visual disturbance.

7.8.2 MANAGEMENT

7.8.2.1 Visual disturbance

Objectives

The objective of the management measures is to limit visual impacts.

Actions

TABLE 7-15: ACTIONS RELATING TO VISUAL DISTURBANCE

No	Issue	Management commitment
These commitments apply to <u>construction and only</u>		
1	Earthworks	It is proposed that areas of disturbance be minimized as far as possible during the construction phases.
These commitments apply to <u>design, construction and operation phase</u>		
2	Lighting	Light pollution should be seriously and carefully considered and kept to a minimum.
3		Security lighting should only be used where absolutely necessary and carefully directed.
4		The negative impact of night lighting, glare and spotlight effects, can be mitigated using the following methods: <ul style="list-style-type: none"> • Install light fixtures that provide precisely directed illumination to reduce light “spillage” beyond the immediate surrounds of the project. • Avoid using bright, white colour lights where possible. Preferably use lights emitting a yellow light which travels less than white coloured lights. • Light public movement areas (pathways and roads) with low level ‘bollard’

No	Issue	Management commitment
		<p>type lights and avoid post top lighting.</p> <ul style="list-style-type: none"> • Avoid high pole top security lighting where possible.
5	Materials	Buildings and structures can be painted with a mat finish in a shade of grey or green that would best blend in with the colours of the environment, to reduce the colour contrast between the structures and the receiving landscape. Avoid the use of bright colours and shiny finishes, especially on roofs and taller structures.
6	Project Area Development and General	Retain as much as possible of the existing vegetation within the study area and along the Project boundaries and roads in aid of screening the Project.
These commitments apply to <u>construction, operation and decommissioning phases</u>		
7	Access	Dust suppression techniques should be in place at all times during the construction, operational, the decommissioning and closure phases.
8		Keep the speed limit as low as possible in order to minimise the creation of dust.
9		Ensure that, when trucks are transporting materials, the material is covered so that the finer particles do not get airborne and create dust pollution.
10	Managing vegetation and soils	All vegetation within the mine site that is not removed needs to be managed and protected
11		In all areas which are to be excavated, topsoil needs to be removed and stockpiled in a suitable location and utilised in rehabilitation of the TSF, WRD, plant areas and infrastructure areas.
12	General	Rehabilitate / restore exposed areas as soon as possible after construction activities are complete.
13		Only indigenous vegetation should be used for rehabilitation / landscaping purposes.
14	Waste Rock Dumps	Final shaping and dumping should be implemented such that the sides of the waste dump are articulated in a fashion that create areas of light and shadow interplay.
15		Harsh, steep engineered slopes should be avoided if at all possible as these could impose an additional impact on the landscape by contrasting with existing topographic forms. The tailings facility and waste dumps are the only surface infrastructure that will remain after decommissioning and it is important that a long-term view of their integration with the surrounding landscape be taken.
16		Maintain the final landform height and slope angles for the tailings facility and waste dumps as low as possible.

No	Issue	Management commitment
17		Where slopes compatible with the surrounding landscape can be achieved, an attempt should be made to visually soften steeper areas by avoiding straight engineered ridges and sharp changes of angle (see also point above).
18		Grass seeding and tree planting of the WRDs and TSF should be undertaken to emulate the groupings of natural vegetation within the study area. The Biodiversity specialist should be consulted in this regard.
These commitments apply to <u>decommissioning & closure phases</u>		
19	Rehabilitation	<p>Rehabilitation of all the faces of the WRD to grass / scrub bushes and some trees;</p> <p>Reduce the angle of the WRD slope if not suitable for rehabilitation;</p> <p>There will be continuous rehabilitation of the new TSF dam walls as they are raised;</p>
20	Closure	<p>For the closure phase:</p> <ul style="list-style-type: none"> • Okorusu will establish a mechanism to ensure that the rehabilitation of the mine is properly funded to ensure that sufficient funds are available to implement the rehabilitation and mitigations required for closure. • All components of the infrastructure used during operation must be removed. The site must be visually 'cleaned up' so as to portray an uncluttered landscape. • The ground where processing plants were located must be decontaminated and then covered by the earth used for the berm and landscaped into a natural form in alignment with the natural hydrological patterns.

7.9 ARCHAEOLOGY MANAGEMENT PROGRAMME

No archaeological sites have been identified in the project area. The archaeological assessment concluded that the Okorusu project will have a negligible impact on the archaeology of the project area and that the project is therefore not expected to have any implications in terms of the National Heritage Act.

The commitments are derived from the 2016 Scoping Report and 2013 EIA with regards to archaeology, form the basis of this MP.

7.9.1 COMPONENTS

This plan is made up of the following components:

- Chance heritage finds.

7.9.1.1 Chance archaeological finds

Objectives

To ensure that the correct actions are taken to preserve or document chance archaeological finds.

Actions

TABLE 7-16: ACTIONS RELATING CHANCE ARCHAEOLOGICAL FINDS

No	Issue	Management commitment
These commitments apply to <u>construction and operation phases</u>		
1	Chance Finds Procedure	<p>Areas of proposed mining and related activity have undergone a heritage survey and assessment. It is possible that sites or items of heritage significance will be found in the course of development work. The personnel and contractor heritage induction process is intended to sensitize people so that they may recognize heritage “chance finds” in the course of their work. The procedure set out here covers the reporting and management of such finds.</p> <p>The “chance finds procedure covers the actions to be taken from the discovery of a heritage site or item, to its investigation and assessment by a trained archaeologist or other appropriately qualified person.</p> <p>Operator - To exercise due caution if archaeological remains are found Foreman - To secure site and advise management timeously Superintendent -To determine safe working boundary and request inspection Archaeologist -To inspect, identify, advise management, and recover remains</p> <p><u>Action by person identifying archaeological or heritage material:</u> If operating machinery or equipment stop work</p>

No	Issue	Management commitment
		<p>Identify the site with flag tape</p> <p>Determine GPS position if possible</p> <p>Report findings to foreman</p> <p><u>Action by foreman:</u></p> <p>Report findings, site location and actions taken to superintendent</p> <p>Cease any works in immediate vicinity</p> <p><u>Action by superintendent:</u></p> <p>Visit site and determine whether work can proceed without damage to findings</p> <p>Determine and mark exclusion boundary</p> <p>Site location and details to be added to project GIS for field confirmation by archaeologist</p> <p><u>Action by archaeologist:</u></p> <p>Inspect site and confirm addition to project GIS</p> <p>Advise NHC and request written permission to remove findings from work area.</p> <p>Recovery, packaging and labelling of findings for transfer to National Museum</p> <p><u>In the event of discovering human remains:</u></p> <p>Actions as above; and</p> <p>Field inspection by archaeologist to confirm that remains are human</p> <p>Advise and liaise with NHC and Police</p> <p>Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.</p>
2	Legal requirements	<p>The “chance finds procedure is intended to ensure compliance with the relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): “ <i>a person who discovers any archaeological object must as soon as practicable report the discovery to the Council</i>”. The procedure of reporting set out below must be observed so that heritage remains reported to the NHC are correctly identified in the field.</p>

7.10 TRAFFIC MANAGEMENT PROGRAMME

The activities associated with the mine have traffic impacts. This MP aims to provide measures to limit the negative impacts.

The commitments are derived from the 2016 Scoping Report and the 2013 EIA with regards to traffic issues form the basis of this MP.

7.10.1 COMPONENTS

This plan is made up of the following components:

- Infrastructure – road use.

7.10.2 MANAGEMENT

Objectives

The objective of the management measures is to reduce the potential for safety and vehicle related impacts on road users.

Actions

TABLE 7-17: ACTIONS RELATING TO ROAD USE

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u> phases		
1	Future road use related impacts	Company policies apply to employees who operate haul trucks.
2		Contractors will be required to comply with Namibian Roads Authority regulations.
3		Apply dust palliatives (surfactants/binders) in order to bind dust particles on unpaved roads in order to prevent dust entrainment.
4	Road safety	Reduce safety risks by undertaking general routine road maintenance on a regular basis.
5	Emergency	Any mine related road accident must be handled in accordance with the emergency response procedure.

7.11 SOCIAL AND ECONOMIC MANAGEMENT PROGRAMME

The activities associated with the mine have socio-economic impacts in all mine phases – some positive and some negative. These impacts related to amongst others employment/job creation, inward migration, local- and regional economies, land use and surrounding landowners and community safety and security. This MP aims to provide measures to enhance the positive impacts and limits the negatives impacts.

The commitments derived from the 2016 Scoping Report and 2013 EIA with regards to socio-economic issues form the basis of this MP:

7.11.1 COMPONENTS

This plan is made up of the following components:

- Economic Impact.
- Inward migration and community health/safety and security.
- Change of land-use and neighboring communities.

7.11.2 MANAGEMENT

7.11.2.1 Economic Impact

Objectives

The objective of the management measures is to enhance the positive impacts associated with job creation and investment.

Actions

TABLE 7-7-18: ACTIONS RELATING TO ECONOMIC IMPACT

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u> phases		
1	Employment opportunities and development benefits.	<ul style="list-style-type: none"> • Weighting tender selection is weighted in favor of suppliers of goods and services which use local suppliers down the supply chain (assuming that the vendor is qualified and that they can deliver the requested product of the required standard in the requested time with their requested quality); • Mine procurement policies that promote the use of small and medium enterprises; • A human resources policy which prioritises the selection of women for training and recruitment and which supports women to perform well in the workplace; • Skills development strategies and programmes are in place prior to construction to maximise use of the local labour force.
These commitments apply to <u>operation</u> phase		
2	Employment opportunities and	<ul style="list-style-type: none"> • Support employees and community members to continue learning and developing skills so they too benefit from being able to offer labour flexibility and productivity, throughout the LoM and on mine closure; • Promote continuous learning programmes to diversify and upgrade skills;

No	Issue	Management commitment
	development benefits.	<ul style="list-style-type: none"> • Ensure skills upgrading during employment at mine is documented and accredited where possible so skills are recognised with future employers; • Maximise the permanent workforce; • Provide training on personal financial management; • Assist Otavi and Otjiwarongo town councils to diversify their economic activities.

7.11.2.2 Inward migration and community health/safety and security

Objectives

The objective of the management measures is to limit the impacts associated with inward migration.

Actions

TABLE 7-7-19: ACTIONS RELATING TO INWARD MIGRATION AND COMMUNITY HEALTH/SAFETY AND SECURITY

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u> phases		
1	Perceived job opportunities causing inward migration	<ul style="list-style-type: none"> • Build up local skills before operations begin by working with local training establishments, providing bursaries for key skills. • Actively recruit women for training and employment into the mining sector. • Give preferential recruitment first to mine neighbours and then to Otjozondjupa residents. • Support the town councils to have enlightened town plans which enable affordable land tenure and business development. • Fence in the working area of the ML and employ strict security. Okorusu must ensure that the security of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the neighbouring community. • Have zero tolerance to drugs and alcohol in the workplace and on site. • Establish a comprehensive HIV / AIDS / TB workplace policy and wellness programme.

7.11.2.3 Change of land use and neighboring communities

Objectives

The objective of the management measures is to reduce negative impacts on land use and neighbouring communities.

Actions**TABLE 7-7-20: ACTIONS RELATING TO CHANGE OF LAND USE AND NEIGHBORING COMMUNITIES**

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u> phases		
1	Issues relating to change of land use and neighbouring residents	<ul style="list-style-type: none"> • Establish a platform for on-going dialogue with neighbouring farmers, as a special interest group and provide a named point of contact. • Enforce strict rules of no walking except along roads. • Any person conducting work for/on behalf of Okorusu on neighbouring farms shall first liaise with farm owner(s) and obtain the necessary authorization before entering these properties.

7.12 RESOURCE MANAGEMENT PROGRAMME

This MP provides management actions regarding scarce resources like water and provides means of reducing consumption of resources.

7.12.1 COMPONENTS

This plan is made up of the following components:

- Consumption of energy.
- Consumption of water.
- Use of manufactured materials.
- Consumption of fuel.

7.12.2 MANAGEMENT

7.12.2.1 Consumption of Energy (electricity)

Objectives

The objective of the management measures is to monitor the energy (electricity) consumption and to find ways to minimise consumption.

Actions

TABLE 7-21: ACTIONS RELATING TO ENERGY CONSUMPTION

No	Issue	Management commitment
These commitments apply to <u>all phases</u>		
1	Understanding	Maintain the electricity consumption monitoring system.
2	Okorusu's electricity consumption and demand	Total consumption to be monitored and recorded and compared with NamPower readings.
3		Maintain the energy management plan that optimises electricity consumption whilst meeting efficiencies as far as practically possible.
4	High consumption of electricity	Maintain the energy management plan that optimises electricity consumption whilst meeting efficiencies.
5	Monitoring of the energy management plan	Review energy consumption in relation to the energy management plan.

No	Issue	Management commitment
6	Awareness and training	Implement an awareness programme pertaining to energy usage.
7	Maintenance of electrical equipment	Maintain a maintenance schedule for all electrical equipment used on site.

7.12.2.2 Consumption of water

Objectives

The objective of the management measures is to monitor the water consumption and to find ways to optimise water usage.

Actions

TABLE 7-22: ACTIONS RELATING TO WATER CONSUMPTION

No	Issue	Management commitment
These commitments apply to <u>all phases</u>		
1	Water usage and control	Install and calibrate water flow meters on pipes at selected locations (including tailings lines and dewatering boreholes).
2		Monitor monthly abstraction volumes to ensure that the permitted annual volumes are not exceeded.
3	Maintenance of equipment	Further develop, maintain and implement a comprehensive maintenance programme for tanks, tankers, pumps and pipes.
4	Monitoring of water leaks	Ensure that checking for water spills is included in the daily inspections.
5		Report spillages as per the incident management procedure.
6	Training and awareness	Maintain and implement water awareness programme for Okorusu employees and contractors.
7	Reporting to Society	Reporting to stakeholders on water management.
These commitments apply to <u>operation and decommissioning only</u>		
8	Water usage and control	Ensure that storm water falling inside the processing area is captured and directed via drains and pipes to the return water dam and re-used.
These commitments apply to <u>operation only</u>		
9	Water usage	Ensure that the design of the relevant clean and dirty water systems are sufficient to cater for the water volumes associated with the infrequent flood events and that

No	Issue	Management commitment
	and control	unacceptable discharges of polluted water are prevented.
10		Optimise the recycling of process water in the process plant to reduce the demand for fresh water.
11		Recycle tailings decant water back to the return water dam in closed pipes for reuse in the process plant.
12		Groundwater encountered in the pits is dewatered and used (e.g. in the process plant).

7.12.2.3 Use of manufactured materials

Objectives

The objective of the management measures is to monitor the use of manufactured materials and to ensure efficient usage.

Actions

TABLE 7-23: ACTIONS RELATING TO THE USE OF MANUFACTURED MATERIALS

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u>		
1	Transport of hazardous materials	Conduct routine inspections of the supply companies transporting hazardous materials to and from site.
2		Ensure companies compliance to legal and Okorusu requirements and that the contractor has all the necessary hazardous protection equipment for people and environment in the advent of a spill.
3	Consumption of reagents and chemicals	Monitor reagent consumption monthly.
4		Review and implement best practices for use by cleaning contractors. Monitor compliance.
5		Identify consumables that might qualify to be replaced by more environmentally friendly products and conduct market research on such products.
6	Consumption of consumables (e.g. PPE, paper)	Calculate the volumes of consumables used and determine ways of reducing consumption.
These commitments apply to <u>operation</u> only		
8	Consumption of reagents	Monitor and update the process flow balance regularly to ensure optimum use of

No	Issue	Management commitment
	and chemicals	reagents.

7.12.2.4 Consumption of fuel

Objectives

The objective of the management measures is to monitor the fuel consumption and to find ways to optimise fuel usage.

Actions

TABLE 7-24: ACTIONS RELATING TO FUEL CONSUMPTION

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u>		
1	Fuel consumption	Maintain and implement the preventive maintenance plan for all equipment and mine vehicles using diesel, petrol and gas on site to avoid wastage and leakages.
2		Monitor fuel consumption in all departments.

7.13 SOIL MANAGEMENT PROGRAMME

Management of soils is important as mining is a temporary land use where-after rehabilitation is the key to re-establishing post closure land capability that will support conservation, agricultural and tourism type land uses. Soil is a key part of rehabilitation.

The commitments derived from the 2016 Scoping Report and 2013 EIA with regards to soil form the basis of this MP.

7.13.1 COMPONENTS

This plan is made up of the following components:

- Topsoil stockpiling/management.

7.13.2 MANAGEMENT

7.13.2.1 Topsoil stockpiling/management

Objectives

The objective of the management measures is to ensure that all topsoil stripping, stockpiling and replacement operations will be undertaken in a manner that limits impacts on the soil functionality and to ensure it can be used for rehabilitation as and when required.

Actions

TABLE 7-25: ACTIONS RELATING TO TOPSOIL STOCKPILING/MANAGEMENT

No	Issue	Management commitment
These commitments apply to <u>construction and operation phases</u>		
1	Delineation of stockpiling areas and	Limit the disturbance of soils to what is absolutely necessary. Stripping will only occur where soils are to be disturbed by activities described in the 2016 Scoping Report and 2013 EIA.
2	stockpile management	Soil stockpiles will be demarcated, and clearly marked to identify both the soil type and the intended area of rehabilitation.
3		Investigate the possibility of establishing storm water diversion berms to prevent run off erosion around stockpiles.
4		Stockpiles will be benched to a maximum height of 2 m. Design the benches to ensure maximum security of topsoil and to minimize erosion.
5		For storage periods greater than 3 years, erosion control in the form of vegetation will be established and the stockpile sides should as far as practically possible be stabilised as a slope of 1 in 6 or less.
6		No waste material will be placed on the soil stockpiles.

No	Issue	Management commitment
7		Equipment movement on top of the soil stockpiles will be limited.
8	Stripping and handling of	Handle soils in dry weather conditions so as to cause as little compaction as possible.
9	soils	Utilizable soil is considered to be the top 300mm of soil (or deeper if applicable) or until hard rock is encountered where soil depths are <300mm. The utilizable soil will be stripped and stockpiled together with any vegetation cover present.

7.14 WASTE MANAGEMENT PROGRAMME

Waste is generated during all phases of the mine. This MP deals with solid waste management.

7.14.1 COMPONENTS

This plan is made up of the following components:

- Non-hazardous solid waste (non-mineralised).
- Hazardous solid waste (non-mineralised).
- Medical waste.

Waste Inventory list:

Waste type	Waste specifics (example of waste types)	Source
Non-hazardous solid waste (non-mineralised)	Metal Cut offs, rubber, wood, product packaging, organic materials, glass, plastics, food scraps, cardboard/paper, used PPE, etc.	Across site
Hazardous solid waste (non-mineralised).	Printer cartridges, sewerage, batteries, hydrocarbons (oils, grease), fluorescent bulbs, etc.	Admin building, workshops, plant
Medical waste	Syringes, material with blood stains, bandages, etc.	First Aid Centre

7.14.2 MANAGEMENT

7.14.2.1 Non-hazardous solid waste (non-mineralised)

Objectives

The objective of the management measures is to ensure proper storage, recycling, re-using, removal, transportation and disposal of non-hazardous solid waste.

Actions

TABLE 7-26: ACTIONS RELATING TO NON-HAZARDOUS SOLID WASTE (NON-MINERALISED)

No	Issue	Management commitment
These commitments apply <u>construction, operation and decommissioning</u> phases		
1	General	The waste management procedure for Okorusu must cover the recycling, re-use, storage, handling, transportation and disposal. Ensure that the

No	Issue	Management commitment
		contractors responsible are made aware of these procedures.
2	Collection of waste	Designated waste collection points will be established on site. Care will be taken to ensure that there will be sufficient collection points with adequate capacity.
3	Disposal of waste	Waste will be disposed of at the existing waste disposal facility on site.
4		A waste disposal facility management procedure will be written up and implemented.
5	Waste storage/separation – domestic waste	Collect general domestic and recyclable waste from all offices, tearooms, ablutions, security office, laboratory, workshop and stores and place into wheely or luggar bins and skips.
		Segregate the discarded domestic general and recyclable waste before placement into the correct wheely or luggar bins and skips.
6		Provide the recyclable materials to qualified companies that either directly or indirectly recycle the materials themselves or through third party companies.
7		Ensure that waste storage areas and/or containers meet the risk needs for that specific waste (e.g. impervious floor, bunded areas with drainage/containment systems, lids to prevent light material from blowing away or sealed containers for hazardous material).
8	Waste classification (domestic and industrial)	The waste inventory will be kept up to date.

7.14.2.2 Hazardous solid waste (non-mineralised)

Objectives

The objective of the management measures is to ensure proper storage, removal, transportation and disposal of hazardous solid waste

Actions

TABLE 7-27: ACTIONS RELATING TO HAZARDOUS SOLID WASTE (NON-MINERALISED)

No	Issue	Management commitment
These commitments apply <u>construction, operation and decommissioning</u> phases		
1	General	The waste management procedure for Okorusu will cover the storage, biodegrading and or neutralising if possible, handling, and transportation of waste. Ensure that the contractors responsible are made aware of these procedures.
2	Collection of	Designated waste collection points will be established on site. Care will be taken

No	Issue	Management commitment
	waste	to ensure that there will be sufficient collection points with adequate capacity.
3	Waste storage	Hazardous waste will not be stored in skips but in designated suitable containers.
		Store empty print cartridges in a designated box at the office assistant's desk until removal from site.
4		Store fluorescent tubes in a specially labelled steel drum at the engineering workshop.
5		Collect and accumulate other hazardous waste i.e. car batteries, miscellaneous batteries, oil filters, etc. at the engineering workshop until such time that the amounts can be removed from site.
6		Explosives packaging shall be safely burnt at the magazine site according to permit conditions and procedures.
7		Place oil and greasy cloths and rags into a steel drum and when full transported off site to the hazardous waste site.
8		Keep empty reagent bags (for a short period of time) at the reagents store until removed by the reagent contractor for refills.
9		Ensure that waste storage areas and/or containers meet the risk needs for that specific waste (e.g. impervious floor, bunded areas with drainage/containment systems, lids to prevent light material from blowing away or sealed containers for hazardous material).
10		Waste classification
11	Hazardous waste biodegradation and neutralisation	Where possible if natural means are available on site as will be practiced for remediating polluted soils, some hazardous waste or reagents can be neutralised and or biodegraded on site before transportation. Eg, grease or mixed collector (fatty acid)
12	Waste transport	An approved waste management subcontractor will undertake the waste transport.
13	Disposal	Disposal of waste at appropriate permitted waste disposal facilities as follows: <ul style="list-style-type: none"> ○ Hazardous waste that cannot biodegrade by natural means shall be removed from site and may be recycled or disposed of at the nearest hazardous site (i.e. Walvis Bay) ○ Dispose of spoiled reagents offsite at the reagents facility in Walvis Bay. ○ Damaged reagent bags shall also be removed by the reagent contractor for repairs or disposal.

No	Issue	Management commitment
14	Disposal records	Written evidence of safe disposal of waste will be kept.

7.14.2.3 Medical waste

Objectives

The objective of the management measures is to ensure proper storage, removal, transportation and disposal of medical waste

Actions

TABLE 7-28: ACTIONS RELATING TO MEDICAL WASTE

No	Issue	Management commitment
These commitments apply <u>construction, operation and decommissioning</u> phases		
1	General	The medical waste handling procedure for Okorusu will cover the storage, handling, and transportation of all medical waste. Ensure that the contractor's responsible are made aware of these procedures.
2	Disposal	Incinerate the medical waste offsite at an approved medical facility. Receive written evidence as proof of safe disposal and / or destruction

8 PARTIES RESPONSIBLE FOR THE IMPLEMENTATION OF THE EMP

This section describes the roles and responsibilities for implementing the various management plans.

8.1 MANAGING DIRECTOR

The Okorusu Fluorspar Mine General Manager has overall accountability for environmental management on the mine and for ensuring this EMP is implemented. This General Manager, will delegate the EMP responsibilities to various personnel across the mine which form part of the SHE (Safety, Health, Environment) Management Structure. As part of this department's responsibilities, the EMP will be implemented and an environmental management system will be developed.

8.2 SHE DEPARTMENT

The Okorusu SHE Department will be responsible for assisting the Managing Director and various other managers across the mine. The Environmental Control Officer (ECO) will coordinate all environmental and community issues on site, and together with the Environmental Manager for the Gecko Group (off site) specifically ensure that the commitments as set out in this EMP are implemented during the design, operations, decommissioning and closure phases. The Health and Safety Coordinator will assist with their areas of expertise as they relate to the EMP.

In addition to the above, the SHE Department is responsible for ensuring that all persons involved with Okorusu Fluorspar Mine comply with this EMP.

The SHE Department will be responsible for the following aspects related to compliance of this EMP:

- Regular inspections and auditing compliance to this EMP and any other relevant legal requirements e.g. permits and authorisations.
- Conduct environmental awareness training during induction training and on an ad hoc basis thereafter.
- Conduct scheduled monitoring as outlined in section 9 as well as any additional monitoring required by permit and authorisations issued to Okorusu by relevant authorities.
- Ensure compliance to this EMP and permits and authorisations issued to Okorusu by relevant authorities. Ensure responsibilities and target dates are developed for each one of the commitments in this EMP. This will be through one of the following mechanisms:
 - Design requirements; or
 - Construction tender documents and contracts.
- Submit required information to relevant authorities such as reporting related to monitoring and with regard to compliance with the EMP, permit and relevant authorisations.

- Liaise with Okorusu Mine Management and various external stakeholders such as authorities and interested and affected parties on environmental management (where required).

8.3 EXTERNAL SPECIALISTS

Okorusu Mine may appoint external environmental specialists, as and when required, to assist with the implementation of certain commitments made in the various management plans.

An independent auditor will also assess compliance against the EMP on an Annual basis.

9 MONITORING AND AUDITING

9.1 MONITORING

The management programmes in Section 7 have covered various aspects of the proposed monitoring. This section both augments those requirements and sets further detail where relevant. Okorusu will develop detailed monitoring procedures including the relevant monitoring commitments spelled out in this EMP.

As a general approach, the monitoring procedures will comprise the following:

- A formal procedure.
- Appropriately calibrated equipment – regular inspections and calibration of equipment will be undertaken in line with the equipment calibration/validation procedure.
- Where samples require analysis, they will be preserved according to laboratory specifications.
- Parameters to be monitored can be identified in consultation with a specialist in the field and/or the relevant authority.
- If necessary, following the initial monitoring results, certain parameters may be removed from the monitoring programme in consultation with a specialist and/or the relevant authority.
- Monitoring data will be stored in a structured database.
- Data will be interpreted and reports on trends in the data will be compiled on a biannual basis.
- Both the data and the reports will be kept on record for the life of mine.

As a general comment, if monitoring points become damaged or redundant then they can be replaced with new points.

9.1.1 WATER MONITORING

9.1.1.1 Groundwater

Groundwater levels, metered abstraction and pumped yield must be recorded at monthly intervals from all boreholes that are used for groundwater abstraction and/or mine dewatering purposes. This is important for the purpose of establishing baseline values, but also to monitor any impacts as a result of abstraction.

A groundwater monitoring plan must be compiled with dedicated boreholes drilled to monitor water quality at regular intervals. The monitoring plan must take into account the kind of contaminants/major ions/metals that potentially can be dissolved in the groundwater system due to the mining activities. The number of boreholes, the parameters that are analysed for, and the intervals of water sampling must be communicated with the Department of Water Affairs.

The monitoring boreholes should be located in such a manner as to target any contamination coming from the mine operations.

9.1.1.2 Surface water

Due to fact that no natural surface water resources exist on site, no regular surface water quality monitoring is required. However, stormwater management is essential for the prevent of contamination spreading beyond the mine's operation boundaries and it is important that the stormwater management structures be monitoring during the daily inspections.

Surface water sampling after storm events should also be undertaken where possible, to enable a database to be compiled of water quality, which would indicate if a deterioration occurs during the mining.

9.1.2 AIR MONITORING

A dust monitoring network, comprising of single dust fallout units following the following the American Society for Testing and Materials standard method for collection and analysis of dust fall (ASTM D1739), should be implemented at the mine. A total of 15 possible locations have been identified for dust monitoring (refer to Figure 9.1). However, a number of these are only necessary should the proposed expansion from the 2013 EIA be implemented (Sites 9 – 12). Dust fallout should not exceed 1 200 mg/m²/day for any three months in a calendar year or for two consecutive months.

Okorusu will establish a dust monitoring system which enables the continued operations, including dust generated from the graphite processing and magnetite mining and process to be assessed. In addition to the dust sampling network, a continuous sampler will be placed to the west of the plant samplers will be placed to the west of the operations in order to monitor PM₁₀ and PM_{2.5}. Figure 9.1 provides the suggested locations for the dust sampling network. As each activity is initiated the necessary additional locations will be monitored for air quality.

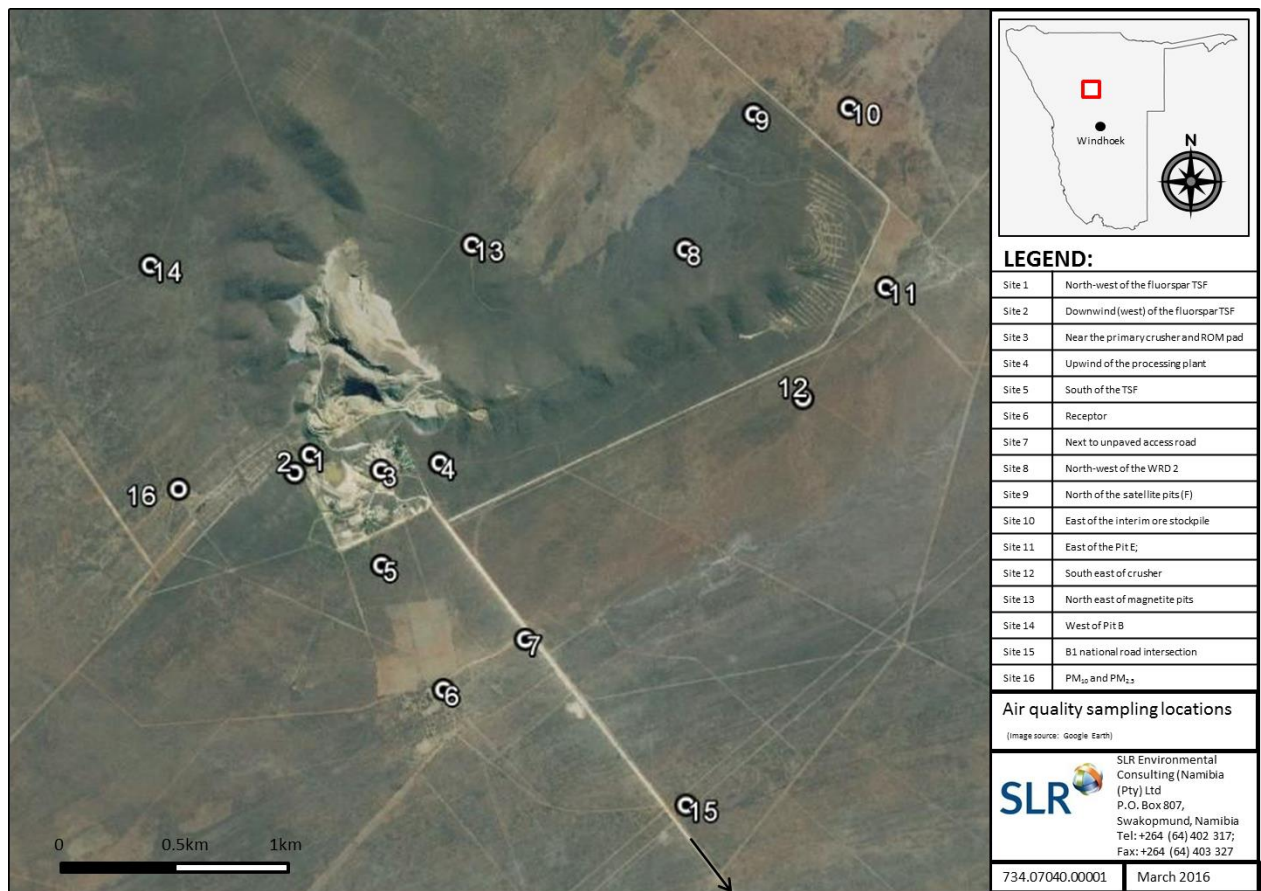


FIGURE 9.1: AIR QUALITY MONITORING SAMPLING LOCATIONS

9.1.3 NOISE MONITORING

The frequency of noise monitoring as well as the parameters that should be determined are summarised in Table 4-1. In addition to the measurement of sound pressure levels, the 3rd octave band frequency spectra should also be recorded. Frequency spectrum data can provide useful insight into the nature of recorded sound pressure levels and assist with distinguishing between potential sources of noise that contribute to noise levels at a certain location. Source noise measurements could be conducted to confirm equipment manufacturer sound power data and assumed sound power data used in the current study.

TABLE 4-1: NOISE MONITORING PROGRAMME

Proposed Monitoring Plan	
Parameters to be Measured	Frequency
L_{Aeq}(1 hour) between 07:00 and 22:00	One campaign during construction One campaign every two years of operation
L_{Aeq}(1 hour) between 22:00 and 07:00	One campaign during construction One campaign every two years of operation
3rd Octave band frequency spectrum	During every noise monitoring campaign

9.1.4 BIODIVERSITY MONITORING

The biodiversity monitoring will include the following:

- An ecological management plan that includes recommendations on best rangeland management practises including a fire management plan.
- Monitor the occurrence and spread of invasive species so as to instigate steps for their control, following expert advice.
- Enforce speed limits, including using speed-reducing methods and speed-monitoring devices.

9.1.5 SOIL MANAGEMENT MONITORING

Regular inspections of soil stockpiles and rehabilitated areas will be undertaken to ensure that the soil conservation procedure is being implemented.

9.1.6 MINERALISED WASTE FACILITIES

The following issues will, where relevant, be monitored on a quarterly basis and reported as required by relevant permits and authorisations issued to the Okorusu Fluorspar Mine by the authorities:

- Slope stability, integrity of walls and liner in the tailings facility, presence of seepage, capacity of dirty water system, and functioning of drains.
- The volume of mineralised waste generated as well as the disposal area, height and footprint of mineralised waste disposal/storage facilities will be monitored and recorded as required. The results will be reported bi-annually.

9.1.7 NON-MINERALISED SOLID AND LIQUID WASTE

Weekly inspections of non-mineralised waste handling and management facilities will be undertaken to ensure that the waste management procedures are being implemented. The volume and type of non-mineralised waste, and the disposal destination, will be monitored and recorded as required. The results will be reported annually.

9.2 AUDITING COMPLIANCE OF THE EMP

The commitments contained in this EMP will, once an environmental clearance has been obtained, be Okorusu's contractual agreement with the Namibian authorities for sound environmental management. All employees, contractors and sub-contractors and any visitors to site will be expected to comply with the commitments contained herein.

9.3 AUDITS AND INSPECTIONS

The ECO and Gecko Group Environmental Manager shall conduct internal environmental management audits against the commitments in the EMP. During the construction phases, these audits will be conducted every month. In the operational phase, these audits will be conducted on a quarterly basis. The audit findings will be documented for both record keeping purposes and for informing continual improvement.

In addition, an independent professional will conduct an EMP performance assessment at least once a year. The mine's compliance with the provisions of the EMP and the adequacy of the EMP relative to the on-site activities will be assessed and documented in an independent report. This report will be submitted to the MET in support of ECC renewal applications.

Furthermore the ECO and designated mine personnel will conduct inspections during construction phases and during mining and processing operations at a frequency commensurate with the intensity of the activities and risks associated therewith.

9.3.1 SUBMISSION OF INFORMATION

As a minimum, the following documents will be submitted to the relevant authorities on an ongoing basis:

- The bi-annual report required by the MET will be submitted every six months.
- Other monitoring reports will be provided to the relevant authorities as per the permit and other agreements.

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