SHALI GROUP
STRATEGIC METAL DISCOVERY AND DEVELOPMENT

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REPORT:

ONGOMBO COPPER PROJECT – EMP

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Please note at ECC we care about lessening our footprint on the environment; therefore, we encourage that all documents are printed double sided.

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DEFINITIONS AND ABBREVIATIONS

ABBREVIATIONS	DESCRIPTION
%	percentage
AFP	African Pioneer PLC
ASTM	American Society for Testing and Materials
CSI	corporate social investment
DWA	Department of Water Affairs
ECC	Environmental Compliance Consultancy
EMA	Environmental Management Act
EMP	environmental and social management plan
EMS	environmental management system
EPL	exploration prospecting licence
ESIA	environmental and social impact assessment
GHG	greenhouse gases
GIS	geographic information system
GPS	global positioning system
HR	human resources
HSE	health, safety and environment
JV	joint venture
LOM	life of mine
MAWLR	Ministry of Agriculture, Water and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
ML	mining licence
MSDS	material safety data sheet
$PM_{2.5}$	particulate matter with a diameter of 2.5 microns or less
PM_{10}	particulate matter with a diameter of 10 microns or less
PM	particulate matter
PPE	personal protective equipment
PV	photovoltaic
NHC	National Heritage Council
ROM	run of life of mine
ToR	terms of reference

TSF	tailings storage facility
TSP	total suspended particles
SOP	standard operating procedure
WRD	waste rock dump

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Environmental Compliance Consultancy (ECC) has been retained by Shali Group Holdings (Pty) Ltd which is a joint venture (JV) with African Pioneer PLC (AFP), on behalf of Manmar Investments One Hundred and Twenty-Nine (Pty) Ltd a Namibian company. ECC is conducting an environmental and social impact assessment (ESIA) for the proposed mining of precious metals on a mining licence (ML) area (ML 240) within exploration prospecting licence 5772 (EPL 5772), located 40 km northeast of Windhoek, Khomas Region, Namibia.

The Proponent has focused on the acquisition and development of potential copper projects in Namibia through extensive exploration programmes. The advanced and successful exploration programme has resulted in the development of the Ongombo Copper Project. The proposed Project will be an underground mining accessed via an incline shaft with a copper extraction process similar to existing copper mines in Namibia, for example the Otjihase and Matchless mines. The proposed Project will be referred to herein as the “Ongombo Project” or the “Project”. Additionally, a conventional open pit is planned to be mined from the Central shoot.

ECC has compiled this draft environmental management plan (EMP) in terms of the Environmental Management Act (EMA), No. 7 of 2007 and its associated Regulations of 2012. The purpose of this draft EMP is to support the full environmental and social impact assessment (ESIA) report.

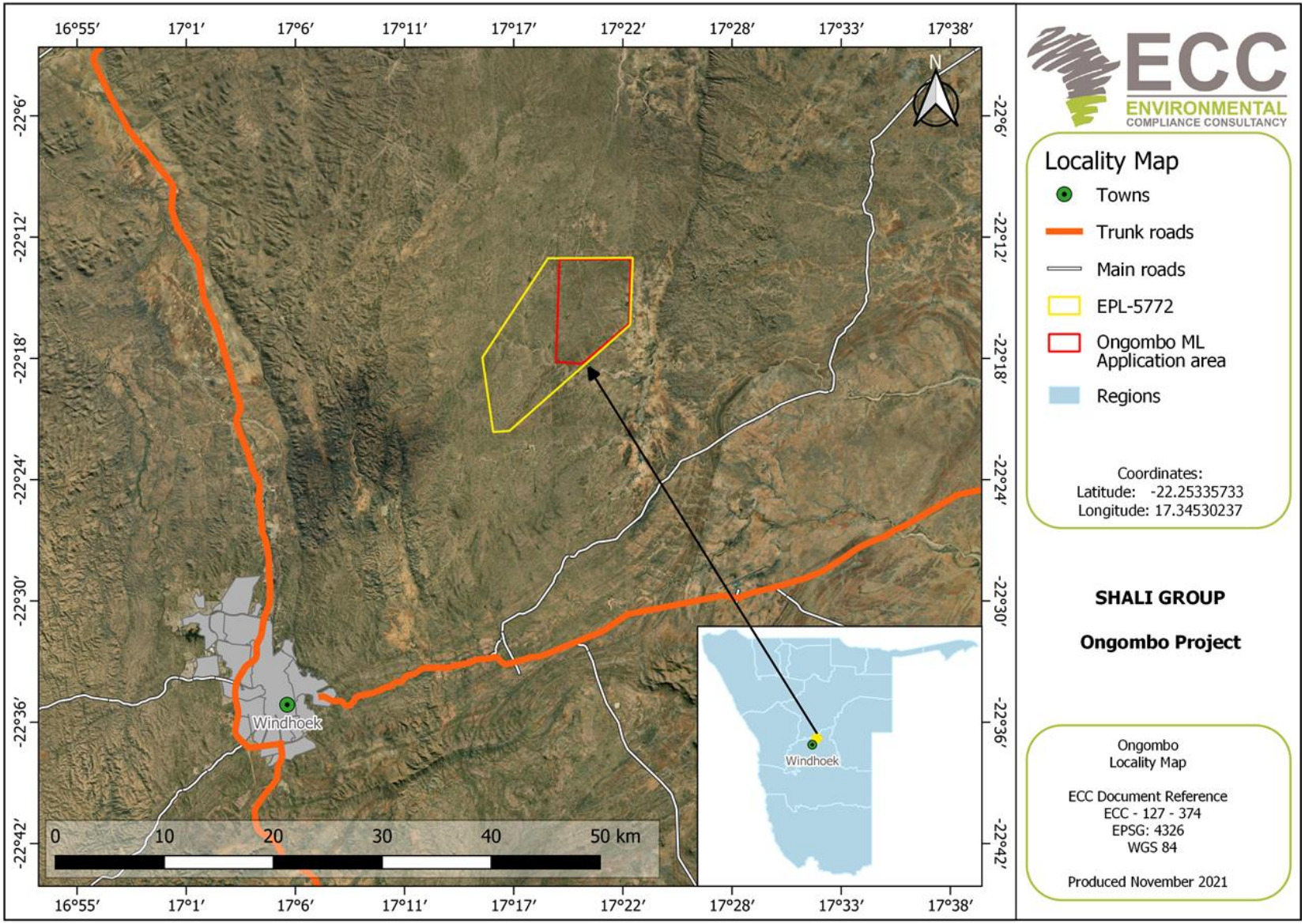

Figure 1: Locality map showing the location of the proposed Ongombo Copper Project

1.2 ENVIRONMENTAL REGULATORY REQUIREMENTS

The proposed project is considered as a listed activity as stipulated in the Environmental Management Act, No. 7 of 2007 and its Regulations, promulgated in 2012. An environmental scoping report, environmental impact assessment (EIA) and environmental management plan (EMP) are required to be submitted as part of the application to support the decision-making process for issuing an environmental clearance certificate.

This report presents the EMP and has been undertaken in terms of the requirements of the Environmental Management Act, 2007 and its Regulations.

1.3 PURPOSE AND SCOPE OF THIS REPORT

The preliminary environmental and social management plan (hereafter referred to as the EMP) provides a logical framework, mitigation measures and management strategies for the mining activities associated with the proposed Project, in this way ensuring that the potential environmental and social impacts are curbed and minimised as far as practically possible and that statutory and other legal obligations are adhered to and fulfilled. Outlined in the EMP are the protocols, procedures and roles and responsibilities to ensure the management arrangements are effectively and appropriately implemented.

The EMP forms an appendix to the environmental scoping report and is based on the findings of the assessments carried out to date. The environmental scoping report should be referred to, for further information on the proposed Project, assessment methodology and terms of reference (ToR), applicable legislation, and assessment findings.

This EMP is a live document and shall be reviewed at predetermined intervals, and or updated during the ESIA process when or if the scope of work alters, or when further data or information is added. All personnel working on the Project will be legally required to comply with the requirements set out in the final draft EMP that is approved by the competent authorities and Ministry of Environment, Forestry and Tourism (MEFT).

The scope of this EMP includes all activities associated with the underground mining undertaking.

1.4 MANAGEMENT OF THIS EMP

The Proponent, will hold the environmental clearance certificate for the proposed Project and will be responsible for the implementation and management of this EMP. Before the mining activities commence, this EMP will be reviewed, amended as required and approved ready for implementation. The implementation and management of this EMP, and thus the monitoring of compliance, will be undertaken through daily duties and activities, as well as monthly inspections.

1.5 LIMITATIONS, UNCERTAINTIES, AND ASSUMPTIONS RELATED TO THIS EMP

This EMP does not include measures for compliance with statutory occupational health and safety requirements. This will be provided in the safety management plan to be developed by the Proponent.

Where there is any conflict between the provisions of this EMP and any contractor's obligations under their respective contracts, including statutory requirements (such as licences, project approval conditions, permits, standards, guidelines, and relevant laws), the contract should be amended, and statutory requirements are to take precedence.

The information contained in this EMP has been based on the project description as provided in the ESIA report. Where the design or construction methods is different, this EMP may require updating and potential further assessment may be undertaken.

1.6 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Environmental Compliance Consultancy (ECC) (Reg. No. CC 2013/11401) has prepared this preliminary EMP on behalf of the proponent.

This report has been authored by employees of ECC, who have no material interest in the outcome of this report, nor do any of the ECC team have any interest that could be reasonably regarded as being capable of affecting their independence in the preparation of this report. ECC is independent from the proponent and has no vested or financial interest in the project, except for fair remuneration for professional fees rendered based upon agreed commercial rates. Payment of these fees is in no way contingent on the results of this report or the assessment, or a record of decision issued by Government. No member or employee of ECC is, or is intending to be, a director, officer, or any other direct employee of Shali Group. No member or employee of ECC has, or has had, any shareholding in Shali Group.

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2 ENVIRONMENTAL MANAGEMENT FRAMEWORK

This EMP provides measures, guidelines, and procedures for managing and mitigating potential environmental impacts. The EMP also indicates monitoring and reporting guidelines and sets responsibilities for those carrying out management and mitigation measures.

2.1 OBJECTIVES AND TARGETS

Environmental objectives and targets have been developed so that mining activities can minimise potential impacts on the environment, as far as reasonably practicable.

Environmental objectives for the project are as follows:

- Zero pollution incidents;
- Minimal vegetation clearing and earthworks;
- Minimal impact on regional groundwater users;
- Protect local flora and fauna, and
- Use natural resources effectively and efficiently.

2.2 ORGANISATIONAL STRUCTURE, ROLES AND RESPONSIBILITIES

The proponent shall provide a project team to oversee and undertake the preparation and mining activities, which will be composed of the proponent's personnel and contractors. A nominated role shall be identified to ensure the management and implementation of this EMP is carried out throughout the Project Life of Mine (LOM). The proponent shall be responsible for:

- Ensuring all members of the project team, including contractors, comply with the procedures set out in this EMP
- Ensuring that all persons are provided with sufficient training, supervision, and instruction to fulfil this requirement
- Ensuring that any persons allocated specific environmental responsibilities are notified of their appointment and confirm that their responsibilities are clearly understood
- Contractors shall be responsible for ensuring and demonstrating that all personnel employed by them are compliant with this EMP, and meet the responsibilities listed above

Table 1 lists the roles and responsibilities allocated to different management levels in the company and specific personnel.

Table 1 – Roles and responsibilities

ROLE	RESPONSIBILITIES AND DUTIES
Proponent	– Responsible for the overall management and implementation of the EMP; – Ensure environmental policies are drafted/updated and communicated to all personnel throughout the company; – Responsible for providing the resources required to effectively run the mine and comply with the EMP;

ROLE	RESPONSIBILITIES AND DUTIES
	– Appoint all managers needed to ensure effective running of the mine; and – Ensure systems for proper induction and training of personnel and contractors are in place.
Mining management	– Manage all activities on the mine; – Monitor daily operations and ensure systems are in place for implementation of the EMP; – Maintain the community issues and concerns register and keep records of complaints; – Ensure corrective action are taken and communicated to complainants; and – Maintain up to date records of employees who have completed training and induction.
Site manager	– Ensure that all contract workers, sub-contractors and visitors to the site are aware of the requirements of this EMP, relevant to their roles and always adhere to this EMP – Report any non-compliance or accidents – Receive, recording and responding to complaints – Ensure adequate resources are available for the implementation of the EMP – Ensure safe and environmentally sound operations – Responsible for the management, maintenance, and revisions of this EMP.
HSE Appointed Person	– Maintain the mine's EMS – Draught and update mine specific environmental procedures – Ensure on-mine induction training is relevant and address issues from this EMP – Do all environmental audits and inspections and report findings to relevant personnel – Check the implementation of corrective action for incidents and complaints – Ensure all environmental monitoring and reporting is done – Conduct environmental monitoring, audits and inspections; and – Compile draft environmental reports.
Employees	– Adhere to measures set out in the EMP – Ensure they have undertaken a site induction – Report any operations or conditions which deviate from the EMP as well as any non-compliant issues or accidents to the Environmental Manager

2.3 CONTRACTORS

Any contractors hired during the mining activities of the underground operations and accessory works for the Project duration shall be compliant with this EMP and shall be responsible for the following:

- Undertaking activities in accordance with this EMP as well as relevant policies, procedures, management plans, statutory requirements, and contract requirements.
- Implementing appropriate environmental and safety management measures.
- Reporting of environmental issues, including actual or potential environmental incidents and hazards, to the site manager.
- Ensuring appropriate corrective or remedial action is taken to address all environmental hazards and incidents reported by employees and subcontractors.

2.4 EMPLOYMENT

The proponent and all contractors shall comply with the requirements of the Republic of Namibia Regulations for Labour, Health and Safety, and any amendments to these regulations. The following shall be complied with:

- In liaison with local government and community authorities, the proponent shall ensure that local people have access to information about job opportunities and are considered first for construction/maintenance contract employment positions.
- The number of job opportunities shall be made known together with the associated skills and qualifications.
- The maximum length of time the job is likely to last for shall be indicated.
- Foreign workers with no proof of permanent legal residence shall not be hired.
- Every effort shall be made to recruit from the group of unemployed workers living in the surrounding area.

2.5 REGISTER OF ENVIRONMENTAL RISKS AND ISSUES

An environmental review of the proposed Project has been completed to identify all the commitments and agreements made. A list of environmental commitments and risks has been produced, which details deliverables including measures identified for the prevention of pollution or damage to the environment during the mining phase.

Table 2 provides a list of environmental risks and issues, as well as associated mitigation (as derived from the ESIA) and monitoring measures, and the roles responsible for compliance. It will be subject to regular review by the General Manager and updated when necessary. The Mining Manager and Environmental Manager will use this register to undertake monthly inspections (see next section) to ensure the project is compliant with this EMP.

Table 2 – A list of environmental risks and issues, as well as associated mitigation and monitoring measures

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
Employee health and safety	Underground ground control and ground support failures	– The Proponents safety management plan will ensure that the SOP and golden rules include that no person is to go beyond supported ground (meaning no one can go into an area of unsupported ground). Supported ground is ground that has been controlled to an approved standard and made safe; – A Ground Control Coordinator will be appointed; – A ground control plan will be developed; – The proponent will ensure that the application of a rigorous mine design process is in place; – Prior to mining, and refined as data becomes available, the proponent will ensure a ground conditions model is developed; – Ensure that the evaluation of long-term ground control requirements is incorporated into the sites' technical plans and planning process; – Ensure that there is a multi-tiered response plan for ground support; – Ensure that all underground operators are trained in underground hazard identification; – Ensure that the site has ground control monitoring systems in place to proactively measure potential ground movement; – Ensure that the ground control requirements are incorporated into shift plans and work plans; and – Ensure that the site develops a quality assurance program for all areas of ground control/support.	– Ground stability monitoring / Seismicity monitoring; and – Pre-shift ground condition and support checklists.	– Mining Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
	Underground fire incident	– Develop a fire control plan through the process of risk assessment; – Develop a Maintenance System to prevent the deterioration of equipment condition and performance; – Ensure no petrol is used underground; – Design and control flammable substances use and storage; – Ensure that the control of hot work through a hot work permit system is in place specifically for underground operations; – Ensure the underground operators receive training to be able to identify and provide first response to fire emergencies; – Ensure that the site has an operational and maintenance procedures for fire control; – Ensure that the design requirements for underground mobile equipment factors in fire suppression; – Ensure that the site has specific design requirements for fixed mechanical, electrical and compressor installations; – Design the ventilation system to ensure the least exposure to smoke from underground fires during evacuations; and – If associated infrastructure is required for underground operations such as workshops, lunchrooms, toilets and refuge chambers ensure these are planned and requirement designed for purpose.	– HSE Audits and inspections.	– Mining Manager
	Collision of underground mining equipment	– Ensure that procedures are in place to minimise the instances where pedestrians and operating mobile equipment are in the same area at the same time; – Ensure that operational risk assessments are part of the	– HSE Audits and inspections; and – Pre-start checklists on all machines.	– Mining Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
	causing injury to people	planning process; – Develop equipment specifications which include minimum safety requirements and the identification of critical control systems for underground equipment; – Develop a maintenance system that identifies the maintenance requirements for critical safety systems; – Design requirements of all underground roads to ensure good road conditions underground are maintained; – Ensure suitable control of traffic through the development of SOPs; – Ensure the site makes provisions for the use of remote-controlled equipment to ensure high standards of safety; and – Ensure all operators understand and are trained for emergency response.		
	Inrush or subsidence event within the underground mine causing injury and harm to people and project feasibility	– Ensure that due consideration of inrush and subsidence potential at each stage of a project is implemented at the planning phase; – Ensure that the use of a risk assessment process is in place to identify specific hazards; – Implement a systematic collection and analysis of data; – Evaluate of climatic conditions; – Identify risks of operating near water; – Ensure that consideration of pathways for inrushes is evaluated at each phase; – Develop, apply and monitor lead indicators; – Develop and apply a response plan for lead indicators	– Monitoring of surface and groundwater levels.	– Environmental Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
		– Ensure the site has implemented contingency planning; – Prior to the development of working areas ensure a Water Control Plan is developed and in place; – Apply appropriate procedures for surface and underground drilling; – Apply rigorous mine design process; – Implement effective ore and waste fill design; – Implement effective tailings and surface water storage; – Implement effective backfill design and procedures; – Implement effective underground and surface pumping and drainage systems; and – Ensure that there is a method for open and clear communication of experiences and outcomes of inrush and subsidence events.		
Training and awareness	Lack of environmental knowledge on EMP requirements leads to environmental incidents	– Environmental department to provide weekly information regarding environmental issues of concern; – Line management to discuss topics with teams; – HSE staff will be employed by contractor staff to brief staff on their company SHE topics and those of the Proponent; – Awareness will be distributed by various channels as deemed appropriate; – Daily site inspections to ensure HSE requirements are adhered to; – HSE files to be maintained per shift; and – Incident reports covering HSE to be included, including lessons learned and corrective actions.	– Environmental audits and inspections	– Mining Manager – Environmental Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
Surface water	Sediment loading of surface water from decline development activities	– Installation of diversion structures to divert non-contact surface water away from and around the mining operations; – Ensure wastewater produced during the construction of the decline development is directed into a containment pond for reuse; and – If the volume of water is too large and cannot be handled concurrently with mining operations, ensure water is diverted to the processing plant for reuse, or if not feasible, ensure an adequately sized sedimentation pond is constructed for handling the waste water during the decline development phase, or find a suitable reuse strategy for the water.	– Mine water balance	– Mining Manager
	Sediment loading of surface water from uncontrolled surface discharge of underground mine wastewater	– Ensure wastewater produced from underground mining activities is sent to the processing plant for reuse in the processing plant; and – If the volume of water is too large and cannot be handled by the processing plant for reuse, ensure an adequately sized sedimentation pond is constructed for handling the wastewater from the underground mining operations. Reuse of the water back into the underground mine should be investigated once operations commence and the water quality is better known and understood.	– Mine water balance	– Mining Manager
	Discharges of chemicals to surface water	– Ensure correct chemical use and clean-up procedures are in place and followed; – Ensure chemical spills are cleaned up underground; and – prevent spills from entering the dewatering system that would be transferred to surface.	– Surface water monitoring	– Environmental Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
	Potential failure of containment dams that hold underground mine dewatering water	– Ensure water storage facilities are constructed and have capacity to hold the volume of water to be pumped from the underground workings.	– Mine water balance	– Mining Manager
Groundwater	Contamination of groundwater from underground and open pit mining operations including hydrocarbons and explosives	– Ensure correct chemical use and explosive charging practices are in place and followed for mining operations; – Bulk fuel will not be stored underground and majority of fleet refuelling will occur on surface; and – Refuelling of drills and equipment working at the face will be done in a controlled manner following standard underground refuelling procedures.	– Groundwater monitoring	– Mining Manager; and – Environmental Manager
	Modification of hydrologic flow patterns from underground mining operations	– The potential to alter hydraulic flow during operations exists as the very nature of mining requires dewatering for the safe access to mining areas, the potential impact associated with dewatering require further studies.	– Groundwater monitoring	– Mining Manager; and – Environmental Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
	Infiltration of potential spills or discharges of chemicals into groundwater	– Ensure correct chemical use and clean up procedures are in place and followed for mining operations; – Bulk fuel will not be stored underground and majority of fleet refuelling will occur on surface therefore risk is reduced; and – Ensure all operators are trained on spill response for underground events.	– Groundwater monitoring	– Mining Manager; and – Environmental Manager
	Potential infiltration of groundwater from aquifers into the underground mining operation	– Ensure that the mine plan is followed at all times; – Ensure known structures, and water bearing features are mapped and surveyed into the mine plans; – Ensure monitoring systems are in place to detect potential inflows; and – Ensure the dewatering plan is followed and monitoring and reporting on the dewatering plan is undertaken.	– Groundwater monitoring; and – Mine water balance.	– Mining Manager; and – Environmental Manager
	Groundwater passive inflow into the open pit causing geotechnical instability	– It is estimated that the predicted inflows can easily be handled by sump pumping, and active dewatering boreholes are not specifically required, unless geotechnical studies show critical geotechnical domains, where depressurisation may be needed; – Pit dewatering water is either used for dust suppression or released to an ephemeral water course, in line with permit conditions; – Volumes of water abstracted is recorded and reported to DWA, in line with permit conditions; and – Regular updating of groundwater model recommended.	– Environmental audits and inspections – Groundwater database – Pit dewatering records	– Mining Manager – Environmental Manager
	Contamination of an aquifer	– The mine design may allow for the groundwater level to be intersected. The mine will act as a sink of potentially	– Groundwater monitoring	– Environmental Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
	by the rebounding water table of potentially polluted water in the underground workings after closure	contaminated water from various sources, including the rebounding water table in the underground workings; – Using the water for irrigation after closure could be an option to investigate.		
	Potential runoff of seepage from the solid waste landfill site as a result of additional solid waste being disposed of in the on-site landfill	– Ensure the landfill is managed in accordance with site procedures and the landfill is covered and rehabilitated as required; and – Reduce the volume of material entering the landfill by continuing to implement the reduce, reuse and recycle principle installed on site.	– Waste volume monitoring; and – Groundwater monitoring	– Environmental Manager
	Potential for inrush into the underground mine workings during development	– Ensure the dewatering plan is followed and monitoring and reporting on the dewatering plan is undertaken; – Ensure all operations are undertaken in accordance with the mine plan; – Ensure all water bearing features are mapped and included in survey plans;	– Groundwater monitoring	– Mining Manager; and – Environmental Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
	and operations	– Ensure emergency response procedures are in place in the event of an inrush; and – Ensure adequate pumping capacity with back up pumps as critical spares are kept on site.		
Stormwater management	Flood risks and pollution control	– A stormwater management plan to be developed for the site, in line with the ESIA requirements; – Stormwater management plan to be reviewed and updated on a regular basis; – Dirty (contact) and clean (non-contact) water to be separated; – Clean water should be allowed to enter the natural drainage channels/ephemeral river; and – Dirty water should be redirected to the ponds or processing plant to be reused in the process.	– Environmental audits and inspections – Stormwater management plan – Survey database – Stormwater monitoring programme	– Mining Manager
Geotechnical	Pit wall stability failures due to elevated pore pressure in the open pit	– The open pit will continue to be regularly inspected by geotechnical engineers; – Pore pressures will be monitored on an ongoing basis utilising a series of piezometers located around the pit; and – The need to install an active dewatering system to depressurize the pit walls will be considered as the pit deepens.	– Regular geotechnical inspections – Piezometer monitoring programme	– Mining Manager
Soils management	Disturbance footprint management	– Only designated surface roads, haul roads or paved areas will be utilized; – Boundary berms to be constructed, where required; and – Topsoil to be removed, where feasible.	– Environmental audits and inspections	– Mining Manager
Socio-economic	Creation of jobs during	– Ensure that local residents get first opportunity to apply for positions were applicable.	– HR recruitment	– HR Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
	project construction/development		policies	
	Creation of 20-50 jobs during operational mining	– Ensure that local residents get first opportunity to apply for positions were applicable.	– HR recruitment policies	– HR Manager
	Influx of contractor (workers and families) stimulating the local economy through increase spends	– Engage with the local and regional government to ensure development plans cater for influx; and – Ensure local spend of CSI finding address development needs to cater for influx where applicable.	– HR and CSI policies	– General Manager
	Changes to community cohesion	– Ensure local spend of CSI finding address development needs to cater for influx where applicable.	– HR and CSI policies	– General Manager
Terrestrial and ecology	Further reduction in the water table could affect deep rooted tree survival during	– Monitoring groundwater levels and physiological stress levels in trees to see if a correlation exists; – Mapping trees that might be at risk using the cone of depression maps; and – Determine feasibility for rescue of these trees.	– Groundwater monitoring; and – Vegetation monitoring.	– Environmental Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
	droughts			
	Protection of fauna and flora to avoid damages, injuries and/or mortalities	– Protected tree species to be identified clearly and uprooting of trees to be avoided, where possible; – Seed and sample collection to be done for future rehabilitation purposes; – No firewood collection is allowed; – Permits to be acquired from MEFT if protected trees are to be removed and/or relocated; – No hunting or poaching is allowed; – No authorized removal of vegetation is allowed; – Fauna and flora incidents to be reported and recorded as per the incident management procedure; – Briefings on snakes and snake bite first aid treatments will be conducted; – Non-venomous snakes should be captured into a container and removed from site; – The killing of venomous snakes is not encouraged; and – Contact the Environmental department to remove the snake should it be within the mining or construction area.	– Environmental audits and inspections – Biodiversity monitoring programme – Mine closure plan	– Mining manager – Environmental manager
Air quality	Deterioration in air quality from odour and particulate matter (i.e. total suspended	– Ensure mechanical equipment is maintained and serviced to ensure particulate matter is reduced; and – Ensure ventilation systems are providing fresh air to working headings and the underground workings are exhausted after each blast.	– Pre-shift access checklist; – Air quality monitoring; and – Personal exposure monitoring.	– Shift supervisor; – Environmental Manager; and – Safety Manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
	particulate matter (TSP), PM_{10} and $PM_{2.5}$ and dust deposition) from the underground operations			
	Air pollution and dust emissions through vehicle emissions from open pit operations	– Diesel exhaust fumes/emissions from heavy machinery on site (excavators, front end loaders and haul trucks) must be controlled and minimized by regular checks and servicing of vehicles; – Any mining or construction vehicle found to be emitting excessive smoke or hydrocarbon spillage will be stopped from operating until found to be mechanically sound; – Blasting should be conducted during period of atmospheric instability or as per the blasting regulations to allow for maximum dispersion of dust that has been created; – Fall out dust, $PM_{10}/_{2.5}$ and passive gases monitoring campaigns to be conducted in and around the open pit; – Adherence to speed limits on unpaved roads and surfaces; – Regular dust suppression through chemical binding agents and watering of roads, surfaces and stockpiles; – Additionally, goosenecks to be established where required; and – Alternate plans need to be in place for dust suppression as	– Environmental audits and inspections – Pre-start inspections and services – Air quality monitoring programme	– Mining manager – Environmental manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
		mining activities will be stopped if dust levels become too high.		
	Ventilation discharged from the underground workings via the portal could contribute to offensive odours	– Implement gas monitoring procedures as part of the daily operations of the underground mine; and – Ensure adequate ventilation to prevent the build-up of odours and gas within the underground mine.	– Air quality monitoring; and – Personal exposure monitoring.	– Environmental Manager; and – Safety Manager
	Air quality and GHG emissions from underground mining activities	– Ensure mechanical equipment is maintained and serviced to ensure particulate matter is reduced; and – Ensure efficient waste handling such as backfilling to reduce haul distances and therefore reduce potential GHG emissions.	– GHG emission reporting	– Environmental Manager
Noise management	Disturbance to third parties, fauna and flora	– Regular noise and vibration monitoring to be conducted on neighbouring farms or the perimeter of the mining licence; – To limit disturbance to neighbouring farms/landowners, hauling of material from the pit to the main mining areas/ROM, should take place during daylight hours as far as possible; and – If nighttime hauling is required, the neighbours needs to be consulted.	– Environmental audits and inspections – Noise and vibration monitoring programme – Community liaison records	– Mining manager – Environmental manager
Power generation	Incorrect supply and	– Power generation will be done using diesel generators, where required;	– Environmental audits and inspections	– Mining

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
	storage of power generators results in reduced mining operations and/or soil/groundwater contamination	– Lighting plants are expected to be used at night or during poor visibility; – All generators and diesel storage tanks must be contained within bund walls with a sufficient capacity (110 %) contained volume; and – Records of diesel supplied to be maintained.	– Fuel records	manager
Domestic effluent water management	Lack of appropriate ablution facilities can result in soil contamination and pollution	– Only approved ablution facilities to be utilized; – Ablution facilities must be easily accessible; – No employee or contractor may relieve themselves in the surrounding environment and work area; – Ablution facilities to be cleaned and maintained on a regular basis; – Effluent water to be contained and spills to be cleaned up within 24 hours of the incident occurring; – Sewage facilities to be permitted with DWA; – Grey water to be separated from effluent water and be reused; and – Regular effluent water quality samples to be taken by the Environmental department.	– Environmental audits and inspections – Effluent monitoring programme	– Mining manager – Environmental manager
Heritage sites	Loss or damage to	– Chance finds to be reported to the Environmental department in line with the Chance Finds Procedure; and	– Environmental audits and inspections	– Mining manager

RECEPTORS	POTENTIAL IMPACTS	MANAGEMENT/MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
	heritage sites	– No authorized removal or damage to artefacts is allowed.	– Archeological monitoring programme	– Environmental manager
Resource use	Inefficient use of water resources	– Use water effectively and efficiently by following the reduce-recycle-reuse approach; and – Record volumes of abstraction and supply.	– Daily observations; and – Mine water balance	– Mining Manager; – Environmental Manager; and – Employees
	Inefficient electricity use increasing carbon footprint	– Rely on the use of a PV solar plant if appropriate or the maximum electricity supply; and – Use energy efficient electrical equipment and lighting underground.	– Track energy usage	– Mining Manager

3 ENVIRONMENTAL MANAGEMENT PRINCIPLES

3.1 CONTINUAL IMPROVEMENT

The Proponent's team is responsible for reviewing and updating this EMP, which will be supported by the monthly reports from the Underground and Open Pit Mining Domains. As part of this review process, the monthly reports will be reviewed, identifying any trends or significant areas of concern, as well as measures implemented to manage / resolve environmental or social issues. Compliance and legislative changes will be reviewed, and lessons learnt will be captured. The EMP will be amended as required, and follow up training, awareness or updates will be provided.

Ongoing hazard identification through the review of the EMP and supporting management plans and SOPs will ensure environmental impacts are avoided or minimised to as low as reasonably practicable as part of the continuous improvement of the EMS.

3.2 BEST PRACTICE

The best practice management measures that will be complied with across site are listed in Table 3.

Table 3 – A list of environmental best practice measures to be implemented

ENVIRONMENTAL ASPECT	BEST PRACTICE REQUIREMENT
Pollution prevention control	Plant and equipment to be maintained and serviced regularly; Refuelling at designated locations; Spill kits available where the risk of loss of containment is identified; Bunds to be at least 110 % of the container; and Good housekeeping.
Solid waste management	Good housekeeping (no littering); Designated waste collection areas around site and one central location; Bins labelled; Waste to be separated and kept clean and tidy; and Waste bins emptied on regular basis.
Ground contamination	Refuelling will be undertaken in designated areas with spill kits available; Chemical management enforced on site; and Good housekeeping.
Storage of fuels, oils, chemicals and other hazardous liquids	Storage tanks will be suitable and labelled for the liquid being stored; Bunds to be at least 110 % of the container; and

ENVIRONMENTAL ASPECT	BEST PRACTICE REQUIREMENT
	Daily inspections of tanks.
Energy efficiency	Plant and equipment to be maintained and serviced regularly; and Turn off plant and equipment when not in use.
Air quality	Maintenance of roads; Turn off plant and equipment when not in use; and Plant and equipment to be maintained and serviced regularly.

3.3 ENVIRONMENTAL MONITORING

A monitoring and evaluation program will be used in line with internal HSE standards to evaluate environmental performance and promote continual improvement. Monitoring also supports environmental management on site to evaluate how effective the environmental management has been, over an extended period of time.

An environmental monitoring schedule will be put in place for the operations and the underground domain.

The monitoring program comprises:

- Air quality monitoring;
- Noise and vibration monitoring;
- Water monitoring (e.g. surface water, groundwater and discharge water);
- Biodiversity monitoring (e.g. fauna, vegetation); and
- Meteorological monitoring (e.g. rainfall and evaporation).

The Environmental Officer will be tasked with conducting the monitoring within the underground Domain with the support of the Mining Manager.

4 COMMUNICATION AND TRAINING

To ensure potential risks and impacts are minimised it is vital that personnel are appropriately informed and trained on how to properly implement the EMP. It is also important that regular communications are maintained with stakeholders (if applicable) and made aware of potential impacts and how to minimise or avoid them. This section sets out the framework for communication and training in relation to the EMP.

4.1 COMMUNICATIONS

During construction and operations, the project manager and site manager shall communicate site-wide environmental issues to the project team through the following means (as and when required):

- Ensure all personal are afforded the opportunity to attend an environmental site induction that sets out their requirements in relation to this EMP
- Ensuring audits and inspections are undertaken regularly on a risk-based schedule
- Toolbox talks, including instruction on incident response procedures
- Deliver project-specific environmental briefings where required
- Ensure all personnel have access to the EMP
- Ensure operators of key activities and environmentally sensitive operations are briefed and understand their requirements.

This EMP shall be distributed to the mining team including any contractors and personnel working on the mining site to ensure that the environmental requirements are adequately communicated. Key activities and environmentally sensitive operations shall be briefed to workers and contractors.

During the mining activities, communications between the management team shall include discussing any complaints received and actions to resolve them; any inspections, audits, or non-conformance with this EMP; and any objectives or target achievements.

4.2 ENVIRONMENTAL EMERGENCY AND RESPONSE

An emergency is any abnormal event, which demands immediate attention. It is any unplanned event, which results in the temporary loss of management control at site, but where functional resources can manage the response. An Emergency Response plan document will be put in place that manages the response in relation to emergencies including environmental emergencies. Emergency contact details are presented in Table 4.

Table 4 – Emergency contact details

TOWN	AMBULANCE	POLICE	FIRE BRIGADE
Windhoek	061 411 600 / Toll Free 924	+264 (61) 1-0111	+264 (61) 21-1111

For large-scale spills and other significant environmental incidents, the fire services should be contacted as required and the office of the Ministry of Environment, Forestry and Tourism (MEFT) informed of the incident (telephone +264 61 284 2111). All correspondence with MEFT should be undertaken by the General Manager.

For the clean-up of smaller spills, the relevant Material Safety Data Sheet (MSDS) should be consulted to determine the appropriate clean-up procedure. Basic spill response training will be provided as part of the site environmental induction, spill response equipment, including relevant MSDS copies, will be provided in areas where potentially environmentally hazardous chemicals may be used.

4.3 COMPLAINTS HANDLING AND RECORDING

Any complaints received verbally by any personnel on the project site shall be recorded by the receiver including:

- The name of the complainant
- The contact details of the complainant
- Date and time of the complaint
- The nature of the complaint

The information shall be given to the project manager who is overall responsible for the management of complaints. The project manager shall do the following:

- Inform the site manager of issues, concerns, or complaints.
- The project manager must maintain a complaint register that required details of the complaint
- The project manager will provide a written response to the complainant of the results of the investigation and action to be taken to rectify or address the matter(s). Where no action is taken, the reasons why are to be recorded in the register

The workforce shall be informed about the complaints register, its location and the person responsible, to refer residents or the general public who wish to lodge a complaint. The complaints register shall be kept for the duration of the Project and will be available for government or public review upon request.

4.4 TRAINING AND AWARENESS

All personnel working on the project shall be competent to perform tasks that have the potential to cause an environmental impact. Competence is defined in terms of appropriate education, training, and experience. Training and toolbox talks will be provided to all employees and contractors.

4.5 SITE INDUCTION

All personnel involved in the Project shall be inducted to the site with a specific environmental awareness training, and health and safety issues. The environmental awareness training shall ensure that personnel are familiar with the principles of this EMP, and the environmental impacts associated with their activities, the procedures in place to control these impacts and the consequences of departure from these procedures. The project manager shall ensure a register of completed training is maintained.

The site induction should include, but is not limited to the following:

- A general site-specific induction that outlines:
  - What is meant by “environment” and the EMP?
  - Why the environment needs to be protected and conserved?
  - How can mining activities impact the environment?
  - What can be done to mitigate against impacts?
- The inductee's role and responsibilities concerning implementing the EMP
- The site’s environmental rules
- Details of how to deal with, and who to contact should any environmental problems occur
- Basic vegetation clearing principals and species identification sheets
- The potential consequences of non-compliance with this EMP and relevant statutory requirements, and
- The role of responsible people for the Project.

5 INCIDENT REPORTING

The proponent must have an accident and incident reporting system that covers all applicable statutory requirements. The section below sets out the minimum requirements for incident reporting and should be used as a basis for incident reporting, in the event that no incident reporting system exists.

5.1 MINOR INCIDENT OR "NEAR MISS"

Any incident or "near miss" involving the Proponent's employees, a nominated representative, any contractor, or its subcontractors or any third party's personnel, property, plant, or equipment, must be

1) Orally reported to the manager or the manager's nominated representative:
    a. immediately and without delay
    b. regardless of whether or not injury to personnel has occurred
    c. or property or equipment has been damaged.
2) Written up and handed to the manager or the manager's nominated representative by the end of the shift. The written report should:
    a. state all known facts and conditions at the time of the incident and
    b. includes a preliminary assessment of the most likely potential consequences of the incident under the current circumstances.

5.2 SERIOUS INCIDENT

For any serious incident involving a fatality, or permanent disability, the incident scene must be left untouched until witnessed by a representative of the police. This requirement does not preclude immediate first aid being administered and the location being made safe.

5.3 INCIDENT REPORT AND CLOSE OUT

The manager must investigate the cause of all work accidents and significant incidents and must provide the results of the investigation and recommendations on how to prevent a recurrence of such incidents. A formal root-cause investigation process should be followed.

6 COMPLIANCE AND ENFORCEMENT

6.1 ENVIRONMENTAL INSPECTIONS AND COMPLIANCE MONITORING

Inspections and audits of the site will be managed and undertaken by the Mining manager to check that the standards and procedures set out in this EMP are being complied with and pollution control measures are in place and working correctly. All equipment will be inspected to ensure they are operating as per specification; no damage has been caused, and no leaks or spills have occurred. Any non-conformance shall be recorded, including the following details: a brief description of non-conformance; the reason for the non-conformance; the responsible party; the result (consequence); and the corrective action is taken and any necessary follow up measures required. The application documentation for renewal of the environmental clearance certificate must include an audit report and copies of the 6 bi-annual reports that were submitted every 6 months for the 3 years that the clearance certificate is valid for.

6.2 HERITAGE PERMIT

As part of the application for an environmental clearance, an application for a permit must first be submitted to the National Heritage Council (NHC). Once issued the permit must be cited and included in the ESIA report and EMP. The contents of the application for the heritage permit can be obtained from the council. The requirements to renew the heritage permit can also be obtained from the council's head offices in Windhoek.

6.3 WATER PERMITS AND LICENCE

The Water Act of (1956) governs the use of water resources in Namibia and is the enforceable piece of legislation for water related matters. The Water Resources Management Act of (2013), passed but pending regulations (not enforced), provides an improved framework for managing water resources based on the principles of integrated water resource management. While not enforced, it is considered best practice to adhere to its stipulations while ensuring compliance with the Water Act of 1956 at the same time.

6.4 WASTEWATER DISCHARGE PERMIT

In the event that the operations produce wastewater, a permit must be obtained from the Department of Water Affairs (DWA). In order to obtain an effluent wastewater permit, the proponent should provide the following information and complete the application form issued by the DWA:

- Specification of the treatment system (type of technology)
- Description of major activities resulting in effluent generation
- List of contaminants (analysis of effluent samples)

- Effluent quality
- Points of discharge
- Show the present average quantities of incoming water, recycled water, final outflow
- Where final effluent will be discharged

6.5 REPORTING

Reports shall be submitted to the Mining Commissioner in terms of the Minerals (Mining and Prospecting) Act, No. 33 of 1992.

Bi-annual environmental reports shall be submitted to the Environmental Commissioner every 6 months of every year. These reports should include records of the monitoring and other deliverables of every aspect or programme described in the EMP.

6.6 NON- COMPLIANCE

Where it has been identified that works are not compliant with this EMP, the project manager shall employ corrective actions so that the works return to being compliant as soon as possible. In instances where the requirements of the EMP are not upheld, a non-conformance and corrective action notice shall be produced. The notice shall be generated during the inspections and the project manager shall be responsible for ensuring a corrective action plan is established and implemented to address the identified shortcomings.

A non-compliance event / situation is considered if, for example:

- There is evidence of a contravention of this EMP and associated indicators or objectives.
- The site manager and or contractor have failed to comply with corrective or other instructions issued by the environmental manager or qualified authority.
- The site manager and or contractor fail to respond to complaints from the public.

Activities shall be stopped in the event of a non-compliance until corrective action(s) has been completed.

6.7 DISCIPLINARY ACTION

This EMP is a legally binding document and non-compliance with it shall result in disciplinary action being taken against the perpetrator/s. Such action may take the form of (but is not limited to):

- Fines / penalties
- Legal action
- Monetary penalties imposed by the proponent on the contractor
- Withdrawal of licence

- Suspension of work

The disciplinary action shall be determined according to the nature and extent of the transgression / non-compliance, and penalties are to be weighed against the severity of the incident.

7 SURFACE AND GROUNDWATER MANAGEMENT PROGRAMME

7.1 INTRODUCTION

Chemical and waste spills must be contained, so as not to contaminate the soil or groundwater. Any contact with groundwater must be treated with exceptional care and reported immediately, so as to minimize the potential for contamination of an aquifer. It is important to limit the potential for wastewater seepage to groundwater.
This surface and groundwater management plan outlines appropriate surface and groundwater water management measures, monitoring programs and reporting procedures to be implemented.

7.2 OBJECTIVES

This surface and groundwater management plan has been prepared to minimise potential impacts on surface and groundwater resulting from the mining activities. It is important to report any contact with or contamination of groundwater to the environmental coordinator or site manager as soon as possible.

7.3 RESPONSIBILITIES

WORKFORCE AND ALL CONTRACTORS
Required to take all reasonable measures to prevent the discharge of sediments and pollutants from the site into surface and groundwater sources. Report any contact with groundwater to the environmental coordinator.

ENVIRONMENTAL COORDINATOR
Will ensure that the objectives listed above are being met and provide performance feedback to the manager.

7.4 SURFACE AND GROUNDWATER MANAGEMENT MEASURES

The surface and groundwater management plan measures are designed to minimise the runoff of sediment-laden or polluted water/effluent into the surrounding environment. Mining activities that could potentially alter natural surface water and groundwater quality include:

- Chemical spills
- Refuelling
- Seepage of wastewater into groundwater
- Dewatering and mining
- Poor resource stewardship practices.

The following requirements are to be met to ensure that groundwater is not contaminated:

- Fuel/oil and chemicals must be safely stored and removed.
- Any contact with surface or groundwater must be treated with exceptional care and reported immediately, so as to minimize the potential for contamination of an aquifer.

Table 5 - water quality mitigation measures

Responsibility	Mining Manager Site Manager Employees
Potential issues or impacts	Groundwater contamination due to incidental hydrocarbon spills Change in the water table Water contamination due to acid mine drainage (AMD)
Protection of groundwater	Where the water table is penetrated by drilling and the water flows out onto the surface, a furrow needs to be dug that diverts the water to vegetation.
	All boreholes should be capped and labelled. In the instances where water is encountered the water should be sampled and tested and the local farm owner be made aware thereof
	Water saving measures should be applicable at all times. No taps or pipes left to run, leaks to be detected immediately. Vehicles only to be washed with buckets, not running water
Sewage and grey water from temporary portable toilets on site	Use of the toilets instead of the veld must be strictly adhered to
	If grey water can be collected from ablution facilities at the campsite it should be recycled and: o Used for dust suppression o Used to water vegetable gardens or to support a small nursery in local communities (as and when agreed upon by such communities) o Used to clean equipment
Lowering of the groundwater levels	1. To maximise the re-use of water during the construction and operational phases in order to minimise the use of clean water no matter the source 2. Extraction volumes of water shall be minimal during mining and where possible, water from existing water sources shall be used 3. Use water effectively and efficiently by following the reduce-recycle-reuse approach 4. Record volumes of abstraction and supply 5. A site wide water balance will be kept and updated on a regular basis
Inefficient use of water resources	1. To ensure compliance with all legal obligations 2. All plant and surface infrastructure (including the TSF and waste rock dumps) to be designed and constructed according to national standards and applicable legislative requirements, to prevent surface water and groundwater contamination 3. Ensure erosion control and prevention measures are in place during construction 4. Ensure any new laydown areas that will be used for construction of the mine

	are located outside of stormwater catchment areas 5. Installation of diversion structures to divert non-contact surface water away and around the mining operations 6. Refuelling shall be undertaken in a designated area 7. All stationary vehicles and machinery must have drip trays to collect leakages of lubricants and oil during any field repairs or emergency maintenance 8. In the event of pollution, polluted soils must be collected and disposed of at an approved site 9. A 'good housekeeping' policy shall be adopted across the mining area
Trenching and blasting could penetrate the groundwater table,	1. Dewatering of the mine may be necessary; if suitable this water can either be used in the processing plant or pumped into drainage lines of the catchment downstream of the infrastructure 2. The impact of mining and any dewatering on the surrounding aquifers will be monitored and reported on. Should there be a reduction of the cone as a direct result of dewatering from the mine then an alternative source of water may need to be identified for the affected users if any.
Any hazardous fluid or lubricating chemicals used could enter the aquifer or surface water environment causing pollution	1. Hazardous waste disposal facilities need to be approved by the MEFT prior to construction and / or meet industry standards to prevent pollution events from occurring 2. Temporary waste disposal facilities will be provided for the collection of waste, which will be removed regularly by a reputable contractor to the permitted waste disposal site 3. Tailings, chemical and hydrocarbon spillages from trucks, conveyors and pipelines will be cleaned up timeously in order to prevent contamination 4. Water in the pollution control dams will be used for road watering for dust suppression, make up water where possible, industrial water or for construction 5. The contractors' laydown areas are to be surfaced and will drain to a sump with silt traps and hydrocarbon collectors 6. All chemicals, bulk fuels, oils and grease and any other hazardous substance, will be stored and handled as per all applicable legislation and national standards 7. Portable chemical toilets will be provided during the construction phase. They will be routinely cleaned, and sewage disposed of at a licenced sewage treatment plant with the safe disposal certificate to be provided 8. A sewage plant may be provided for during the operational phase and the treated water will either need to be contained in pollution control dams and will be recycled or if treated water is of high enough standard, it can be flushed into the catchment's water courses 9. Pollution control dams will be constructed downslope of the mine and plant site to capture all dirty water run-off 10. Silt traps will be constructed upslope of the pollution control dams and return water dam 11. The pollution control facilities (pollution control dams, silt traps and return water dam) will be placed on planned maintenance, routine inspections will be implemented, and they will be de-silted periodically to ensure effective performance

Monitoring requirements	1. Take borehole water level at the start of mining and at the end of mining operations. 2. Keep the records. 3. Monitor the use of water and keep records of daily requirements.

7.5 SURFACE AND GROUNDWATER QUALITY MONITORING

Every effort must be made throughout to preserve the quality of surface water and groundwater sources that the proponent may impact. Containment of waste and chemicals and the correct disposal thereof must be of an acceptable standard. Personnel must report any unusual conditions and intersection with surface and groundwater immediately to the environmental coordinator.

The Department of Water Affairs require quarterly reporting for water quality of water from the sources for which a permit was required, namely, for abstraction permits and discharge permits.

1. Daily and weekly observations for any leakages
2. Maintain a record of all abstracted volumes and report to DWA / MAWLR as per permit conditions
3. Install water flow meters if required
4. Maintain a monthly water balance
5. Submit quarterly water quality tests for water and monitoring boreholes, effluent discharge points and any surface water bodies.
6. Monitor the integrity of the weir / dam wall in accord with the frequency laid down by engineers who designed the structures.

8 WASTE MANAGEMENT PROGRAMME

8.1 INTRODUCTION

The construction and mining activities will generate both solid and liquid waste. The types of waste generated at the facility are classified as mineral and non-mineral waste. All non-mineral waste will eventually be removed from the mine site and will either be disposed of at the Windhoek landfill site (household or garden waste) or the Kupferberg hazardous waste disposal site. Mineral waste from mining operations is either deposited on the WRD or TSF or a combination of both.

8.2 OBJECTIVES

This waste management programme has been prepared to ensure the proper storage, transport, treatment, and disposal of waste and where possible will follow the waste hierarchy, which encourages waste avoidance and waste reduction followed by reuse, recycling, and reclamation, before waste treatment and waste disposal.

8.3 ROLES AND RESPONSIBILITIES

WORKFORCE AND ALL CONTRACTORS

- Required to ensure that all waste generated during mining activities is removed and disposed of accordingly including providing evidence in the form of waste transfer receipts for the waste moved off site.
- Ensure no windblown rubbish pollutes the environment, and
- Remove waste on a regular basis to prevent vermin.

SITE MANAGER AND ENVIRONMENTAL COORDINATOR

- Required to inspect receipts and evidence of correct waste handling.
- Review waste management practices regularly during the construction and mining operations on site.

8.4 SOLID AND LIQUID NON-MINERAL WASTE

The mine site will set up a form of recycling system thus reducing its impacts associated with solid waste generation. Where possible the proponent will implement measures to reduce, reuse and recycle waste generated as part of the operations of the mine. In order to achieve this a temporary waste storage facility will be required.

Waste will be controlled through prevention and mitigation measures as follows:

- Reduce, reuse, and recycle where possible
- Storage of domestic waste on site may result in the attraction of unwanted scavengers and should be disposed of the accredited site as soon as is feasible, and
- Hydrocarbon and chemical contaminated solids have the potential to cause contamination to the soil, groundwater and/or surface water, thus correct storage

and disposal methods are required. Some of these materials can be recycled or used by other facilities.

Table 6 - Waste mitigation measures

Responsibility	Mining Manager Site Manager Employees
Potential issues or impacts	Soil, surface water and ground water contamination due to spillage Land and water pollution. Loss of biodiversity Infectious diseases
Waste Management Plan	The Proponent should compile a Waste Management Plan that should address as a minimum the mitigation measures included below
Hazardous waste	All mining vehicles (4x4 vehicles and trucks) and equipment on site should be provided with a drip tray/oil spill kit: - Drip trays and sealable containers are to be transported with vehicles wherever they go - Drip trays should be cleaned daily, and spillage handled, stored, and disposed of as hazardous waste
	All mining vehicles should be maintained regularly to prevent oil leakages. Maintenance of vehicles is not permitted to occur on site as far as reasonably possible, but if maintenance is to be undertaken on site, measures need to be put in place to avoid hydrocarbon spillages.
	Maintenance and washing of mining vehicles should be conducted at a suitable site/facility which adhere to the following: – The work area/facility should be lined to be impermeable – The work area/facility should have an oil-water separator (oil trap) to collect any run-off from the washing and or maintenance activities, or be equipped with an oil and water separation system
	Spilled oil or fuel should be treated as hazardous waste, disposed of as it occurs in the appropriate hazardous waste containers (sealable drums) on site, and removed off site at the end of each day to the closest recognised, appropriate hazardous waste disposal site in the vicinity or as soon as possible when working in remote areas. All such waste should be provided to specialists in the handing and treatment of such materials
	All hazardous substances (e.g., fuel, grease, oil, drilling fluids etc.) or

	chemicals should be stored in a specific location at the mining campsite on an impermeable surface which is bunded
General waste	The mining site should be kept tidy at all times. All domestic and general waste produced daily should be contained: – No waste may be buried or burned – No waste is to be left uncontained, in suitable containers, over night – Waste containers (bins) should be emptied regularly and removed from site to the nearest official waste disposal site. All recyclable waste needs to be taken to the nearest recycling depot if available – A sufficient number of separate waste containers (bins) for hazardous and domestic/general waste must be provided on site. These should be clearly marked as such – Mining personnel should be sensitised to dispose of waste in a responsible manner and not to litter – No waste may remain on site after the completion of the project
Residual mineral samples	Samples that will not be used for further analysis, or submitted to MME should be taken off site or used (with the required permission from the affected landowner and/or tenant) to repair any possible damaged roads. No samples are to be dumped at site or in the vicinity of the site as to not affect rehabilitation efficiency through physical and chemical pollution of weathering samples.
Littering and environmental contamination from waste	No littering by workers shall be allowed.
	All litter on and around the site must be picked up and placed in the bins provided.
	The site should be kept tidy and free of litter at all times. All domestic and general waste produced on a daily basis should be cleaned and contained daily.
	No solid waste landfill will be established at the site.
	No waste shall be burned or buried anywhere unless permitted to do so.
	Waste shall be collected and shall be removed regularly to avoid bad odours.
	Hazardous and non-hazardous waste shall be stored separately at all times.
Environmental contamination from liquid waste	Hydrocarbon and chemical contaminated solids must be stored correctly and disposed of by registered companies.
	Safe disposal certificates must be kept and provided to the project manager on request.
Sewage and	Portable toilets such as portable camping units, must be provided

grey water from temporary portable toilets on site	during mining: – At all drill sites
	Discharging of the portable units are to be conducted at an existing suitable facility
	The Solid Waste division of the City of Windhoek should be contacted should permission be sought to dump at the municipal landfill site
Monitoring Requirements	1. Monitor whether the provisions set out in this EMP concerning waste management is being applied as per instructions 2. All non-compliances should be recorded and discussed at weekly site meetings and timeous remedial actions taken 3. All guilty parties that are in contravention of the provisions set out for managing waste should be given a penalty and according to the severity of the impact appropriate steps taken

8.5 WASTE DISPOSAL MONITORING

Certificates providing the safe disposal of waste from a permitted hazardous waste disposal site must be provided to the manager upon request.

9 SPILL MANAGEMENT PROGRAMME

9.1 INTRODUCTION

The uncontrolled release of fuels and other chemicals has the potential to result in the contamination of soil, groundwater, and surface water, which may lead to serious environmental harm. On this basis, the storage and use of fuels or other chemicals must be managed to minimise the risk of a release, and measures must be in place to promptly address impacts should a release occur.

9.2 OBJECTIVES

This spill management plan has been prepared to minimise the potential for the uncontrolled release of fuels, oils and other chemicals. Preventative measures to minimise the potential for a spill are listed. Should a spill occur, this plan provides guidance for the proponent on the appropriate spill response measures.

9.3 ROLES AND RESPONSIBILITIES

WORKFORCE AND ALL CONTRACTORS
Required to implement the spill prevention and response measures listed below.
SITE MANAGER/ ENVIRONMENTAL COORDINATOR
Required to ensure that appropriate spill prevention measures (listed below) are implemented and that any spills have been appropriately managed and reported.

9.4 SPILL PREVENTION MEASURES

The following management measures are to be implemented by the proponent:

- Spill kits are to be made available throughout the site. The kits are to include, as a minimum, the following items:
    - Absorbent materials
    - Shovels
    - Heavy-duty plastic bags
    - Protective clothing (e.g., gloves and overalls), and

- Major servicing of equipment shall be undertaken off site or in appropriately equipped workshops
- Provision of adequate and frequent training on spill management, spill response and refuelling must be provided to all onsite staff and contractors
- Fuels, lubricants, and chemicals are to be stored within appropriately sized, impermeable bunds or trays with a capacity not less than 110% of the total volume of products stored

- All fuel and chemical storage and handling equipment (including transfer hoses, etc.) shall be well maintained
- Storage and handling of fuels and chemicals shall be in compliance with relevant legislation and regulations
- No refuelling is to take place within 50 metres of groundwater boreholes, surface water or streams, and
- MSDS are to be kept for each chemical used on site. These must be easily accessible to all personnel.

9.5 SPILL RESPONSE MEASURES

The primary concern, in the event of any spill, is the health and safety of any residents/ employees and contractors in the vicinity. Of secondary, but highly significant, importance, is the protection of water sources and then soil and vegetation.

The following points therefore apply to all areas on the site:

- Assess the situation for potential hazards.
- Do not come into contact with the spilled substance until it has been characterised and necessary personal protective equipment (PPE) is provided.
- Isolate the area as required.
- Notify the site manager or safety, health, and environmental coordinator.

The following measures are to be implemented in response to a spill:

- Spills are to be stopped at source as soon as possible (e.g., close valve or upright drum)
- Spilt material is to be contained to the smallest area possible using a combination of absorbent material, earthen bunds, or other containment methods
- Spilt material is to be recovered as soon as possible using appropriate equipment. In most cases, it will be necessary to excavate the underlying soils until clean soils are encountered
- All contaminated materials recovered subsequent to a spill, including soils, absorbent pads, and sawdust, are to be disposed to appropriately licenced facilities
- The manager or safety, health and environmental coordinator are to be informed as soon as possible in the event of a spill, and
- A written Incident Report must be submitted to the manager.

Table 7 - Spill mitigation measures

Responsibility	– Mining Manager – Site Manager – Employees
Potential issues or impacts	Soil, surface water and ground water contamination due to spillage
Stored Hazardous Chemicals	Hazardous chemicals are to be stored in bunded areas
	Hazardous chemicals (such as fuels) are to be handled over areas provided with impervious surfaces
	Spills of hazardous chemicals are to be contained and cleaned-up to ensure protection of the environment
	All the necessary PPE required for the safe handling and use of petrochemicals and oils shall be provided to, and used or worn by, the onsite staff
Machinery and Equipment Maintenance	Major servicing of equipment shall be undertaken off site or in appropriately equipped workshops
	For small repairs and required maintenance activities all reasonable precautions to avoid oil and fuel spills must be taken (e.g., spill trays, impervious sheets).
	Vehicles and machinery are to be regularly serviced to minimise oil and fuel leaks
	All the necessary PPE required for maintenance activities must be issued to staff whose duty it is to manage and maintain the machinery and equipment.

The table below (Table 8) shows the environmental risks and issues, and mitigation and monitoring measures for the Spill of hazardous substances.

Table 8 - Spill of hazardous substances

Responsibility	- Mining Manager - Site Manager	
Potential issues or impacts	Hydrocarbon and chemical handling and storage can cause spillages that lead to groundwater contamination and soil contamination.	
Management/ Mitigation measures	Safe delivery and handling	1. Training employees and toolbox talks 2. Good housekeeping across the site 3. Fuel and chemicals are handled with care 4. Spill kits to be at designated areas across the site or available for use during refuelling, fuel/chemical delivery, or use. Absorption material should be available and at hand. Where sawdust is used it should be cleaned up

		immediately and not left for long periods as this poses a fire hazard 5. Any major spill is reported once containment has been achieved 6. Plant and equipment to be well maintained and serviced regularly 7. In the field, the use of hydrocarbons under 200 litres can be used for mobile refuelling or servicing
	Storage	1. All tanks to be stored on a non-porous floor and within a bunded area. 2. Bund to be capable of storing at least 110% of the volume of the largest tank 3. All containers to be suitable for use and not damaged 4. Tanks are locked at all time 5. Spill kits available at storage locations and around the site at suitable locations
	Refuelling	1. Drip tray to be used during refuelling of vehicles and on an impermeable flat surface where possible 2. A funnel should be available and used to avoid spillage during decanting
	Rehabilitation	Contaminated soils should be removed and deposited on lined storage areas for rehabilitation purposes. Rehabilitation can take place naturally by adding water, air and fertiliser. The process can be accelerated by using special additives that will breakdown the hydrocarbons. Once rehabilitated the soils can be used for revegetating WRD slopes.
Monitoring requirements	1. Daily observations when fuels/chemicals are delivered and handled 2. Supervision during refueling 3. Weekly observations monitor containment and storage 4. Establish an internal land clearing permit system that restricts advance clearing. 5. Monitor the level of hydrocarbons in contaminated soils after a year of rehabilitation. 6. Monitor each year until the soils are ready for re-use in revegetation projects.	

For large-scale spills and other significant environmental incidents, the fire services should be contacted as required and the office of the Ministry of Environment, Forestry and Tourism (MEFT) informed of the incident (telephone +264 61 284 2111). All correspondence with MEFT should be undertaken by the General manager.

For the clean-up of smaller spills, the relevant material safety data sheet (MSDS) should be consulted to determine the appropriate clean-up procedure. Basic spill response training will be provided as part of the site environmental induction, spill response equipment, including relevant MSDS copies, will be provided in areas where potentially environmentally hazardous chemicals may be used.

9.6 SPILL REPORTING

All major petroleum product spills should be reported to the Ministry of Mines and Energy (MME) on Form PP/11 titled “Reporting of major petroleum product spill”, issued by the ministry.

9.7 REHABILITATION OF CONTAMINATED SOILS

All soils that are contaminated with chemicals and or hydrocarbons should be taken to the rehabilitation area. A procedural manual for rehabilitating contaminated soils on site should be developed.

10 AIR QUALITY MANAGEMENT PROGRAMME

10.1 INTRODUCTION

This air quality management plan describes the strategies and procedures that will be implemented to ensure that the health and amenity of construction workers and nearby sensitive receptors are protected from elevated concentrations of airborne dust and other gaseous emissions (e.g., oxides of nitrogen; nitrogen dioxide, particulate matter; sulphur dioxide and carbon monoxide). Typically, the gases present in a mining environment include carbon monoxide, hydrogen sulphide, sulphur dioxide, methane, nitrogen dioxide and ammonia. In cases where generators and other machinery are used, there will be some release of exhaust fumes that will impact the immediate vicinity but will be of short duration.

10.2 OBJECTIVES

This air quality management plan has been prepared to prevent deterioration of air quality and to minimise the potential for emitted dust and airborne pollutants. Preventative measures are listed below.

10.3 RESPONSIBILITIES

WORKFORCE AND ALL CONTRACTORS
To implement the necessary management practices in order to meet the objectives listed above.
SITE MANAGER/ ENVIRONMENTAL COORDINATOR
To ensure that the objectives listed above are being met and to provide performance feedback to the mining manager.

10.4 AIR QUALITY MANAGEMENT PROCEDURES

Activities that may potentially emit dust and airborne pollutants during the operations include the following:

- Vehicle movements
- Machinery operations

Underground mine activities can contribute to ambient noise and vibration, affecting neighbours.
The proponent will minimise the potential for dust generation and the emission of airborne pollutants by undertaking the following management measures, as required:

- Vehicle movements will be restricted to sealed roads.
- Appropriate speed limits will be set and enforced.
- Ground disturbance will be minimised as far as practical.

- Vehicles and machinery will be maintained so as to limit exhaust fume emissions.

Table 9 - Air quality mitigation measures

Responsibility	- Mining Manager - Site Manager
Potential issues or impacts	Impaired visibility for drivers and employees Respiratory related health issues
Dust and fumes	Appropriately rated and fitted dust masks should be given to personnel working in areas of dust exposure
	Grey water should be used for dust suppression on a constant basis if available and as required
	Maintain speed limits

10.5 AIR QUALITY MONITORING

Visual monitoring of mining activities can ensure the minimum discharge of airborne dust and other emissions according to the air quality management programme.

1. Daily observations
2. Air Quality Monitoring:

A depositional dust fall monitoring network, comprising of eight (8) single dust fall units, should be maintained and the monthly dust fall results used as indicators to tract the effectiveness of the applied mitigation measures. Dustf all collection should follow the ASTM method.

10.6 ODOURS, NOISE AND VIBRATION IMPACTS

The sensitive receptors within proximity to the site might be the surrounding farmers. Activities related to the mining activities have the potential to generate nuisance odours, noise and vibration that can impact the quality of life for neighbouring residents and tourism activities. However, this potential impact is minimal due to the nature of the mining methods employed.
Notwithstanding the above point, the proponent should continue to ensure potential odours, noise and vibration sources are mitigated through measures such as:

- Avoid noise generating activities at night, by ensuring noisy activities are avoided especially at night,
- Ensure appropriate measures are put in place to rectify odours, noise and vibration complaints, should they occur.
- Scheduling of works to avoid disturbance between the hours of 7 pm and 5 am, and

- Procedures for receiving complaints from nearby land users or residents to be in place and mitigation measures to be implemented should construction and mining generate excessive odours, noise, and vibration, which is unexpected.
-

Occupational noise and vibration are managed through the health and safety management plan and therefore not applicable to this EMP.

Table 10 below shows the environmental risks and issues, and mitigation and monitoring measures for noise aspects

Table 10 – Noise aspects

Responsibility	- Mining Manager - Site Manager
Potential issues or impacts	Environmental noise evaluation criteria for residential, educational, and institutional receptors are potentially exceeded at NSR 1 and NSR 4 due to proposed Ongombo Copper Project operations.
Management/ Mitigation measures	Work hours should be restricted to between dawn and dusk where mining involving the use of heavy equipment, power tools, and the movement of heavy vehicles is within 500 m from sensitive receptors. In the event that this is not possible, the affected community need to be consulted well in advance to agree on a mutually acceptable solution
Monitoring requirements	Sources of excessive noise will be investigated, and recommendations made for mitigation.

11 ARCHAEOLOGICAL AND HERITAGE PROGRAMME

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

Scope: The "chance finds" procedure covers the actions to be taken from the discovery of a heritage site or item to its investigation and assessment by a trained archaeologist or other appropriately qualified person.
Compliance: The "chance finds" procedure is intended to ensure compliance with relevant provisions of the National Heritage Act, No. 27 of 2004), especially Section 55 (4): "a person who discovers any archaeological object must as soon as practicable report the discovery to the Council". The procedure of reporting set out below must be observed so that heritage remains reported to the NHC are correctly identified in the field.

Table 11below shows the environmental risks and issues, and mitigation and monitoring measures for Archaeological and heritage aspects.

Table 11 – Archaeological and heritage aspects

Responsibility	- Mining Manager - Site Manager
Potential issues or impacts	Impact on heritage features
Management/ Mitigation measures	Should a heritage site or archaeological site be uncovered or discovered during either mining phases of the project, a "chance find" procedure should be applied in the order they appear below: If operating machinery or equipment, stop work Demarcate the site with danger tape Determine GPS position if possible Report findings to foreman Report findings, site location and actions taken to superintendent Cease any works in immediate vicinity Visit the site and consult with any potentially affected community to determine whether work can proceed without damage to findings Determine and demarcate the exclusion boundary Site location and details to be added to the project's Geographic Information System (GIS) for field confirmation by an archaeologist Inspect site and confirm addition to project GIS Advise the National Heritage Council (NHC) and request written permission to remove findings from work area Recover, package and label findings for transfer to the National Museum
	Should human remains be found, the following actions will be required: Apply the chance find procedure as described above

	Schedule a field inspection with an archaeologist to confirm that remains are human Advise and liaise with the NHC and Police Remains will be recovered and removed to either the National Museum or the National Forensic Laboratory. Contact person at NHC: Rev. Soloman April; Tel: (061) 244 375/ 385/594
SPECIFIC MITIGATION DETAILS	
Archaeology	Obtain inputs from an archaeologist to identify potential archaeological sites in the area and to determine further mitigation where necessary
Monitoring requirements	1. Check that the archaeologist has given a written statement about the location of the known archaeological sites in the area vs the location of the drilling area. 2. Make sure no archaeological site is disturbed whilst excavation and recovery take place 3. Make sure everything of importance, as identified by an appropriate specialist, is removed from site and declared safe by an archaeologist before mining can continue on the site

11.1 RESPONSIBILITY

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

11.2 PROCEDURE

Action by person identifying archaeological or heritage material
a) If operating machinery or equipment stop work
b) Identify the site with flag tape
c) Determine GPS position if possible
d) Report findings to foreman

Action by foreman
a) Report findings, site location and actions taken to superintendent
b) Cease any works in immediate vicinity

Action by superintendent
a) Visit site and determine whether work can proceed without damage to findings
b) Determine and mark exclusion boundary
c) Site location and details to be added to project GIS for field confirmation by archaeologist

Action by archaeologist
a) Inspect site and confirm addition to project GIS
b) Advise NHC and request written permission to remove findings from work area

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

In the event of discovering human remains
a) Actions as above
b) Field inspection by archaeologist to confirm that remains are human
c) Advise and liaise with NHC and Police
d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.

12 IMPLEMENTATION OF THE EMP

This environmental management plan:

A. Has been prepared according to a contract with the Proponent

B. Has been prepared based on information provided to ECC up to November 2022

C. Is for the sole use of the proponent, for the sole purpose of an EMP

D. Must not be used (1) by any person other than the proponent or (2) for a purpose other than an EMP

E. Must not be copied without the prior written permission of ECC.