UIS TIN MINING COMPANY

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REPORT:

UIS TIN MINE UPDATED OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN

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ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AMD	Acid mine drainage
CPF	Central processing facility
CWC	Clean water channel
DMS	Dense Media Separation
DWA	Department of Water Affairs
ECC	Environmental Compliance Consultancy
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMS	Environmental Management System
EPL	Exploration Prospecting Licence
ESIA	Environmental Social Impact Assessment
GHG	Greenhouse gas
GIS	Geographical Information System
MAWLR	Ministry of Agriculture, Water and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
ML	Mining Licence
MSDS	Material Safety Data Sheet
NHC	National Heritage Council
ESMP	Environmental and Social Management Plan
POI	Point of interest
PV	Photovoltaic
SLM	Sound level meter
ToR	Terms of reference
TPH	Tonnes per hour
TSF	Tailings Storage Facility
UTMC	Uis Tin Mining Company
WRD	Waste Rock Dump

1 INTRODUCTION

Environmental Compliance Consultancy (ECC) has been retained by Uis Tin Mining Company (Pty) Ltd (hereinafter referred to as the Proponent or UTMC) a Namibian company and subsidiary of Andrada Mining Limited. ECC conducted the environmental and social impact assessment (ESIA) for the proposed Stage 2 expansion of the pilot tin processing plant and the addition of a bulk sample, sorting, and testing facility on Mining Licence 134 (ML134), located near Uis in the Erongo Region, Namibia.

Tin was discovered at Uis by the German Colonial Gesellschaft in 1911. Mining commenced in 1923 under the name of Namib Tin Mines Ltd. After a few changes in ownership Imcor Tin (Pty) Ltd bought Uis in 1958. Imcor steadily enlarged the capacity of the mine and also started to develop the town of Uis, providing infrastructure and service facilities as well as housing for employees. In 1980 capacity was again enlarged to become the largest hard-rock tin mine in the world. Operations ceased as a result of depressed tin prices in 1990.

UTMCs commitment to ensure suitable and responsible mining practices are in place, which is demonstrated through a corporate commitment to ensure the protection of the environment and communities in which they operate. UTMC has a duty to ensure that all regulatory and company standards with regards to the environment are met and complied with. In addition, UMTC is responsible for the protection of the environment that may be impacted as a result of site operations and activities.

1.1 ANDRADA MINING LIMITED

Uis Tin Mine Company is a subsidiary of Andrada Mining with a portfolio of assets in Namibia. The company was established in 2017 and listed on the Alternative Investment Market (AIM) in November 2017, to acquire the tin assets of Bushveld Minerals Limited, an AIM quoted Natural Resource Company.

Andrada is listed on AIM, of the London Stock Exchange (LSE), and the Namibian Stock Exchange. Andrada has a vision to create a portfolio of world class, conflict-free, technology metals. The company's top assets are the tin, tantalum and lithium rich resources in the Uis area.

Andrada's management includes an experienced board of directors and a management team with a current two-fold strategy – to fast track the Uis brownfield tin mine in Namibia for commercial production and consolidation of other quality African tin assets. Andrada strives to capitalise on the solid supply or demand fundamentals of tin by developing a critical mass of tin resource inventory, achieving production in the near term and further scaling production by consolidating tin assets in Africa.

1.2 Uis Tin Mine

Uis is a small town in the Erongo Region, Namibia approximately 330 km from Windhoek. The town can be accessed via the C36 from Omaruru or from the cost via Henties Bay. The mine site consists of three separate mining licences namely; ML129, ML133, ML134, each of which has been historically exploited for tin on varying scales as shown in Figure 1. Currently all construction activities are carried out on ML 134. The total size of ML 134 is approximately 197 km^2 and the mining footprint is 8 km^2, which is <2% of the licence area. Limited activities are currently taking place on ML 133 and ML 129 however there are plans for near future development.

Uis has a JORC compliant resource of 81 million tonnes at 0.15% tin (Sn), 0.73% lithium (Li2O) and 82 ppm tantalum (Ta)., Additionally, Andrada has a JORC compliant resource over the other Uis pegmatites totalling 53 million tonnes with an average grade of 0.13% Tin. The company has also recently announced a new lithium resource in the project area.

Uis Tin Mine is situated on a topographical belt associated with the escarpment, between the Namib Desert and the Central Plateau of Namibia. Climatic conditions are associated with a transition between the semi-arid (east) and the arid (west) parts of Namibia.

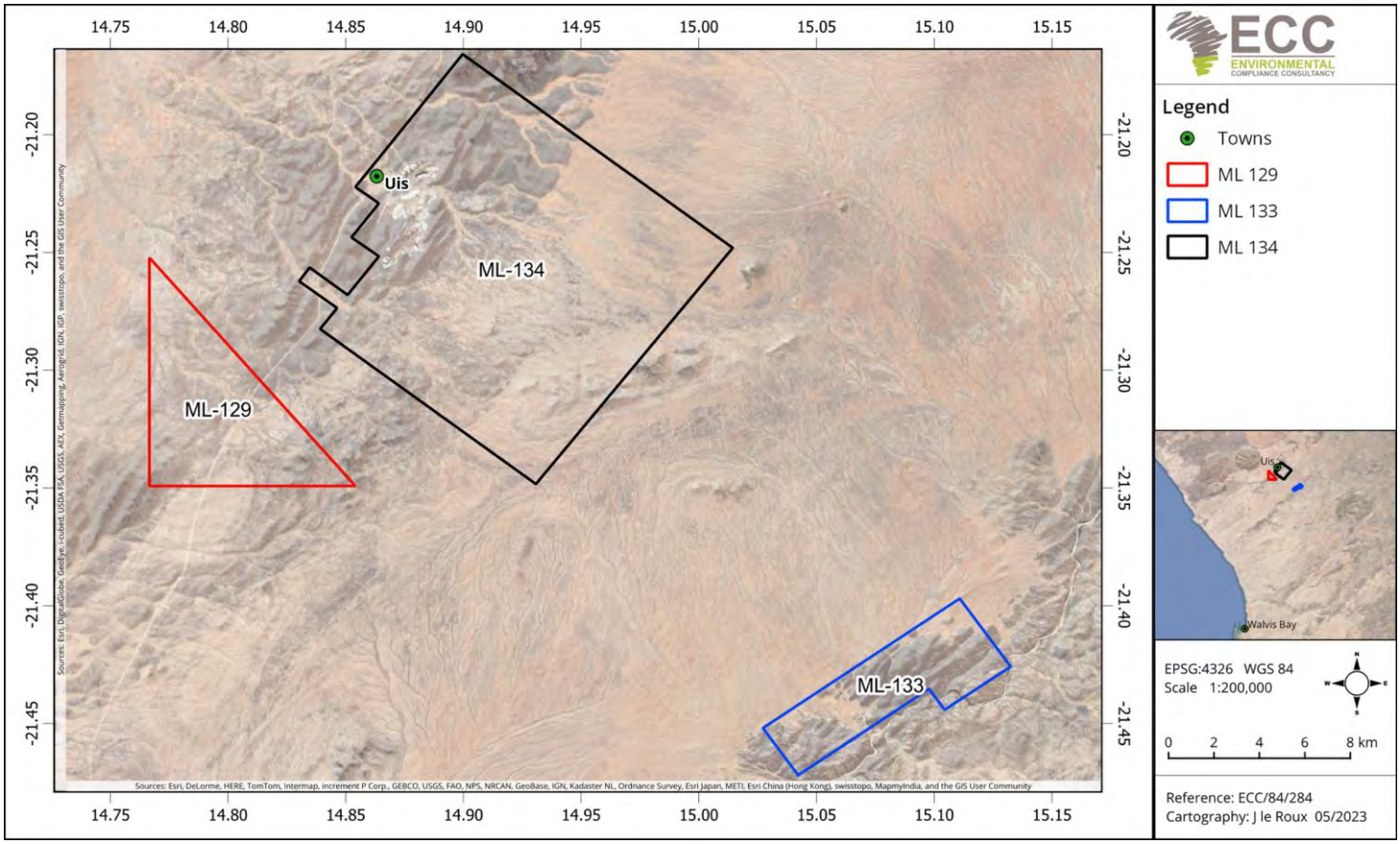

Figure 1 - UTMCs mining licence areas

The tin at the Uis Tin Project is hosted in a large pegmatite deposit. The deposit will be utilised in two phases, namely Phase 1 and Phase 2. Phase 1 of the project involves using a pilot plant, and a 1:1.5 stripping ratio is expected during this phase with an estimated production of approximately

65t of concentrate per month. The project will then advance into Phase 2, consisting of a full-scale processing plant, during which time a stripping ratio of approximately 1:1.5/2 is anticipated, yielding approximately 460 tonnes per month of tin concentrate . The operation is designed to produce 95 640 tonnes of mineral using a Dense Media Separation (DMS) plant. Existing waste dumps will be used to dispose of waste produced from mining. Three waste dumps have been identified for use during Phase 1 and therefore no additional waste dumps will be created during Phase 1 mining. The tailings (blended coarse and fine plant discard) produced will be co-disposed with waste rock onto the waste dumps and a filter press system will be used for recycling approximately 85% of water. The latter is a critical component of the design consideration for the project plant.

1.3 CHANGES TRIGGERING THE AMENDMENT

Since 2019, Andrada has been in the process of restarting and enhancing production at the Uis Tin Project. The site is located in the historical mining town of Uis in the Erongo Region, Namibia as shown in Figure 2. The tin is hosted in pegmatite deposits, the primary minerals is cassiterite and secondly tantalum. The Proponent proposes several mechanical and process flow upgrades to components of the current pilot plant's processing and supporting infrastructure (i.e., upgrades to the Dense Medium Separation (DMS) 1 cyclone feed, inlet pressure system rates and constant moisture control within feed material, etc.). This upgrade is expected to increase the production rate from the current 80 tons per hour (TPH) in Stage 1 to 120 (TPH) in Stage 2. The Mine also intends to build a bulk sample processing facility adjacent to the existing processing plant. The purpose of the bulk sample processing facility is to undertake metallurgical test work on the material from the existing mine pits, as well as from external areas where exploration work is being undertaken to assess the process required to extract minerals from the ore(s).

The Proponent intends to implement the proposed upgrades, as well as on-site supporting infrastructure, to be able to sustain and support the planned expansion project. The additional changes and upgrades include the following which are all addressed and managed under domain 4 processing plant:

The additional changes associated with this amendment and project change include:

- Upgrades to the existing sewage effluent water collection and treatment system
- Building a clean stormwater channel (CWC) and berm around the plant for water re-use in the processing circuit
- An upgrade of the existing settling and evaporation ponds
- Increased water supply (from 75 000 to 150 000 cubic meters per year), now part of the amended abstraction permit.
- Bulk sample processing facility
- New, but limited in spatial extent, haul and access roads will be constructed to access the bulk sampling, sorting, and testing facility.

These upgrades are designed to consistently achieve a targeted tin recovery of 64% and they form an integral part of the 20-year life of mine (LOM).

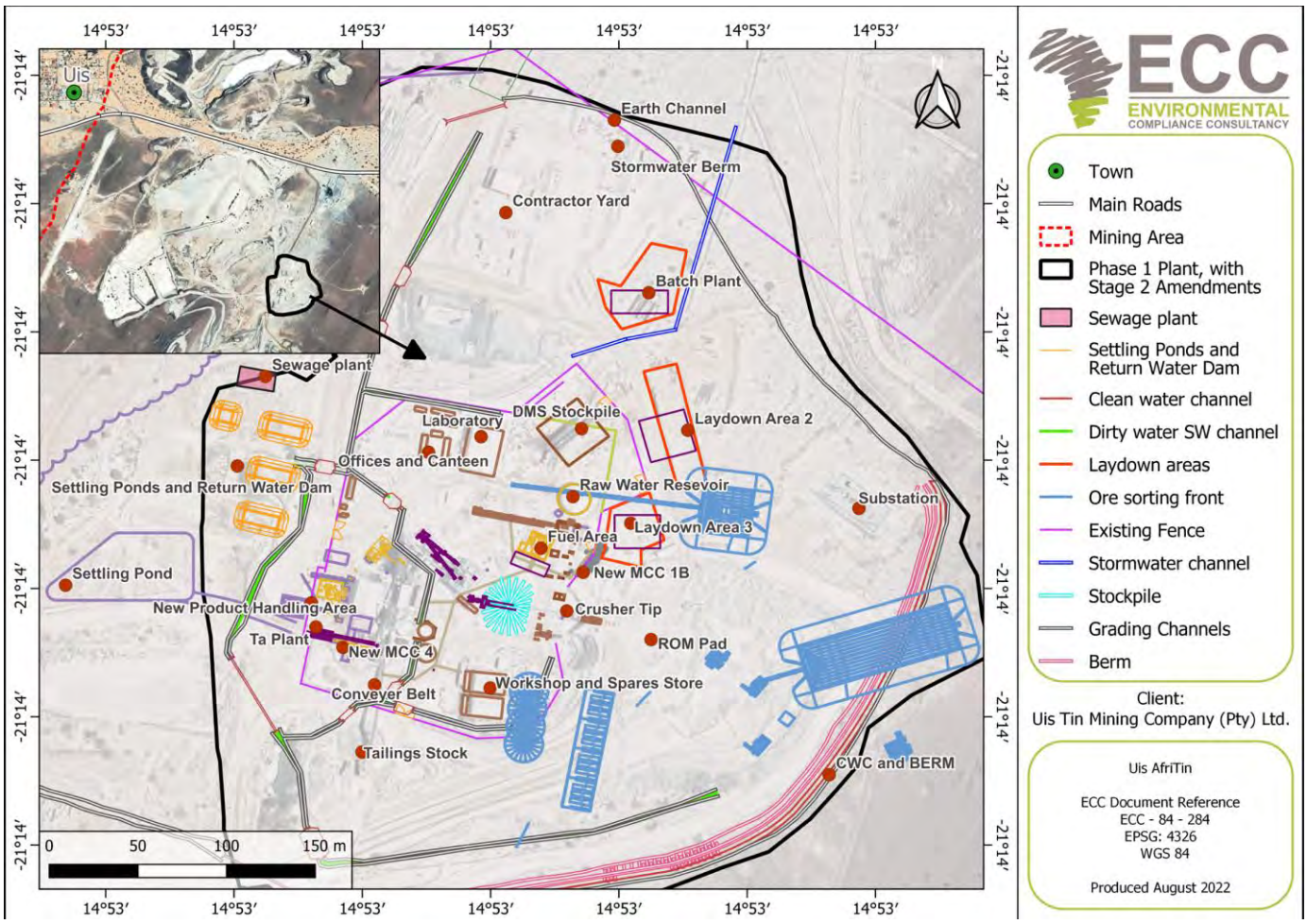

Figure 2: Location of the proposed expansion elements of the pilot tin processing plant on ML134

1.4 Purpose of the OEMP

This amended operational environmental management plan (OEMP) is a site-specific plan developed to ensure that appropriate environmental management practices are followed during the construction, reopening and operational phase of a project. This OEMP has been prepared to address environmental risks associated with the operations at the Uis Tin Mine.

The OEMP is a 'live' document, which shall be reviewed annually and periodically updated to reflect material changes to the operations and to allow continual improvement for environment and community management on the Uis Tin Mine site.

This OEMP has been approved by the site's Mine Manager and therefore it can be implemented across all activities at the Uis site. ECC has compiled this operational environmental management plan (OEMP) in terms of the Environmental Management Act (EMA), No.7 of 2007 and its regulations of 2012.

The purpose of this amended OEMP is to support the full environmental and social impact assessment (ESIA) report for the expansion and changes of the Uis operation. The OEMP has been

updated since the submission of the final scoping report, to incorporate information from additional specialist studies that form part of the ESIA report.

1.5 ENVIRONMENTAL REGULATORY REQUIREMENTS

The Uis Tin Mine and associated activities trigger a number of listed activities as set out in the Environmental Management Act, 2007 (Act No. 7 of 2007) and its gazetted Environmental Impact Assessment Regulations (No. 30 of 2011).

The site has an approved environmental clearance certificate to undertake these listed activities in accordance with the Act. As per the Act and its Regulations, this certificate is required to be renewed every three years. This OEMP supports compliance with the Uis Tin Mine site's environmental clearance certificate and shall be submitted to the Department of Environmental Affairs, in the Ministry of Environment, Forestry and Tourism for endorsement.

1.6 LEGAL COMPLIANCE

The Uis Tin Mine management team holds a copy of the environmental clearance certificate and is responsible for ensuring clearance certificates to be in place prior to works associated with listed activities, and ensures they are current, up to date and renewed on the basis required by the Act.

UTMC holds their responsibilities in line with the legal framework and provides a statement of commitment to comply with the provisions of the regulatory arrangements set out in the OEMP. Figure 3 sets out a declaration of commitment.

ANDRADA MINING LIMITED – UIS TIN MINE

DECLARATION OF COMMITMENT

On behalf of the Uis Tin Mine, I hereby declare my unwavering commitment to ensure that appropriate and leading environmental management practices are followed at the Uis Tin Mine site.

Furthermore, I will ensure that the relevant management plans, procedures, and internal policies for the site are established. I hereby offer this commitment on behalf of the Uis Tin Mine team to ensure the protection of the environment and community in which they operate.

Yours Sincerely,

Mr Efraim Tourob

Mine Manager – Uis Tin Mine

Figure 3 - Declaration of commitment

1.7 SCOPE OF THIS OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN

This OEMP has been developed by adopting a collaborative and integrated approach to environmental management. It is based on the findings from the ESIA conducted for the proposed changes to the project site.

Obligations and commitments made in the superseded plan have been incorporated into this OEMP; where commitments are no longer applicable, or are redundant, they have been removed. The site's environmental and social impact assessment (ESIA) report as well as the experience and knowledge of the authors have been used to compile this OEMP. This OEMP aims to avoid repeating information, procedures or guidance that are available in other site and company reports, and has been written in line with the Namibian Government guidance document titled "Draft Procedures and Guidelines for Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP), 2008".

This OEMP has been prepared to reflect the entire mine's life cycle. The mine is currently in the operational phase and intends to move into advanced operations in 2023 and beyond. The OEMP will be used to tie into the decommissioning and closure plan framework as well. The geographical scope of this OEMP includes all operations and activities within the boundary of Mining Licence 134, 133 and 129 and includes monitoring requirements for the mining licence areas. These activities are categorised work areas, termed "domains", which are separated by operational activities, with the long-term view of integrating the OEMP into the decommissioning and closure plan for Uis Tin Mine. Standard operating procedures (SOPs) feed into this OEMP, allowing a holistic environmental management approach to be adopted across the site. Health and safety management measures are not included in this OEMP.

1.8 ENVIRONMENTAL CONSULTANT

Environmental Compliance Consultancy (ECC), a Namibian consultancy registration number Pty Ltd 2022/0593, has prepared this OEMP on behalf Uis Tin Mine. ECC operates exclusively in the environmental, social, health and safety fields for clients across Southern Africa, in the public and private sector. ECC is independent to the proponent and has no vested or financial interested in the proposed project.

ECC has over 25 years combined construction and operational experience in the fields of mining and metals, nuclear and renewable energy plants. Through this experience ECC has been involved with developing and implementing several operational environmental management plans for projects of various scales and hazard risks; including but not limited to gold, copper, nickel and vermiculite mining operations in Australia, nuclear power plants in the United Kingdom, renewable energy plants in South Africa and Namibia.

ECCs team focuses on ensuring environmental management is practical, implementable and useable on the ground to ensure the impacts are minimised to the environment and community in

which the site operates. This is reinforced with specific environmental monitoring objectives and the OEMP has been verified and approved by the ECC team.

1.9 STRUCTURE OF THIS OEMP

As this is an operational environmental management plan it is assumed that the reader is familiar with the site. If the reader requires further details on the site and its operations, the environmental and social impact assessment report for Uis Tin Mine should be referred to (ECC, 2023).

The layout of this OEMP has been set up to provide site-specific and relevant information in the main sections of the report and provides supporting or supplementary information in the appendices, thereby providing the end user with an operational document for ease of use.

The targeted users of this OEMP are heads of the departments (HODs), the site environmental team and the authorities or stakeholders with a vested interest in how the Uis Tin Mine manages its environment and social responsibilities. The OEMP structure is summarised in Table 1.

Table 1 – Report structure

Chapter	What this chapter addresses
Chapter 1	Broad overview of the site and the purpose of the OEMP
Chapter 2	Sets out the company integrated management system and how this OEMP is managed and enforced
Chapter 3	Sets out the OEMP and the various domains and domain schedules
Chapter 4	Sets out the site's environmental schedules and provides a customised OEMP for each domain (work area), setting out the responsibilities; the activities in the work area and potential impacts; operational management measures; environmental pollution control measures; monitoring requirements; and reporting expectations.

Appendices to support the OEMP and the implementation thereof are as follows:

- Appendix A – Environmental monitoring programme and trigger values
- Appendix B – Domain sign off and certification
- Appendix C – Grievance submission form
- Appendix D – Domain checklists
- Appendix E – Weed and seed clearance certificate
- Appendix F – Environmental improvement plan
- Appendix G – Land clearing permit
- Appendix H – Standard operating procedure –water quality monitoring
- Appendix I – Standard operating procedure – air quality monitoring
- Appendix J – Standard operating procedure – ambient noise monitoring

- Appendix K – Supporting documents

1.10 Assumptions, Limitations and Uncertainties

During the development of this OEMP, assumptions have been made based on the scope and scale of the project and limitations and uncertainties have been identified. The assumptions, limitations and uncertainties are as follows:

- The old tailings storage facility (TSF) is not considered within the operational control of the site, furthermore the mining strategy has mitigated the need for the construction of a TSF or use of the existing TSF and therefore has not been included in this OEMP.
- The site does not have a bio-remediation facility currently, however due to the nature of the operations a bio-remediation facility will be required and therefore has been included within this OEMP, and
- This OEMP 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 OEMP 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 OEMP has been based on the project description as provided in the ESIA report. Where the design or construction methods are different, this OEMP may require updating and potential further assessment may be undertaken.

2 OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN

This OEMP provides measures, guidelines and procedures for managing and mitigating potential environmental issues during the operations of the site. It also indicates monitoring and reporting guidelines and sets responsibilities for those carrying out management and mitigation measures. One of the aims of this OEMP is to act as an umbrella document that drives a holistic iterative approach to environmental management across the Uis Tin Mine site.
The incorporation of the company's integrated management system into this OEMP ensures that silo working across domains is avoided, and a holistic environmental management approach is implemented across the site.

2.1 ORGANISATIONAL STRUCTURE, ROLES AND RESPONSIBILITIES

The site's environmental commitments are managed at various levels across the organization and is supported by an on-site appointed HSEC manager. The site appointed HSEC Manager reports to the site General Manager and Mine Manager, and is responsible for the management and strategic direction, and advisory services on all environmental related matters to support Uis Tin Mine operations. The site has been divided into various domains, for which mitigations and environmental management measures are set out. Each domain is supervised by a domain manager.

2.2 REVIEW OF THIS PLAN

This OEMP shall be reviewed and updated as required and shall be submitted to the MEFT every third year to accompany the application for the renewal of the environmental clearance certificate (in line with current legal requirements) or submitted to MEFT for endorsement as required.

2.3 COMPLIANCE, INSPECTIONS AND ENFORCEMENT

The environmental risks and impacts associated with the operations and activities of the Uis Tine Mine are detailed in each environmental schedule, along with specific mitigation and operational management arrangements.

A copy of this OEMP will be available to all personnel and hard copies shall be available across site. All personnel shall comply with this OEMP through their daily roles and any activities undertaken.

The appointed environmental control officer (ECO) shall undertake regular inspections; the type and frequency will be determined based on the level of risk associated with the activities and operations performed in each domain. For the higher risk areas, inspections shall be no less than weekly, and supervisors shall inspect their area of responsibility no less than monthly. The purpose of these inspections is to ensure this OEMP is being complied with.

Work areas and work tasks shall be inspected by the domain manager, which will be an experienced and qualified person. Conditions, controls and practices in and around the work area shall be inspected and inspections shall be both visual examinations and discussions with personnel.

Specialised inspection programs shall be implemented to ensure that equipment and processes with a high risk of causing harm are inspected routinely or (where applicable) to meet either internal and/or statutory requirements. The inspection schedules for each domain shall be maintained and a record of each inspection shall be produced by the appointed ECO. Any corrective or preventative actions shall be communicated to the environmental team as soon as the inspection is complete.

2.4 Non-Compliance

The proponent and all companies and businesses operating on the project site shall ensure that this OEMP is fully complied with by contractors and personnel. All non-compliance events shall be reported via the incident reporting system and the standard reporting process that includes ensuring preventative action, reporting and where required taking disciplinary action.
Non-compliance events can be considered as:

- Evidence of contravention of this OEMP and associated indicators
- Failure of personnel to comply with corrective action or other instructions instructed by the operational manager, and
- Failure to address and respond to community complaints.

3 DOMAINS AND ENVIRONMENTAL SCHEDULES

Uis Tin Mine operates in distinct operating zones/work areas that are defined as domains. Through defining these domains, clear operating areas are established. Each domain has a concise environmental management plan, known as a domain schedule.

Within each domain, a domain manager is assigned and is responsible and accountable for the management of the environment within the domain and who shall ensure that the domain schedule is reviewed to ensure no additional environmental risks or impacts are occurring.

The appointed ECO shall ensure that all measures are implemented to mitigate and manage environmental risks; e.g. ensuring pollution control measures, and that monitoring and reporting associated with the domain are in place. The domains for the Uis Tin Mine site have been set out in Table 2.

Table 2 – Uis Tin Mine domain schedule of areas within the operational control of UTMC and addressed within the scope of this OEMP

Description		Includes	Domain manager
Domain 1	Linear Infrastructure	Access roads and tracks Powerlines Water abstraction boreholes, pipelines, and management thereof	Technical Services Manager
Domain 2	Open pit and mining area	Open pits Mining offices and change house	Technical Services Manager
Domain 3	Co-disposal and waste rock dumps (WRD)	Hauling and dumping of mineral waste rock/material from the open pit Hauling and co-disposal of blended tailings/plant discard with waste rock Landform sloping and design Bulldozing and levelling of waste rock	Technical Services Manager
Domain 4	Processing plant	ROM Crushing circuit Processing plant and associated infrastructure Bulk sample processing facility Clean water channel, stormwater management system Sewerage, settling and water return ponds Processing plant workshop	Processing Manager supported by the Engineering Manager
Domain 5	Workshops	Heavy and light vehicle workshops Contractors workshops Wash bay Excavator pad Tyre workshop	Technical Services Manager Supported by Engineering Manager

Description		Includes	Domain manager
		All mobile maintenance activities for infield emergency repairs, maintenance or servicing of equipment	
Domain 6	Fuel Depot	62,000 lt of diesel fuel Fuelling bay	Supply Chain Officer and General Manager
Domain 7	Salvage yard and non-mineralised waste facility	Salvage yard	Engineering Manager
Domain 8	Old Contractors camp/s	Camp site	Technical Services Manager
Potential future domain	Bioremediation facility	Bioremediation facility for the onsite treatment and rehabilitation of hydrocarbon contaminated soils	Technical Services Manager supported by the General Manager

3.1 AREAS OUTSIDE ANDRADAS OPERATIONAL CONTROL

Due to the site's long and extensive mining history, Andrada has strategically identified areas within (depicted in green in Figure 4) and outside (depicted in red in Figure 4) of their operational control. This approach has been adopted to limit the impact of the current mining activities. Areas outside of Andradas control are therefore not addressed in this OEMP and are listed below:

- Existing waste rock dumps;
- Existing TSF;
- 'White' tailings stockpiles; and
- All non operational areas located within the ML for example the town of Uis and its related infrastructure.

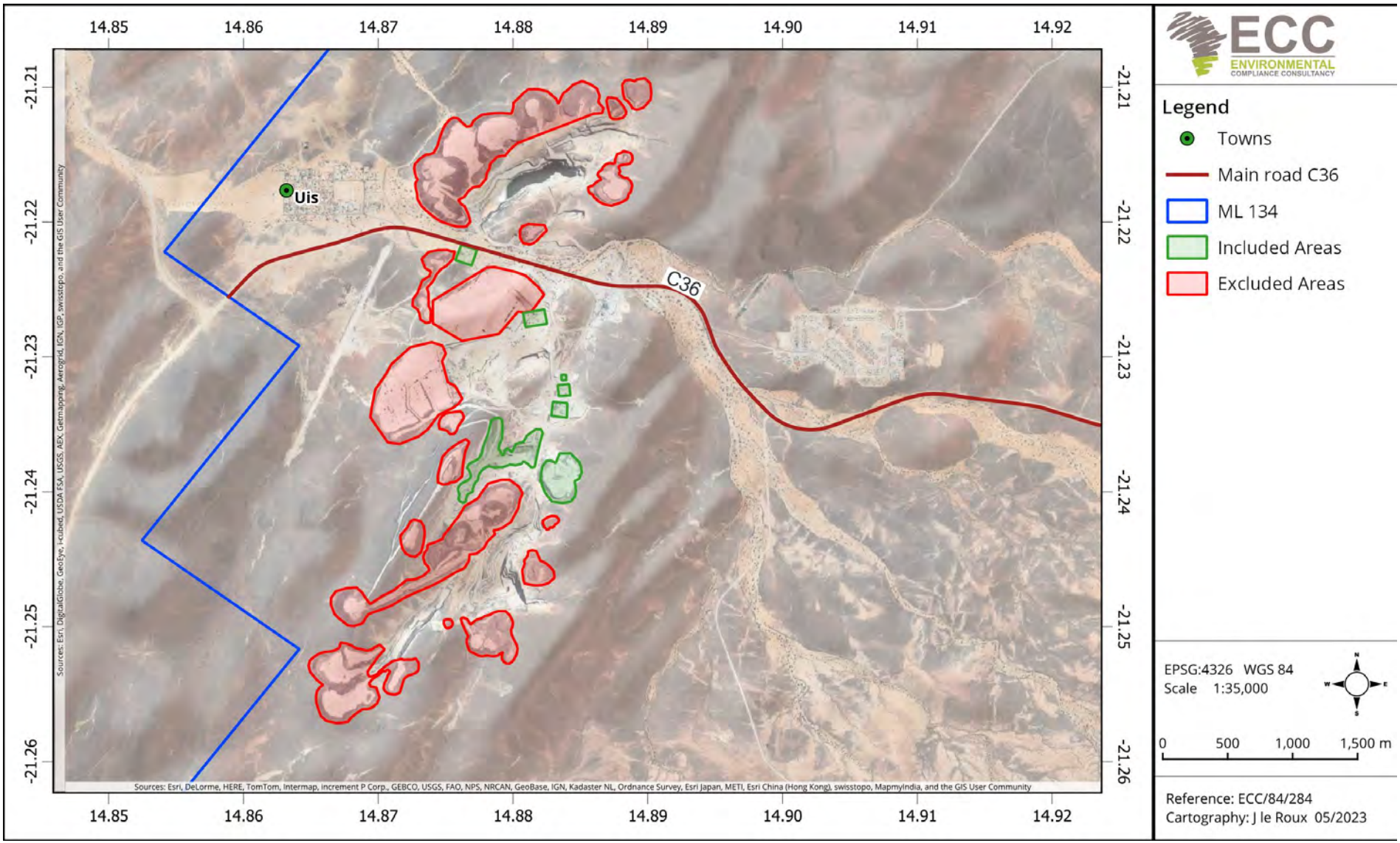

Figure 4 – Areas within and excluded of UTMCs operational control

3.2 Environmental Monitoring

3.3 Surface water quality monitoring

Surface water has been regularly monitored at the northern pit (K5), the southern pit, Ralph's Pond, the Bleed water pond and the V1/V2 pit. The northern pit and the southern pit are historic mining pit voids that have accumulated water over time. The V1/V2 pit is also monitored when surface water is present.

The water from the northern pit is now used for operational purposes and when the site was not in operation it was used for an aquaculture fish farm project. Ralf's ponds waters are a mixture of the "grey water" emanating from the onsite sewage system and the processing plant.

The objective of monitoring surface water is to establish the surface water quality within the operational area of the mine and to continue to build the operational dataset to compare against the baseline water quality data. This information is then used to draw a conclusion on the impacts of mining activities on water quality.

Surface water monitoring is also required at the toe of the waste rock dumps after heavy rains as stated in Domain 4. It is recommended that sampling or water quality monitoring points are placed at suitable locations for recycled process water.

Additional surface water monitoring sites may be added to this programme as the site develops and evolves, and as the need arises.

3.4 Groundwater level and quality monitoring

Groundwater levels are measured monthly to assess the water level of the aquifers and the possible impact of abstraction on the water systems. Monitoring is required to understand the quality of groundwater prior to, and during mining operations in order to determine the impacts on groundwater from mining operations. A number of monitoring locations have been established for the site based on previous studies on the groundwater quality in Uis, this data serves as baseline ground water quality data for the operation. Monitoring of groundwater in proximity to the waste rock dumps is required. The locations of the monitoring boreholes is presented in Figure 5.

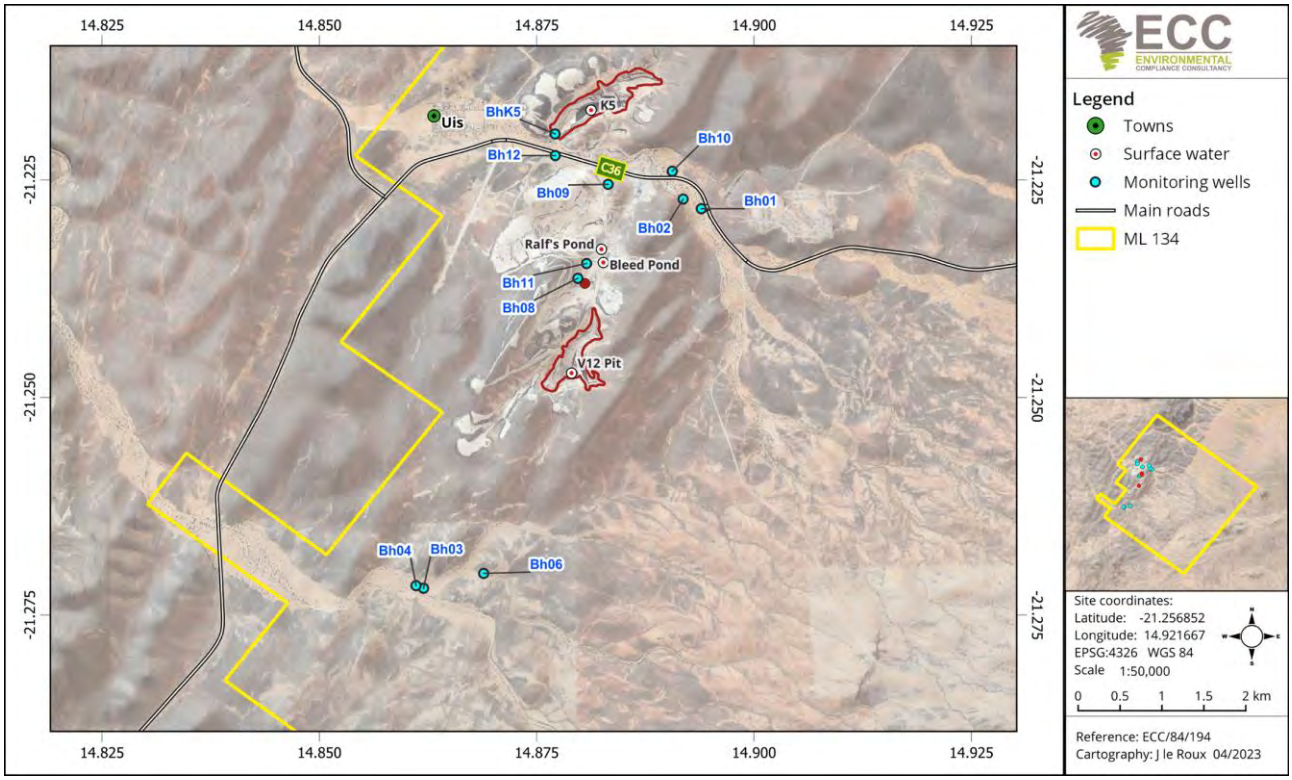

Figure 5 – Ground and surface water quality monitoring locations

3.5 AIR QUALITY MONITORING

Air quality monitoring locations were established prior to the onset of mining operations as shown in Figure 6. These sites are updated as required as the mine moves into the advanced operational phase. A dustfall monitoring network is set up by following the American Society for Testing and Materials Standard (ASTM D1739-98) method for collection and analysis of dustfall at each of the illustrated sites. Passive sampling will include collecting SO2, NO3, and dust fall samples. Monitoring during the operational phase will focus on Total Suspended Particulates (TSP), PM10 and PM2.5 and Sulphur dioxide (SO2) as shown in the monitoring plan (Appendix A).

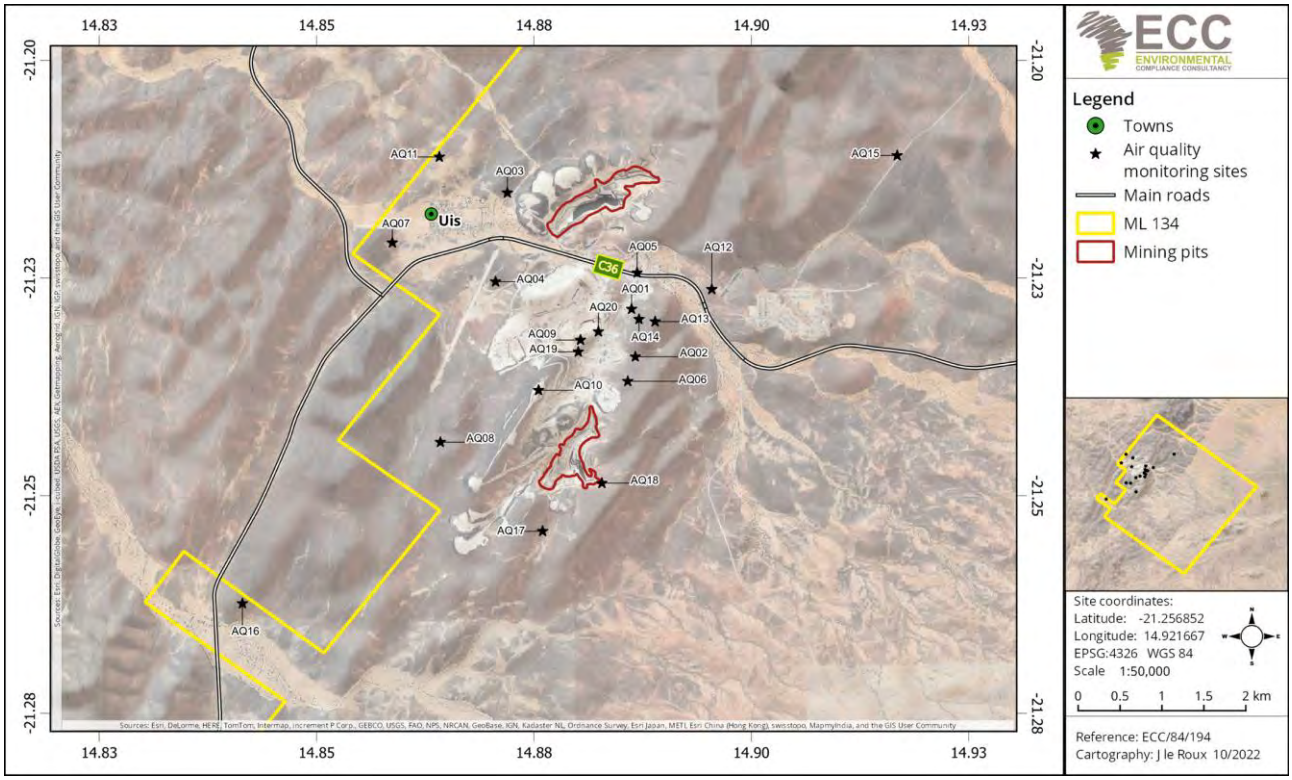

Figure 6: Air quality monitoring locations

3.6 NOISE MONITORING

Ambient noise levels have been monitored in locations in close proximity of nearby sensitive receptors to determine the noise levels in the area prior to the onset of mining operations. The locations of the noise monitoring stations are shown in Figure 7. The nearby sensitive receptors have been identified as the village council building, the Namclay brick factory and the houses situated in close proximity to the Namclay brick factory, although all residents of Uis can be regarded as potential receptors. Monitoring is undertaken on an annual basis or as required.

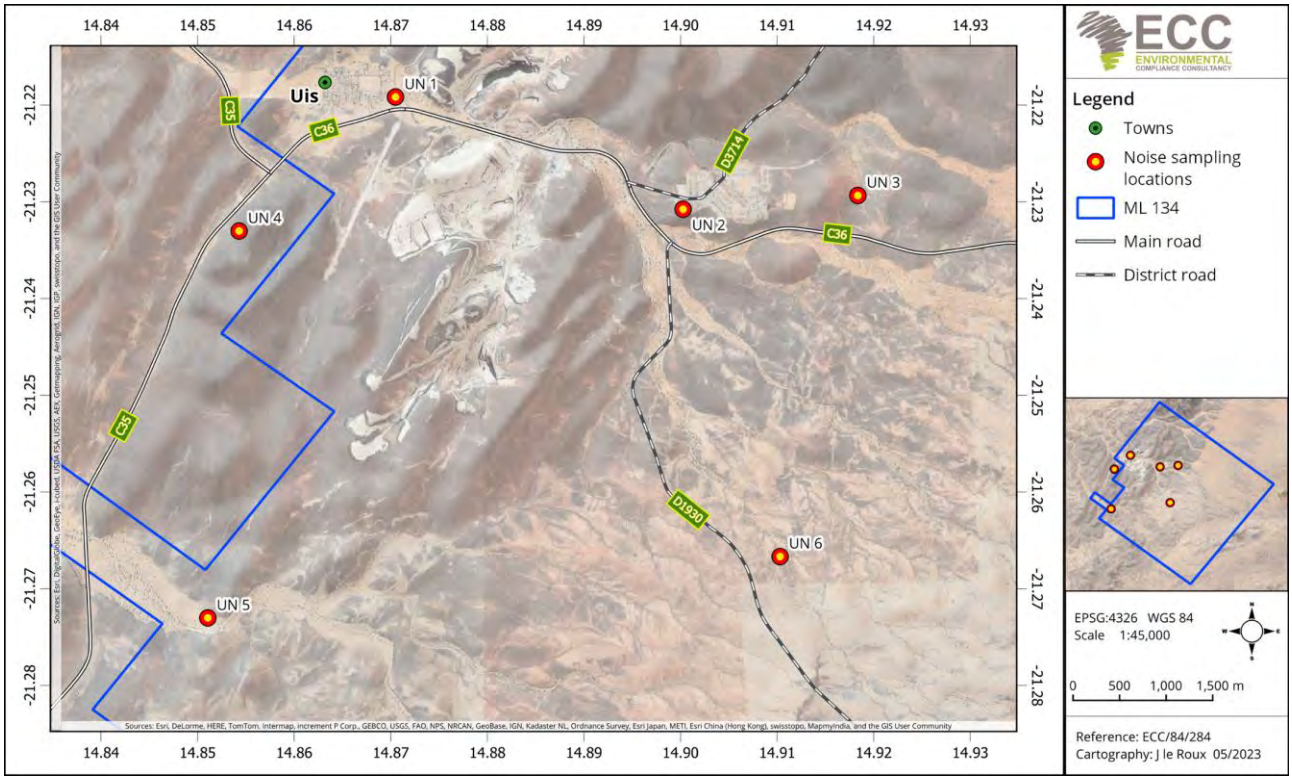

Figure 7: Noise monitoring locations

3.7 CONTINUAL IMPROVEMENT

The appointed ECO of the Uis Tin Mine is responsible for reviewing and updating this OEMP. Obsolete documents are to be promptly removed from circulation and relevant personnel made aware, thereby preventing unintended use.

As part of this review process, the monthly reports from each domain will be reviewed, identifying any trends or significant areas of concern, as well as measures implemented to manage/resolve the environment or social issues. Compliance and legislative changes shall be reviewed, and lessons learnt shall be captured. This OEMP shall be amended as required, and follow up training, awareness or updates shall be provided in the domain(s) and across the site.

This OEMP shall be circulated to all domain responsible positions and stakeholders as required. It will be made available to all those inducted on site and presented in the environmental awareness training and site induction.

Ongoing hazard identification through the review of this OEMP and supporting management plans and SOPs shall ensure environmental impacts are avoided or minimised as low as reasonably practicable.

4 OVERARCHING ENVIRONMENTAL MANAGEMENT PRINCIPLES

4.1 INTRODUCTION

This section sets out the overarching environmental principles that are applicable across all domains and environmental schedules on the Uis Tin Mine site. Environmental schedules set out the site-specific environmental management requirements for the Uis Tin Mine. The environmental schedules have been separated per domain and includes potential issues or impacts that the specific work area may create. It provides the management measures or mitigation measures in place to manage the impacts, it sets the targets and objectives for the domain, outlines the monitoring and reporting requirements and provides clear roles and responsibilities for those managing the domains.

In accordance with best practice the following information is provided in each domain schedule: roles and activities in the domain, environmental risks; objectives for managing the impacts; environmental objectives and targets; management measures; environmental protection equipment; monitoring requirements; and reporting requirements.

4.2 BEST PRACTICE MANAGEMENT MEASURES

The overarching general best practice management measures that shall be complied with across site are listed in Table 3. The domain manager for each domain is responsible for complying with the measures set out in Table 3 where applicable.

Table 3 – Best practice environmental management

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 – Good housekeeping (no littering and adequate waste bins) – Ensure lights are downward facing to reduce light pollution at night
Solid waste management	– Good housekeeping (no littering and adequate waste bins) – Designated waste collection areas around site and one central disposal location – Bins labelled and colour coded – Waste to be separated and kept clean and tidy – Waste bins emptied on regular basis
Ground contamination	– Refuelling shall be undertaken in designated areas with spill kits available

ENVIRONMENTAL ASPECT	BEST PRACTICE REQUIREMENT
	– Hydrocarbon spills to be promptly cleaned and disposed of correctly – Chemical management enforced on site – Good housekeeping
Soil management	– Topsoil is to be recovered in all cases of land clearing – Topsoil to be stockpiled upstream of potential contamination areas
Storage of fuels, oils, chemicals and other hazardous liquids	– Storage tanks shall be suitable and labelled for the liquid being stored – Storage tanks to be stored in an appropriate areas with adequate ventilation and not to be stored with any flammable materials – Bunds to be at least 110% of the container – Daily inspections of tanks
Energy efficiency	– Plant and equipment to be maintained and serviced regularly – Turn off plant and equipment when not in use – Lights in and around the plant to be turned off during daylight hours
Air quality and dust suppression	– Maintenance of internal roads, including dust suppression – Turn off plant and equipment when not in use – Plant and equipment to be maintained and serviced regularly
Landscape and biodiversity	– Control the spread of weeds through weed and seed inspections prior to equipment being used on site. – Relocation of any protected plant species that need to be removed for land clearing purposes. – Ensure lights are downward facing to reduce light pollution at night
Noise and vibration	– Work hours should be restricted to between dusk and dawn where mining involving the use of heavy equipment, power tools, and the movement of heavy vehicles is within 500 m of sensitive receptors.
Water	– Water use hierarchy – use recycled water as far as possible in the plant – Minimise water discharge from the process into the environment – Responsible water use in the work place (e.g. no hosepipes left running); and – Identify and fix all water leaks timeously. – Track water consumption/use from all areas through installed flowmeters with the aim of a closed circuit.

4.3 Environmental Monitoring

Monitoring also supports environmental management on site to evaluate how effective the environmental management has been, over an extended period of time. A consolidated environmental monitoring schedule is provided in Appendix A. Standard operating procedures

(SOPs) were developed to provide further detail of the monitoring programme and specific requirements (Appendix D and Appendix H - J).

The appointed ECO is responsible for the site approved environmental monitoring programme implementation across the site. The monitoring programme comprises of:

- Air monitoring (using samplers at locations within the site boundary and nearest to sensitive receptors),
- Noise and vibration monitoring;
- Water monitoring (e.g., surface water, groundwater levels and quality, and discharge water);
- Biodiversity monitoring (e.g., fauna, vegetation);
- Meteorological monitoring (e.g., rainfall and evaporation); and
- Carbon footprint monitoring (as required).

The domain schedules state the specific monitoring requirements and SOPs. The appointed ECO is tasked with conducting the monitoring within each domain with the support of the domain manager and in line with the monitoring plan as discussed above. The domain manager must ensure the following:
Monitoring is conducted,
The area is safe to allow monitoring personnel access,
Access to the area is granted upon request, and
Reviews the monitoring information related to their domain.

4.4 ENVIRONMENTAL OBJECTIVES AND TARGETS

Environmental objectives and targets have been developed so that activities on the site can minimise potential impacts on the environment, as far as reasonably practicable. These objectives align to environmental and biodiversity performance standards and are applicable to all domains on site. They also form a foundation in developing specific objectives to each domain.

- Zero pollution incidents,
- Sustainable resource use,
- Application of the waste management hierarchy,
- Sustainable use of water,
- Responsible disposal of waste,
- Minimise aerial discharges and dusts being generated,
- Minimise noise and vibration levels, and
- Biodiversity protection and enhancement.

Procedures for monitoring site activities against these environmental objectives are detailed in supporting management plans under this OEMP.

4.5 DOCUMENT CONTROL AND RECORDS MANAGEMENT

Document control and records management sets out requirements to ensure that necessary documentation, records, data and information exist to support the functionality and effectiveness of the Uis Tin Mine.

4.6 NON-ROUTINE OPERATIONS

For all new and non-routine activities that occur on site a specific risk assessment will be conducted. Risk assessments must capture environmental and social risks and must be reported in the monthly report to the appointed ECO, who will then ensure that the relevant documents are updated to reflect the new activity.

4.7 ACCIDENTS AND EMERGENCIES

All incidents, near misses, complaints or concerns from members of the local community or other stakeholders shall be reported in a timely and factual manner; accurately classified; effectively investigated; corrected and prevented from reoccurring through implementation of additional or more effective controls. All incidents are reported on site in accordance with site incident reporting procedures.

An emergency is any abnormal event, which demands immediate attention, usually by adopting a team approach to line management within the affected part of the site or operation. It is any unplanned event, which results in the temporary loss of management control at site, but where functional resources can manage the response. The sites emergency response plan document manages the response in relation to emergencies including environmental emergencies. Emergency response and management falls outside the scope of this OEMP and therefore is not further discussed within the OEMP. Emergency contact details are provided in Table 4.

Table 4 – Emergency contact details

Town	Ambulance	Police	Fire brigade	Onsite Emergency Contact
Uis	+264 (64) 57 0037/ Toll Free 924	+264 (64) 1-0111	+264 (64) 57-0028	+264 814 335 109

For large-scale spills (>200 lts) 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 (and regularly tested) 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.

The appointed ECO will be the primary contact person in the event of an environmental emergency.

The appointed ECO has the authority and independence to request reasonable steps to be taken to avoid or to minimise unintended or adverse environmental impacts. If preventative steps appear to be ineffective the officer can cease immediately the process, should an adverse environmental impact be anticipated.

4.8 CHANGE MANAGEMENT

Any changes on site, such as mining and management of waste rock or mineral processing methods and tailings management, are subject to the change management process. The change management process ensures that identified modifications or newly introduced equipment, systems, processes, etc. are effectively assessed to determine their associated hazards and level of risk to employees and the environment. The extent of the assessment shall be appropriate to the nature of the change and level of potential risk.

Recommendations or improvements for the site as identified in the environmental improvements plan (Appendix F), shall be reviewed and may be subject to the change management process. This OEMP shall be revised annually taking into consideration changes and associated risk and impacts.

DOMAIN 1 – LINEAR INFRASTRUCTURE

This domain includes tasks for miscellaneous surface infrastructure and activities, which are mapped below Figure 8 and set out in Table 5

- Access roads or tracks;
- Water abstraction boreholes and pipelines; and
- Powerlines.

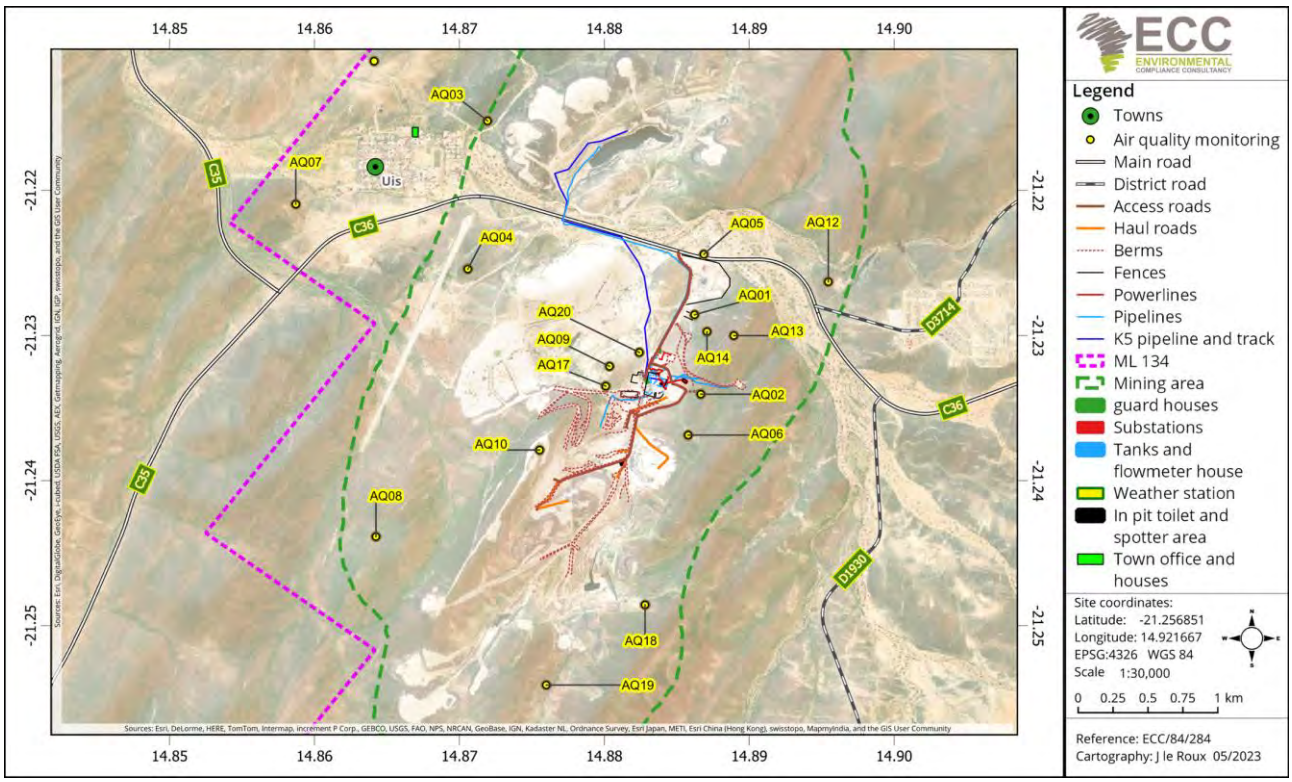

Figure 8: Domain 1 – Linear infrastructure with monitoring locations

Table 5 – Domain 1: Linear infrastructure domain schedule

Domain 1 - Linear Infrastructure			
Environmental risk of domain	**Consequence**	**Likelihood**	**Risk**
	Insignificant 1	Likely 4	Moderate 4
Domain manager	Technical Services Manager		
Statutory requirements	**Permit / Permit name**	**Environmental permit conditions**	
	Accessory works permit. Water abstraction permit - Water abstraction permit for mining purposes should be obtained from Ministry of Agriculture Water and Forestry (if required)	Permit renewal every 5 years or when significant changes occur. Ensure the water abstraction volume is not exceeded.	
Potential issues or impacts	**Water** – Water leaks from unchecked pipelines, leaking valves and flowmeters – Groundwater contamination from hydrocarbon spills and leaks from hydraulic pipe bursts etc. **Air quality** – Dust generated from open roads **Noise** – Noise and nuisance factor to neighbouring communities from roads – Impacts of noise on employees **Biodiversity** – Death of birds from power line collisions – Wildlife injury from users of roads – Vegetation damage from road users not using demarcated roads **Social** – Potential traffic issues during the construction and operational phases – Water ponding creating mosquito breeding areas in dis-used borrow pits – Nuisance dust or noise impacting neighbours – Poor visual amenity for the site from dis-used borrow pits		
Targets	– Zero community complaints relating to dust or noise – Dis-used roads and tracks are rehabilitated within 6 months of being deemed uneconomical or viable for future use – Water loss prevented as much as possible		

<table>
<tr><th colspan="6">Domain 1 - Linear Infrastructure</th></tr>
<tr><td>Operational management measures</td><td colspan="5">To minimise the effects the above-mentioned impacts may have on the environment and community, the domain manager will ensure the following measures are implemented:
– Maintain pipelines to ensure no water is lost through pipeline breaks and failures
– Ensure a leak detection system is in place on the water abstraction pipeline
– Ensure all flowmeters are operational through a daily/weekly check and if not operational abstraction is stopped until the flowmeter is replaced.
– Contractor management will be in place to ensure heavy delivery vehicles are kept in good mechanical condition to minimise noise associated with their operation and to prevent hydrocarbon spills.
– Open roads within the ML are managed using suitable dust suppression measures to prevent visible dust leaving the site.
– Speed limited are enforced on site to reduce dust and prevent collisions
– Existing tracks should always be used to prevent biodiversity loss
– Where death of birds due to power line collisions is reported suitable preventative measures such as bird deterrents will be placed on overhead lines by suitably qualified high voltage electrician.
– Minimising individual vehicle engine, transmission, and body noise/vibration by implementing a preventative maintenance program.
– Provide large visible road signage indicating the presence of heavy vehicle traffic at least 500 m before, on either side of the mine site access road.
– The needs of pedestrians should be taken into consideration in the planning and design of the access to the proposed site, as well as the design of the road infrastructure.
– Install streetlighting at the C36 turnoff to the mine entrance as a safety measure, and
– Install speed reduction signage (80km/hr) at least a kilometre away from the C36 turnoff to the mine entrance on either side of the turnoff.</td></tr>
<tr><td rowspan="2">Environmental pollution control measures (PCM)</td><td colspan="2">PCM risk score</td><td colspan="2">Function and performance</td><td>Maintenance frequency</td></tr>
<tr><td colspan="2">Water truck
Low 3</td><td colspan="2">Used on a daily basis during the dry season to wet ground to reduce dust</td><td>Monthly maintenance as per planned maintenance schedule</td></tr>
<tr><td rowspan="3">Environmental monitoring</td><td colspan="5">Environmental Monitoring</td></tr>
<tr><td>Site code</td><td>Name</td><td>Monitoring purpose</td><td>Frequency</td><td>Threshold</td></tr>
<tr><td>Air quality - Depositional dust monitoring</td><td>As shown in the domain map</td><td>Monitoring dust impacts on sensitive receptors</td><td>Monthly</td><td>600 mg/m^2/day</td></tr>
</table>

Domain 1 - Linear Infrastructure					
	Abstraction volumes - Flowmeter readings	Site flow meters on abstraction points	Required to report the monthly abstraction volumes to DWA.	Monthly	As per permit conditions.
	Groundwater levels	As shown in the domain map	Required to monitoring aquifer groundwater levels	Monthly	NA
	Groundwater quality	As shown in the domain map	To monitor the change and trends in groundwater quality for the site	Quarterly	As per permit conditions
Environmental reporting	Domain manager to report to appointed ECO (monthly) – Any flowmeter leaks or breakages on a weekly basis. Appointed ECO to report to domain manager (monthly) – Complaints from neighbours to be directed to community relations manager in accordance with the grievance procedure. – Any complaints made from neighbours regrading noise from operations will be reported in the monthly report. The reports are to include a description of actions taken and response times. – Any biodiversity loss including bird collisions with powerlines and wildlife death.				
Environmental Inspection	**Daily**	**Weekly**	**Monthly**	**Other**	
	NA	NA	NA	NA	
Supporting Documents	Environmental monitoring plan Appendix A Domain sign off Appendix B				

DOMAIN 2 – OPEN PIT AND MINING AREAS

The mining methods utilised will consist of conventional drilling and blasting with the initial mining area focusing on exposed ore zones located within the old/existing mining footprint as well as new pegmatite outcrops. Two pits have been identified on ML 134, where mining activities are planned; namely the V1 and V2 pits as shown in Figure 9 and set out in Table 6.

This domain schedule includes all infrastructure and activities within the operational control of the domain outlined and mapped below:

- Open pits, and
- Mine offices and change house.

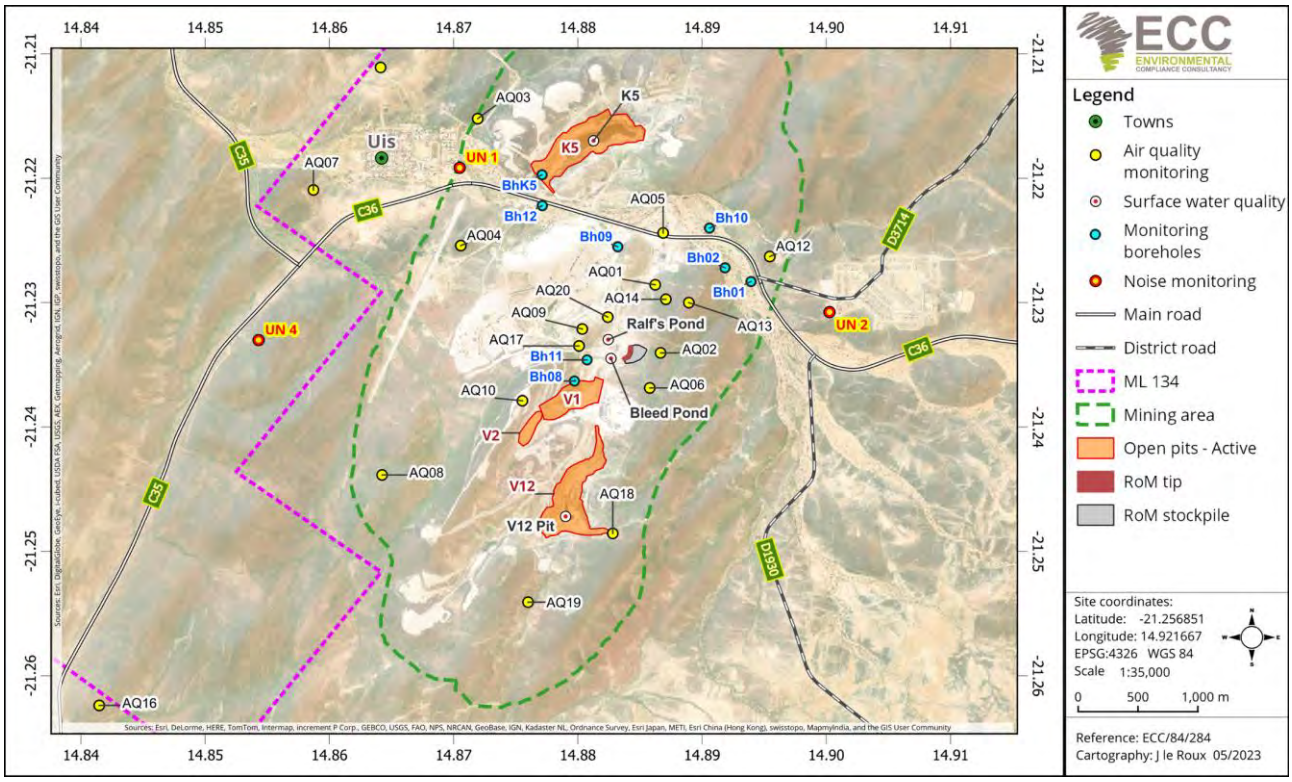

Figure 9: Domain 2 – Open pits and mining areas with monitoring locations

Table 6 – Domain 2: Open pit and mining areas domain schedule

Domain 2 - Open pit and mining areas			
Environmental risk of domain	**Consequence**	**Likelihood**	**Risk**
	Moderate 3	Likely 4	High 12
Domain manager	Technical Services Manager		
Statutory requirements	**Permit / Permit name**	**Environmental permit conditions**	
	A. Environmental Clearance Certificate (ECC)	A. Compliance to this OEMP	
	B. ML 134, ML 133, ML 129 Mining Licences	B. A mine closure plan will be in place and the mining operation will work towards concurrent mine closure through progressive rehabilitation. Integrate progressive rehab into the operational mining plan	
	C. Water abstraction permit - Water abstraction permit for mining purposes should be obtained from Ministry of Agriculture Water and Forestry (if required)	C. Ensure the water abstraction volume is not exceeded	
	D. Accessory works permit	D. Renewed every 5 years or when material change occurs.	
Potential issues or impacts	**Water** – Increase levels of nutrients and potential contamination of groundwater from excessive explosive use due to incorrect charging – Potential hydrocarbon contamination of groundwater from heavy equipment failures or spills, or incorrect servicing procedures – Decreased groundwater level around the site that impact from mine dewatering boreholes that may affect the groundwater levels in neighbouring boreholes – Impacts to the catchment area due to stormwater diversions incorrectly installed or water diverted away from the catchment – Contamination of an aquifer by the rebounding water table of potentially polluted water in the open pit workings after closure. – Potential for inrush into the open pit mine workings during development and operations – Over-abstraction for mining and processing activities **Air quality** – Dust generated from blasting activities		

Domain 2 - Open pit and mining areas	
	– Dust generated from drilling, hauling, loading and tipping of material **Biodiversity** – Excessive land clearing outside of approved areas – Fish farming can potentially be negatively affected by blasting and vibrations – Death and injury to wildlife from heavy equipment using haul roads or falling into pit – Disturbance and stress to wildlife from blasting vibration and noise **Social** – Noise to neighbours from mining activities including blasting and vibrations – Nuisance dust to neighbours from mining activities – Selective mining and poor resource stewardship – Potential structural damage to Borehole 8 and power line/pylon structures within the pit area due to ground vibrations from the minimum (69kg) explosive charges used – Potential structural damage to Borehole 8 and 11 and power line/pylon structures within the pit area due to ground vibrations from the maximum (207 kg)
Targets	– Zero complaints from neighbours relating to mining activities including blasting, dust or noise – Maintain abstraction of water at a rate as stipulated in abstraction permit – Ensure that production is not affected from accumulation of water in the open pits through the use of ad hoc dewatering of rain water – Technical Services Manager to report to the mining department in advance of potentially acid forming (PAF) mining so material can be handled correctly.
Operational management measures	To minimise the effects the above-mentioned impacts may have on the environment and community, the domain manager will ensure the following measures are implemented: – Ensure correct charging and use of explosive at all times in accordance site procedures – Ensure equipment is made available for servicing to prevent equipment-associated impacts (spills, noise etc.) – Ensure mining area complies with the mining plan and does not exceed the permitted area (i.e. prevent excessive clearing) – Ensure the roads are wet to prevent dust – Ensure existing roads and tracks are used as far as reasonably practical, and

Domain 2 - Open pit and mining areas	
	– Ensure the most effective and efficient blast pattern and explosive are used to limit the noise and vibration impacts to neighbours and wildlife. – Bulk fuel facilities to be kept adjacent to the mine site at a location with sealed surfaces and a spill collection sump; and – Refuelling of drills and equipment working at the pit wall faces will be done in a controlled manner following standard open pit refuelling procedures. – Fuel bowsers are to have drip trays for each refuelling event. – Ensure known structures, and water bearing features are mapped and surveyed and are incorporated into the mine plans and programmes; – 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. – The mine design may allow for the groundwater level to be intersected. The mine will act as a sink of potentially contaminated water from various sources, including the rebounding water table in the open pit workings; – Consider using the water for irrigation after closure (investigate viability) – 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 and site water management plans; – Ensure all water bearing features are mapped and included in survey plans; – Ensure emergency response procedures are in place in the event of an inrush; and – Ensure adequate pumping capacity with backup pumps as critical spares are kept on site. – Do blast design that considers the actual blasting, and the ground vibration levels to be adhered too. – Only apply electronic initiation systems to facilitate single hole firing. – Do design for smaller diameter blast holes that will use fewer explosives per blast hole. – Relocate the POI / acquire the POI of concern – mined owned. – Blast designs should always minimise air emissions and noise, and control fly rock and vibration. – Blasthole liners and emulsion explosives should be used in wet holes. – Blast areas should be restricted to authorised personnel only.

Domain 2 - Open pit and mining areas					
	– Remain within specified occupational health and safety noise limits. – Do design for smaller diameter blast holes that will use fewer explosives per blast hole.				
Environmental pollution control measures (PCM)	**PCM risk score**	**Function and performance**		**Maintenance frequency**	
	Water cart **Moderate 8**	Used on a daily basis to wet roads and stockpiles to reduce dust		Monthly maintenance as per planned maintenance schedule	
Environmental Monitoring	**Site Code**	**Name**	**Monitoring purpose**	**Frequency**	**Threshold**
	Noise – Ambient Noise	As shown on domain map	Noise impacts on receptors	Annual	45 dB daytime 35 dB night time
	Air quality - Depositional dust monitoring	As shown in the domain map	Monitoring dust impacts on sensitive receptors	Monthly	600 mg/m^2/day
	Groundwater levels	As shown in the domain map	Required to monitoring aquifer groundwater levels	Monthly	NA
	Groundwater quality	As shown in the domain map	To monitor the change and trends in groundwater quality for the site	Quarterly	As per permit conditions
	Vibration monitoring	As require	To measure impact of mine blasting on community	Annually	NA
Environmental reporting	**Domain manager to report to appointed ECO (monthly)** – Volume of waste removed to waste rock dump – Volume of ore mined **Appointed ECO to report to domain manager (monthly)** – Appointed ECO to report to the domain manager water quality results and levels monthly. – Appointed ECO to interpret results and signatures relevant to the open pit i.e. nutrients, sulphides, hydrocarbons etc.) and report these to the domain manager against trigger values. – Report air quality results to the domain manager, and				

Domain 2 - Open pit and mining areas				
	– Volume of water abstracted from boreholes (flow meter readings)			
Environmental inspection/s	**Daily**	**Weekly**	**Monthly**	**Other**
	NA	Domain manager to complete	To be inspected by domain manager and appointed ECO	Annual compliance audit
Supporting documents	– Domain sign off Appendix B			

DOMAIN 3 – CO-DISPOSAL FACILITY AND WASTE ROCK DUMPS

The schedule includes all infrastructure and activities within the operational control of the domain outlined and mapped below:

- Hauling and dumping of mineral waste rock/material from the open pit;
- Co-disposal facility;
- Landform sloping and design; and
- Bulldozing and levelling of waste rock.

The existing waste rock dump will be used during mining operations as shown in Figure 10 and set out in Table 7. Mineral waste from the open pit mine is placed on the waste rock dump at a suitable angle which allows for future rehabilitation.

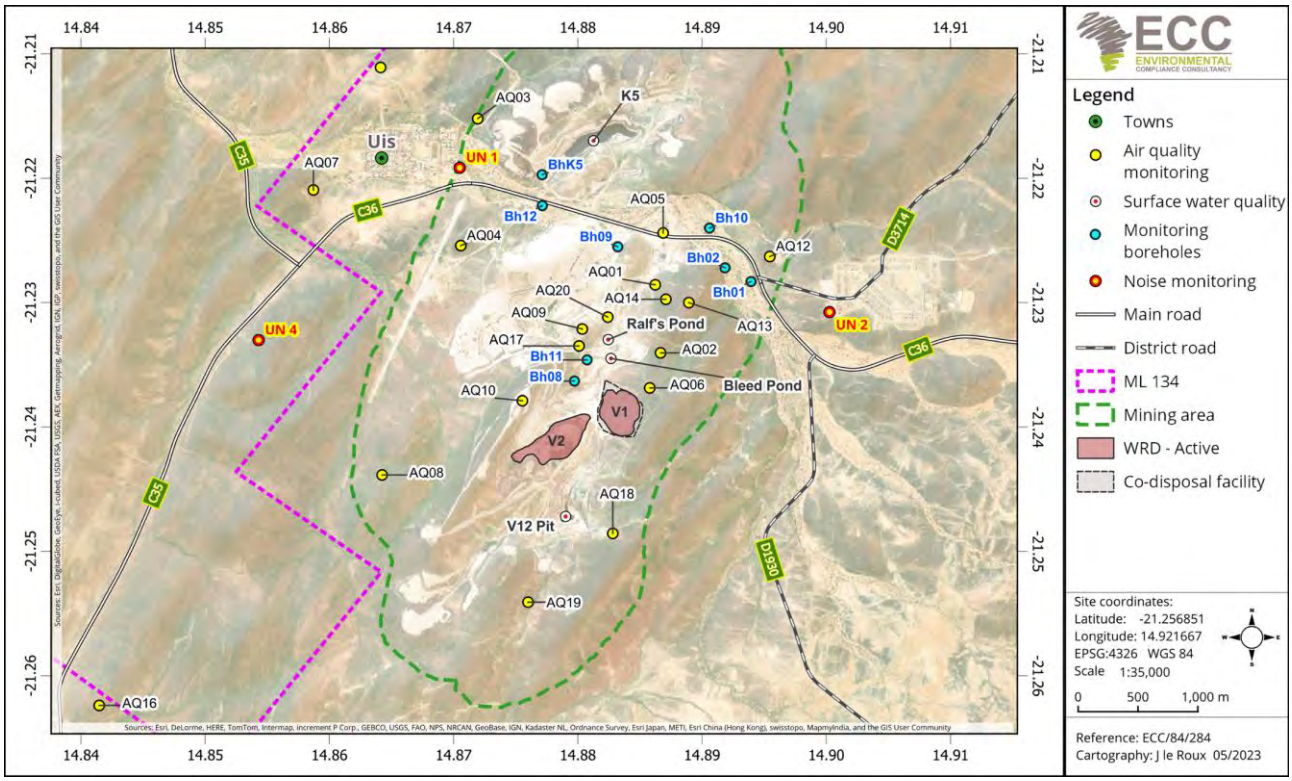

Figure 10: Domain 3 – Co-disposal facility and waste rock dumps with monitoring locations

The mining department is responsible for:

- Shaping the landform to comply with the mine design and the sites rehabilitation design requirements, and
- To ensure slopes are provided to the remediation specification as determined by the appointed ECO.

The technical services team in conjunction with the mining department are responsible for managing Potentially Acid Forming (PAF) waste. A proactive approach to PAF identification should be in place on the site.

The mine surveyors are responsible for ensuring that all PAF cells are identified and clearly included in the site plans for future use and consideration in the mine closure plan.

Table 7 – Domain 3: Co-disposal facility and waste rock dump domain schedule

Domain 3 – Co-disposal facility and waste rock dump			
Environmental risk of domain	**Consequence**	**Likelihood**	**Risk**
	Major 4	Possible 3	High 12
Domain manager	Technical Services Manager		
Statutory requirements	**Permit / Permit name**	**Environmental permit conditions**	
	In the event that new waste rock dump site needs to be established: Where practical and required obtained a land clearing permit from the Ministry of Agriculture, Water and Forestry (MAWF) (Only valid for 3 months therefore must be applied for in advance of clearing works)	Stipulated on permit. General conditions may include; Number of protected trees to be removed, area cleared and surveyed, photos and use of resources cleared e.g. rehabilitation	
Potential issues or impacts	**Water** – Potential for groundwater and surface water contamination from acid rock drainage (ARD) **Air Quality** – Dust generated from the truck movements on dump, hauling, loading and dumping – Dust generated off unrehabilitated waste surfaces – Dust generated from mobile crusher activities **Biodiversity** – Excessive clearing of vegetation for waste dump footprint – Barrier to wildlife movement – Loss of habitat **Social** – Nuisance noise and dust		
Targets	– Zero noise and dust complaints from neighbouring community – 100% encapsulation of PAF material – No clearing for the waste dump footprint without land clearing permits where recovery of topsoil or substrate material for rehabilitation is possible (10 days notices to be given)		

<table>
<tr><th colspan="6">Domain 3 – Co-disposal facility and waste rock dump</th></tr>
<tr><td></td><td colspan="5">– Air quality monitoring reflects that the waste dump running surfaces have been kept moist with a 90% compliance commitment applied to the dust thresholds</td></tr>
<tr><td>Operational management measures</td><td colspan="5">To minimise the effects the above-mentioned impacts may have on the environment and community, the domain manager will ensure the following measures are implemented:
– A robust monitoring system is in place to predict and prevent ARD from mineral waste.
– In the event PAF is identified, the SOP for PAF is triggered and PAF material is encapsulated, surveyed, and signed off according to the procedure.
– Land clearing permits are applied from the appointed ECO in advance. The domain manager should ensure that the Land Clearing permit process is triggered at the mine planning stage and therefore must include environmental consideration for future works, this is important in areas where recovery of topsoil or substrate material for rehabilitation is possible.
– Ensure a proactive approach to weather monitoring and when high winds are predicted, ensure an operational water cart is deployed to the waste dump to prevent excess dust being generated off the running surface of the waste dump.
– Implement measures to reduce noise from the waste dump if monitoring/community feedback detects noise breaches (especially at night) from tipping or dumping activities. This might include a night-time tipping location that is below the highest level of the waste dump, so the dump can act as a noise barrier for neighbouring properties.
– Ensure the mining plan includes provisions for rehabilitation and that the mining schedule is adhered to prevent visual impacts from an unrehabilitated waste dumps.</td></tr>
<tr><td rowspan="3">Environmental pollution control measures (PCM)</td><td colspan="2">PCM risk score</td><td colspan="2">Function and performance</td><td>Maintenance frequency</td></tr>
<tr><td colspan="2">Water cart
Moderate 8</td><td colspan="2">Water down surfaces to prevent dust</td><td>As per PMS</td></tr>
<tr><td colspan="2">ARD SOP
Moderate 8</td><td colspan="2">Used to monitor mineral waste for potentially acid forming material</td><td>Reviewed annually</td></tr>
<tr><td rowspan="2">Environmental Monitoring</td><td>Site code</td><td>Name</td><td>Monitoring purpose</td><td>Frequency</td><td>Threshold</td></tr>
<tr><td>Acid rock drainage (ARD)</td><td>ARD monitoring</td><td>Visual monitoring around dumps after rains for ARD evidence</td><td>Within 24 – 48 hours rainfall</td><td>If field pH is <5 pH send sample to laboratory</td></tr>
</table>

Domain 3 – Co-disposal facility and waste rock dump					
	Water	Surface water sample to be taken at the toe of dump	Impacts of waste dump site on water quality in the area	Within 24 – 48 hours rainfall	Appendix A
		As shown on domain map	Impacts on surface water quality	Monthly or when present	
		Groundwater levels	Impacts on groundwater from abstraction	Monthly	
		Groundwater quality - monitoring boreholes	Impacts on ground water quality	Quarterly	
	Deposition al dust	As shown on domain map	Impacts of dust from waste dumps on receptors	Monthly	600 mg/m^2/day
Environmental reporting	**Domain manager to report to appointed ECO (monthly)** – Volume of PAF material identified and survey locations if applicable. – Any areas that required vegetation removal for the month ahead. **Appointed ECO to report to domain manager** – Notify domain manager in advance when high winds are predicated (daily). – Notify domain manager if monitoring detects contamination from waste dump (monthly).				
Environmental inspection/s	**Daily**	**Weekly**	**Monthly**	**Other**	
	On shift geologist to inspect waste mined in the pit prior to dumping to confirm no evidence of PAF material	Domain manager to complete a weekly inspection of the domain	Domain manager and appointed ECO to complete	Bi-annual compliance audit	
Supporting documents	Waste rock dump inspection form, Domain sign off Appendix B, Land clearing permit Appendix G.				

DOMAIN 4 –PROCESSING PLANT

The Uis Tin Mine site's trial processing plant shown in Figure 11 and set out in Table 8 improved design to process up to 120 TPH of concentrate.

- ROM
- Crusher
- Bulk sample processing facility
- Clean water channel, stormwater management system
- Sewerage, settling and water return ponds
- Water abstraction boreholes and management thereof

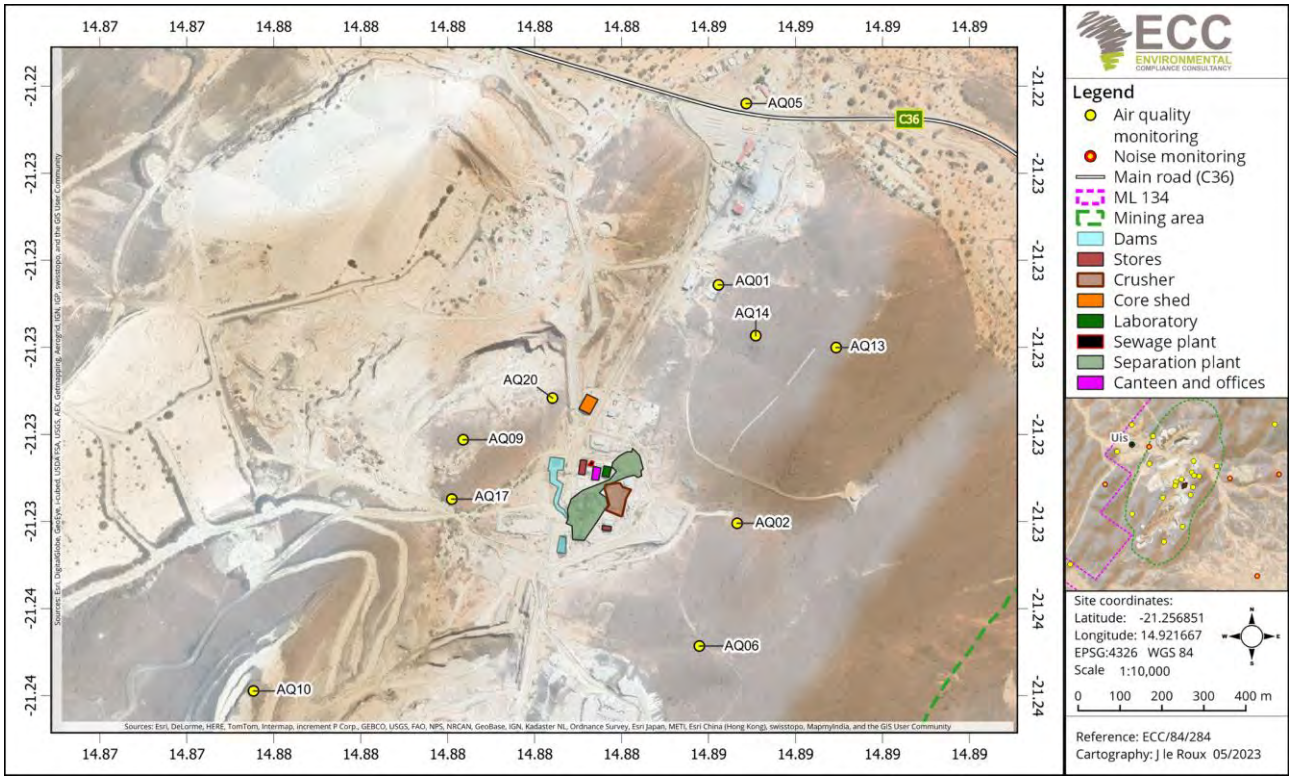

Figure 11: Domain 4 - Processing plant with monitoring locations

Table 8 – Domain 4: Process plant domain schedule

Domain 4 – Process plant			
Environmental risk of domain	**Consequence**	**Likelihood**	**Risk**
	Moderate 4	Possible 3	High 12
Domain manager	Processing Manager supported by the Engineering Manager		
Statutory requirements	**Permit / Permit name**	**Environmental permit conditions**	
	Water abstraction permit	Nil	
Potential issues or impacts	**Water** – Contamination of soil and water from plant and equipment – Contamination from spillage of process material from pipeline breaks / failures – Chemical spills from reagent mixing – Sediment loading of surface water from uncontrolled surface discharge of open pit mine wastewater – The potential failure of containment dams that hold mine site contact water (open pit mine dewatering water) – Over-abstraction for mining and processing activities – Groundwater cone of depression from potential cumulative abstractions **Air quality** – Dust generated from process areas – Release of chemical gases from process operations – Dust generated from ore falling onto stockpiles from height **Biodiversity** – Fauna deaths from drowning in ponds – Fauna deaths from chemical ingestion – Light pollution at night disorientating birds and bats – Further reduction in the water table could affect deep rooted tree survival during droughts – Clearing of vegetation during the expansion of the pilot plant – Potential Impacts on biodiversity and migratory patterns of fauna **Social** – Noise from processing operations – Light pollution at night – Nuisance dust to neighbours		
Targets	– Zero process spills from the plant – Zero noise or dust complaints from processing activities		
Operational management measures	To minimise the effects the above-mentioned impacts may have on the environment and community, the domain manager will ensure the following measures are implemented:		

Domain 4 – Process plant	
	– Ensure wastewater produced from open pit mining activities is sent to the processing plant for reuse; 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 open pit mining operations. Reuse of the water back into the open pit mine can be investigated during operations for water quality. – Ensure all process bunds are kept empty and free of rainwater or process material – Ensure correct chemical use and clean-up procedures are in place and followed; – Ensure chemical spills are cleaned up within the open pit; and – In the event of heavy rainfall prevent spills from entering the dewatering system that would be transferred to the surface. – Ensure water storage facilities are constructed adequately and have the capacity to hold the volume of water to be pumped from the open pit workings and from run-on water to the site and facilities. – Ensure plant is maintained according to PMS – Ensure that pipes and flanges are contained within a bund – Ensure mixing of reagents is conducted according to site procedures – All lined ponds must have fauna egress mats at required intervals and not more than 50m apart – Ensure water bodies that could contain chemical that could poison fauna or birds are either; – Fitted with bird deterrents; or – Water body is of such a quality that mass fatalities do not occur – Ensure lighting towers and light fittings are pointing downwards – By checking for cracks in lining, vegetation growing in pond or green areas around water facilitates. – Integrate the groundwater outcomes into the site water balance to assist with the efficient management of water resources on site and identify and minimise water losses from the system; – Implement the monitoring, operational and maintenance requirements as outlined in the Water Management Plan – Locate or drill alternative boreholes to replace the existing boreholes if yields cannot be improved or maintained or to supplement water supply during borehole maintenance periods (after the K5 pit has been drained) – Schedule borehole maintenance every 2 years unless the monitoring data (yield vs drawdown) indicates more frequent cleaning is required; – Establish a covered water storage area nearby to the plant which contains water storage tanks with a minimum capacity of 1 week (~2700 m^3) which can provide an emergency water source to the plant; – Andrada will need to amend their permitted abstraction volume to account for the required 18 m^3/hr (127 440 m^3/a) required by the plant for the Phase 1 Stage II expansion;

Domain 4 – Process plant			
	– Locate third-party groundwater users within a 10 km radius of the mine wellfields and confirm their current abstraction requirements and planned future abstraction requirements; – In the event that bulk dewatering is required to augment processing requirements, plan the dewatering of the K5 pit well in advance so the dewatered volumes can be used to meet the plant requirements instead of being discharged to the environment. – The water quality requirements of the plant will therefore need to be defined as soon as possible or the establishment of a water treatment plant could be considered; – The numerical model must be recalibrated every 2 (two) years to incorporate the latest monitoring data as well as any changes to the water supply network or plant yield requirements. The model will be an asset to Andrada to assess any changes which could affect the water supply for the Project; – The numerical model can be refined in future updates to simulate climate change responses to the expected rainfall volumes over the life of mine. The IPCC report indicates that drought events in Southern Africa (caused by the El Nino oscillation) are predicted to become more frequent and intense, which could affect the recharge potential to aquifers in the region. – Monitoring groundwater levels and physiological stress levels in trees to assess any correlation; – Mapping trees that might be at risk using the cone of depression maps; and – Determine feasibility for the rescue of these trees and carry out relocation if viable. – Ensure internal land clearing permits are applied for prior to land clearing and through this process the environmental team has the opportunity to recover or rescue plants of significance or plants that can be used for progressive rehabilitation. Permits obtained from Directorate of Forestry; – Minimal vegetation clearing and earthworks; and – Basic vegetation clearing principles and species ID sheets. – Avoid development and infrastructure in sensitive areas to minimise the negative effect on the local environment, especially unique features serving as habitat to various vertebrate fauna species; – Remove (e.g., capture) unique fauna and sensitive fauna, before commencing with the development activities, as well as during the operational phase, and or species serendipitously located during this period and relocate to a less affected site in the immediate area; and – Prevent domestic pets – e.g., cats and dogs – accompanying the workers to site – All night lighting where possible should be directed downwards to reduce the impact on nocturnal bird movements; and – Use lighting that is less likely to attract insects at night.		
Environmental pollution	**PCM Risk Score**	**Function and performance**	**Maintenance frequency**

Domain 4 – Process plant					
control measures (PCM)	Process Plant inspection Moderate 6	Visual inspection to detect major spills or leaks from the Plant		Daily inspection	
Environmental monitoring	**Site code**	**Name**	**Monitoring purpose**	**Frequency**	**Threshold**
	Air quality - Depositional dust monitoring	As shown in the domain map	Monitoring dust impacts on sensitive receptors	Monthly	600 mg/m^2/day
	Noise – Ambient	As shown on domain map	To determine impacts of noise on nearest sensitive receptor	Monthly	45 dB Day time 35 dB Night time
	Groundwater levels	As shown in the domain map	Required to monitoring aquifer groundwater levels	Monthly	NA
	Groundwater quality	As shown in the domain map	To monitor the change and trends in groundwater quality for the site	Quarterly	As per permit conditions
Environmental reporting	**Domain manager to report to appointed ECO (monthly)** – Report monthly process water volumes to the appointed ECO – Report an wildlife fatalities straight away to the appointed ECO **Appointed ECO to report to domain manager (monthly)** – ECO to report to the domain manager process water quality results monthly. – ECO to interpret results and signatures relevant to the process plant i.e. heavy metals, etc. and report these to the DM against trigger values.				
Environmental inspection/s	Daily	Weekly	Monthly	Other	
	Shift supervisor to complete the daily visual inspection	Domain manager to complete a weekly process plant and tailings line inspection	Domain manager and appointed ECO to complete monthly inspection	Bi-annual compliance audit	
Supporting Documents	Area inspection form, Domain sign off Appendix B, and Spill prevention and management.				

DOMAIN 5 – WORKSHOPS

Almost all items of light and heavy equipment are serviced and maintained on site at the Uis Tin Mine Engineering workshops.

This domain schedule includes all infrastructure and activities within the operational control of the domain outlined and mapped below Figure 12 and set out in Table 9:

- Heavy and light vehicle workshops;
- Contractors workshops;
- Wash bay;
- Excavator pad;
- Offices;
- Tyre workshop; and
- All mobile maintenance activities for infield emergency repairs, maintenance or servicing of equipment.

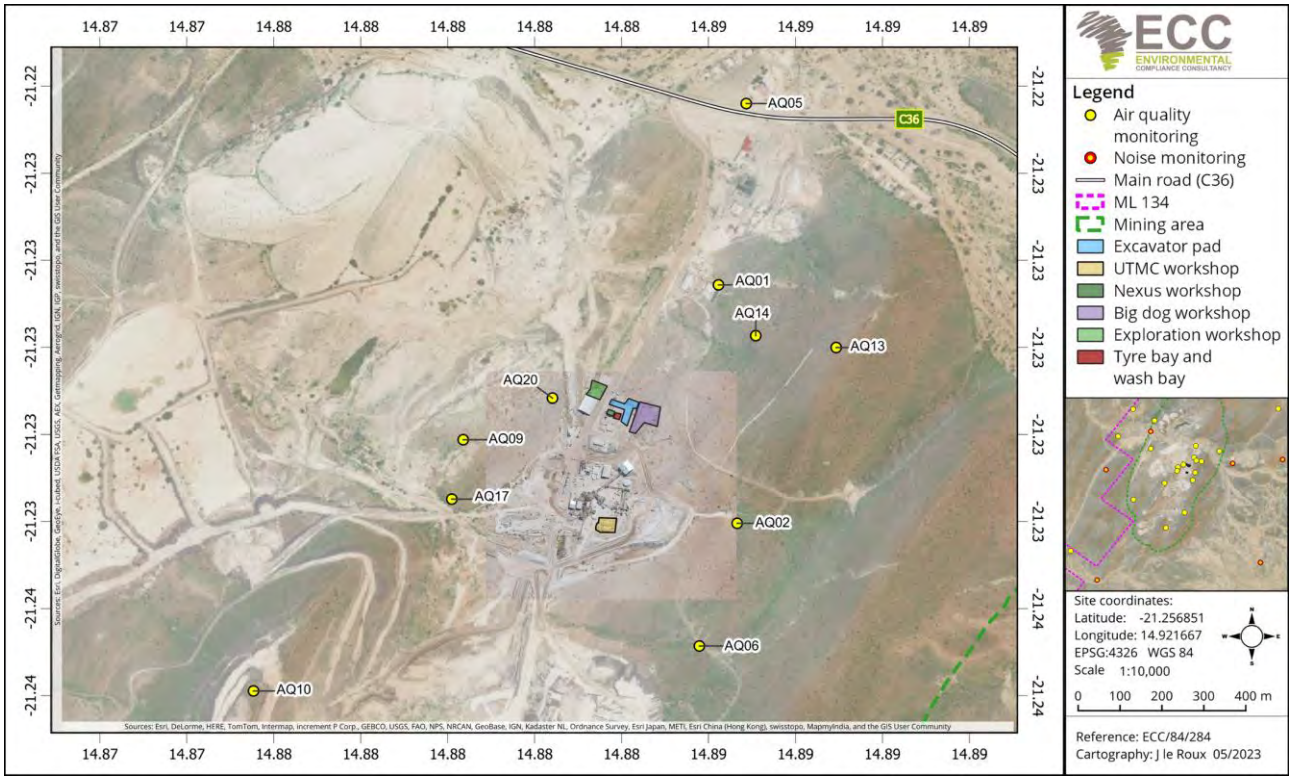

Figure 12: Domain 5 – Workshops with monitoring locations

Table 9 – Domain 5: Workshops domain schedule

Domain 5 – Workshops					
Environmental risk of domain	**Consequence**		**Likelihood**	**Risk**	
	Minor 2		Possible 3	Moderate 6	
Domain manager	Technical Services Manager supported by Engineering Manager				
statutory requirements	**Permit / Permit name**		**Environmental permit conditions**		
	A. Nil		A. Nil		
Potential issues or impacts	**Water** – Contamination of soil and water from plant and equipment, – Contamination from spillage of chemicals and hydrocarbons, – Chemical spills from infield refuelling, reloading or mechanical breakdowns, – Contamination to surface water from a poorly functioning / designed wash bay. **Air quality** – Dust generated from workshop loading bays, – Increased PM emissions from poorly maintained equipment. **Biodiversity** – Fauna deaths from drowning in ponds, – Fauna deaths from chemical ingestion, – Light pollution at night disorientating birds and bats. **Social** – Noise from workshop operations especially at night				
Targets	– Ensure the wash bay is operational and compliant at all time, – Ensure all chemicals are stored correctly and bunded at all times.				
Operational management measures	To minimise the effects of the above mentioned impacts pose to the environment and community, the domain manager will ensure the following measures are implemented: – Ensure that pipes and flanges are contained within a bund, – Ensure all staff are trained on how to respond to chemical spills and emergencies, – Ensure all bunds are kept empty and free of rainwater, – Ensure plant is maintained according to PMS, – Ensure staff report leaking pipes, joins or flanges to prevent failure, – Ensure refuelling, handling of chemicals, oils and greases is conducted according to specific site procedures, – Ensure that all waste oil tanks are pumped out at 80% full capacity.				
Environmental pollution control measures (PCM)	**PCM risk score**	**Function and performance**		**Maintenance frequency**	
	Wash bay **LOW 3**	The final collection point for the domains oily and contaminated wastewater.		Daily	
	Noise				
	Site Code	**Name**	**Monitoring Purpose**	**Frequency**	**Threshold**
	Noise - Ambient	N 01	Impacts of noise on Uis		

Domain 5 – Workshops					
		N 02	Impacts of noise on nearest receptors (The Uis Village Council and NamClay bricks)		45 dB daytime 35 dB night time
		N 03	Impacts of noise on settlement		
	Surface water – wash bay functionality	TBD	A surface water monitoring point to determine the effectiveness of the wash bay hydrocarbon treatment prior to water being used elsewhere on site.	Monthly	As per permit conditions
Environmental reporting	**Domain manager to report to appointed ECO (monthly)** – Quantities of fuels and oils used. **Appointed ECO to report to domain manager (monthly)** – Water quality results relating to the wash bay.				
Environmental inspection/s	**Daily**	**Weekly**	**Monthly**	**Other**	
	To be completed by the shift supervisor	To be completed by the foreman with the shift supervisor	To be completed with the appointed ECO and the HOD	Bi-annual compliance audit	
Supporting documents	– Area inspection form, – Domain sign off Appendix B, and – Spill prevention and management.				

DOMAIN 6 – FUEL DEPOT

UTMC will be constructing a fuel depot on site, which will supply fuel for all activities on site as required.

This domain schedule includes all infrastructure and activities within the operational control of the domain outlined and mapped below Figure 13 and set out in Table 10:

- Fuel storage.

Figure 13: Domain 6 - Fuel depot with monitoring locations

Table 10 - Domain 6: Fuel depot domain schedule

Domain 6 – Fuel depot			
Environmental risk of domain	**Consequence**	**Likelihood**	**Risk**
	Catastrophic (5)	Rare (1)	High 5
Domain manager	Supply Chain Officer and General Manager		
Statutory requirements	**Permit / Permit Name**	**Environmental permit conditions**	
	A. Nil	A. Nil	
Potential issues or impacts	**Water** – Potential contamination from breach of fuel containment **Biodiversity** – Spills can lead to detrimental damage to soil **Social** – Fire hazard		
Targets	– Ensure the safe handling, transportation and containment of fuel		
Operational management measures	To minimise the effects the above-mentioned impacts may have on the environment and community, the domain manager will ensure the following measures are implemented: – Fencing off fuel depot to avoid unauthorised entrance, – All hydrocarbons must be stored in a bund at all times, – The bund needs to hold 110% of the largest unit stored in the bund, – Small bunded containments need to be sheltered from the rain, – Storage areas require adequate ventilation, – Storage area to be kept clean and tidy and free of combustibles, – Equipment at the depot must be kept in a good state, – In the event of a spill, hazardous material may be generated. This material must be disposed in a suitable manner. – Leak proof drums for the disposal of oils and grease must be placed at a suitable location where such hazardous material can likely be generated, – Ensure equipment that is clearing vegetation is free of weeds and seeds prior to clearing vegetation, – Any leakages and spills must be reported to the domain manager. **Fuel deliveries and dispensing** – Do not leave area unattended when refuelling, the use of a Deadman switch should be investigated and installed on site to reduce potentials of spill during refuelling – Turn off all vehicles while refueling, – No smoking should be allowed in the fuel depot area especially during fuel handling. **Tank, pump and pipelines** – Any suspected leaks and spills should be reported to the domain manager,		

Domain 6 – Fuel depot					
	– Any leaks from tanks or pipelines must be checked and attended to immediately, the leak should be isolated, and the general area should be treated with an absorbing agent immediately. **Fire prevention and control** – Ensure fire extinguishers are kept in close proximity and attended to regularly, – Training should be provided in the use of the appropriate firefighting equipment, – Smoking should be prohibited in the vicinity of flammable substances.				
Environmental pollution control measures (PCM)	**PCM Risk Score**	**Function and performance**	**Maintenance frequency**		
	Emergency response plan Low 3	To set out guidelines for emergency response	Nil		
Environment Monitoring	**Biodiversity**				
	Site Code	**Name**	**Monitoring purpose**	**Frequency**	**Threshold**
		Visual	Inspect tanks for leakages and any breach of containment within this domain.	Daily	NA
Environmental reporting	**Domain manager to report to appointed ECO (monthly)** – Nil **Appointed ECO to report to domain manager (monthly)** – Nil				
Environmental inspection/s	**Daily**	**Weekly**	**Monthly**	**Other**	
	To be completed by the shift supervisor	Inspection by domain manager	To be completed with the appointed ECO	6 monthly	
Supporting documents	– Land clearing permit Appendix G, – Area inspection form, and – Domain sign off Appendix B.				

DOMAIN 7 – SALVAGE YARD AND NON-MINERALISED WASTE FACILITY

The first options for the handling of non-mineralised waste is to reduce, re-use and recycle. A landfill facility is to be constructed on the mine site for the event that the first options are not practically feasible. The location of the on-site landfill is still to be decided and although there is currently a landfill on-site, this site will require significant work to reach an acceptable standard. The landfill is to be classified as a non-hazardous landfill therefore each cell is earthen lined. The landfill site should be fenced to avoid windblown litter and to control access to the landfill site.

Uis Tin Mine should consider other alternatives for the non-mineralised waste facility, such as using the municipal waste site (which is poorly managed) or use on-site waste removal options such as waste incineration.

This domain schedule includes all infrastructure and activities within the operational control of the domain outlined and mapped below Figure 14 and set out in Table 11:

- Proposed landfill;
- Salvage yard; and
- An on site designed landfill for non mineralised waste.

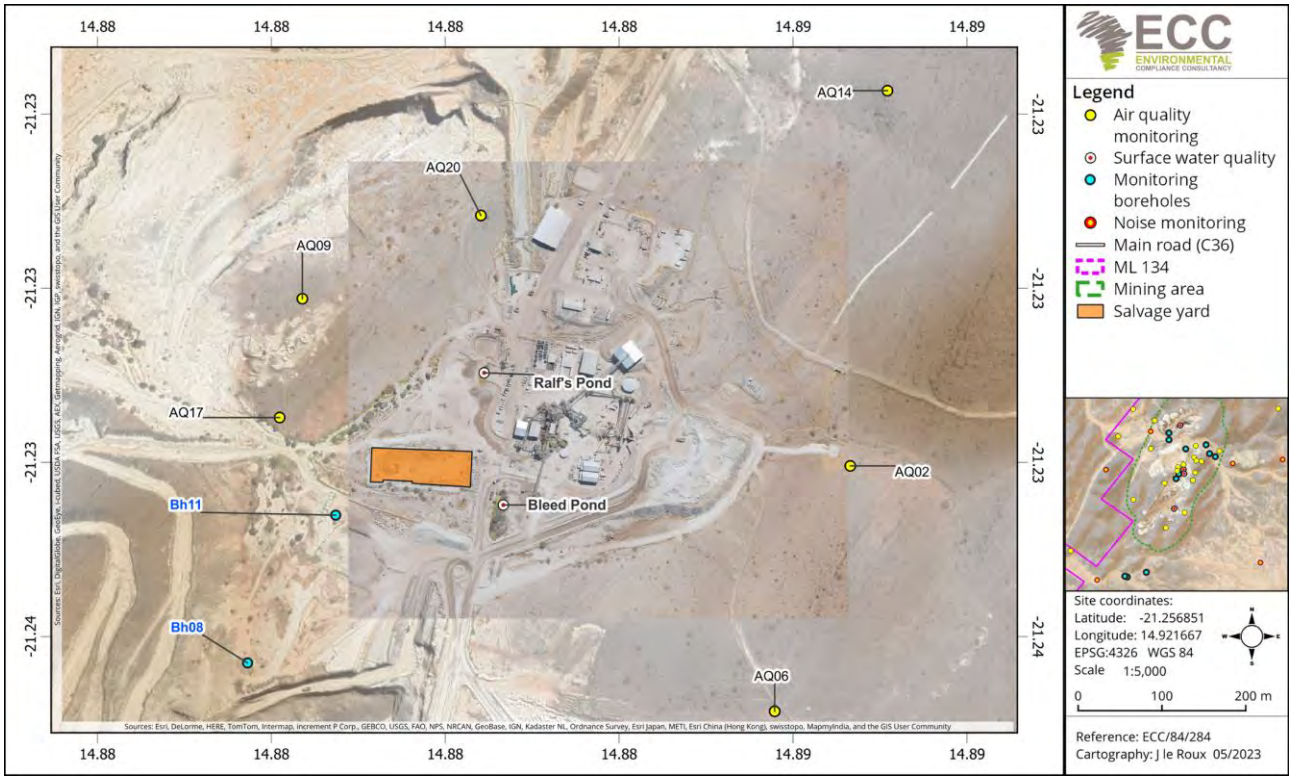

Figure 14: Domain 7 - Salvage yard and non-mineral waste facility

Table 11 – Domain 7: Salvage yard and non-mineral waste facility domain schedule

Domain 7- Salvage yard and non-mineral waste facility (landfill and recycling site)			
Environmental risk of domain	**Consequence**	**Likelihood**	**Risk**
	Minor 2	Possible 3	**Moderate 6**
Domain manager	Engineering Manager		
Statutory requirements	**Permit / Permit name**	**Environmental permit conditions**	
	A. Environmental Clearance Certificate	A. Compliance with the EIA that supports the clearance certificate	
Potential issues or impacts	**Water** – Contamination to groundwater from incorrect disposal of waste in the landfill, – Contamination from uncleared drums or containers from the chemicals used in the operation arriving at the waste site. **Air quality** – Dust from landfill operations **Biodiversity** – Loss of topsoil and remediation material, – Potential poaching incidents from landfill operators, – Injury to wildlife from scavenging in the landfill site. **Social** – Nuisance odour from landfill		
Targets	– Demonstrate an increase in the throughput of recycled materials annually, – Demonstrate a reduction in volumes of waste going into landfill annually.		
Operational management measures	To minimise the effects the above mentioned impacts may have on the environment and community, the domain manager will ensure the following measures are implemented: – A vegetation clearing permit is obtained through the appointed ECO prior to land clearing activities where recovery of topsoil or substrate material for rehabilitation is possible, – Vegetation is cleared and stockpiled for rehabilitation, – Quality control process are in place to prevent hazardous materials entering the landfill site, – Ensure training and awareness is in place with all operators to prevent contaminated drums or containers arriving on the landfill site.		
Environmental pollution control measures (PCM)	**PCM risk score**	**Function and performance**	**Maintenance frequency**
	Fencing of landfill LOW 3	Improves containment of waste to landfill site	Weekly
Environment monitoring	**Water quality**		
	Site Code	**Name**	**Monitoring purpose**	**Frequency**	**Threshold**

Domain 7- Salvage yard and non-mineral waste facility (landfill and recycling site)					
	Ground- and surface water quality	To be confirmed upon suitable landfill location selection	To detect contamination from landfill site		Appendix A
	Air quality				
	Site code	**Name**	**Monitoring purpose**	**Frequency**	**Threshold**
	Depositional dust	To be confirmed upon suitable landfill location selection	Air quality from the landfill	Monthly	600 mg/m^2/day
Environmental reporting	**Domain manager to report to appointed ECO (monthly)** – Volumes of waste sent to landfill, – Volumes of recycled materials. **Appointed ECO to report to domain manager (monthly)** – Results from water quality monitoring relating to potential landfill contamination, – Results from air quality monitoring relating to the landfill.				
Environmental inspection/s	**Daily**	**Weekly**	**Monthly**	**Other**	
	Landfill operator supervisor to inspect the facility	Inspection by domain manager	Appointed ECO and domain manager to complete	Bi-annual compliance audit	
Supporting documents	– Area inspection form – Domain sign off Appendix B				

DOMAIN 8 – OLD CONTRACTORS CAMP

A contractor's camp is located on the site that was erected only for the construction phase.

This domain has since closed and has been rehabilitated. It is now subject to the formal closure and rehabilitation process in accordance with the sites mine closure plan; the domain has been retained in the OEMP for completion purposes until closure is complete and signed off.

This domain schedule includes all infrastructure and activities within the operational control of the construction camp or any further construction camps and mapped below Figure 15 and set out in Table 12:

- Accommodation facilitates for construction employees.

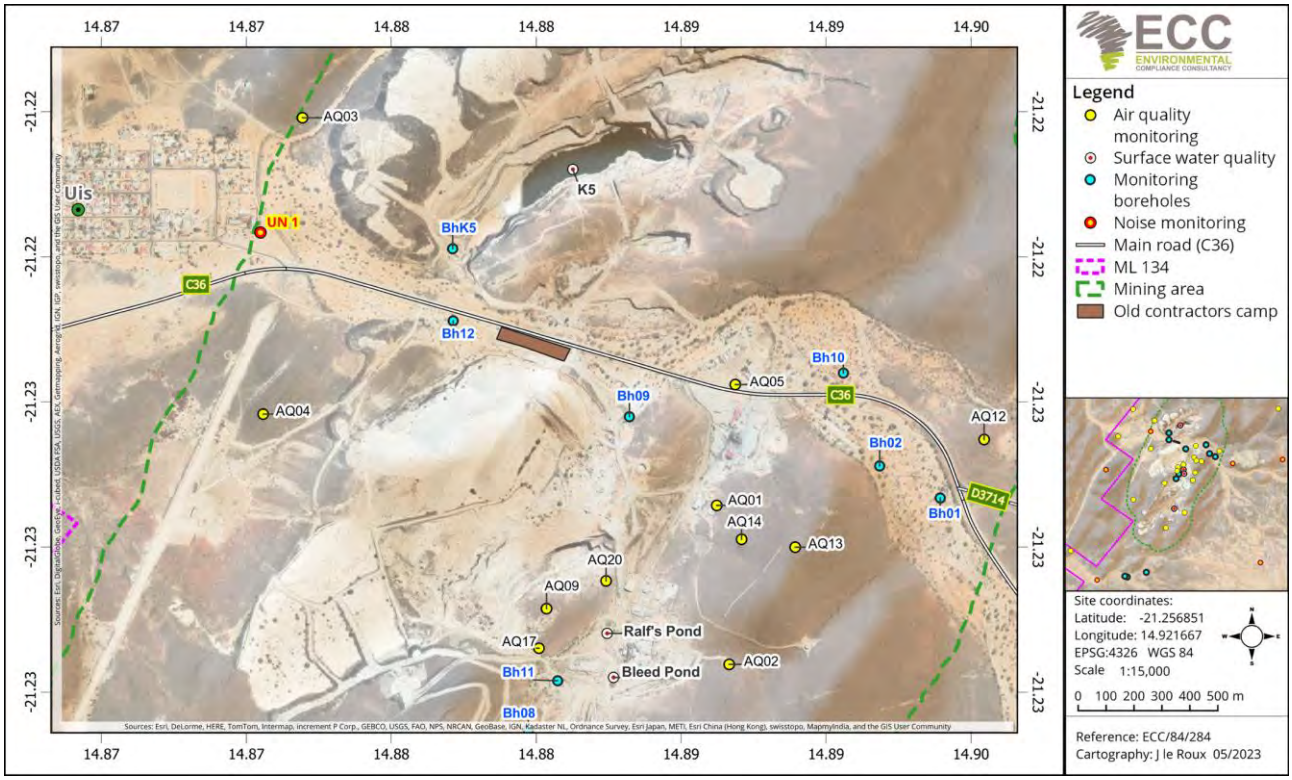

Figure 15: Domain 8 – Old contractors camp with monitoring locations

Table 12 – Domain 8: Old contractors camp - domain schedule

Domain 8 – Old contractors camp					
Environmental risk of domain	**Consequence**	**Likelihood**	**Risk**		
	Minor B	Unlikely 2	**Low 5**		
Domain manager	Technical Services Manager				
Statutory requirements	**Permit / Permit name**	**Environmental permit conditions**			
	A. Nil	A. Nil			
Potential issues or impacts	**Water** – Contamination from canteen or mess area from fats oils and grease entering the wastewater system. **Air quality** – Nil **Biodiversity** – Poaching risk from employees staying on site, – Potential for fire as a result of unauthorised fires being lit in the camp. **Social** – Reputation damage with neighbouring farmers from poaching incidents.				
Targets	– Zero incidents relating to poaching from camp				
Operational management measures	To minimise the effects the above-mentioned impacts may have on the environment and community, the domain manager will ensure the following measures are implemented: – Ensure the fence around the main camp is maintained, – Ensure the fat trap is cleaned our monthly by approved contractor, – Ensure all contractors are educated and aware of camp rules including poaching and fires.				
Environmental pollution control measures (PCM)	**PCM risk score**	**Function and performance**	**Maintenance frequency**		
	Canteen fat trap Low 3	Intercepts fats, oils and grease to prevent contamination to wastewater stream	Monthly		
	BIODIVERSITY				
	Site code	**Name**	**Monitoring purpose**	**Frequency**	**Threshold**
	Contractor's camp	Campsite	Monitoring for potential poaching/snares	Weekly	Zero
Environmental reporting	**Domain manager to report to appointed ECO (monthly)** – Nil **Appointed ECO to report to domain manager (monthly)** – Nil				
Environmental inspection/s	**Daily**	**Weekly**	**Monthly**	**Other**	
	Nil	Nil	Appointed ECO with domain manager to complete	Annual audit of compliance	

Domain 8 – Old contractors camp	
Supporting documents	– Area inspection form, – Domain sign off Appendix B.

POTENTIAL FUTURE DOMAIN – BIO-REMEDIATION SITE

When a hydrocarbon spill occurs on site, the spill is assessed, and a suitable remediation plan is actioned depending on the location and site of the spill. When the spill cannot be transported to the bioremediation site it is remediated in situ. A suitable location for the bio-remediation site is yet to be selected, in the event of hydrocarbon spills the material is collected and transported to the bioremediation site for treatment.

This domain schedule and set out in Table 13 includes all infrastructure and activities within the operational control of the domain outlined and mapped below:

- Bio-remediation facility/cells

Table 13 – Potential future domain: Bio-remediation site domain schedule

Potential future domain – Bio-remediation site			
Environmental risk of domain	**Consequence**	**Likelihood**	**Risk**
	Major 4	Possible 3	High 12
Domain manager	Technical Services Manager supported by the General Manager		
Statutory requirements	**Permit / Permit name**	**Environmental permit conditions**	
	Nil	Nil	
Potential issues or impacts	**Water** – Contamination to groundwater from leaking liners in the facility – Contamination to surface water from overfilling of cells and contamination to surrounding areas **Air quality** – Dust generated from open and dry cells **Biodiversity** – Wildlife trapped in cells **Social** – NA		
Targets	Remediate available soil in a timely manner		
Operational management measures	To minimise the effects the above-mentioned impacts may have on the environment and community, the domain manager will ensure the following measures are implemented: – All cells are constructed according to the specifications – The facility is managed according to the site procedures		
Environmental pollution control measures (PCM)	PCM risk score	Function and performance	Maintenance frequency
	Nil	Nil	Nil
Environmental reporting	Domain manager to report to appointed ECO (monthly) – Volume of material received into the facility each month		

Potential future domain – Bio-remediation site				
	– Volume of material treated each month – Volume of material produced for rehab Appointed ECO to report to domain manager (monthly) – Water quality results as applicable			
Environmental inspection/s	Daily	Weekly	Monthly	Other
	Nil	Domain manager	Environmental officer with domain manager	Bi-annual compliance audit
Supporting documents	Area inspection form, Domain sign off Appendix B, and Spill prevention and management.			

APPENDIX PAGES

APPENDIX A – ENVIRONMENTAL MONITORING PROGRAMME AND TRIGGER VALUES BASED ON NAMIBIAN STANDARDS

Table 14 - Uis tin mine monitoring plan

Type	Rationale	Monitoring area / site description / details	Frequency	Phase (construction, operations, decommissioning, or all)	Parameters	Quality control point
Air quality -Dust fallout collection	Potential impacts on air quality can arise from mine development and operations. Air quality monitoring is done to monitor the potential impacts on surrounding communities. Potential to generate dust during access track development, blasting and use of haul roads.	Sites surrounding the mine – in line with predominant wind direction. The co-ordinates for the selected sites are: **AQ 01** (21'13'44''S 14'52'57''E) **AQ 02** (21'14'10''S 14'53'8''E) **AQ 03** (21'12'54''S 14'52'20E) **AQ 04** (21'13'24''S 14'52'11''E) **AQ 05** (21'13''32''S 14'53'13E)	Prior to mine operations to determine the baseline air quality - Monthly At the onset of mining operations – Five (5) samplers exchanged monthly for 12 months	All	Total Suspended Particulates (TSP)	Yes Yes
Air quality- Passive sampling	Equipment used during operations generates SO_2	The co-ordinates for the selected sites are: **AQ 01** (21'13'44''S 14'52'57''E) **AQ 02** (21'14'10''S 14'53'8''E) **AQ 03** (21'12'54''S 14'52'20E) **AQ 04** (21'13'24''S 14'52'11''E)	Five samplers; cartridges are exchanged every month for 12 months	Operations	Sulphur Dioxide (SO_2)	Yes

Type	Rationale	Monitoring area / site description / details	Frequency	Phase (construction, operations, decommissioning, or all)	Parameters	Quality control point
		AQ 05 (21'13''32''S 14'53'13E)				
Air quality- Minivol	Dust generating activities such as road construction, mining activities such as drilling and blasting, excavation and land clearing Wind erosion on tailings dumps.	The co-ordinates for the selected sites are: **AQ 01** (21'13'44''S 14'52'57''E) **AQ 02** (21'14'10''S 14'53'8''E) **AQ 03** (21'12'54''S 14'52'20''E) **AQ 04** (21'13'24''S 14'52'11''E) **AQ 05** (21'13''32''S 14'53'13E)	Three-day cycle for one month	Operations	PM_{10} and $PM_{2.5}$	Yes
Water quality	To monitor the water quality (both surface and ground water). Monitoring prior to the onset of mining operations- to determine baseline. Monitoring after mining commences to determine impacts of mining operations on water quality.	Existing open pits, the co-ordinates are as follows: **<u>Surface Water Sites</u>** **South Pit - WQ 01** (21°14'43.90"S 14°52'45.33"E) **North Pit - WQ 02** (21°13'7.30"S 14°52'42.60"E) **<u>Groundwater Sites</u>** To be determined / confirmed with groundwater specialist	Annually	All	pH Metals	Yes
Noise	Noise monitoring to determine impact of development on	Specific locations selected to conduct noise monitoring: **N 01**	During the construction phase of the mine – Quarterly	Prior to construction commencing and during construction	dB	No

Type	Rationale	Monitoring area / site description / details	Frequency	Phase (construction, operations, decommissioning, or all)	Parameters	Quality control point
	residents and surrounding areas	(21'13'24''S 14'52'11E) **N 02** (21'12'47"S 14'51'40E) **N 03** (21°13'37.32"S 14°53'40.93"E)	During the mine's operational phase – Annually			
Biodiversity	An LFA transect was to monitor the baseline diversity	**LFA site** (21'14'6"S 14'53'7"E)	Inspected Monthly		Visual and inspections	Yes

THRESHOLDS FOR AIR QUALITY

The Namibian Atmospheric Pollution Prevention Ordinance, No. 11 of 1976, does not make provision for any standards for individuals and institutions to comply to with regards to fall out dust. The South African National Dust Control Regulations (NDCR) state the limits in Table 15 for dustfall rates in residential and non- residential areas.

Table 15 - Allowable dustfall limits

RESTRICTION AREAS	DUSTFALL RATE (D) ($mg/m^2/day$), 30 -DAYS AVERAGE)	PERMITTED FREQUENCY OF EXCEEDING DUST FALL RATE
Residential area	D < 600	Two within a year, not sequential months
Non-residential area	D ≤ 1200	Two within a year, not sequential months

The most widely referenced international criteria are those published by the World Bank group (WB), World Health Organization (WHO), and the European Union (EU) as shown in Table 16. Additionally, South African legislation (the Air Quality Act No. 39 of 2004) stipulates air quality standards for the mining sector, which can be regarded as representative indicators to Namibia because of the similarity in social, environmental and economic features.

Table 16 - Standards / guidelines derived from the WB, WHO, EU and South African standards

POLLUTANT	AVERAGING PERIOD	WHO GUIDELINES (µg/m³)	EU DIRECTIVES (µg/m³)	SOUTH AFRICA STANDARDS NAAQS (µg/m³)
Particulate matter PM10	1 year 24 hours	70 50 30 20 150 100 75 50	40 50	50 40 120 75
Particulate matter PM2.5	1 year 24 hours	35 25 15 10 75 50 37.5 25	25 -	25 20 15 65 40 25
Sulphur dioxide (SO_2)	1 year 24 hours 1 hour 10 minutes	- 125 50 20 - 500	20 125 350 -	50 125 350 500

POLLUTANT	AVERAGING PERIOD	WHO GUIDELINES (µg/m³)	EU DIRECTIVES (µg/m³)	SOUTH AFRICA STANDARDS NAAQS (µg/m³)
Carbon monoxide (CO)	1 hour	30 000	10 000	30 000
Nitrogen Dioxide (NO_2)	1 year 1 hour	40 200	40 200	40 200

THRESHOLDS FOR WATER QUALITY

It is required that all mine water in Namibia is adequately monitored and analysed to ensure compliance to regulatory standards, according to the obligatory industrial and domestic effluent discharge exemption permit under section 21(5) and 22(2) of the Water Act (Act 54 of 1956). Table 17 indicates the general standards for Article 21 Permits (effluents).

Table 17 - General standards for waste/effluent water discharge

DETERMINANTS	MAXIMUM ALLOWABLE LEVELS
Arsenic	0,5 mg/l as As
Biological Oxygen Demand (BOD)	no value given
Boron	1,0 mg/l as B
Chemical Oxygen Demand (COD)	75 mg / l as O
Chlorine, residual	0,1 mg/l as Cl2
Chromium, hexavalent	50 µg/l as Cr (VI)
Chromium, total	500 µg/l as Cr
Copper	1,0 mg/l as Cu
Oxygen, dissolved (DO)	at least 75% saturation
Detergents, Surfactants, Tensides	0,5 mg/l as MBAS
Fats, Oil & Grease (FOG)	2,5 mg/l (gravimetric method)
Fluoride	1,0 mg/l as F
Free & Saline Ammonia	10 mg/l as N
Lead	1,0 mg/l as Pb
Oxygen, Absorbed (OA)	10 mg / l as O
pH	5,5 – 9,5
Phenolic Compounds	100 µg/l as phenol
Phosphate	1,0 mg/l as P
Sodium	not more than 90 mg/l Na more than influent
Sulphide	1,0 mg/l as S
Temperature	35°C
Total Dissolved Solids (TDS)	not more than 500 mg /l more than influent
Total Suspended Solids (TSS)	25 mg/l
Typical faecal Coli.	no typical coli should be counted per 100 ml
Zinc	5,0 mg/l as Zn

THRESHOLD FOR NOISE

The South African Noise level Criteria, SANS 10103: 2003 (SABS 0103) is frequently used in Namibia to determine the maximum allowable ambient noise levels Table 18 which should not be exceeded.

Table 18- Recommended allowable ambient sound (rating) levels for various land use type districts

Type of District	Maximum Allowable Ambient Noise Levels L_{eq} (Hourly) in dB (A)					
	Outdoors			Indoors with Windows Closed		
	Day- night ($L_{R, dn}$)	Daytime ($L_{Req, d}$)	Night – time ($L_{Req, n}$)	Day -night ($L_{R, dn}$)	Daytime ($L_{R, d}$)	Night – time ($L_{R, n}$)
RESIDENTIAL DISTRICTS						
a) Rural Districts	45	45	35	35	35	25
b) Suburban districts (little road traffic)	50	50	40	40	40	40
c) Urban districts	55	55	45	45	45	35
NON- RESIDENTIAL DISTRICTS						
d) Urban districts (some workshops, business premises and main roads)	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50
Note: Residential buildings such as dormitories, hotel accommodation, residences, etc. should only be allowed in non- residential districts on condition that the calculated anticipated indoor maximum equivalent continuous rating levels ($L_{Req, T}$)						

APPENDIX B – DOMAIN SIGN OFF AND CERTIFICATION

The action can't be displayed.

APPENDIX C – GRIEVANCE SUBMISSION FORM

GRIEVANCE SUBMISSION FORM

Reference Number:

Date:

D	D	M	M	Y	Y

Submitted at:

Windhoek Representative Office	
Uis Office	
Site Office	

Please mark applicable box with an X:

I want to raise my grievance anonymously	
My identity may only be disclosed with my consent	

First or given name:

Last name/Surname:

How would you prefer to be contacted?

By Post	
By Telephone/Mobile	
By E-mail	

Postal Address:

Landline number: ( )

Mobile number:

Preferred language for feedback communication:

Description of Incident or Grievance (What happened? Where? Who was involved? What is the result?)

Please mark the appropriate block with an X:

It was a once-off incident		Date: / /
It happened more than once		How many times?.....
It is an ongoing problem		

What would you like AfriTin to do to resolve this problem?

Respondent Signature:

AfriTin Representative Signature:

APPENDIX D – DOMAIN CHECKLISTS

APPENDIX E – WEED AND SEED CLEARANCE CERTIFICATE

ENVIRONMENTAL COMPLIANCE CONSULTANCY

EMP SUPPORT FORMS AND TOOLS

WEED AND SEED CLEARANCE CERTIFICATE

SECTION 1 – PROJECT MANAGER TO COMPLETE (AT LEAST 2 DAYS PRIORTO EQUIPMENT ARRIVING)

Project Manager or responsible person bringing equipment to site:

Name:		Department:	
Site:		Equipment Arrival Date:	

Details of the owner of the equipment:

Equipment owner:		Company Name:	
Equipment type:		Equipment ID:	
Date Equipment was washed:		Inspected By:	
Where was the equipment last used:			

SECTION 2 - ENVIRONMENTAL CONTROL OFFICER TO COMPLETE PRIOR TO ANY GROUND WORKS COMMENCING

Inspection area	Requirements	Compliance		
		Yes	No	NA
Body works	Free of all soil and vegetation?			
Bumpers	Hollow sections and attachment points free of dirt			
Tyres	Free of all soil and vegetation			
Dual Wheels	Free of all soil and vegetation			
Canopy	Free of all soil and vegetation			
Radiator	Free of all soil and vegetation – specifically look for seed heads			
Interior	Free of soil and vegetation – specifically look for seed heads in upholstery and under mats			
Storage compartments	Free of all soil and vegetation			
Jack and tool kit	Check tool roll and spare wheel are clean			
Racks and bull bars	Free of all soil and vegetation			
Ropes/ Straps/ Cages	Free of all soil and vegetation? Carefully check Velcro and tensioning devices			
Tracks	Carefully check tracks are clean of soil and vegetation			

APPENDIX F – ENVIRONMENTAL IMPROVEMENT PLAN

AFRITIN MINING	**HSE Improvement Plan**	Document Number:	
		Page:	1 of 1
		Issue Date:	February 12,2019
		Revision:	1.0

Department:	**Date Created:**	
Created By:	**C-Safe number:**	
Environmental Improvement Program		
Objective:		
Target: **1.** **2.**		
Key Performance Indicator: **1.**		
Target Date:	**Accountable Person:**	**Signature:**
Significant Risk Register Number/s:		

Task	Target/KPI (#)	Responsible Person	Completion Date	C-Safe No.	Signature
1.					
2.					
3.					
4.					
5.					
6. .					
7.					
8.					
9.					
10.					

Notes:

Approval : _____ Department Manager (signature over printed name)

Date :_____

Approval : _____ General Manager (signature over printed name)

Date :_____

Uncontrolled if Printed: Printed on: 12 February 2019; Review 2 Years after issue date

APPENDIX G – LAND CLEARING PERMIT

ENVIRONMENTAL COMPLIANCE CONSULTANCY

EMP SUPPORT FORMS AND TOOLS

INTERNAL LAND CLEARING CERTIFICATE

SECTION 1 – PROJECT MANAGER TO COMPLETE

Submit to the Project Environmental Officer 7 DAYS PRIOR to ground disturbing works

Site:			
Project Manager:		**Department:**	
Commencement date:		**Estimated completion date:**	
Size of area to clear:		**Date of application:**	
Map *(must be attached)* ❑	**Photos: Yes ❑ No ❑**	**Est. No. Trees to be removed**	
Equipment to be Used:		**Mining Licence Number:**	

Purpose of clearing

Map showing area to be cleared

APPENDIX H – STANDARD OPERATING PROCEDURE – WATER QUALITY MONITORING

APPENDIX I – STANDARD OPERATING PROCEDURE – AIR QUALITY MONITORING

APPENDIX J – STANDARD OPERATING PROCEDURE – AMBIENT NOISE MONITORING

APPENDIX K – SUPPORTING DOCUMENTS

1.0 INTRODUCTION

The main objective of this procedure is to manage and contain the spill thereby minimizing adverse effects on the environment. The procedure is also intended to ensure the safety of site personnel and nearby community.

2.0 GENERAL PROCEDURES

If you recognize a hazardous spill:

- Move away from spill
- Alert others and restrict access to the spill area
- If the spill occurs indoor, close door and windows to control ventilation. Turn off fans, heaters, etc.
- Alert company specialists of situation.
- Do not attempt to contain material unless you are trained and equipped to do so
- Identify material only if this can be done safely
- Call emergency numbers
- Alert responding medical personnel (on site or outside of the site) if victim has been contaminated by toxic material.

3.0 SPECIFIC PROCEDURES

3.1 Hydrocarbon Spills

PROCEDURE:

- Supervisor will inspect and assess the spillage area.
- Supervisor will ensure all personnel near the area are notified of the spill occurrence and personnel involved in the leak clean up and repairs preparation have suitable protective clothing including. No special PPE is required but a dust mask is recommended.
- The source of the spill will be isolated to prevent the spill from becoming larger
- Spills should be cleaned up by means of absorption, which typically converts the liquid spill into a solid for easy clean up
- The spill material is then disposed – the disposal method is dependent on the extent and nature of the spill
- Report the spill to the Environmental Officer on site

3.2 Acid Spills

Acid spills should be neutralized first before being pumped to the tails hopper, as they can cause fumes if pumped directly to the tails hopper.

Personal Protective Equipment:

- Standard Site PPE
- Rubber gloves (full length)
- Mono-goggles/Face shield
- Yellow protective coat and pants (2x)
- Full length chemical apron (1x)
- Respirator (2x)

Procedures

Step	Action	Notes
1	Examine the size of the acid spill. If it is less than 50 liters then dilute with approximately 15minutes of hosing before pumping to the tails hopper	Do not hose directly into the acid
2	If spill is outside of bunded area attempt to contain spill with earthen containment If it is more than 50liters, notify your supervisor immediately before proceeding Sentry will be required	An investigation into the cause of the spill will be required Any spill outside a bunded area or the release of a hazardous gas must have an environmental incident report written up
3	Notify downwind personnel of spill and evacuate as necessary	Contact emergency number if necessary
4	Call for an assistant to help you with the task of neutralizing the spill. You must have two people present at all times in case of any incidents occurring	
5	Put on the required PPE.	A full-face respirator, pair of long gloves, yellow protective coat and pants, and full-length apron is required
6	With the use of the forklift, bring the pallet of soda ash (in the reagents shed) to the acid spill	
7	Estimate the size of the spill. Every 50L of acid will require a 25kg bag of soda ash to neutralize it	
8	The sentry must be wearing the required PPE as well and should stand back for the following steps (respirator can be hanging around your neck)	A full-face respirator, pair of long gloves and yellow protective coat and pants is required for the sentry
9	Carefully put the required amount of soda ash into an unaffected area. If this is not possible (i.e. the bund floor is totally covered in acid solution) carefully pour all of the required amount into a neat pile into a corner of the bund	The reaction between the acid and the soda ash is violent and bubbling will occur, this is just carbon dioxide gas forming and is not harmful, however it will cause the solution to splash around so make sure all due care is taken when adding the two together
10	Using a hose slowly pout water onto the pile of soda ash and gently mix it into the acid solution	Be careful not to splash acid solution on to yourself or others

Step	Action	Notes
11	Once all of the soda ash has been mixed into the acid solution, more water can be added to ensure it has been diluted as much as possible	
12	Start the sump pump to dispose of the neutralized acid. Hose out the bund to remove all traces of acid and soda ash	
13	Clean the chemical aprons thoroughly with water and dry it before placing it back in the green plastic bag	
14	Dispose of the red rubber gloves and issue new ones from the store, place them in the green plastic bag	
15	Issue soda ash from the store to replace the once used. There must be 10 bags of soda ash available at all times from the reagent shed	
16	Notify your supervisor that you have disposed of the acid spill and assist with the investigation if required. Have the supervisor declare the area safe	Incident report or environmental spill report must be submitted within 24hours of incident