Submitted to: Uis Tin Mining Company (Pty) Ltd.
Attention: Mr Efraim Tourob
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REPORT:

UIS TIN MINE – ESIA REPORT FOR THE STAGE II EXPANSION OF THE PILOT TIN PROCESSING PLANT INCLUDING A BULK SAMPLE, SORTING AND TESTING FACILITY ON ML 134

PROJECT NUMBER: ECC-84-284-REP-14-D

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Project Name:	Uis Tin Mine – ESIA report for the Stage II expansion of the pilot tin processing plant including a bulk sample, sorting and testing facility on ML 134
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Client Name:	Mr Efraim Tourob
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EXECUTIVE SUMMARY

Environmental Compliance Consultancy (Pty) Ltd (ECC) has been contracted by Uis Tin Mining Company (Pty) Ltd., a subsidiary of Andrada Mining (Pty) Ltd. to undertake an environmental and social impact assessment (ESIA). Uis Tin Mining Company (Pty) Ltd. is the Proponent for the proposed Project.

ECC has conducted an ESIA for the proposed amendment to the stage II expansion of the pilot tin processing plant, the construction and operation of a new bulk sample sorting and testing facility, and continued mining activities on Mining Licence (ML) 134 in the Erongo Region, Namibia. The proposed Project will be referred to as the "Uis Stage II Project" or the "Project" herein.

In terms of the Namibian Environmental Management Act, 2007 and its regulations, the Ministry of Mines and Energy (MME) is the competent authority for the proposed Project. Mining operations trigger listed activities in terms of the Act, and as such, require an environmental clearance certificate.

SCREENING PHASE

A high-level ESIA formed part of the company's published preliminary economic assessment (PEA) and was incorporated into the screening phase. Alternatives considered on the Project were limited to technological designs of the comminution and processing machinery, and placement within the already disturbed footprint. Water supply alternatives were also considered.

The screening phase determined that the most likely potential environmental and social impacts could include:

- Surface and groundwater impacts
- Impacts on road users
- Visual impacts affecting the sense of place
- Impacts on air quality
- Social impacts during construction, operations, and post-closure
- Habitat alteration and impacts on biodiversity.

SCOPING PHASE

The objective of the scoping Phase 1 is to obtain an understanding of the biophysical and socioeconomic environment in which the Project is located. It also provides an opportunity for the public to have input into the scope of the assessment. The technical inputs combined with the inputs from the interested and affected parties (I&APs) led to the development of the

Terms of Reference (ToR) for the assessment phase. The following sources of information were used during the preparation of the scoping report and assessment process:

- Desktop and literature research
- Site visits by ECC and specialists
- Environmental monitoring data
- Specialist baseline studies, including:
    - Acid-base accounting (ongoing geochemical study)
    - Air quality
    - Biodiversity study
    - Heritage and archaeology study
    - Noise
    - Road traffic study
    - Socioeconomic baseline
    - Soil sampling and analysis (ongoing study)
    - Surface and groundwater studies (ongoing study)
    - Visual impacts on sense of place.

TERMS OF REFERENCE

The ToR within the scoping report proposed the assessment phase will cover the following:

- Acid mine drainage impact assessment
- Surface and groundwater impact assessment
- Biodiversity impact assessment
- Noise impact assessment
- Air quality impact assessment
- Traffic impact assessment
- Visual impact assessment
- Socioeconomic impact assessment
- Heritage impact assessment
- Blast and vibration assessment.

The methodology used for assessing impacts was described in the scoping report and is set out in chapter 6 of this assessment report. A hierarchical decision-making process was followed, to prevent or eliminate, reduce, or offset, mitigate, or manage potential impacts. The draft scoping report and draft environmental management plan (EMP) were provided to the public for review (23 February to 9 March 2022) prior to submission to the competent authority, including MME and MEFT on the 11th of March 2022.

The next stage of the assessment was to undertake the impact assessment. All I&AP comments were responded to, either by providing an explanation or further information in the response table, or by signposting where information exists, or where new information has been included in the ESIA report or appendices. The comments and concerns were considered along with the technical information for completing the assessment and developing mitigation for inclusion in the environmental and social management plan (ESMP).

The draft ESIA report and appendices were available to all stakeholders, and all I&APs were informed of the reports available for review.

This final report and appendices will be formally submitted to the competent authority, first the MME and then to the MEFT as part of the application for an environmental clearance certificate for the proposed Project. The process completed is shown in Figure 1.

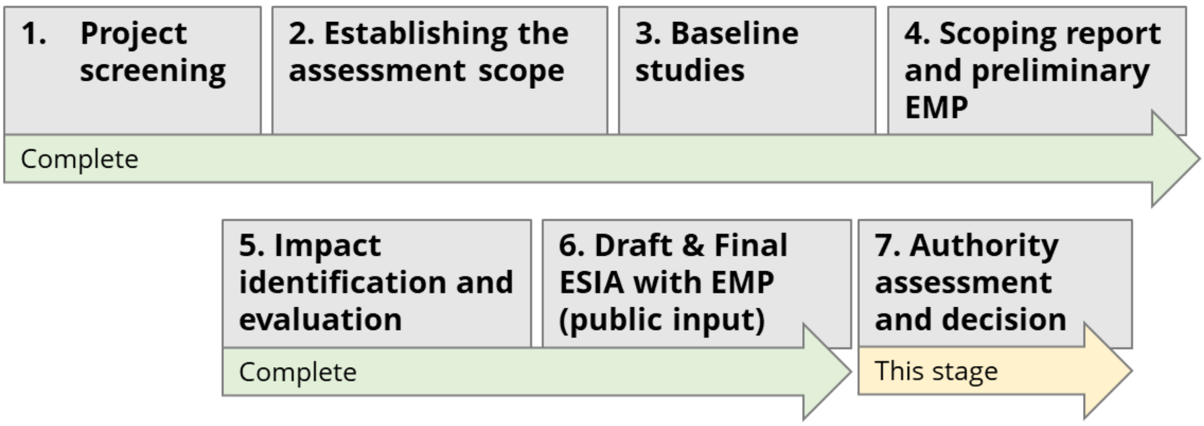

Figure 1 – Simplified Namibian ESIA process noting UTMC progress

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ABBREVIATIONS

ABBREVIATION	DESCRIPTION
APP	Air pressure pulse
CBNRM	Community based natural resource management
CC	Close Corporation
CEO	Chief Executive Officer
CIA	Cumulative impact assessment
COVID	Coronavirus
COVID-19	Coronavirus 2019
CUPB	Cape Cross–Uis Pegmatite Belt
CWC	Clean water channel
dBA	Decibels
DEA	Directorate of Environmental Assessment
DTM	Digital terrain model
DMS	Dense medium separation
DWA	Department Water Affairs
EAP	Environmental assessment practitioner
ECC	Environmental Compliance Consultancy
ECC	Environmental clearance certificate
EHS	Environmental health and safety
EIA	Environmental impact assessment
EMA	Environmental Management Act
EMP	Environmental management plan
EPLs	Exclusive prospecting licences
ESIA	Environmental and social impact assessment
g/t	Grams per tonne
GDP	Gross domestic product
GG	Government gazette
GN	Government notice
GRP	Gas release pulse
HCV	High conservation value
HDPE	High density polyethylene
HIV/AIDS	Human immunodeficiency virus / acquired immunodeficiency syndrome
I&APs	Interested and affected parties
IFC	International Finance Corporation
ITS	ITS Global - traffic engineering consultants
km	Kilometres
km/h	Kilometres per hour
km2	kilometres squared

ABBREVIATION	DESCRIPTION
kV	kilovolts
kW	kilowatt
LOM	life of mine
Ltd	limited
m	metre
m/s	metre per second
m3	cubic metres
m3/day	cubic metres per day
Ma	million years ago
masl	metres above sea level
MAWLR	Ministry of Agriculture, Water and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
mg/m2/day	milligrams per metres squared per day
ML	mining licence
mm	millimetre
Mm3	million cubic metres
MME	Ministry of Mines and Energy (competent authority)
MoWT	Ministry of Works and Transport
Mt	million tonnes per annum
Mtpa	million tonnes per annum
MW	million watts
MSF	metallurgical support facility
N$	Namibian dollar
Na	sodium
NBRI	National Botanical Research Institute
NDP	National Development Plan
NHC	National Heritage Council
NSR	noise sensitive receptor
NT	near-threatened
OECD	Organisation for Economic Co-operation and Development
PCP	pollution control pond
pH	acidity alkalinity unit
PM	particulate matter
PM10	particulate matter with an aerodynamic diameter of less than 10 μm (thoracic particles)
PM2.5	particulate matter with an aerodynamic diameter of less than 2.5 μm (respirable particles)
POI	points of interest

ABBREVIATION	DESCRIPTION
Project	Uis Tin Mine Stage II Project
Proponent	Uis Tin Mining Company (Pty) Ltd
Pty	propriety
Reg	registration
ROM	run of mine
RPP	rock pressure pulse
RWP	return water pond
t	tonnes
TB	tuberculosis
ToR	terms of reference
Tph	tonnes per hour
TSF	tailings storage facility
WHO	World Health Organisation
WRD	waste rock dump
Zn	zinc
μS/cm	microsiemens per cm

1 INTRODUCTION

1.1 COMPANY BACKGROUND

Environmental Compliance Consultancy (ECC) has been contracted by Uis Tin Mining Company (Pty) Ltd (UTMC), the Proponent, a subsidiary of Andrada Mining Limited to undertake an environmental and social impact assessment (ESIA) and an environmental management plan (EMP) in terms of the Environmental Management Act, No 7 of 2007 and its regulations of 2012 for target expansion interventions at UTMC.

The Uis Tin Mine is located in the town of Uis, Erongo Region, Namibia. The mine can be accessed by the C36 road from Omaruru, the C35 from Henties Bay or the C35 from Khorixas. Refer to Figure 2 for the project location.

Andrada Mining has a portfolio of tin assets in Namibia. UTMC, the Namibian registered subsidiary, intends to undertake mechanical and process flow upgrades to its existing tin extraction systems which would allow the mine to produce tantalum as a by-product of the existing process. UTMC also intends to build a bulk sample processing facility adjacent to the existing processing plant at a later stage during the life of operations. 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). Extraction of minerals such as tin, tungsten, tantalum, lithium, copper, silver, and gold will be assessed. Due to the use of hazardous chemicals like hydrofluoric acid, sulphuric acid, and caustic soda in the flotation circuit of the bulk sample processing facility, a waste neutralisation plant will be installed within the bulk sampling, sorting, and testing facility. Acid-bearing waste products (liquid and solid form) will be neutralised before final discard on either the existing waste rock dumps or disposal at the Walvis Bay hazardous waste disposal site via trucks. Monitoring measures (kinetic leach tests) will be implemented at this plant to ensure the final discard material meets safety and environmental standards (inert and unreactive) before final disposal.

The addition of the lithium flotation circuit will undergo an environmental impact assessment amendment application before its addition to the bulk sampling, sorting, and testing facility.

The proposed Project upgrades to the current pilot plant's processing and supporting infrastructure will expand production from the current 80 tons per hour (tph) of tin concentrate in Stage I to 120 tph in Stage II.

Ore (cassiterite) will continue to be extracted from the current two open pit mines, which will supply the Stage II operations within the project area of ML 134. Petalite bearing ore will be separated from overburden, sorted and prepared in the newly proposed bulk sampling, sorting, and testing facility. Open-pit V1 will continue to be mined and extended in a southerly direction eventually being merged with Open-pit V2.

The additional changes associated with this assessment and project changes 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.
- 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).

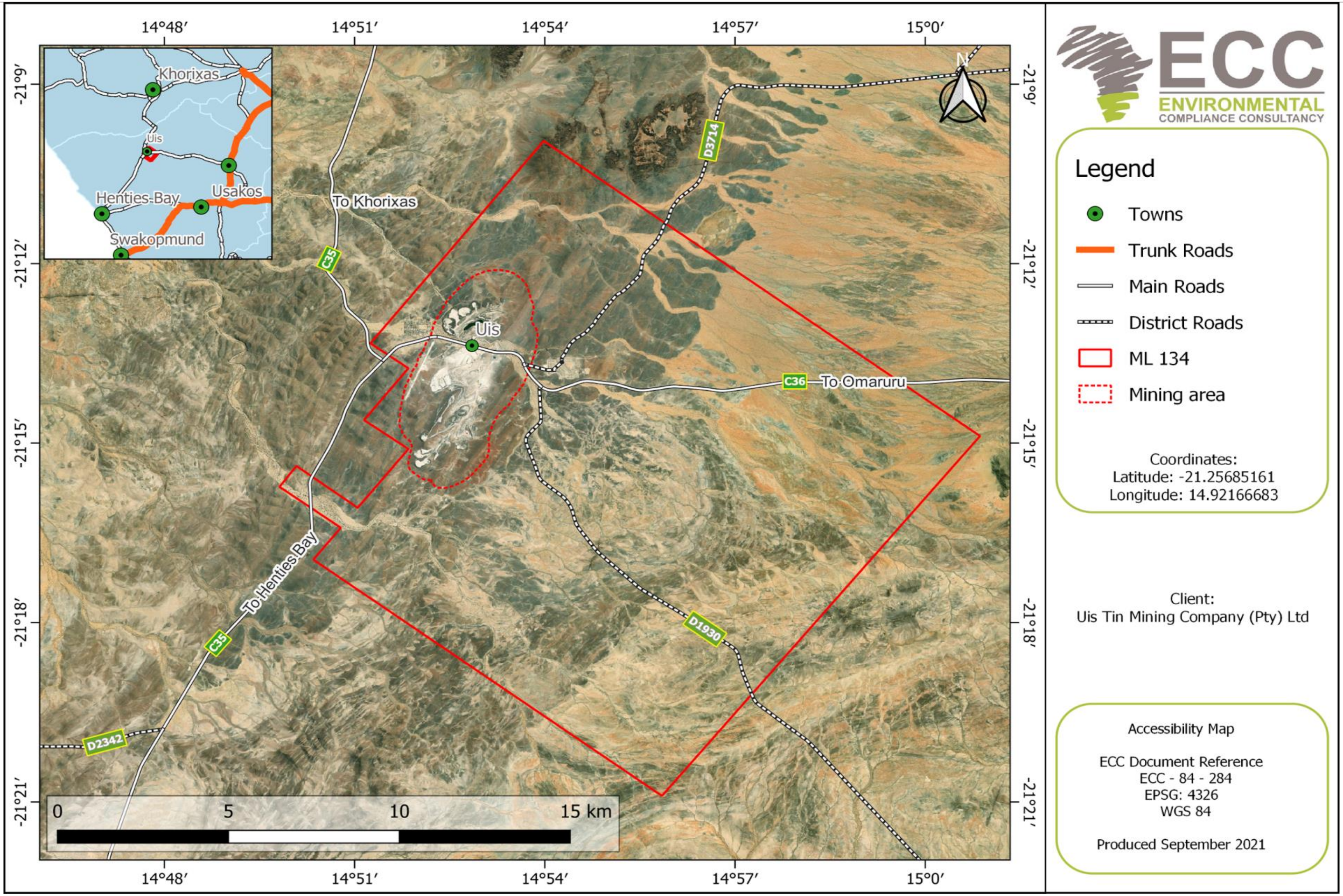

Figure 2 – A map showing the regional location of the Uis tin mining area and ML 134 and access options

1.2 Report purpose

The environmental and social impact assessment (ESIA) has been conducted in terms of the Namibian Environmental Management Act, 2007 and its regulations. This report presents the findings of the assessment, including inputs from stakeholders. In addition to describing the prescribed ESIA process, the report describes the baseline biophysical and socioeconomic environments, provides a project description, provides findings from the assessment phase, and presents a preliminary environmental and social management plan (ESMP) (Appendix A).

The scope of the assessment was determined by undertaking a preliminary assessment of the proposed Project against the receiving environment, obtained through a desktop review, available site-specific literature, monitoring data, site reports, and specialist studies.

The scoping report and appendices were submitted to the public for review (23 February – 9 March 2022), and inputs on the impacts and the related ESIA terms of reference were sought. After the public review period the final scoping report (with public input) was submitted to the Ministry of Mines and Energy (MME) as the competent authority for the Project, and to the Ministry of Environment, Forestry, and Tourism (MEFT) – Directorate of Environmental Affairs (DEA) for their review. The MEFT awarded environmental clearance for the project on the scoping report and issued an environmental clearance certificate on the 8th August 2022.

An addendum report containing the details of the proposed material changes for the project was submitted to the MEFT on the 9th of September 2022. The addendum report supplied additional project details to supplement the scoping report, and was produced to update and confirm the scope of this assessment. The scope of this assessment excludes the construction and operation of the proposed lithium flotation circuit. This will be covered in an assessment once all details, test work, and specialist investigations are finalised.

Once completed, the ESIA report will be shared with registered I&APs for a 14-day review period. The final report will then be sent to the competent authorities, MME and MEFT, for review and a record of decision. The report comprises nine chapters covering the project introduction, ESIA approach, legal environmental requirements, potential impact assessment, screening and scoping results, impact evaluation methodology, impact assessment findings, conclusion, and bibliography.

1.3 THE PROPONENT OF THE PROPOSED PROJECT

The Uis Tin Mining Company is the Proponent for the proposed Project. The Proponent holds the rights to the mining licence 134 located in Uis, Erongo Region, Namibia. The Proponents' details are provided in Table 1.

Table 1 – Proponent's details

COMPANY REPRESENTATIVE:	CONTACT DETAILS:
Mr. Efraim Tourob	Uis Tin Mining Company (Pty) Ltd: 4th Avenue East, Number 1, Uis, PO Box 30, Uis efraim.tourob@Andradamining.com +264 (64) 504 404

1.4 ENVIRONMENTAL AND SOCIAL ASSESSMENT PRACTITIONER

Environmental Compliance Consultancy (Pty) Ltd (ECC) (CRN 2022/0593) has prepared this ESIA report and the preliminary ESMP on behalf of the Proponent.

This report was authored by employees of ECC (Appendix C), who have neither material interest in the outcome of this report, nor any interest that could be reasonably regarded as being capable of affecting their independence in the preparation of this report. ECC is independent from the Proponent and has no vested or financial interest in the Project, except for fair remuneration for professional fees rendered based upon agreed commercial rates. Payment of these fees is in no way contingent on the results of this report or the assessment, or a record of decision issued by Government. No member or employee of ECC is, or is intending to be, a director, officer, or any other direct employee of Uis Tin Mining Company (Pty) Ltd. No member or employee of ECC has, or has had, any shareholding in the Uis Tin Mining Company (Pty) Ltd.

All compliance and regulatory requirements regarding this report should be forwarded by email or posted to the following address:

Environmental Compliance Consultancy
PO Box 91193, Klein Windhoek, Namibia
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Email: info@eccenvironmental.com

1.5 ENVIRONMENTAL REQUIREMENTS

The Environmental Management Act, 2007, and its regulations stipulate that an environmental clearance certificate is required before undertaking any of the listed activities that are identified in the Act and its regulations. Potential listed activities triggered by the Project are provided in Table 2.

Table 2 – Activities potentially triggered by the Project

Source: Environmental Management Act, 2007, and its regulations

Listed activity	As defined by the regulations of the Act	Relevance to the project
Energy generation, transmission, and storage activities	The construction of facilities for: (1a) The generation of electricity. (1b) The transmission and supply of electricity.	External diesel generators are in use on site as emergency back-up power supply sources to skeleton operations in the event of a power failure. An existing 66 kilovolt powerline and associated infrastructure located within the Accessory Work Permit area of the ML will continue to be used. No upgrades are needed for the proposed Project.
Waste management, treatment, handling, and disposal activities	2.1 The construction of facilities for waste sites, and the treatment and disposal of waste. 2.2 Any activity entailing a scheduled process referred to in the Atmospheric Pollution Prevention Ordinance Act, 1976. 2.3 The importing, processing, use and recycling, temporary storage, transit, or exporting, of waste.	The following fall within provision 2.2: Any activity entailing a scheduled process referred to in the Atmospheric Pollution Prevention Ordinance, 1976. ○ Mining activities generate dust, monitored monthly. ○ Potential for noxious gas generation and emission. The following aspects fall within this provision: (2.3). The import, processing, use and recycling, temporary storage, transit, or export of waste. A BioMite sewage system has recently replaced the old Clarus Fusion Wastewater Treatment Plant, or WWTP sewage effluent water collection and treatment system. Sewage waste is pumped out of septic tanks onsite every quarter, or when required, by a local contractor and disposed of at the local evaporation ponds.

Listed activity	As defined by the regulations of the Act	Relevance to the project
		A salvage yard collection and storage facility is in use within the area of the facilities. Overburden and processing plant waste minerals (>6mm) are transported and co-disposed on the WRD site located within the mining licence footprint. Solid and hazardous waste collection points are in use on the site. Hazardous waste is disposed of at an approved facility, or in an approved manner as per permitting.
Mining and quarrying activities	3.1 The construction of facilities for any process or activities that require a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation, in terms of the Minerals (Prospecting and Mining) Act, 1992. 3.2 Other forms of mining or extraction of any natural resources, whether regulated by law or not. 3.3 Resource extraction, manipulation, conservation, and related activities.	The current brownfields operations are permitted under an approved mining licence (ML134). The resource, tin and tantalum ore within pegmatite, is mined and extracted within the processing plant to produce tin and tantalum concentrates. The process crushes the ore and separates the denser tin and related minerals (tantalum) from the pegmatite, primarily through gravity type separation. No chemicals are used in the separation process, other than ferrosilicon to enhance dense media separation; the FeSi medium is recovered and reused. The bulk sample, sorting and testing facility will utilise sensors containing radioactive sources to sort ore and chemical reagents

Listed activity	As defined by the regulations of the Act	Relevance to the project
		(hydrofluoric, sulphuric acid and caustic soda) in the petalite lithium concentrator plant.
Forestry activities	4. The clearance of forest areas, deforestation, afforestation, timber harvesting, or any other related activity that requires authorisation in terms of the Forest Act, 2001 (No. 12 of 2001) or any other law.	Vegetation clearing will be required for site construction and infrastructure establishment. Necessary licences and permits will be obtained for the clearing of protected species Before operations, vegetation clearing will be required. Vegetation may also be removed as the project develops
Water resource developments	8.1 The abstraction of ground or surface water for industrial or commercial purposes. 8.2 The abstraction of groundwater at a volume exceeding the threshold authorised in terms of the law relating to water resources. 8.5 Construction of dams, reservoirs, levees, and weirs. 8.6 Construction of industrial and domestic wastewater treatment plants and related pipeline systems. 8.8 Construction and other activities in watercourses within flood lines. 8.9 Construction and other activities within a catchment area.	– Mining operations will continue to utilize groundwater and surface water sources for their processing requirements, and dust suppression. Potable water will continue to be sourced from NamWater. – Currently, there is an abstraction permit that allows for 150 000 cubic meters abstraction threshold per year valid for three years. This was increased from the 75 000 cubic meters authorised volume to supply production needs. – The Project will entail the installation of a new clean water channel (CWC) stormwater channel and berm around the processing plant as well as an upgrade of the existing settling and water return ponds, all to increase the availability of recycle and reusable water. – The Project falls within the Ugab catchment area.
Hazardous substance treatment,	9.1 The manufacturing, storage, handling, or processing of hazardous substance defined in the Hazardous Substances Ordinance, 1974.	The mining operations and proposed process plant triggers this activity, as both fuel and hazardous substances are required for mining and processing.

Listed activity	As defined by the regulations of the Act	Relevance to the project
handling, and storage	9.2 Any process or activity that requires a permit, licence, or other form of authorisation, or the modification of, or changes to, existing facilities for any process or activity that requires amendment of an existing permit, licence or authorisation, or which requires a new permit, licence or authorisation in terms of governing the generation or release of emissions, pollution, effluent, or waste. 9.4 The storage and handling of dangerous goods, including petrol, diesel, liquid petroleum, gas, or paraffin, in containers with the combined capacity of more than 30 cubic meters at one location.	Bulk fuel is stored onsite for refuelling the mining fleet and for backup power from onsite generators. Consumer installation certificates are required for bulk fuel storage and dispensing. Hazardous reagents will be used within the petalite lithium beneficiation plant, in addition to the current fuels and lubricants and related maintenance and consumable hydrocarbons and petrochemical for operating and maintaining the fleet. Licences will be obtained for hazardous substances and their storage and use on site. The relevant certificate to erect a building that will store and use hazardous chemicals (i.e., Hydrofluoric and sulphuric acid) will also be obtained.

2APPROACH TO THE ASSESSMENT

2.1 PURPOSE AND SCOPE OF THE ASSESSMENT

The aim of this assessment is to provide a summary of the project, the environmental and social baseline conditions, the summary of assessment process and methodology, legal requirements, a list of aspects and specialists investigations, a determination of which impacts are likely to be significant, mitigation required to management the potential impacts, and an environmental and social management plan.

2.2 THE ASSESSMENT PROCESS

The ESIA methodology applied to this assessment has been developed using the International Finance Corporation (IFC) standards and models, in particular Performance Standard 1: Assessment and management of environmental and social risks and impacts (International Finance Corporation, 2012 and 2017); Namibian Draft Procedures and Guidance for EIA and EMP (Republic of Namibia, 2008); international and national best practice guidelines; and combined relevant ESIA experience.

This assessment is a formal process. The potential effects that the Project will have on the biophysical, social, and economic environments are identified, assessed, and documented so that the breadth and significance of potential impacts can be taken into account when considering a record of decision for the proposed Project.

Final mitigation measures and recommendations are based on the cumulative experience of the consulting team (including the contracted specialists) and the client, taking into consideration the potential environmental and social impacts. The process followed, through the basic assessment, is illustrated in Figure 3 and is detailed further in the following sections.

1. Project screening

Complete

The first stages in the ESIA process are to undertake a screening exercise to determine whether the Project triggers listed activities under the Environmental Management Act, 2007, and its regulations. The screening phase of the Project is a preliminary analysis, in order to determine ways in which the Project might interact with the biophysical, social, and economic environments.

Stakeholder engagement:

- Registration of the project
- Preparation of the BID

2. Establishing the assessment scope

Complete

Where an ESIA is required, the second stage is to scope the assessment. The main aim of this stage is to determine which impacts are likely to be significant; to scope the available data and any gaps that need to be filled; to determine the spatial and temporal scope; and to identify the assessment methodology.

The scope of this assessment was determined through undertaking a preliminary assessment of the proposed Project against the receiving environment. Feedback from consultation with the public and the Proponent informs this process. The following environmental and social topics were scoped into the assessment, as there was the potential for significant impacts to occur. Impacts that are identified as potentially significant during the screening and scoping phase are taken forward for further assessment in the ESIA process. These are:

BIOPHYSICAL ENVIRONMENT

- Noise and air quality, including dust emissions
- Surface and ground water
- Heritage and culture
- Biodiversity
- Soils

SOCIAL ENVIRONMENT

- Socio-economic
- Air quality
- Traffic
- Occupational health and safety
- Ground vibration and fly rock from blasting
- Heritage and archaeology
- Noise disturbance assessment
- Visual and sense of place

The following topics were scoped out of the ESIA, and they are therefore not discussed further in this report.

- An assessment of safety impacts or risks associated with exploration are not included within the scope of this assessment and will be addressed by the Proponent in a site-specific safety management plan.

3. Baseline studies

Complete

A robust baseline is required, in order to provide a reference point against which any future changes associated with a Project can be assessed, and to allow suitable mitigation and monitoring to be identified.

The project area has been studied extensively from 2019 – 2022 utilising various specialist works for various purposes. This literature was available to be referenced. The Project site-specific area has been studied as part of the ESIA process, and the following has been conducted as part of this assessment:

- Desktop studies
- Consultation with stakeholders
- Specialist studies

The environmental and social baselines are provided in the scoping study.

4. Draft scoping report and EMP

Complete

The scoping report documents the findings of the current process and provides stakeholders with an opportunity to comment and continue the consultation that forms part of the environmental assessment. The EMP provides measures to manage the environmental and social impacts of the proposed Project, and outlines the specific roles and responsibilities required in order to fulfil the management plan.

This scoping report focuses on describing the ESIA process, project description, baseline description and Terms of Reference for the assessment phase.

This report was issued to stakeholders and I&APs for consultation, for a period of 14 days, meeting the mandatory requirement as set out in the Environmental Management Act, Act 7 of 2007. The aim of this stage is to ensure that all stakeholders and I&APs have an opportunity to provide comments on the assessment process and to register their concerns, if any.

5. Impact identification and evaluation

Complete

The key stage of the ESIA process is the impact identification and evaluation stage. This stage is the process of bringing together Project characteristics with the baseline environmental characteristics and ensuring that all potentially significant environmental and social impacts are identified and assessed. It is an iterative process that commences at Project inception and ends with the final design and Project implementation. The impact identification and evaluation stages will be updated in the assessment phase.

The final design of the proposed Project will be assessed, along with alternatives that were considered during the design process in accordance with the Environmental Management Act, No 7 of 2007. Section 6 in this report sets out the assessment methodology to be used to assess the Project against the environmental and social baselines that would be affected.

6. Final EIA and EMP

This Stage

All comments received during the I&AP public review period will be collated in an addendum report, which will accompany this scoping report when submitted to the MEFT: DEA. All comments will be responded to, either through providing an explanation or further information in the response table, or by signposting where information exists, or where new information has been included in the ESIA report or appendices. Comments will be considered and where they are deemed to be material to the decision-making, or might enhance the ESIA, they will be incorporated.

The final ESIA report, appendices and the addendum report will be available to all stakeholders and all I&APs will be informed of its availability for review period of 14 days.

The ESIA report, appendices and addendum will be formally submitted to the competent authority (MME), the MEFT: DEA and MFMR as part of the application for an environmental clearance certificate.

7. Authority assessment and decision

Next Step

The Environmental Commissioner, in consultation with other relevant authorities, will assess if the findings of the ESIA presented in the report are acceptable. If deemed acceptable, the Environmental Commissioner will revert to the Proponent with a record of decision and recommendations.

8. Monitoring and auditing

Future Stage

In addition to the EMP being implemented by the Proponent, a monitoring strategy and audit procedure will be determined by the Proponent and competent authority. This will ensure key environmental receptors are monitored over time to establish any significant changes from the baseline environmental conditions, caused by Project activities

Figure 3 – The ESIA process approach – Project screening to post-approval auditing

2.3 STUDY AREA

This ESIA study area has been defined according to the geographic scope of the receiving environment, and potential impacts that could arise because of the proposed Project within that area. The study area encompasses the interior of ML 134, the Uis townlands, the surface, and groundwater resources, in and outbound traffic infrastructure, and the general mining area's spatial footprint. The study area is presented in Figure 4 and Figure 5. The study area extends beyond the mining licence boundary and includes the nearby receptors such as sensitive receptors for each study area and parts of the Uis town.

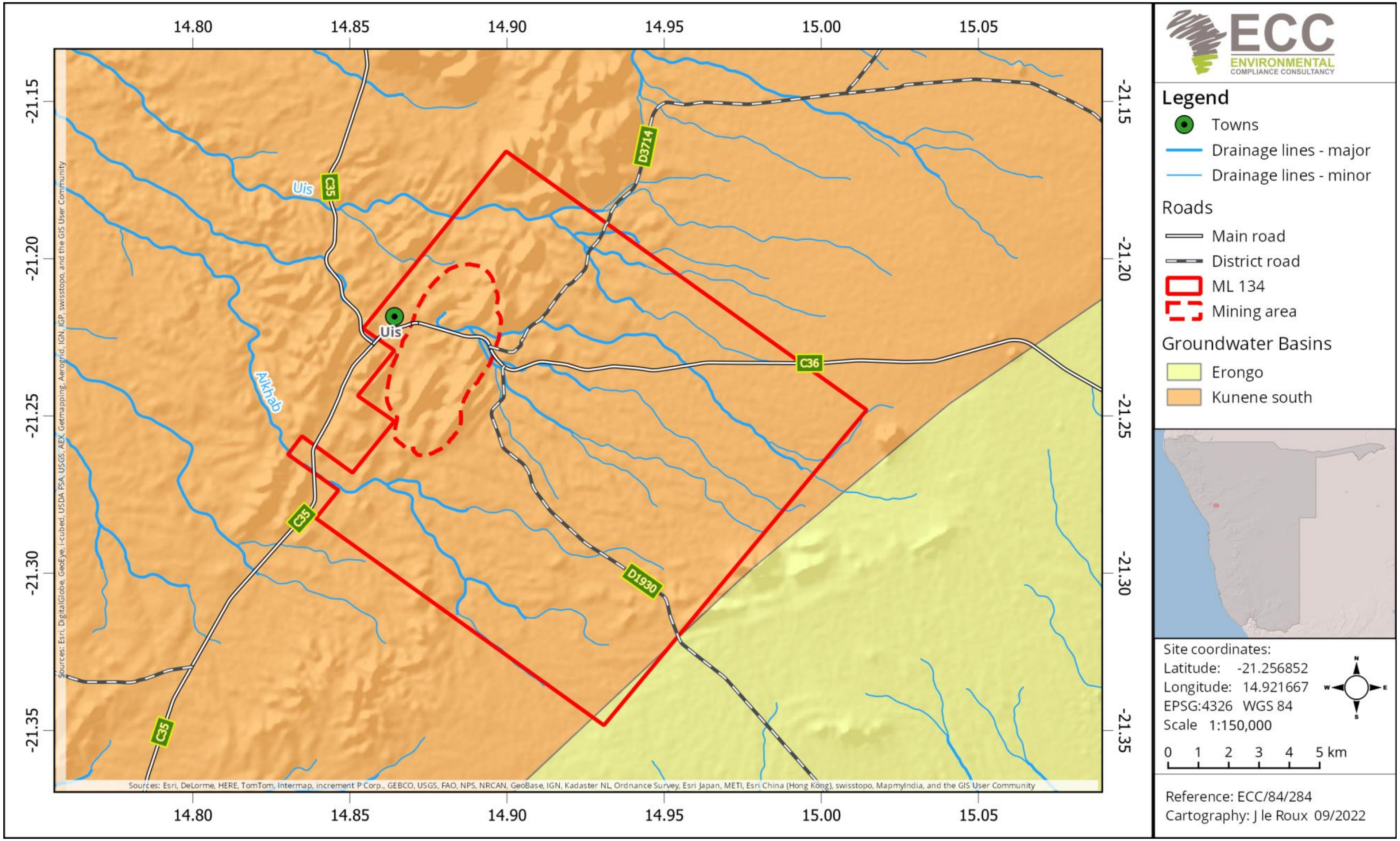


Figure 4 – ESIA study area, linear infrastructure, and regional setting

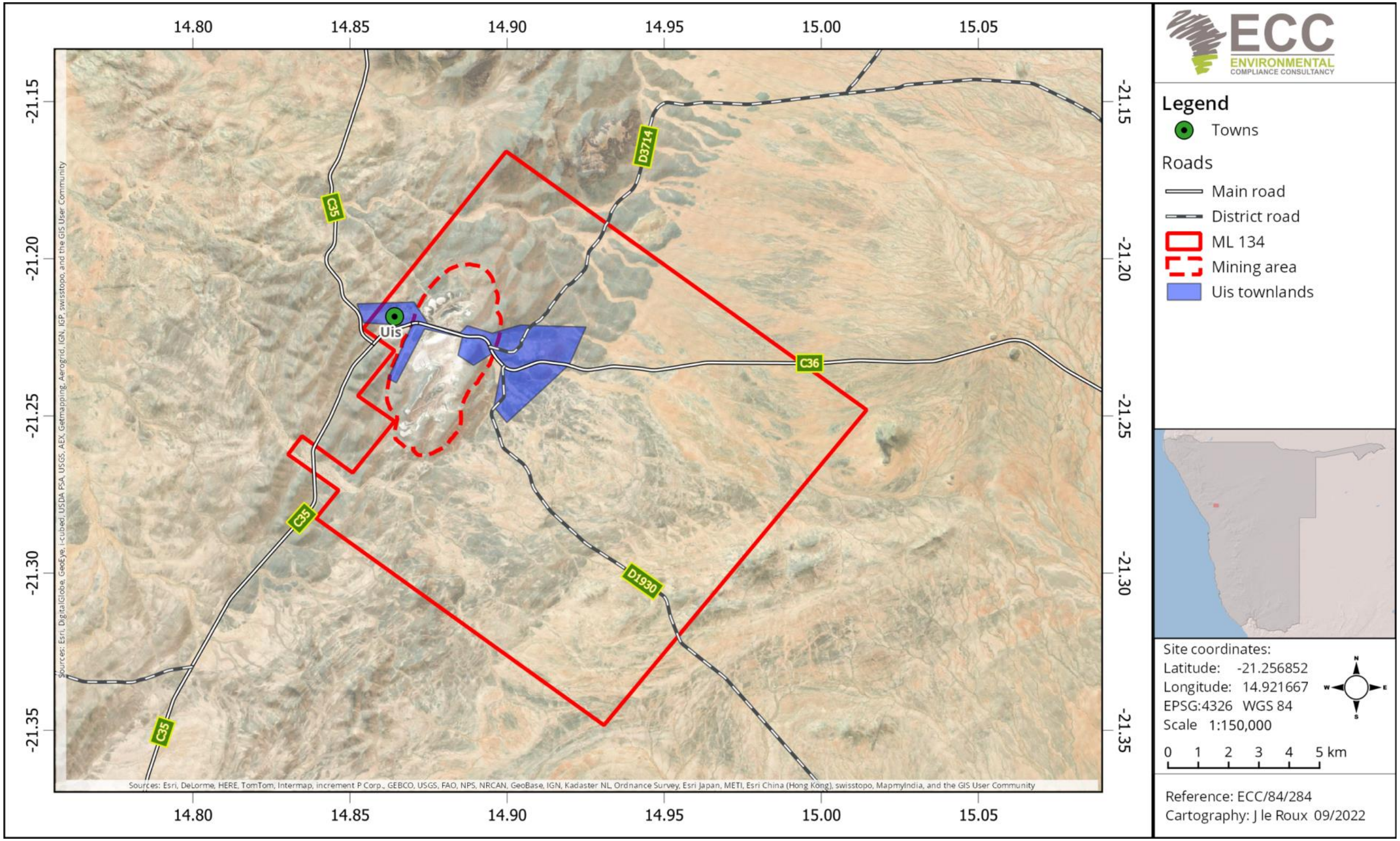


Figure 5 - Mining area, mining licence and townlands

2.4 PUBLIC CONSULTATION

Public participation and consultation is a requirement stipulated in Section 21 of the Regulations of the Environmental Management Act, 2007, for a project that requires an environmental clearance certificate. Consultation is a compulsory and critical component of the ESIA process for achieving transparent decision-making and can provide many benefits. Consultation is ongoing during the ESIA process. The objectives of the public participation and consultation process are to:

- Provide information on the Project, and introduce the overall Project concept and plan in the form of a background information document (BID) and where material changes are added to a project present these in an addendum report;
- Determine the relevant government, regional and local regulating authorities;
- Listen to and understand community issues, record concerns, and questions;
- Explain the process of the ESIA and timeframes involved, and
- Establish a platform for ongoing consultation.

2.4.1 IDENTIFICATION OF KEY STAKEHOLDERS AND INTERESTED OR AFFECTED PARTIES

A stakeholder mapping exercise was undertaken during the scoping phase to identify individual or groups of stakeholders, and the method in which they were engaged during the ESIA process. Stakeholders were approached through direct communication (letters and phone calls), the national press, site notices, or directly by email. The list of stakeholders is included in Appendix B.

A summarised list of stakeholders that were engaged during the public consultation process is given below:

- Directly and indirectly affected landholders
- The general public with an interest in the Project
- Ministry of Environment, Forestry and Tourism (MEFT)
- Ministry of Agriculture, Water and Land Reform (MAWLR)
- Ministry of Mines and Energy (MME)
- Ministry of Works and Transport (MWT) and the Roads Authority
- Ministry of Health and Social Services
- Erongo Regional Council
- Town residents and business owners
- Uis Village Council
- The settlement development committee
- Uis Mining Company Management structure
- Okombahe Traditional Authority
- NamWater and NamPower.

Appendix B provides a list of interested and affected parties, evidence of consultation, including the minutes of public meetings, advertisements in two national newspapers, and a summary of the comments or questions raised by the public. A summary of the key concerns raised during the consultation process is provided in section 2.1.2. A map of the identified stakeholders for the mining licence is illustrated in Figure 6.

The draft ESIA was submitted to the competent authority and I&APs for public review for a period of 14 days from 30 May 2023 to the 13 June 2023. No additional comments or input were received from the public.

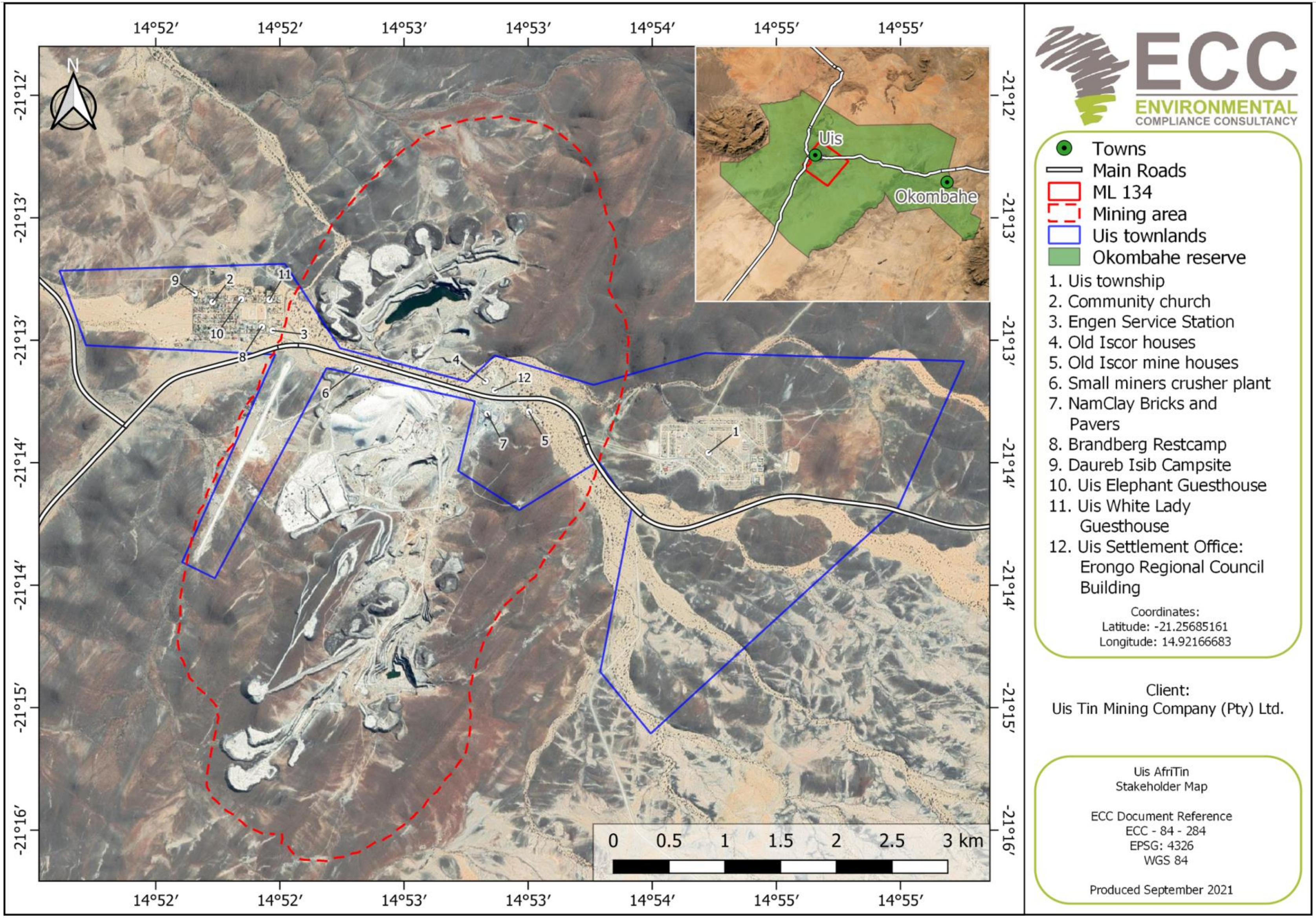


Figure 6 – Stakeholders in and surrounding the mining licence area

2.4.2 SUMMARY OF ISSUES RAISED

During the ESIA process, several stakeholders were engaged for input and feedback on potential issues or concerns regarding the proposed Project. A focus group meeting was held on the 16th of September 2021 at the Uis Settlement Office, but only one attendee showed up for the meeting. A follow-up public meeting was held at the same venue on the 19th of October 2021 with more participants in attendance this time around. Minutes of this meeting and attendance registers can be found in Appendix B. Overall, the proposed Project received significant positive feedback and was well received by the public.

The matters raised could be considered typical concerns for this scale of Project, and these can be summarised as follows:

- Heritage impacts
- Power and water supply
- Waste management
- Waste resource management
- Visual impacts
- Biodiversity impacts
- Socioeconomic and social impacts, such as job creation, training opportunities skills development for youth and unskilled workers, staff housing and accommodation, local housing overall, in migration and informal settlement growth, and the lack of amenities in Uis
- Potential pollution impacts
- Mine closure, and ideas for the site and related assets (pits, mine rock, etc.).

To ensure that interested and affected parties could comment and provide feedback on the initial scoping report, the completed scoping report was circulated to potentially interested and or affected parties, and stakeholders of the Project for a 21-day review period.

The draft ESIA report was circulated to all registered I&APs for an opportunity to review and comment on the findings of the report.

3 REVIEW OF THE LEGAL ENVIRONMENT

This chapter outlines the regulatory framework applicable to the proposed Project. As stated in Section 1, an environmental clearance is required for any activity listed in the Government Notice No. 29 of 2012 of the EMA. The Proponent holds a valid environmental clearance certificate for its current mining (Phase 1) activities.

The Project area is located outside of any national parks, heritage listed areas, or areas of significance. The Project area is not located within a groundwater-controlled area, as regulated under the Water Management Act of 1956.

A thorough review of relevant legislation has been conducted for the proposed Project. Table 3 below identifies relevant legal requirements specific to the Project. Table 4 provides the national policies and plan and Table 5 lists specific permits for the Project.

3.1 National Regulatory Framework

Table 3 – Details of the regulatory framework as it is applied to the proposed Project

ACT	SUMMARY	APPLICABILITY TO THE PROJECT
Constitution of the Republic of Namibia (1990).	The constitution defines the country's position in relation to sustainable development and environmental management. The constitution refers that the state shall actively promote and maintain the welfare of the people by adopting policies aimed at the following: "Maintenance of ecosystems, essential ecological processes and biological diversity of Namibia, and the utilisation of living, natural resources on a sustainable basis for the benefit of all Namibians, both present, and future."	The proposed Project is committed to the sustainable use of the environment, and has aligned its corporate mission, vision, and objectives within the ambit of the Constitution of the Republic of Namibia (1990).
Minerals (Prospecting and Mining) Act No. 33 of 1992.	The Act provides for the granting of various licences related to mining and exploration. Section 50 (i) requires: "An environmental impact assessment indicating the extent of any pollution of the environment before any prospecting operations or mining operations are being carried out, and an estimate of any pollution, if any, likely to be caused by such prospecting operations or mining operations." The Act sets out the requirements associated with licence terms and conditions, such that the holder of a mineral licence shall comply with. The Act also contains relevant provisions for pollution control related to mining activities and land access agreements and provides provisions that mineral licence holders are liable for any damage to land, water, plant, or animal life, caused by spilling or pollution, and must take all such steps as	The proposed mining activity requires an ESIA to be carried out, as it triggers listed activities in the Environmental Management Act's regulations. The Project shall be compliant with Section 76 of the Act with regards to records, maps, plans and financial statements, information, reports, and returns submitted.

ACT	SUMMARY	APPLICABILITY TO THE PROJECT
	may be necessary to remedy such spilling, pollution, loss, or damage, at its own costs.	
Environmental Management Act, 2007 (Act No. 7 of 2007) and its regulations	The Act aims to promote sustainable management of the environment and use of natural resources. The Act requires certain activities to obtain an environmental clearance certificate prior to Project development. The Act states that an EIA should be undertaken and submitted as part of the environmental clearance certificate application process. The MEFT is responsible for the protection and management of Namibia's natural environment. The Department of Environmental Affairs, under the MEFT, is responsible for the administration of the EIA process.	This environmental scoping report documents the findings of the scoping phase of the environmental assessment undertaken for the proposed Project. The process has been undertaken in line with the requirements under the Act and its regulations.
Water Act, 1956 (Act No. 54 of 1956)	Although the Water Resources Management Act (No. 11 of 2013), has been billed, but not promulgated, it cannot be enacted, as the regulations have not been passed – therefore the Water Act of 1956 remains the current piece of legislation relating to water management in Namibia. This Act provides for the control, conservation and use of water for domestic, agricultural, urban, and industrial purposes; and to make provision for the control of certain activities on or in water. The Department of Water Affairs, within the Ministry of Agriculture, Water and Land Reform (MAWLR), is responsible for the administration of the Act.	The Act stipulates obligations to prevent the pollution of water. Measures to minimise potential surface and groundwater pollution are contained in the EMP. The Project is obliged to have all permits relevant to its operations under this Act. Abstraction of water from boreholes requires an abstraction permit to be obtained from the Ministry of Agriculture, Water and Land Reform. The placement of mining infrastructure, such as the tailings storage facility, and the location of industrial effluent storage ponds, require consideration in terms of the Water Act, for example: Condition 4 of

ACT	SUMMARY	APPLICABILITY TO THE PROJECT
		GN 704 – indicates that no person in control of a mine or activity may locate or place any residue deposit, dam, reservoir, together with any structure of other facility within the 1:100-year flood line or within a horizontal distance of 100-metre from any watercourse.
Soil Conservation Act, No. 76 of 1969	This Act makes provision for the prevention and control of soil erosion, and for the protection, improvement, and conservation of soil and vegetation.	The proposed Project is already on an existing and disturbed area, and land may be cleared were necessity. Planned activities will take place within the boundaries of the mining licence and on previously disturbed land. Measures for potential impact due to land clearing will be included in the EMP to ensure conservation of soil and vegetation that will be affected by or used as part of the rehabilitation phase of the Project.
The Forestry Act, No. 12 of 2001 as amended by the Forest Amendment Act, No. 13 of 2005	Section 22 deals with the protection of natural vegetation that is not part of the surveyed erven of a local authority area as defined. Section 23 requires a permit from the Director for the clearance of vegetation on more than 15 ha on any piece of land or several pieces of land situated in the same locality as that which has predominantly woody vegetation; or cut or remove more than 500 cubic metres of forest produce from any piece of land in a period of one year.	The Project activities will require vegetation clearing. The Proponent will ensure that all required permits are in place before vegetation removal commences.
National Heritage Act, No. 27 of 2004.	The Act provides provision for the protection and conservation of places and objects with heritage significance.	Since the proposed Project area is an already operational area, it is unlikely that there is potential for heritage related objects to be found in the

ACT	SUMMARY	APPLICABILITY TO THE PROJECT
	Section 55 compels mining companies to report any archaeological findings to the National Heritage Council. Subsection 9 allows the NHC to issue a consent, subject to any conditions that the Council deems necessary.	mining licence area. However, the relevant stipulations in the Act will be taken into consideration and incorporated into the EMP. In cases where heritage sites are discovered, a generic Chance Find Procedure will be used.
Labour Act, No. 11 of 2007	The Labour Act, No. 11 of 2007 (Regulations relating to the Occupational Health & Safety provisions of Employees at Work, promulgated in terms of Section 101 of the Labour Act, No. 6 of 1992 - GN156, GG 1617 of 1 August 1997)	The Project shall adhere to all labour provisions and guidelines, as enshrined in the Labour Act as a minimum requirement. The Proponent shall ensure industry best practices and international standards used within the mining and processing industry utilising acids shall be applied on site. The Project shall also develop and implement a comprehensive occupational health and safety plan to ensure adequate protection for its personnel throughout the Project lifecycle.
Road Traffic and Transport Act, No. 22 of 1999	This Act makes provision for the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, and the control and regulation of road transport users across Namibia.	The Project will involve normal and specialised transportation activities in support of mining activities. The employees and support business shall adhere to national road regulations on public roads.
Hazardous Substances	This Ordinance provides for the control of toxic substances and can be applied in conjunction with the Atmospheric Pollution Prevention Ordinance, No. 11 of 1976.	The planned Project will involve the handling and storage of hazardous substances such as fuels, reagents, and industrial chemicals. The Proponent

ACT	SUMMARY	APPLICABILITY TO THE PROJECT
Ordinance, No. 14 of 1974	This applies to the manufacture, sale, use, disposal, and dumping of hazardous substances, as well as their import and export.	shall ensure safe handling, transfer, storage, and disposal protocols are developed, implemented, and audited throughout its operations. The Proponent is obliged to ensure that all permits under this Ordinance are obtained prior to Project commencement.
The Atmospheric Pollution Prevention Ordinance, No. 11 of 1976	The Ordinance pertains to the prevention of air pollution, with particular focus on public health, and contains detailed provisions on air pollution matters, including the control of noxious or offensive gases, atmospheric pollution by smoke, dust control, motor vehicle emissions, and other general provisions. Specific attention should be paid to Section 5 (1) (b)" erect or cause to be erected any building or plant, which is intended to be used for the purpose of carrying on any scheduled process in or on any premises, unless he is the holder of a provisional registration certificate authorising the erection of that building or plant for the said purpose…"	The nature of mining activities does generate dust. Activities within the mining operations and processing plant will generate gases, odours, and air pollution. The Proponent will ensure that all measures reasonably practicable will be implemented to reduce and mitigate impacts to air quality, and this will be included in the EMP. Hydrofluoric acid and sulphuric acid are likely to be used in the DMS and flotation circuit (wet system) once this circuit is commissioned in the future. According to Schedule 2 Section 21. Hydrofluoric Acid Works within the Ordinance identifies: b) "processes in which hydrofluoric acid is used" should be permitted. Therefore, the Proponent should apply for the provisional registration certificate issued under

ACT	SUMMARY	APPLICABILITY TO THE PROJECT
		section 6(2)(b)(i) or (3) of this Ordinance utilising the prescribed form.
The Atomic Energy and Radiation Protection Act of 2005	Section 16 (1) Except when such activity is explicitly authorised by a licence, no person may (a) possess any radiation source or nuclear material unless that person has in every case made a notification as contemplated in section 17(1) and an authorisation has been issued in terms of section 17(3). (2) No person may without a licence (b) operate or use any radiation source or instruct, or permit any person in his or her employ or acting in any manner on his or her behalf or promoting his or her interests to operate or use any radiation source. In addition, (4) No person may use or operate any radiation source, unless that source as well as the facilities in which such a source is being operated, is registered as provided by this Act. The periods of storage and transportation may be prescribed for different classes of radiation applied for on the licence.	The Proponent intends to install a sensor-based sorting system within the dry section of the bulk sampling and sorting facility that will use an X-ray transmission (XRT) sorter powered by X-ray technology and a densitometer (density gauge) in the DMS plant within the bulk sample, sorting and testing facility. The Proponent will need to apply for the relevant licence authorising them to be in possession of a radiation source and the operation thereof within the plants.

3.2 NATIONAL POLICES AND PLANS

Table 4 – Namibian national polices and plans applicable to the proposed Project

POLICY OR PLAN	DESCRIPTION	RELEVANCE TO THE PROJECT
Vision 2030	Vision 2030 sets out the nation's development targets and strategies to achieve its national objectives. Vision 2030 states that the overall goal is to improve the quality of life of the Namibian people aligned with the developed world.	The proposed Project shall aim to meet the objectives of Vision 2030 and shall contribute to the overall development of the country through continued employment opportunities and ongoing contributions to the gross domestic product (GDP).
Fifth National Development Plan (NDP5)	The NDP5 is the fifth in a series of seven five-year national development plans that outline the objectives and aspiration of Namibia's long-term vision. The NDP5 pillars are economic progression, social transformation, environmental sustainability, and good governance.	The planned Project supports meeting the objectives of the NDP5 through creating opportunities for continued employment.
The Harambee Prosperity Plan ii (2021 – 2025)	Second Pillar: Economic advancement – ensuring increasing productivity of priority key sectors (including mining) and the development of additional engines of growth, such as new employment opportunities.	The Project will contribute to the continued advancement of the mining industry and create an additional employment generation engine within the regional and national landscape.
Minerals Policy	The Minerals Policy was adopted in 2002 and sets guiding principles and direction for the development of the Namibian mining sector, while communicating the values of the Namibian people.	The planned Project conforms to the Policy, which has been considered through the ESIA process and the production of this report. The Proponent intends to continue to support local spending and procurement.

POLICY OR PLAN	DESCRIPTION	RELEVANCE TO THE PROJECT
	The policy strives to create an enabling environment for local and foreign investments in the mining sector and seeks to maximise the benefits for the Namibian people from the mining sector, while encouraging local participation. The objectives of the Minerals Policy are in line with the objectives of the Fifth National Development Plan that include reduction of poverty, employment creation, and economic empowerment in Namibia.	The Project will comply with the general guidelines of the Policy through the adoption of various legal mechanisms to manage all aspects of the environment effectively and sustainably from the start. The ESIA is one such mechanism to ensure environmental integrity throughout the planned Project's lifecycle.

3.3 Project permits

Table 5 – Specific permits and licence requirements for the proposed Project

Permit or licence	Act / Regulation	Related activities requiring permits	Relevant authority
Environmental clearance certificate	Environmental Management Act, No. 7 of 2007	Required for all listed activities shown in Table 2.	Ministry of Environment, Forestry and Tourism (MEFT)
Mining licence	Section 90 (2) (A) of the Minerals Act, No. 33 of 1992	Written permission from the mining commissioner.	Ministry of Mines and Energy (MME)
Surface rights agreements (mine, infrastructure corridors)	Section 52(1)(A) of the Minerals Act, No. 33 of 1992	Included in the mining licence application. Also required in the permit application for accessory works areas.	Ministry of Mines and Energy (MME)
Exclusive prospecting licences	Section 68 (2) (A) of the Minerals Act, No. 33 of 1992	Written permission from the mining commissioner before prospecting can commence.	Ministry of Mines and Energy (MME)

Permit or licence	Act / Regulation	Related activities requiring permits	Relevant authority
Accessory work permit	Section 90(3) of the Minerals Act, No. 33 of 1992	Written permission from the mining commissioner before accessory works can be erected on an EMP or mining licence area.	Ministry of Mines and Energy (MME)
Permit for boreholes (exploration and water boreholes)	A permit is issued under the Water Act, No. 54 Of 1956 (enforced)	Required before the drilling of boreholes for exploration and the abstraction of water.	Ministry of Agriculture, Water and Land Reform (MAWLR)
Tailings waste disposal permit	A permit is issued under the Water Act, No. 54 of 1956 (enforced)	Required for the disposal of tailings.	Ministry of Agriculture, Water and Land Reform (MAWLR)
Wastewater discharge permit	A permit is issued under the Water Act, No. 54 Of 1956 (enforced) but form types that fall under the Water Act, No. 24 of 2004 are used.	Required for discharge of sewage and/or excess industrial or mine wastewater.	Ministry of Agriculture, Water and Land Reform (MAWLR)
Permit for the clearing of land	The Forest Act, 2001 (Act No. 12 of 2001)	This Act governs the removal of vegetation within 100 m of a water course, or removal of more than 15ha of woody vegetation, or the removal of any protected plant species.	Ministry of Agriculture, Water and Land Reform (MAWLR)
Permit for the destruction of heritage objects and artefacts	The Heritage Act, No. 27 of 2004.	This Act relates to interference with heritage artefacts during the Project life. Heritage sites could potentially be located within the proposed mining licence footprint.	National Heritage Council (NHC)
Consumer installation certificate for bulk fuel storage	Petroleum Products Regulations	A consumer installation certificate is required for bulk fuel storage and dispensing.	Ministry of Mines and Energy (MME)

Permit or licence	Act / Regulation	Related activities requiring permits	Relevant authority
Licence for explosives magazine	Minerals (Prospecting and Mining) Act, No. 33 of 1992; Mine Safety Regulations	This is also covered under the accessory works application.	Ministry of Mines and Energy (MME)
Permit for the storage and use of explosives, and the burning of packaging	Minerals (Prospecting and Mining) Act, No. 33 of 1992; Mine Safety Regulations	Part x (10), explosives and blasting.	Ministry of Mines and Energy (MME)
Provisional registration certificate to erect a building or plant that utilises hydrofluoric acid. HF is a regulated substance under nuclear non-proliferation treaties as it is used in the enrichment of uranium. End users need to apply for an End User Certificate. This certificate will in turn be used to apply for the export licence.	Atmospheric Pollution Prevention Ordinance 11 of 1976	Section 6 (2) (b) (i) or 7 (3) of the Ordinance	Ministry of Health and Social Services (MoHSS)
Application for a licence to use a radiation source as per Section 16 (1)(2) and Section 21 (a) to (i)	Atomic Energy and Radiation Protection Act 5 of 2005	Section 16 (1)(2)	Ministry of Health and Social Services (MoHSS)

3.4 WORLD BANK STANDARDS

The International Finance Corporation (IFC) is a member of the World Bank Group and is the largest global development institution focusing on the private sector in developing countries. Its standards have become a global benchmark for environmental and social performance. They form the basis for the Equator Principles (IFC, 2013), a voluntary environmental and social risk-management framework used by 77 financial institutions worldwide.

The Equator Principles are a framework and set of guidelines for evaluating social and environmental risks in project finance and apply to all new projects with a total capital cost of US$10 million or more, no matter what industry sectors are considered. Depending on the funding mechanism for the project, the Equator Principles may be applicable to this project. If so, the IFC performance standards that may be applicable are provided in Table 6 below.

Table 6 – Applicable IFC Performance Standards

IFC Standards	Relevance
Performance standard 1	Assessment and management of environmental and social risks and impacts
Performance standard 2	Labour and working conditions performance standard
Performance standard 3	Resource efficiency and pollution prevention performance
Performance standard 4	Community health, safety, and security
Performance standard 5	Land acquisition and involuntary resettlement
Performance standard 6	Biodiversity conservation and sustainable management of living natural resources
Performance standard 8	Cultural heritage

4 PROJECT DESCRIPTION

4.1 BACKGROUND

In 2018 the Uis Tin Mine infrastructure development commenced on the historical Uis Tin Mine located adjacent to the Uis mining village which was built and developed to support the historical mine.

A Definitive Feasibility Study (DFS) hereinafter referred to as DFS was conducted between October 2020 and December 2020 for the expansion of production at Uis Tin Mining Company with the intention to fast-track opportunities to implement Stage II of Phase 1 by leveraging the mine's existing capabilities to increase tin production and finding feasible opportunities to add by-products to the operation. During 2021 and 2022, the mine embarked on additional metallurgical test work investigating the feasibility of extracting and processing lithium concentrate on a pilot scale. Results were positive at a 10% production rate with a purity level of 94% Li2O5.

The expansion of the materials handling and concentrating plant (Plant) was designed to increase the average overall monthly production from 80 to 120 tonnes of tin concentrate which form the basis for the Stage II expansion methodology. To achieve increased production, selected mechanical systems upgrades within the existing Plant will be applied, a tantalum processing circuit will be added onto the existing Plant and a new bulk sample, sorting, and testing facility will be constructed adjacent to the existing Plant. One such an example of a mechanical upgrade entails increasing the ore feed rate by 50% in the existing circuits. Other mechanical improvements to the operation of the tin and tantalum concentrating circuits will be applied to continue to achieve a consistent recovery of ore (DFS, 2021). This will be achieved by:

- Increasing the throughput capacity by 50% to 120 tph, which can be achieved by modular expansion of individual circuits;
- Improving the overall recovery of tin from 60% to 70% (currently at 64%) by adding beneficiation capacity for tailings streams in the concentrator, which are currently discarded;
- Introducing a tantalum (Ta) by-product stream and targeting a recovery of 10% at the initial production stage;
- Improving the overall recovery of tantalum from 15% to 30% by optimising liberation between the tin- and tantalum-bearing minerals, which includes improved magnetic separation efficiency, and

- Introducing another by-product in the form of petalite concentrate (lithium concentrate) which is used in the ceramic industry with the potential to be used in the production of lithium batteries.

The Project requires a capital investment of approximately N$100 million and will be financed by a financial investment institution.

4.2 THE TRANSITION FROM HISTORICAL TO CURRENT MINING

The historical tin mine, under ownership by ISCOR, extracted ore from 14 different pegmatite ore bodies spread over an area of approximately 2 km east-west and 4 km north-south (Figure 7). The historical mine did not conduct rehabilitation work on its open pits and waste rock dumps leaving access to previously developed mining faces. These open pit faces are currently being mined further under ML 134 issued to UTMC, therefore eliminating the need for major pre-stripping or costly mining development work (DFS, 2021).

Since Uis Tin Mining Company (Pty) Ltd took ownership of the mine in 2018, construction of the Pilot Phase 1 Stage I tin ore processing and concentrating infrastructure and establishing supporting infrastructure for the mining and processing operations was developed and completed in 2019.

This strategy allowed UTMC to initially focus on the production of tin concentrate (cassiterite mineral) which also contains tantalum (columbite-tantalite) and lithium (as petalite). By the end of December 2020, more than 312 tonnes of tin concentrate at a grade exceeding 60% Sn had been produced and exported to the Thailand Smelting and Refining Company Ltd ("Thaisarco") under a fixed off-take agreement (DFS, 2021). The off-take agreement payable price is directly linked to the LME tin price at the date of sale (DFS, 2021). The ramp-up construction work is anticipated to take approximately six months to complete with initial by-product production envisioned to commence in late 2022.

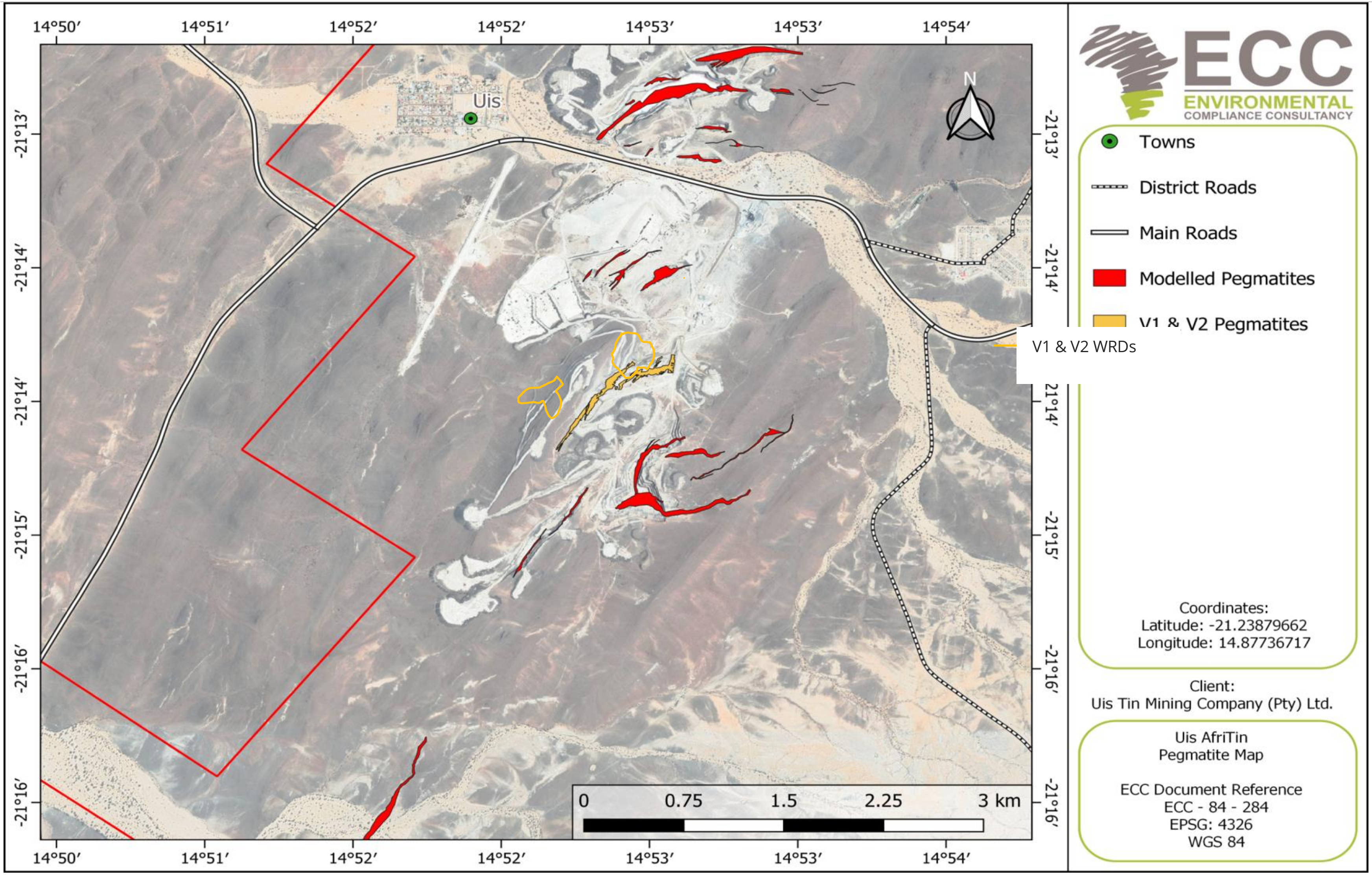


Figure 7 - Historical open pits and pegmatite-tin ore.

4.3 Need for the project

Mining activities contribute to the national and local economies of Namibia. UTMC expects the development and operation of the proposed Phase 1 Stage II mining and additional processing activities to have a positive impact on the Namibian economy. Mining is a significant economic driver and source of investment in Namibia (Uusiku, 2021). The Namibian economy can expect sustained benefits from revenues created during the operational phase of the Stage II expansion program, in the form of royalties and taxes during the life of mine (LoM). Additionally, the operation of the mine will create a positive contribution towards employment both locally and regionally.

UTMC has achieved steady-state production with the Phase 1 pilot plant and recorded a month-on-month increase in Plant throughput. Currently, the Plant production is consistently achieving and surpassing design capacity. UTMC plans to enhance its profitability by increasing the plant's production capacity further in three successive stages. The scope of the ESIA is limited to existing operations and proposed Stage II operations.

UTMC intends to add a bulk sample, sorting and testing facility adjacent to the existing processing plant. The purpose of the bulk sample processing facility is to undertake metallurgical test work on the material (ore) 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). Extraction of minerals such as tin, tungsten, tantalum, lithium, copper, silver, and gold will be assessed in this facility. The focus of the mine, however, will be on the extraction of tin, tantalum, and lithium for resale purposes.

The lithium resource is contained within the current orebody, therefore making it operationally viable for lithium concentrate (4% Li_2O_5) to be produced as a saleable by-product of the existing operation. Positive metallurgical test results allow the mine to progress to the design and construction of a lithium pilot plant at Uis (Andrada, 2022) of which the scale and potential impacts stemming from this will be assessed in the ESIA report.

Petalite lithium concentrate produced from the pilot plant within the bulk sampling, sorting, and testing facility is intended for initial sales into the premium glass and ceramic markets, and test material for existing and or prospective converters of lithium ore concentrates to battery-grade lithium (Viljoen, 2022).

The facility is a testing facility, which will not run continuously. Testing campaigns will run for a maximum of 100 hours (approximately 4 days) after which the plant will be stopped for cleaning to prevent contamination between sampling campaigns. It is expected that one, with a maximum of two, testing campaigns will run per month. The facility will comprise a run of mine (ROM) pad, the metallurgical support facility (MSF), the bulk splitting area, and the dense media separation (DMS) and flotation processing facilities. Associated infrastructure will include offices, water storage tanks and treatment facilities, chemical offloading and storage areas, haul roads, and light vehicle roads.

The location of the bulk sample, sorting, and testing facility is shown in Figure 8, Figure 9 and Figure 10.

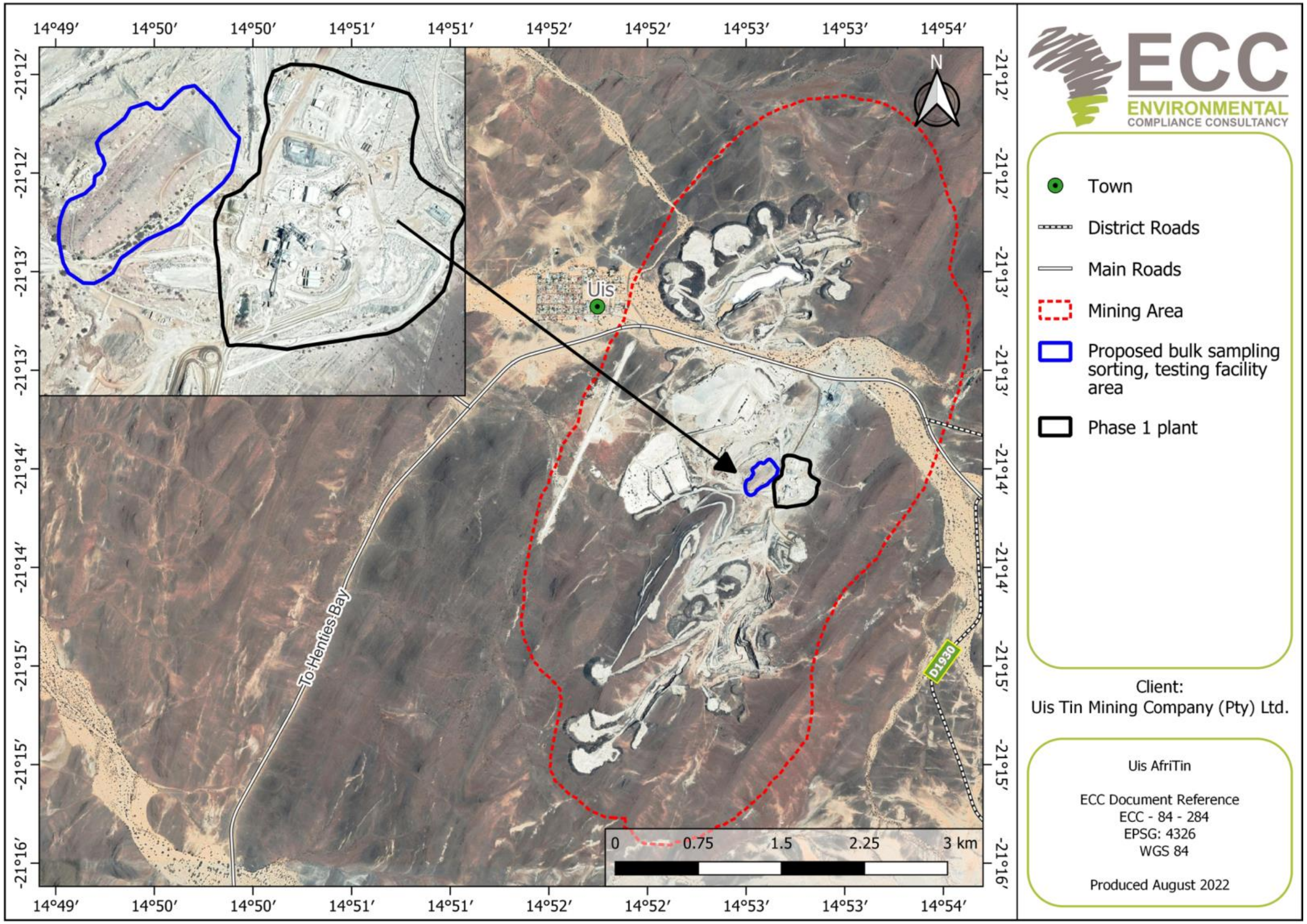


Figure 8 - Position of the bulk sampling, sorting, and testing facility in relation to the existing Sn pilot plant

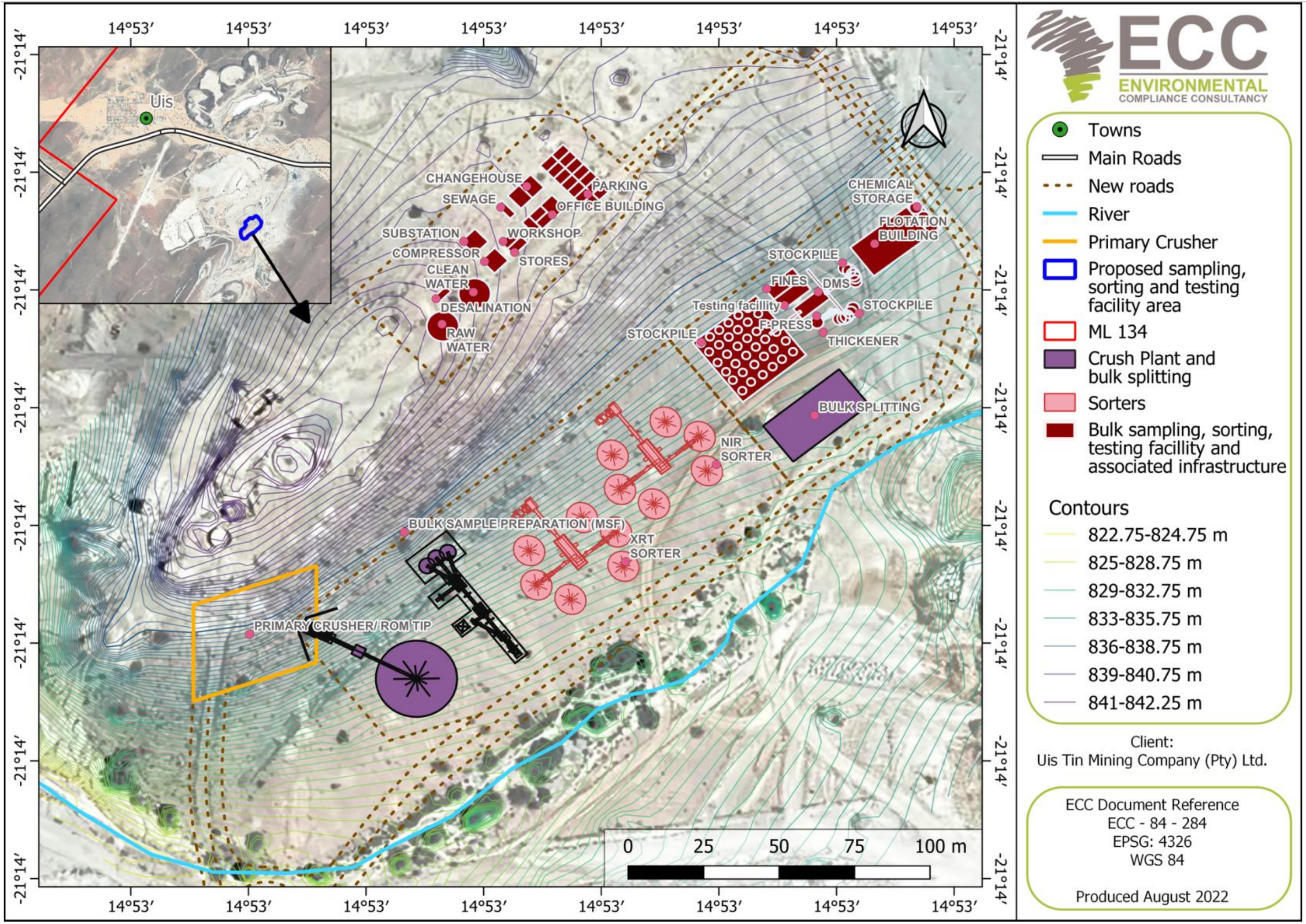


Figure 9 - Location of the bulk sampling, sorting, and testing facility infrastructure and administration block

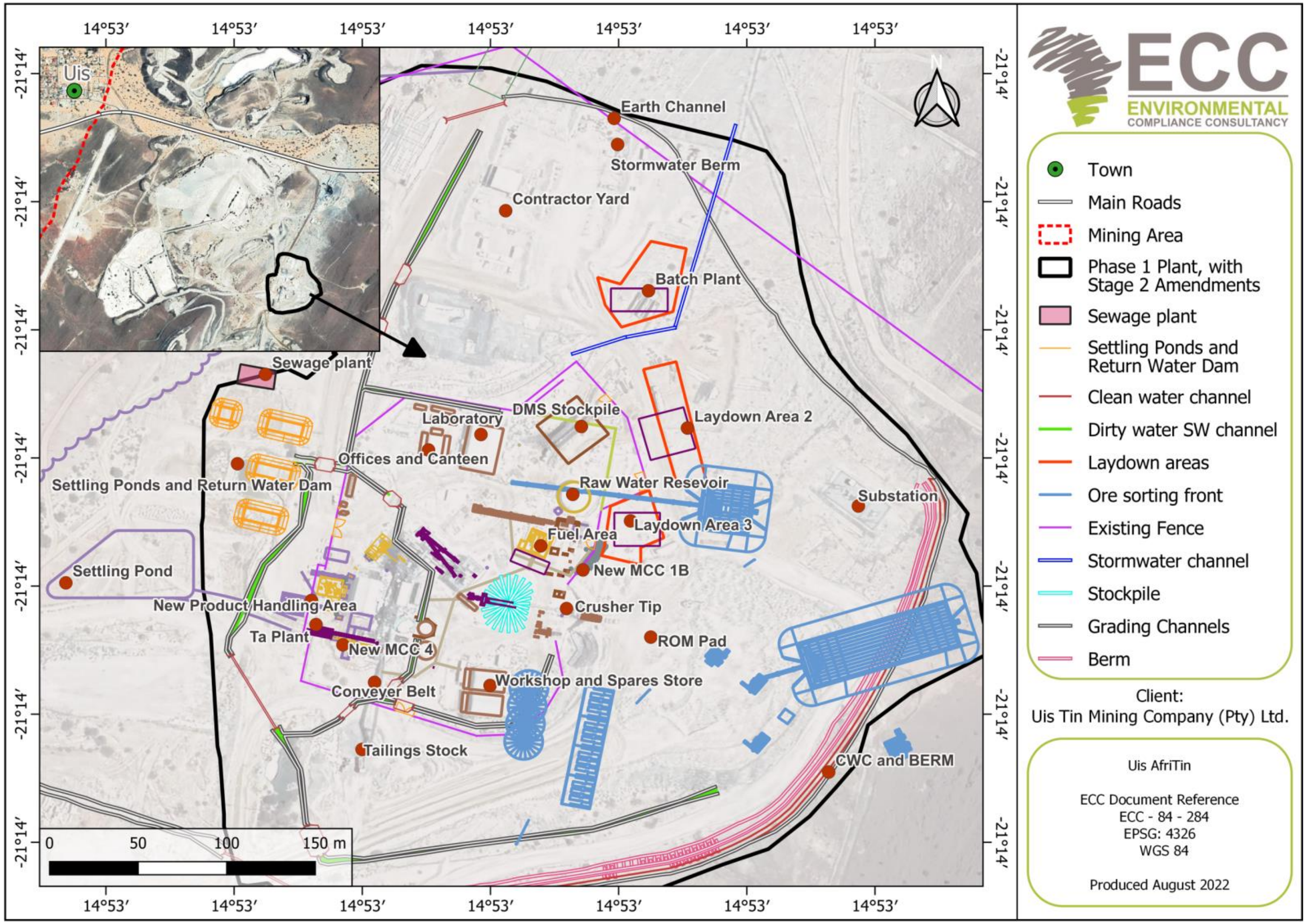


Figure 10 - Existing pilot plant that will undergo modifications for Stage II components

4.4 Access and road conditions

The existing site access is accessed via a T-junction turn-off along the C36 roadway, Figure 11. The control at the mine access is free flow along the C36 and stop/priority controlled on the development exit (ITS, 2022).

From the towns of Henties Bay and Omaruru, access can be gained to other larger towns and cities via tarred roads. The closest larger towns to the Project are Omaruru and Henties Bay located 122 km west and 124 km east, respectively by road from the Project. Walvis Bay is a port city 40 km from Swakopmund by road, with an international airport, and import and export infrastructure. Uis is located approximately 270km northwest of the Namibian capital, Windhoek (DFS, 2021).

There is a boom-control point along this access road at the mine entrance, which is located approximately 500 meters south of the C36 roadway. The mine used to have a secondary access along the C36, however this access is no longer in use by the mine. This secondary access was located approximately 420 meters west from the existing mine access. The current speed limit along the C36 roadway is 100km/h. The required Shoulder Sight Distance (SSD) for this operational speed, is 200 meters for cars and 300 meters for a single unit truck (Urban Transport Guidelines UTG 1).

The available SSD on either side of the road at this exit is approximately 240 meters, which is sufficient for cars, but it is insufficient for trucks. To improve the safety at this exit, it is recommended to reduce the speed limit along the C36 at the mine exit to 80 km/hr, for at least 1 km on either side of the mine access intersection. The required SSD for an 80 km/h design speed environment is 240 meters for trucks. With this reduced speed limit along the C36 to 80 km/h, sufficient SSD would be available for trucks (ITS, 2022).

The condition of the C36 road, near the development, is in relatively poor condition with various spots of cracking and pavement failure. There are various reasons for this type of failure, but it is most likely due to excessive truck loads and excessive travel speeds.

Imports of industrial goods and equipment from South Africa are done via Windhoek via the B1 and B6 main roads, while most imports from overseas come by sea through Walvis Bay. Concentrate export from UTMC is by road and sea via Walvis Bay.

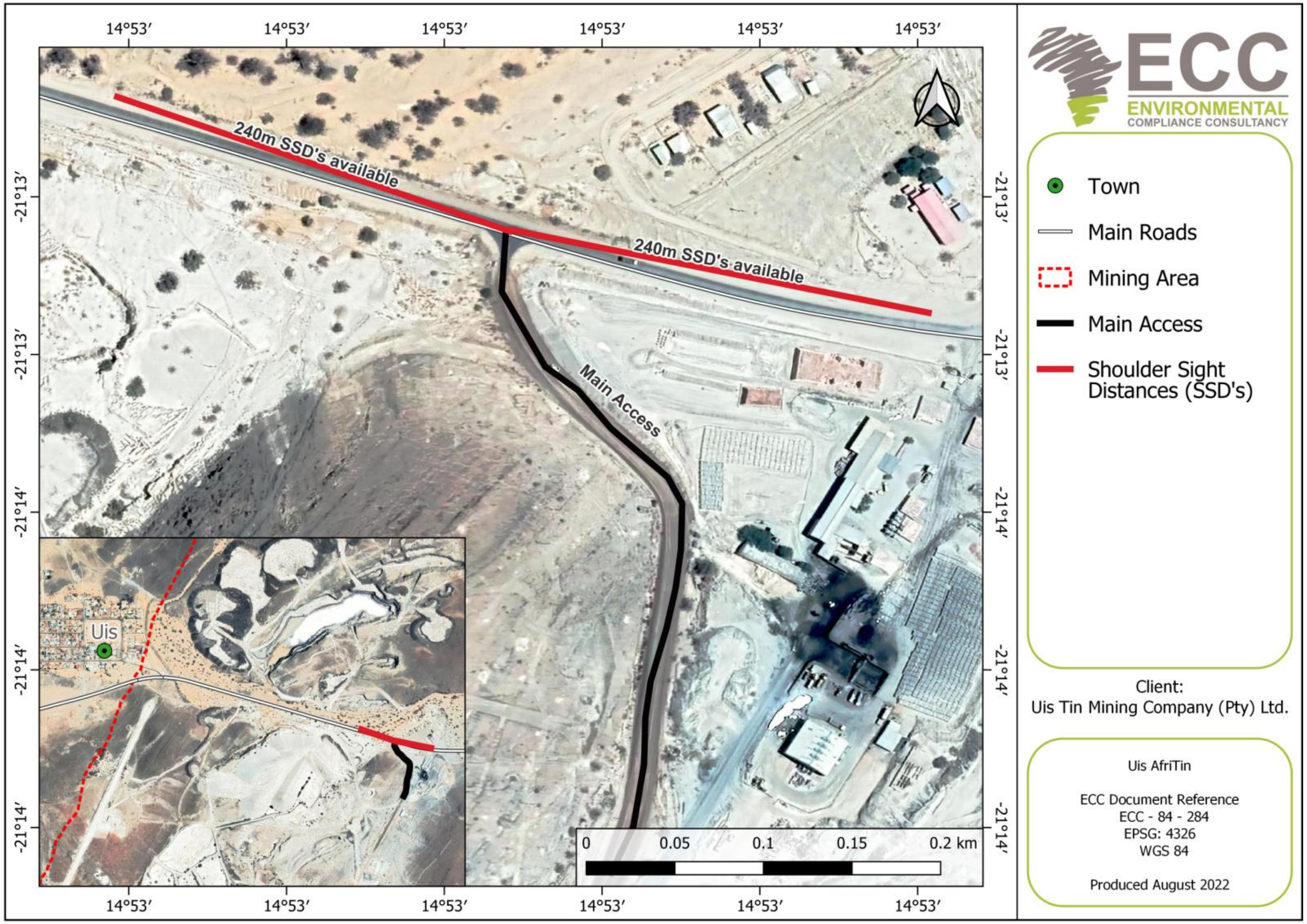


Figure 11 - Directional shoulder sight distance available at the main entrance off the C36

4.5 MINING AND PIT DESIGN PARAMETERS

Typical opencast mining is used to excavate cassiterite-bearing pegmatite ore. The pegmatite is present as large, sub-vertical and outcropping veins up to 100 m in thickness. Phase 1 Stage I and Stage II mining activities will take advantage of the exposed outcrops and accessible mine workings (historical) through conventional open pit mining methods. At a current stripping ratio of 1:1.5 due to the necessity of increased waste removal as pegmatite is mined at depth. The current plan provides a LoM of 18 years with 20 years of processing (DFS, 2021).

An overall pit slope angle design of 55 degrees (crest to crest) was selected using digital measurements on the generated digital terrain model (DTM) therefore limiting mining bench heights to 10 m for stability and operational reasons. The approach forms part of a five-year mine plan that prioritises the reduction of overburden stripping in the initial stages, extracting higher volumes of pegmatite and conversion of ore into saleable tin concentrate for export (DFS, 2021). See Figure 12 illustrating the current ore mining and processing infrastructure placement from an aerial perspective.

Figure 12 - UTMC Mine and Ore Processing Infrastructure (Source: Minxcon, 2020)

The proposed mining method is illustrated below (Figure 13). All mining is completed by contractors. The mining production schedule has been tested and is set to achieve a fixed target per production quarter.

Figure 13 - Proposed Mining Method (Source: Minxcon, 2021)

4.6 MINING FLEET

Mining operations are contracted to Nexus-Ino Mining who is responsible for pit work and haulage. See Table 7 of the current fleet of mining equipment and to be used for the Stage II expansion operations. More mining equipment will be brought in once production is stabilised in line with the design capacities of future stages. Drilling and blasting will be performed on 10 m benches and loading will take place in 2.5 m flitches in the mineralised zones to enhance dilution control.

Table 7 - Current Mining Fleet (Source: Nexus-Ino Mining, 2021)

No.	Plant Number	Make	Description
1	TT126	Scania GX460	40t Tipper Truck
2	TT127	Scania GX460	40t Tipper Truck
3	AD008	Bell B30	30t Tipper Truck
4	AD009	Bell B30	30t Tipper Truck
5	AD010	Bell B30	30t Tipper Truck
6	TT084	Powerstar 2628	10m3 Tipper Truck
7	TT097	Powerstar 2628	10m3 Tipper Truck
8	EX009	New Holland E305B	30t Excavator
9	EX015	Kobelco SK500	50t Excavator
10	EX017	Kobelco SK380	38t Excavator
11	LD020	Cat 95066	Front End Loader

No.	Plant Number	Make	Description
12	LD022	Cat 950	Front End Loader
13	LD024	Cat 226B3	Skid Steer
14	TLB05	JCB 3Dx 4WD	Tractor Backhoe Loader
15	TLB08	Cat 426F2	Tractor Backhoe Loader
16	BD010	Cat D7	Track Bulldozer
17	WT121	Dezzi	23000l Water truck
18	GR022	LuiGong CLG425	Wheel Grader
19	Workshop	Fima 40055	500l Compressor
20	Workshop	Rato	420cc Welder

4.7 Geology and Mineralisation

The tin-bearing pegmatite intrusions occurring at the Uis Tin Mine are part of the Pan-African Damara Belt, which is the northeast-trending branch of the Damara Orogen in Namibia. The Damara Supergroup comprises metasedimentary and metavolcanic lithologies of the Damara Belt and is divided into various tectonostratigraphic zones. Economically mineralised pegmatites are post-tectonic and represent highly evolved magmatic systems. The pegmatites of the Damara Belt are grouped into various northeast-trending pegmatite belts and occur in a variety of morphologies (DFS, 2021).

The Uis Tin Mine occurs at the north-eastern extent of the 120 km long Cape Cross–Uis Pegmatite Belt (CUPB), or the northern tin belt, extending from Cape Cross to the town of Uis and is known for its abundant tin mineralisation. The CUPB is separated from the Northern Central Zone which hosts the Nainais-Kahero pegmatite belt, or central tin belt, by the Autseib Fault. ML 134 and ML 129, known as Uis and Tsaurob respectively, occur in the CUPB, while ML 133, known as Nai-nais, occurs in the Nainais-Kahero pegmatite belt. The CUPB hosts a variety of mineralised to barren, syn- to post-tectonic pegmatites (DFS, 2021).

The mining licence ML 134 is approximately 200 km2 in size and includes a large portion of the Sn-Nb-Ta type granitic pegmatites in the Uis swarm. The pegmatites strike to the northeast and east, dipping between 30°NW and 70°NW, and are discordant to the country rocks which generally dip to the southeast. The larger pegmatite bodies appear to pinch out along strike or splay out into different pegmatite veins (DFS, 2021).

The V1/V2 pegmatite is the only orebody for which a Mineral Resource estimate compliant with the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (2012 Edition) ("JORC Code") has been completed. Sixteen historically drilled dykes were mined from eight principal open pits until mine closure in 1990. The pits were named:

K3/K5 pit, the K6 pit, the K8/K10 pit, the P4/P5 pit, the P6 pit, the V1/V2 pit, the V4/V5/V12 pit, and the V9/V10/V13 pit. The surrounding unmined pegmatite intrusions were also considered in this economic assessment where pegmatite size and observed mineralisation matched predetermined specifications. For the JORC study, only surficial data such as geological mapping and structural measurements were available for this latter group of pegmatites (DFS, 2021).

The Uis pegmatites are granitic in composition, containing abundant quartz, orthoclase, muscovite and albite. Minor mineralogy includes tourmaline, garnet, apatite, microcline and beryl. Li-bearing phases include petalite, spodumene (Karlowa Swarm), lepidolite, hectorite, eucryptite and amblygonite. Sn is present in the form of cassiterite, whereas Ta-Nb-oxides occur as columbite (-tantalite) group minerals, tapiolite with minor wodginite, and ixolite (DFS, 2021).

The central cluster of the Uis swarm encompasses approximately 180 standalone pegmatite bodies at various scales and sizes. Figure 7 illustrates a plan view of the previously mined V1 and V2 pegmatites (DFS, 2021).

4.8 Blasting

Blasting (also known as rock fragmentation) is undertaken by drilling and blasting, with the weathered zones requiring blasting with lower powder factors. Blasting is a core component of the mining operation, impacting all downstream mining and comminution (crushing) processes. Blasting also affects dilution factors and the plant's operation and ore recovery.

UTMC concluded a contract for blast-hole drilling operations. Blasting is sourced through a down-the-hole service rendered by Bulk Mining Explosives ("BME") based on separate orders for each blast and conducted on a bi-weekly basis. Blast notices are created and put up at key locations around the Uis settlement as well as at the entrance to the mine site notifying the community of the time and duration of each blast event. A blast and vibration specialist study was commissioned to study the potential effects on sensitive receptors and infrastructure. This work was contracted to Blast Management & Consulting.

Owing to the slow ramp-up of the plant, current mining progressed well ahead of processing, which resulted in a large build-up of inventory on the RoM stockpile, negating any future risks of mining interruptions (DFS, 2021). The blasting cycle may increase to a weekly event during Phase 2.

Ground vibration predictions were done considering distances ranging from 50 m to 3500 m around the opencast mining area. The objective of the blast and vibration specialist study was to outline the expected environmental effects that blasting operations could have on the surrounding environment and to propose the specific mitigation measures that are required to manage the related influences of expected ground vibration, air blast and fly rock. The effects of the blast attributes are investigated in relation to the blast area and surrounds and the possible influence on nearby private installations and houses (Zeeman, 2022).

4.8.1 BLAST VIBRATION METHODOLOGY

The following methodology was applied in the blast vibration assessment.

- Identifying surface structures/installations that are found within a reasonable distance from the project site. A list of Points of Interest (POIs) was created that was used for the evaluation. Google Earth imagery was used.
- Site evaluation: This consists of the evaluation of the mining operations and the possible influences from blasting operations. The methodology is to model the expected impact based on the expected drilling and blasting information provided for the project. Various accepted mathematical equations are applied to determine the attenuation of ground vibration, air blast and fly rock. These values are then calculated over the distance investigated from the site and shown as amplitude level contours. Overlaying these contours on the location of the various receptors then gives an indication of the possible impacts and the expected results of potential impacts. Evaluation of each receptor according to the predicted levels then gives an indication of the possible mitigation measures to be applied. The possible environmental or social impacts are then addressed in the detailed ESIA investigation.
- The simulation work done by the specialist (Blast & Management Consultants) provided information that was applied for predicting ground vibration and air blast. Evaluation of the blasting operations considered a minimum charge and a maximum charge. The minimum charge was derived from the 89 mm diameter single blast hole and the maximum charge was determined from a shock tube timing. The maximum charge relates to the total number of blast holes that detonates simultaneously based on the blast layout and initiation timing of the blast, thus, the maximum mass of explosives detonating at once. The minimum charge relates to 69 kg and the maximum charge relates to 207 kg. These values were applied in all predictions for ground vibration and air blast (Zeeman, 2022).

The evaluation mainly considered a distance up to 3500 m from the pit area. The closest structures observed are the power lines, boreholes, fibre optical cable and mine buildings/structures. The planned maximum charge evaluated showed that it could be problematic for these structures in terms of potential structural damage. The ground vibration levels predicted for these POI's ranged between 0.1 mm/s and 469.3 mm/s for structures surrounding the open pit area (Zeeman, 2022).

Figure 14 - depicts the result of a sensitivity mapping exercise with the identified points of interest (POI) in the surrounding areas for the proposed project area. Three zones of influence were identified by the specialist.

- A highly sensitive area of 500 m around the mining area. Normally, this 500 m area is considered an area that should be cleared of all people and animals prior to blasting. Levels of ground vibration and air blast are also expected to be higher closer to the pit area.
- An area 500 m to 1500 m around the pit area can be considered as being a medium sensitive area. In this area, the possibility of impact is still expected, but it is lower. The expected level of influence may be low, but there may still be reason for concern, as levels could be low enough not to cause structural damage but still upset people.
- An area greater than 1500 m is considered a low sensitivity area. In this area, it is relatively certain that influences will be low with low possibility of damages and limited possibility to upset people.

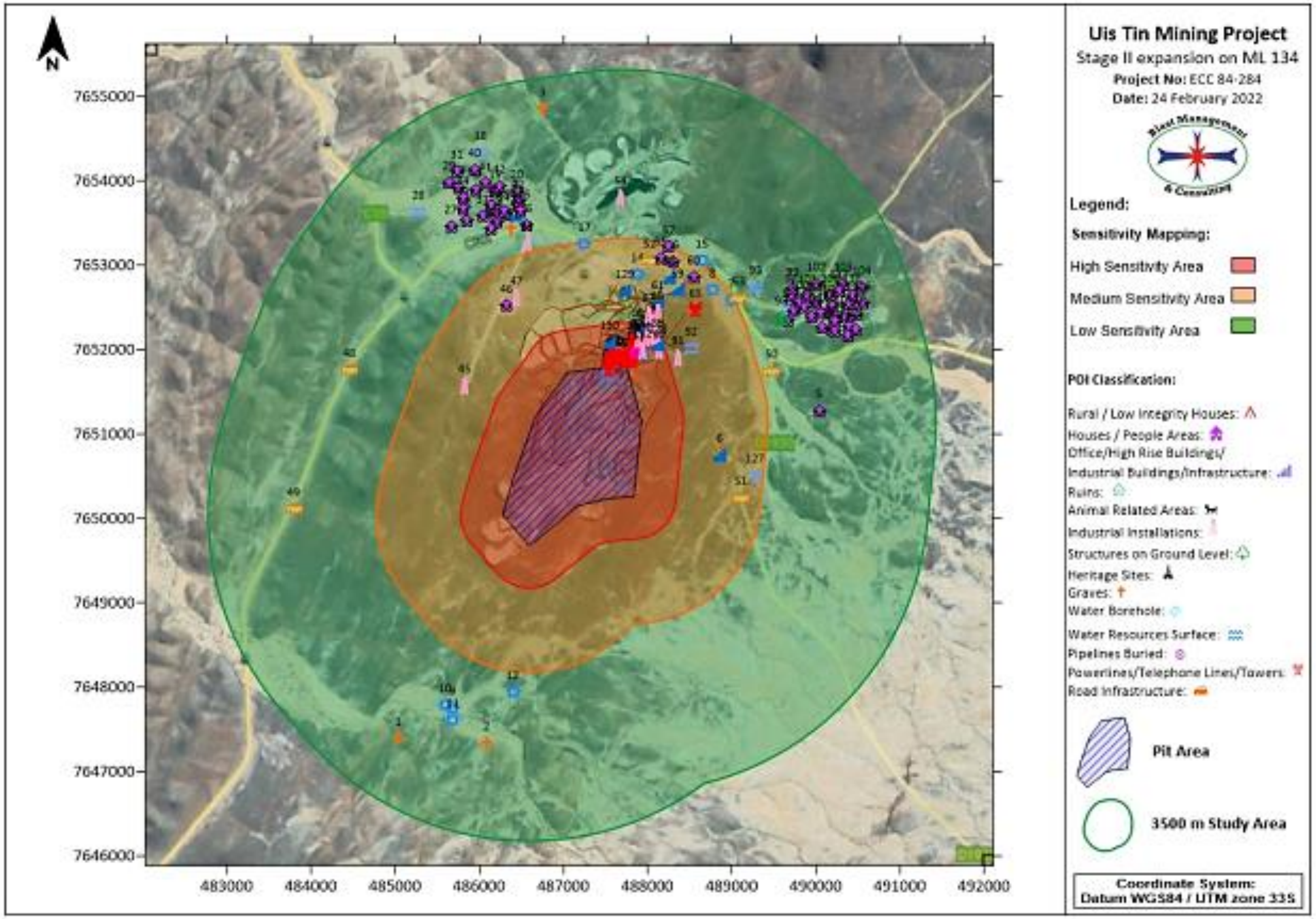


Figure 14 - Identified sensitive areas with identified point of interest (Zeeman, 2022)

4.8.2 GROUND VIBRATION LIMITATIONS ON STRUCTURES

Limitations on ground vibration take the form of maximum allowable levels of intensity for different installations or structures. Ground vibration limits are also dependent on the frequency of the ground vibration. Frequency is the rate at which the vibration oscillates. Faster oscillation is synonymous with higher frequency and lower oscillation is synonymous with lower frequency. Lower frequencies are less acceptable than higher frequencies because structures have a low natural frequency. Significant ground vibration at low frequencies could cause increased structure vibrations due to the natural low frequency of the structure and this may lead to crack formation or damages (Zeeman, 2022).

According to Zeeman (2022) predicting ground vibration and possible decay (Section 4.8.3), a standard accepted mathematical process of scaled distance is used. The equations utilised by the specialist are described in the blast and vibration study (Appendix D).

Based on the designs received from BME on expected drilling and charging, the following Table 8 shows expected ground vibration levels (PPV) for various distances calculated for the two different charge masses. The charge masses are 69 kg and 207 kg for the Pit area. Ground vibration predictions were done considering distances ranging from 50 m to 3500 m around the opencast mining area. The levels used are considered the basic limits that will be applicable for the type of structures observed surrounding the pit area. These levels are: 6 mm/s, 12.5 mm/s, 25 mm/s and 50 mm/s. This enables immediate review of possible concerns that may be applicable to any of the privately-owned structures, social gathering areas or sensitive installations (Zeeman, 2022).

Table 8 – Expected ground vibration at various distances from charges (Zeeman, 2022)

No	Distance (M)	Expected PPV (mm/s) for 69 kg Charge	Expected PPV (mm/s) for 207 kg Charge
1	50.0	59.1	146.4
2	100.0	30.3	75.0
3	150.0	9.7	23.9
4	200.0	6.0	14.9
5	250.0	4.2	10.3
6	300.0	3.1	7.6
7	400.0	1.9	4.7
8	500.0	1.3	3.3
9	600.0	1.0	2.4
10	700.0	0.8	1.9

No	Distance (M)	Expected PPV (mm/s) for 69 kg Charge	Expected PPV (mm/s) for 207 kg Charge
11	800.0	0.6	1.5
12	900.0	0.5	1.2
13	1000.0	0.4	1.0
14	1250.0	0.3	0.7
15	1500.0	0.2	0.5
16	1750.0	0.2	0.4
17	2000.0	0.1	0.3
18	2500.0	0.1	0.2
19	3000.0	0.1	0.2
20	3500.0	0.1	0.0

Based on the simulated results from the ground vibration evaluation for the minimum charge, boreholes 8 and 11, and the power line/pylon structures within the pit area may be at risk of damage. All other structures beyond this point presented an acceptable level of tolerance against ground vibrations. The results from the simulated maximum charge impacts on structures within the project area indicated that boreholes 8 and 11 as well as the power line/pylon structure within the mine pit area to be at risk potentially.

The nearest public houses are located 1070 m from the pit boundary. Ground vibration levels predicted at these buildings where people may be present is 0.9 mm/s for the maximum charge. In view of this no specific mitigations will be required (Zeeman, 2022).

4.8.3 VIBRATION INDUCED CRACKS

Ground vibration-induced cracks (a form of structural decay) from blast events are possible and will mostly be responsible for cracks in structures if the frequency is high enough and at constant high exposure levels (BME, 2022).

The presence of general vertical cracks or horizontal cracks that are found in all structures does not indicate damage due to blasting operations but rather damage due to construction, building material, age, and standards of building applied. Proper building standards are not always applied, and the general existence of cracks may be due to materials used rather than from blasting events.

Figure 15 is a typical example of a crack caused by ground vibrations from blasts on a brick-and-mortar structure and should be used as a reference for future crack surveys on building structures within the ML.

Figure 15 – Example of blast-induced damage

4.8.4 AIR BLAST LIMITATIONS ON STRUCTURES

A blast does generate sound but for the purpose of this study the specialist focussed only on its possible damage capability. The three main causes of air blasts are grouped as:

- Direct rock displacement at the blast; the air pressure pulse (APP).
- Vibrating ground some distance away from the blast; rock pressure pulse (RPP).
- Venting of blast holes or blowouts; the gas release pulse (GRP).

Ground vibration is experienced at different levels; BMC considered only the levels that are experienced as “Perceptible”, “Unpleasant” and “Intolerable” within the industry. This is indicative of the human being’s perceptions of ground vibration and clearly indicates that humans are sensitive to ground vibration perceiving it at levels of 0.8 mm/s as perceptible (See Figure 16).

This general guideline helps with managing ground vibration and the complaints that could be received due to blast-induced ground vibration. Indicated in Figure 16 is a blue solid line that indicates a ground vibration level of 12.5 mm/s and a green dotted line that indicates a ground vibration level of 6 mm/s. These are levels that are used in the evaluation by the specialist.

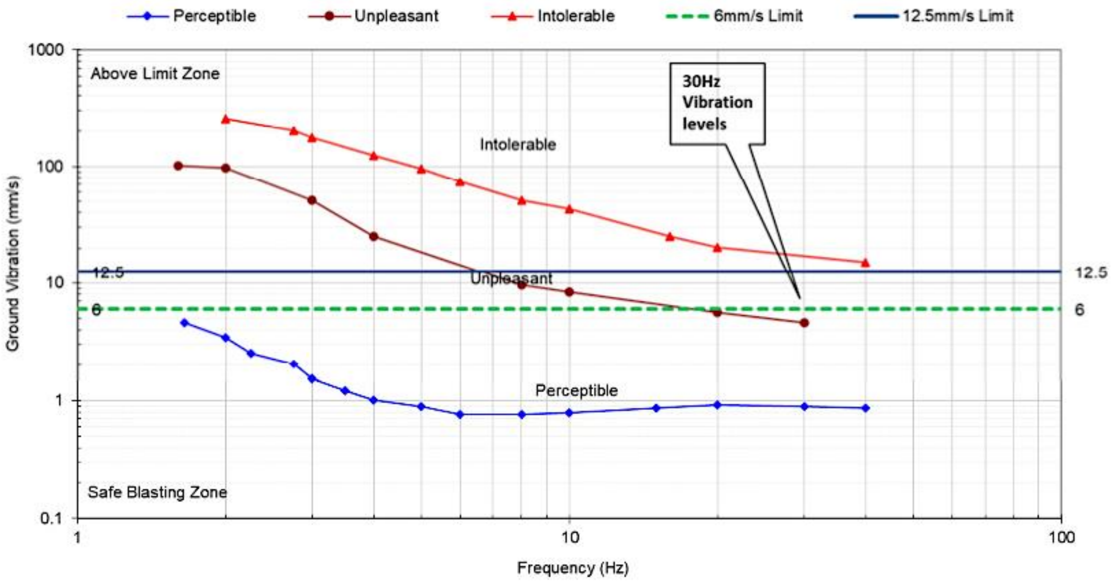


Figure 16 – Ground vibration and human perception

Generally, people assume that any vibration of a structure - windows or roofs rattling - will cause damage to the structure. An air blast is one of the causes of vibration of a structure and is the cause of nine out of ten complaints (BMC, 2022).

In the absence of Namibian standards on this aspect, the general recommended limit for air blast currently applied in South Africa is 134 dB and is used in this assessment. Based on work carried out by Siskind et al. (1980), and referenced in the work done by BME, monitored air blast amplitudes up to 135 dB are safe for structures, provided the monitoring instrument is sensitive to low frequencies (BME, 2022).

Table 9 shows estimates of damage thresholds by air blast based on empirical data developed by Persson et al. (1994). Table 10 shows the air blast limits applied in the blast vibration study.

Table 9 - Estimate damage causing limits for air blast

Level	Description
>130 dB	Resonant response of large surfaces (roofs, ceilings). Complaints start.
150 dB	Some windows break

Level	Description
170 dB	Most windows break
180 dB	Structural Damage

Table 10 - Air blast limits applied in the study

Level	Description
<120 dB	Preferred levels to avoid complaints
120 dB	Bottom limit applied for start of complaints
128 dB	USBM Proposed Limit for Schools and Hospitals
134 dB	Current RSA Limit

The possible negative effects from air blast are expected to be the same as that of ground vibration for both minimum and maximum charges. The specialist maintains that if stemming control is not exercised this effect could be greater with a greater range of complaints or damage. The pit is located such that "free blasting" – meaning no controls on blast preparation – will not be possible. The effect of stemming control will need to be considered as mitigation against air blast effects. All attempts should be made to keep air blast levels from blasting operations well below 120 dB where the public is of concern (BME, 2022).

4.8.5 FLY ROCK

Blasting operations are typically managed in a way that facilitate the excavation process of loosened rock material in terms of scale and type. Therefore, the sought movement should be in the direction of the free face which is why the orientation of the blast is important. Elements travelling outside of the expected range would be considered fly rock. It is important that the blast contractors on site determine the safe distance boundary from blast sources before blasting occurs to avoid damage to people, animals, or property. From a technical standpoint it is important to ensure that the correct stemming type and length is used to ensure that explosive energy is efficiently used to its maximum and to control fly rock (BME, 2022).

4.8.6 NOXIOUS FUMES

Explosives used in the mining environment are required to be oxygen balanced. Fumes generated from blast events are generally nitrous oxides and carbon monoxide. These fumes are dangerous if exposure to them is above the threshold of 150 ppm or more regardless of exposure time. It has been predicted that 50% lethality would occur following exposure to 174 ppm for 1 hour (BME, 2022). UTMC should ensure complete evacuation of the immediate surroundings of a blast event within the safe boundary zone.

4.9 Drilling

UTMC drilled 26 additional drillholes in addition to historical drilling by ISCOR in the 1970s and 1980s to form a combined dataset of 177 diamond and percussion drillholes which informed the resource estimation of the Uis deposit.

Continuous drilling takes place on the mining benches within the open pits (V1 and V2) in tandem with blasting operations by an independent contractor. Drilling and blast optimisation using accurate data will assist in determining improved ore blasting outcomes. Observations of numerous oversize ore were made in October 2021 in the haul trucks and at the feed hopper to the mill crusher. A rock breaker is employed full-time at the hopper to manage the oversize material. Improvements in terms of ore size could be achieved with drilling and blasting adjustments.

4.10 Haul roads

The available space within the pit was used for safe haul roads wherever possible instead of expanding the pit walls. The haul road width was reduced at the lower levels of the pit to minimise waste stripping as much as possible. The exit positions of the ramps were determined based on the proposed positions of the primary crusher and the waste co-disposal facility (DFS, 2021). The surface haul roads are dual directional separated by a course gravel-based island. The width of one lane (18 m) is wide enough to accommodate the width of the largest mobile plant on site i.e., a 40t tipper truck.

It is not envisaged that the ramp to surface haul roads will need additional protective measures to ensure stability whilst in use. Haul road dust suppression is conducted for the Project and is handled through a comprehensive dust management system.

4.11 Materials handling and concentrating plant

An optimal site layout is based on designing the site around critical landform features such as topography and sensitive areas while considering the efficiencies required for the mining operation. Optimal use of available space was considered in the placement of additional comminution and processing infrastructure.

The current processing plant is strategically placed to allow ore throughput of 80 tph. The anticipated expansion required to increase production volume to 120 tph will not require the Plant to relocate but be modified.

The position of the current Plant illustrates the limited spatial extent to which the modifications will be applied to accommodate the tantalum circuit. The petalite beneficiation circuit within the bulk sampling, sorting, and testing facility will be placed west of the current tin processing plant and will contain its own materials handling section and related infrastructure.

4.11.1 COMMINUTION AREAS

The existing processing plant consists of a comminution section and a concentrator section. At the start of the concentrating section, ore is screened into a coarse fraction (larger than 0.65 mm) and a fine fraction. Crushing to a top size of 6.4 mm is done in four stages. From the primary crusher, ore is conveyed to the primary stockpile, from where it is fed to the secondary crushing plant, in which the ore passes through another three stages of comminution (DFS, 2021).

The bulk sampling, sorting, and testing facility will have its own dedicated comminution area that consists of a ROM tip pad and a primary crusher before being fed to the preparation area for secondary crushing, classification and thereafter milling and recovery.

4.12 METALLURGY AND PROCESSING

4.12.1 TIN AND TANTALUM PROCESSING

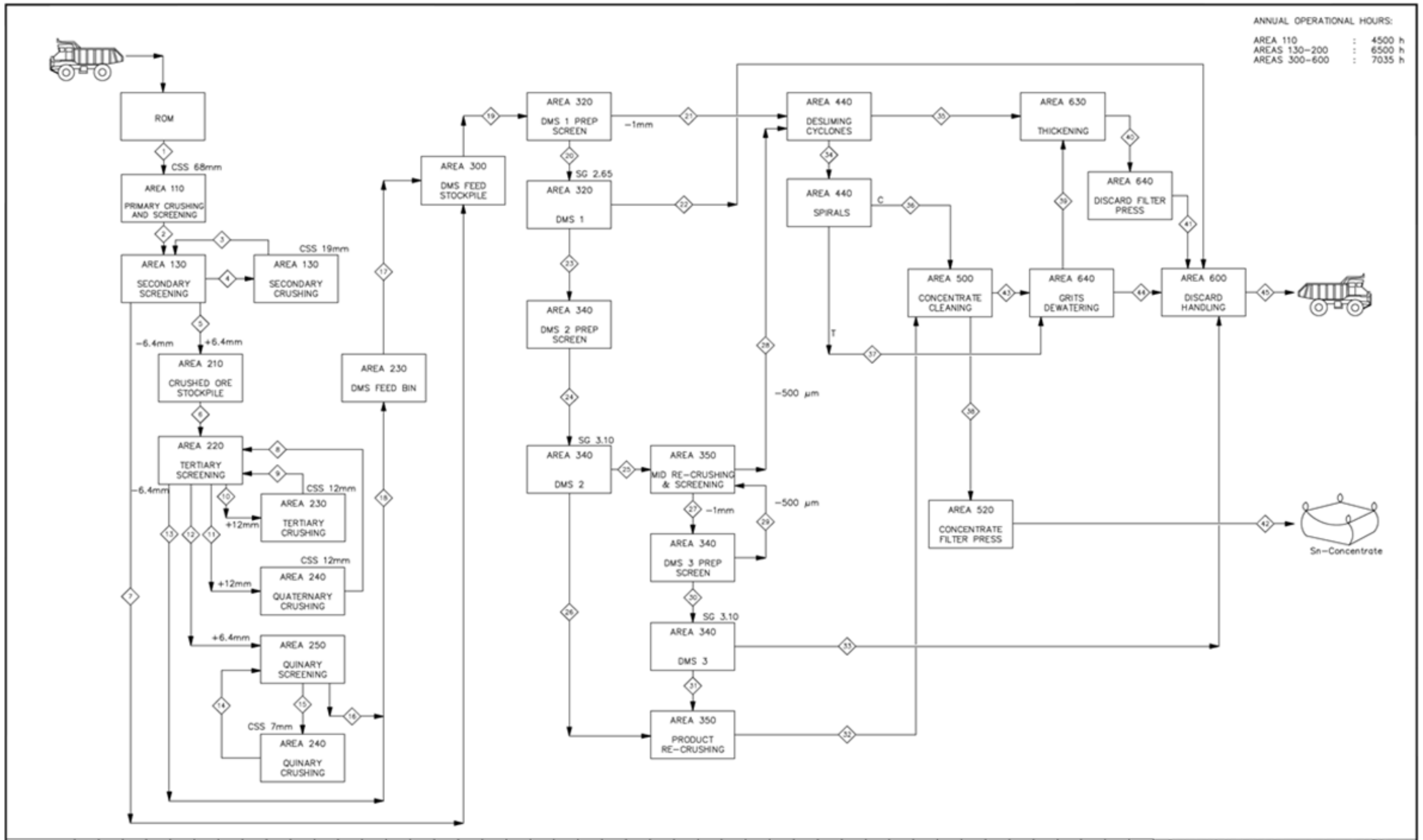
Other than ferrosilicon (FeSi) for dense media separation (DMS), no chemicals are used in the tin and tantalum ore beneficiation process. The recovery of FeSi media for reuse is a critical aspect of effecive DMS. The process plant employs four-stage crushing followed by gravity concentration (pre-concentration, concentration, and scavenging). The coarser fraction is processed with DMS and the finer fraction with scavenging spirals. Concentrates from the DMS and spirals are cleaned on a shaking table to separate the heavier dense metals from the waste rock granules. Discards (waste rock granules) are dewatered and co-disposed with mine waste rock. Coarse and fine tailings are dewatered on vibrating screens, while slimes are dewatered through a thickener and filter press combination. The recovered water is reused in the process. Dewatered tailings are co-disposed with mining waste rock (DFS, 2021).

The following changes are envisioned to be made to the process flow in various sections of the plant as part of the additions under the Phase 1 Stage II development:

- A crusher and screen to be added to Area 100 in feed preparation.
- A stockpile has been added between crushing and beneficiation in Area 300.
- Densifier capacity has been increased in Area 320.

- The medium circuits for DMS2 and DMS3 have been combined to improve operability of DMS3 and maximise Sn recovery from DMS2 floats.
- The DMS2 floats re-crush circuit has been converted to a closed circuit in Area 350. In addition, bins have been added before roll crushers to improve operability.
- Additional spirals to re-process middlings will be installed in Area 440.
- An additional shaking table will be installed to improve capacity and the shaking tables will be relocated. The shaking tables will be replaced with ones with higher separation efficiency.

A simplified summary of the plant flow diagram of the Stage II process is shown in Figure 17.



Stream Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Solids t/h	189.0	189.0	133.4	133.4	128.1	128.1	60.9	95.0	20.1	20.1	95.0	74.9	27.6	227.4	227.4
Water t/h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%Solids	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Stream SG	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
Ta Grade (%)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Sn Grade (%)	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14

Stream Number	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Solids t/h	74.9	102.5	102.5	118.0	79.6	39.1	51.0	27.8	27.8	26.9	0.8	10.2	17.8	1.1	9.1
Water t/h	0.0	0.0	0.0	0.0	14.1	156.6	0.8	2.4	2.1	1.5	0.1	19.3	79.7	29.2	0.3
%Solids	100	100	100	100	85.0	20.0	98.5	92.1	93.0	94.7	85.0	34.5	18.3	3.8	96.8
Stream SG	2.75	2.75	2.75	2.75	2.18	1.15	2.58	2.56	2.60	2.63	3.14	1.29	1.14	1.03	2.73
Ta Grade (%)	0.03	0.03	0.03	0.01	0.01	0.01	0.00	0.04	0.04	0.01	0.84	0.01	0.01	0.01	0.01
Sn Grade (%)	0.14	0.14	0.14	0.14	0.14	0.14	0.02	0.36	0.36	0.11	8.40	0.11	0.11	0.11	0.11

Stream Number	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Solids t/h	0.1	0.9	9.0	47.9	9.1	35.7	12.2	0.2	3.8	12.8	12.8	0.2	36.2	44.9	117.8
Water t/h	0.0	8.6	0.2	18.6	217.7	32.1	80.2	0.0	172.3	23.8	0.8	0.0	40.2	7.9	10.0
%Solids	85.0	9.5	97.4	72.0	4.0	52.6	13.2	99.2	2.2	35.0	94.0	99.2	47.4	85.0	92.1
Stream SG	3.01	1.08	2.74	1.85	1.03	1.51	1.09	6.03	1.01	1.29	2.53	6.03	1.47	2.22	2.54
Ta Grade (%)	0.73	0.83	0.00	0.02	0.01	0.01	0.03	3.48	0.02	0.01	0.01	3.48	0.01	0.02	0.00
Sn Grade (%)	7.29	8.31	0.03	0.16	0.07	0.11	0.25	56.76	0.13	0.09	0.09	60.00	0.00	0.11	0.03

AFRITIN MINING

UIS TIN MINE

Figure 17 - Flow diagram of processing methodology

4.13 BULK SAMPLING, SORTING, AND TEST FACILITY

4.13.1 ROM PAD

The ROM pad will be constructed to accommodate the ore required for bulk sample processing. Access to the ROM pad will be via the existing haul road (for material from the current mining pits), or a separate heavy vehicle haul road for external material. The maximum size of a sample to be processed through the facility in a single campaign will be approximately 2000 tons, which will be placed on the ROM pad prior to processing.

4.13.2 METALLURGICAL SUPPORT FACILITY (SAMPLE PREPARATION)

The material will be moved from the ROM pad to the MSF using mobile earth-moving machinery. The purpose of the MSF area is to prepare the bulk sample into the relevant particle sizes for the testing intended to be undertaken. This area will be equipped with a primary and secondary crusher and two screens with which to crush and classify the material. In addition to mechanical crushing and screening, the area will also have two sensor-based sorters which include an XRT sorter (which sorts material based on particle atomic density) and a near-infrared sorter (which uses broad spectrum light wavelengths in the sorting process). This has the potential of achieving waste rejection early in the beneficiation process and increasing the feed grade to the lithium concentrator.

4.13.3 BULK SPLITTING AREA

The purpose of the bulk splitting area will be to split the sample to be used for test work and analysis.

4.13.4 LITHIUM PROCESSING (FUTURE ACTIVITY)

Andrada's anticipated lithium pilot petalite flotation plant will be designed to produce 20 tph concentrate (Figure 18). The lithium pilot plant is considered to be a material change to the Plant under consideration in this document, and an addendum to this ESIA will need to be initiated if a decision is made to go ahead with this process.

The following are the design parameters for the Plant:

- 20 tph feed;
- 16 – 20% DMS yield to floats, and
- Module to consist of a feed reception and feeding arrangement, DMS, milling flotation, WHIMS magnetic separation, filtration, and water reticulation sections.
- The flotation circuit will comprise flotation cells and associated equipment which will include conditioning tanks, dosage pumps, etc. The circuit will be equipped with acid neutralisation facilities where the HF and H2SO4 are used as reagents.

This flotation requires reagents that are grouped broadly as follows:

- Modifiers – the creation of suitable pH conditions and control (acids or alkalis).
- Activators – create improved conditions for absorption of collectors on mineral surfaces.
- Collectors – make the valuable minerals non-wettable with water (hydrophobic).
- Depressants – make certain minerals (unwanted minerals) wettable with water (hydrophilic).

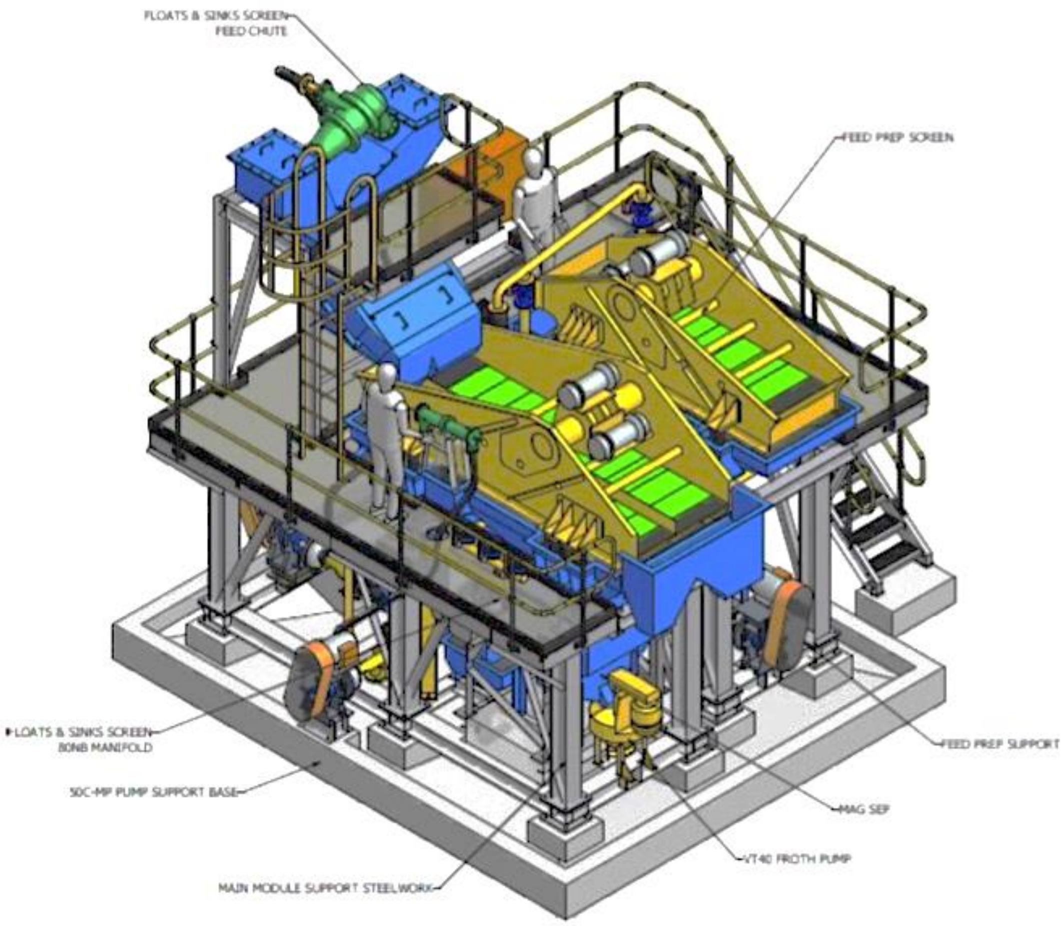


Figure 18 - Schematic diagram of the petalite beneficiation plant

To prevent the potential spillages of the acids, the floatation circuit will be within a well-ventilated, enclosed room with a concrete floor. The lithium-bearing material will first be milled and de-slimed (including attrition) before the de-slimed material is fed into the flotation plant. For the petalite concentration for lithium extraction, the main reagents will be hydrofluoric acid (HF) as the collector at total dosages of approximately 8kg per tonne of feed material and sulphuric acid (H2SO4) as the modifier at dosages of 5kg per tonne of feed material. It is envisaged that approximately five tonnes of HF and 1.5 tonnes of H2SO4 will be stored at any one time on site. From this stored acid reserve on site the below quantities represent the total acid dosages for the flotation part of the process:

- 4.7 kg of H2SO4 per tonne of flotation feed, and
- 8.2 kg of HF per tonne of flotation feed in all stages.

At this early stage of the design process, it is anticipated that approximately five tonnes of HF and three tonnes of sulphuric acid will be required for lithium extraction in the petalite plant. The result would be that approximately 300 tonnes of the lithium-bearing product will be produced from each sampling and testing campaign.

The use of these chemical reagents will require stringent handling and waste management protocols. The two acids used in the beneficiation plant are hazardous, with HF being extremely dangerous. The make-up and dilution of these acids at the industrial level require expertise and operators to be fully trained to satisfy competency requirements. Infrastructure to accommodate this process will need to be designed, constructed, and established to recognised best practices and or international standards for the use of these chemicals. Therefore, the Proponent also intends to develop a waste neutralisation plant within the bulk sampling, sorting, and test facility to neutralise acid-bearing slurry before final disposal onto the existing waste rock dumps.

4.13.5 ACID NEUTRALISATION

Design for neutralisation of the acids will be done by an identified expert. However, in principle, the slurry containing the acids in both the concentrate and waste streams will be neutralised by the addition of lime (Ca (OH)2) or soda ash (Na2CO3) in a tank containing hydrofluoric acid (HF) contaminated slurry before the material is pumped to respective dewatering circuits. In the filters clean water will be circulated through the filter press (in both concentrate and discard) to wash the filter cake and dilute any residual contamination. The filtrate further undergoes pH measurement to ensure pH is in the range 6-8 before recirculating as process water. The filter cake is dried and stored (concentrate) whilst the discard filter cake is potentially discarded onto the current waste dump. Caustic soda (NaOH) will be used for the neutralisation of sulphuric acid in basically the same way as the HF is neutralised (Andrada, 2022).

4.13.6 LITHIUM-BEARING WASTE MATERIAL

The neutralised discard will undergo geochemical testing (kinetic leach testing) before disposal. This will determine the success of the neutralisation process. Until results are obtained from the test work, the filter cake discard material will be stored in a suitably bunded area and treated as a highly hazardous material. Only once the results from the test work are received, will the mine be able to plan an appropriate waste disposal strategy for the material.

4.13.7 GASEOUS EMISSIONS

In addition to particulate matter and TSP classed as fugitive sources that will be generated by the facility, an additional class of emissions are expected to occur from the lithium beneficiation plant from point sources including residual HF vapours and sulphuric acid fumes, that could be generated by the plant during its operations and potentially escape from any point within the circuit into the environment. For example, sulphuric acid is a highly reactive and volatile compound that will form flammable hydrogen gas when in contact with water, whilst hydrofluoric acid vapours could be fatal when inhaled as a vapour in excessive volumes. The Proponent will need to align its operational capacity with the IFC Environmental, Health and Safety Guidelines for mining which contains recommendations for OHS management inclusive of air quality management under Section 1.2. to manage this aspect The Proponent will therefore develop a separate occupational, health, and safety plan to manage the storage, use and emissions prevention of acid-based substances from the facility, given the fact that it intends to certify itself as ISO compliant. In this regard, the ISO 45001 standard can be of significant benefit to the company when pursued.

4.13.8 CHEMICAL STORAGE

All chemicals used in the process will be stored in a cool, dry, well-ventilated bunded chemical store constructed to the required international safety specifications for the storage of such substances used to prevent potential structural failures. The storage area will also be subjected to approved safety and emergency response procedures approved by the relevant competent authority. A separate offloading and storage area will be constructed for the HF that will also conform to all safety protocols of an international standard. It is expected that five tonnes of HF will be used per month, and hazardous materials procedures will be used for the offloading, handling, storage, and use of HF. The standard HF storage tanks are made from either carbon steel, stainless steel, Monel or Polytetrafluoroethylene (PTFE). The tank walls thin over time and regular condition monitoring needs to be conducted (Andrada, 2022). The average tank's lifespan is +approximately four years and must comprise a three-layer containment infrastructure to mitigate and manage potential de-containment.

The chemical storage area will include all required emergency equipment, including safety showers and eyewash stations, and material safety data sheets for all onsite chemicals. Dispensing of the reagents to the flotation streams should take place in closed circuits with dosing systems to control the dosing rates. The Proponent will follow the internationally accepted cyanide management code as guideline for the design and construction methodology of unloading, storage, and mixing facilities consistent with sound, accepted engineering practices, quality control and quality assurance procedures, spill prevention and spill containment measures.

4.13.9 WATER AND WASTEWATER INFRASTRUCTURE

Plant water will be sourced from the mine's current supply borehole network and stored in a reservoir. At the completion of the design for the processing plant, the total required water demand will be finalised. However, the mine intends to utilise a closed-loop water circuit with limited environmental discharge. Raw water can be used in the processing of certain minerals; however, raw water will also be fed into a reverse osmosis plant to ensure optimal water quality for certain plant processes. Potable water will be supplied to the change house and administration offices from NamWater sources. Sewage will be disposed of using a wastewater package system or a French drain system. Stormwater management infrastructure will be constructed to ensure that clean water is diverted around the site, and stormwater within the site is controlled.

Water from the thickener will be diverted to the new settling pond. Water will overflow into the new water return pond (estimated maximum 200 m3 per day for short intermittent periods) and slurry remaining in the settling pond will be excavated out and placed onto the waste rock dump. The water return pond will be lined with clay and an HDPE liner. Water in the water return pond will be recirculated back into the processing plant for reuse. Note it is planned that a second filter press is to be installed to reduce the amount of water from the thickener that will be required to be dumped and thereafter the water return pond will be used collection pond in case of emergency situations.

Figure 19 - Uis Tin Mine with the indicated infrastructure upgrades required for Phase II. Green indicates the impact area for future operations. Pink indicates the new sewage plant (Bio-Mite). Purple indicates the newly planned water return pond. Red indicates the newly planned settling pond and canal (Source: Uis Tin Mining Company (Pty) Ltd).

4.13.10 OFFICE AND CHANGE HOUSE

An office and change house will be located onsite (Figure 20). The change house will contain emergency response facilities designed to protect human health as a first response facility in the event of worker exposure to dangerous chemicals.

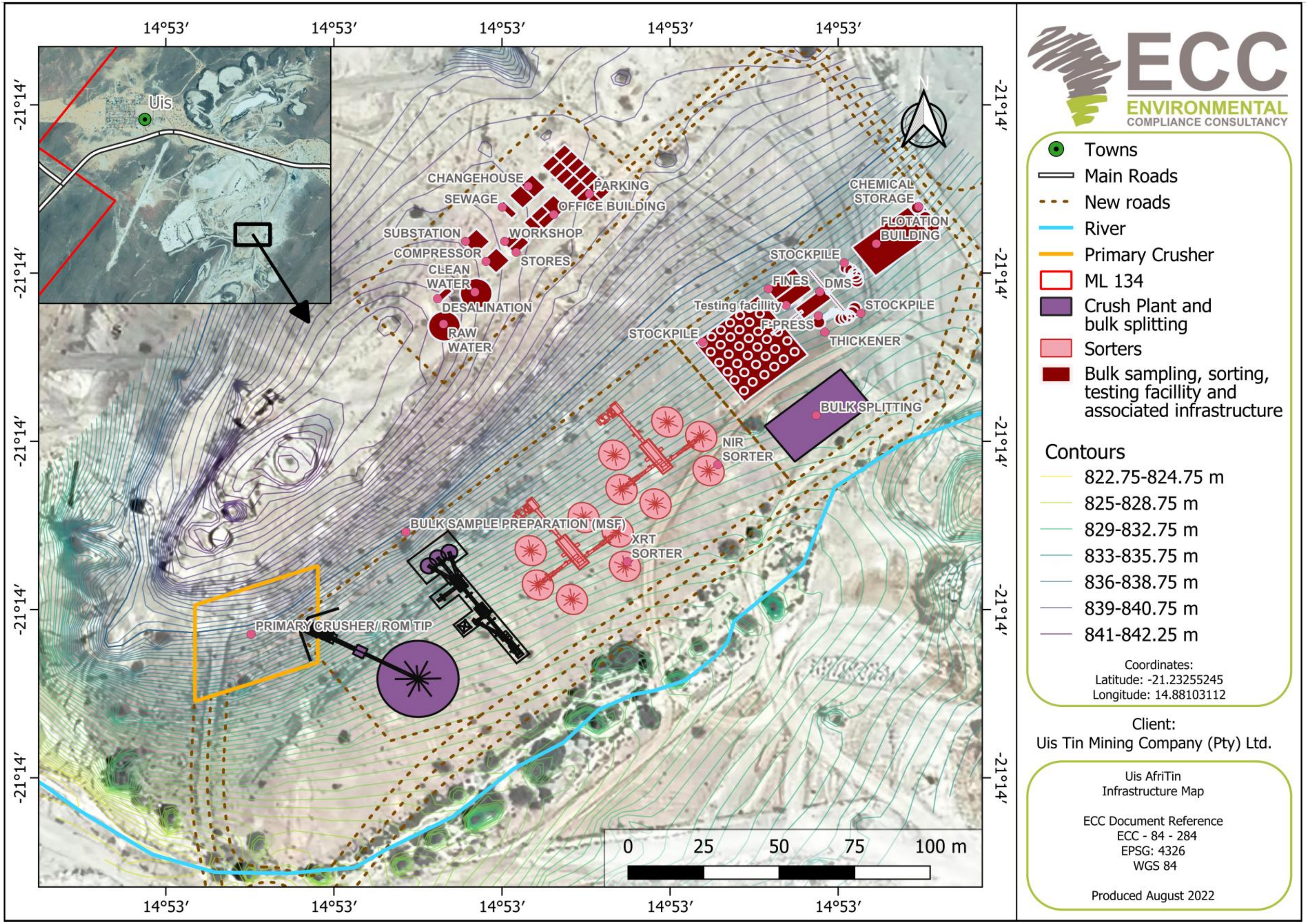


Figure 20 - Bulk sampling, sorting, and testing facility and associated infrastructure

4.14 SUPPORT INFRASTRUCTURE AND SERVICES

4.14.1 ONSITE OFFICE BLOCKS

The mining office block is a modular structure installed on a mesh reinforced concrete slab. The building provides office space to technical personnel, including the process manager, the technical services manager, geology personnel, surveyors, maintenance engineers, the HSE team and mining support staff. The building has a meeting room, male and female ablutions, a kitchen, shaded canteen area, a pit control room, a first aid room, and an open quadrant used as seating space for personnel.

A fully-fledged and functional office block will be established as part of the design criteria for the bulk sampling, sorting, and testing facility to ensure efficiency of operations and management of the facility.

4.14.2 UTMC WORKSHOP AND WAREHOUSE

The mining warehouse (or stores) is a steel sheeted high wall structure. The warehouse is used for the storage of all critical and operational spares, as well as office and other consumables. Goods will be received by the stores personnel through the east-facing receiving bay prior to storage in the main building. Access to the store building is limited to store personnel. Acetylene gas, oil, paint, and other flammable materials

4.14.3 HEAVY MOBILE EQUIPMENT WORKSHOP

The heavy equipment workshop is managed by Nexus-Ino which is the main workshop for the maintenance and rebuilding of mining equipment. The building design is capable of handling maintenance work for all mining and support equipment as per the maintenance plan. The structure is steel sheeted on the sides supported on concrete plinths, with modular container offices. The workshop is bunded with an internal drainage system into a suitable hydrocarbon collection and treatment system. This facility is also used to maintain light vehicles used on site. One wash bay is available for equipment, before, during and after maintenance, and therefore settling dams/ponds are installed as part of the wastewater treatment system in the wash bay.

4.14.4 FUEL FACILITY

Diesel for mine operations is contained in a designated and designed site fuel facility. The fuel service provider has erected infrastructure and facilities for the storage and handling of fuel. The service provider is responsible for the supply, delivery, and management of stock for the life of mine. The Proponent does ensure the facility has the required installation certificates prior to commissioning the fuel facility and is audited monthly for operational compliance.

4.14.5 EXPLOSIVES MAGAZINE

The appointed contractor, BME, based in Arandis, provides explosives and blasting services to the mine on the day of blasting. The contractor has established and is responsible for its satellite explosive magazine infrastructure, located next to the Big Dog and Nexus-Ino shops. Space provision was made for both sites, and the proper siting of the explosive magazine will be re-assessed to ensure it is in conformance with the requirements of the Namibian Labour Act, Namibian Mining Legislation, and Regional Explosives Standards or regulations.

4.14.6 COMMUNICATION

Radio, telephone, and internet connections are already functional for the mining operation. Communication infrastructure, including masts, is installed.

4.15 UTILITIES

4.15.1 POWER SUPPLY

A 1,500 kVA supply agreement was signed with NamPower, with a 66 kV supply take-off from the Uis NamPower substation. A 1 km approximate extension to the existing substation was constructed, with the associated switchgear, metering, and a 66 kV feeder bay. A 66 kV overhead line feeds an existing 66/11 kV substation situated outside the safe blast radius of the open pit mine, close to the current plant area. The capacity of the 66/11 kV transformer is 2,000 kVA, with a protection circuit breaker in the 66 kV circuit. See Figure 21.

Figure 21 - Main power supply off-take (Source: ECC, 2021)

4.15.2 STAND-BY POWER

Standby power supply consists of two 635 kVA containerised Perkins and one 600 kVA MAN diesel generating sets. These are installed in the power station area, and power from each is fed onto a common generator busbar. An automatic centralised synchronisation controller, that interfaces with the individual generator control panels, will allow for the switching and running of the generators in parallel. The standby power station has the capacity to supply the full backup power requirements of the processing plant. The standby power generating sets is illustrated in Figure 22 (DFS, 2021).

Figure 22 - Genset stand-by power source (Source: Minxcon, 2021)

4.15.3 WATER SUPPLY

Phase 1 of the operation sources its water supply from within the Ugab catchment area, utilising the Uis River alluvial aquifer system through supply boreholes in the Uis River channel. The current mine design indicates a water requirement for Phase 1 Stage I to be between 10 m3/h and 15 m3/h, but actual water consumption exceeds 20 m3/h. The stage water demand throughout the life of mine duration is calculated at 18.1m3/hr. Borehole water levels are monitored monthly to keep track of the utilisation of the water source and to manage its sustainability. The largest water demand occurs at the start-up of the tin-tantalum plant, as the facility is run on water only, this demand is then reduced with the feeding of the ore into the plant (DFS, 2021).

The abstraction of groundwater from existing boreholes is permitted under two abstraction permits issued for industrial (mining) purposes by the Ministry of Agriculture, Water and Land

Reform (MAWLR) since 2019. The previous total allowable abstraction volume from boreholes of 75 000 m3 per annum was recently increased to a total volume of 150 000 m3. The borehole locations are presented in Figure 23.

Process water is supplied from well-fields and an open-pit lake (K5) north of the mining area through a pipeline network. Raw water is pumped into a 1,000 m3 bulk reservoir located at the process plant, from where make-up water is pumped to another 250 m3 process make-up water tank, close to the wet part of the plant. This is not potable water.

Potable water to the production areas is supplied through a 60 mm municipal water-supply pipeline that was installed during construction. This water is not used for processing needs (DFS, 2021).

The Digby Wells study conducted determined that the supply of the operations from existing sources is sufficient to sustain the expansion operations of stage II (2022)(Digby Wells, June 2022). Further details are contained within Section 5.9.3.

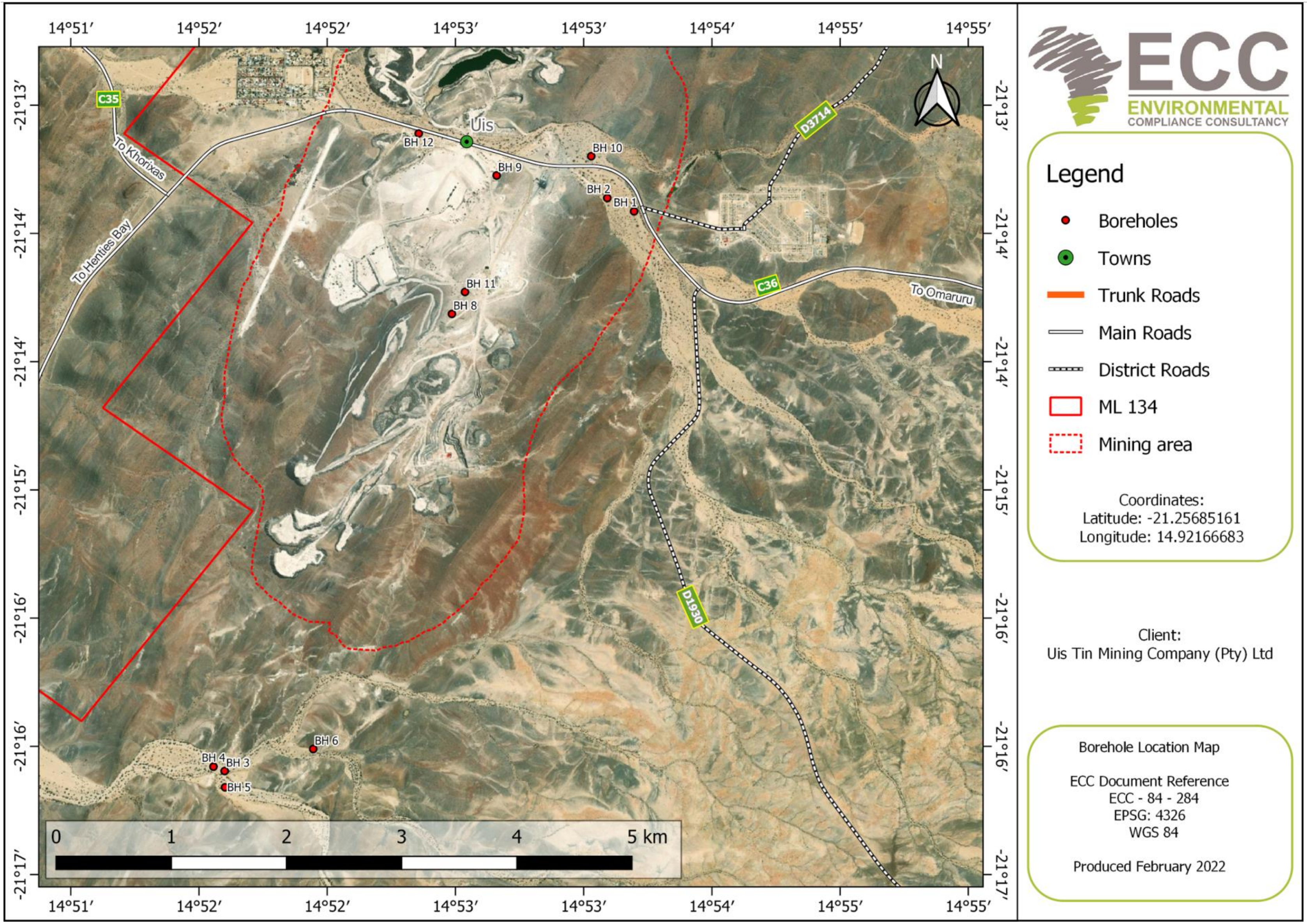


Figure 23 - Borehole locations

4.15.4 WATER DEMAND

As per Digby Wells, June 2022, the Uis Tin Mine pilot plant is currently producing ~65 tonnes of tin concentrate per month for Phase 1 Stage I, with a water demand of ~0.288 Ml/day (12 m3/hr). The expansion of the pilot processing plant to Phase 1 Stage II will increase production at the mine to ~100 tonnes of tin concentrate per month, which will increase the water demand of the plant to ~0.432 Ml/day (18 m3/hr). Water is currently sourced from water supply boreholes in the Uis River channel as well as contributions from water stored within the K5 pit and this investigation assesses whether the water supply boreholes can meet the increased demand for the planned 18-year Life of mine of the Phase 1 Stage II expansion.

A later Phase 2 expansion plans to increase production to ~1 250 tonnes of tin concentrate per month.

Water supply for the Project is proposed from a combination of surface, groundwater and desalination sources and evaluated from supply optimisation studies conducted by Digby Wells. See Section 5.9.3. The existing Ralf's pond and Bleedwater pond will be replaced by a settling pond and return water pond in 2023.

4.16 MINERAL AND NON-MINERALISED WASTE

4.16.1 WASTE ROCK

The proposed waste dumps are located northeast and northwest of the open pit, as shown in Figure 7. The site has three separate dumps which can store an estimated total of 26.66 Mm3 of waste rock and plant waste fines: A (8.75 Mm3), B (14.82 Mm3) and C (3.09 Mm3). This is a 10% overcapacity when compared to the LoM co-disposal volume requirement of 23.85 Mm3 (DFS, 2021).

The current mine plan, taking the 15 Mt pit design into consideration, will produce a total of 23.9 Mt of waste rock and 14.7 Mt of dewatered plant waste fines over the LoM. Dewatered plant waste fines are co-disposed with mining waste rock on a co-disposal facility (DFS, 2021). The co-disposal facility has capacity to be expanded upon and will be used to store Stage II waste rock and plant waste fines (-8mm grain size and clay content). The DFS outlines and describes the design and operating philosophy behind this operation. The parameters taken into consideration are:

- The angle of repose of the outer slope to be 36° for each 20 m lift and a minimum rock crest width of 10 m. This will provide a stable outer shell of waste rock that is erosion-resistant.
- Waste rock and plant discard are placed in 2.5 m wide rows on top of the co-disposal dump and mixed by mining equipment which ensures slope stability and internal void filling.
- Rainwater penetrating the waste rock facility is free of any acid mine drainage and contaminants which eliminate the requirement for settlement ponds and pollution control

water ponds downstream from the co-disposal dumps. Interior paddock embankment slopes ranging from 2.5 H: 1 V to 1.5 H: 1 V 10 m high lifts with 5 m wide benches between lifts. This approach will establish an overall slope angle of 3.5 H: 1 V.

The appropriate waste dump volume requirement of 13.92 Mm3 and the overall plant waste fines dump volume requirement is 9.93 Mm3 (DFS, 2021).

Rehabilitation requirements are considered in dump location and design, and all dumping areas will undergo an ore sterilisation campaign prior to waste dumping. The waste rock dumping strategy is to reduce the hauling distance and similarly enable progressive rehabilitation of the waste dumps wherever possible. In-pit dumping has not been considered for this stage. Waste dumps will be sloped to 3:1 near the top and 4:1 at the bottom covered with finer material. The mine will promote natural vegetation regrowth on the dump shell as opposed to active revegetation. The co-disposal facilities should be re-sloped in this manner as soon as possible in a progressive rehabilitation program. The shallow slopes provide increased stability should the increase fines content create problems with pore pressures. The approach is designed to maintain a low phreatic surface, as noted above.

4.16.2 POTENTIAL ACID ROCK DRAINAGE

UTMC operates two waste rock dumps (V1 and V2) in the form of co-disposal facilities as described above. The tailings produced from this process are currently being disposed of on the V1 and V2 waste rock dumps (WRD) along with the waste rock material extracted from the V1/V2 open pit. To establish the quality of in-situ water infiltrated through the current waste material, water samples were collected from the toe of both waste rock dumps after the heavy rainfall events in February 2022. The results indicate that the runoff from these dumps are compliant to the IFC effluent discharge limits (2007).

ECC is conducting geochemical and kinetic leach tests to confirm the long-term potential for acid drainage and metal leaching.

4.16.3 CONCEPTUAL ACID MINE DRAINAGE RISK FROM THE PETALITE FLOTATION CIRCUIT

In addition to the tin-tantalum processing, Andrada is investigating the addition of a flotation circuit to the bulk sampling, sorting, and testing facility for the processing of petalite. This process will involve milling, froth floatation, and dewatering to produce petalite concentrate and waste discard material. The petalite processing is likely to include the use of sulphuric and hydrofluoric acids as well as sodium chloride (NaCl) and potassium chloride (KCl) brines in the flotation circuit. The tailings material generated from processing the petalite has not been geochemically assessed but based on the XRF results of the DMS floats sample, the tailings materials could comprise of quartz, albite, orthoclase, muscovite, cookeite and clay minerals. These are expected to be non-acid forming minerals. However, the use of acids in the processing circuit could potentially mobilise metals and metalloids. The tailings material will be neutralised and dewatered before being deposited on the V1 and V2 WRD facilities. The water will be recycled back to the plant (Digby Wells, 2022).

4.16.4 CONCEPTUAL CONTAMINATION PLUME MODELLING

As a geochemical assessment of the tailings material has not been undertaken as yet, Digby Wells simulated a plume for Total Dissolved Solids (TDS) using a percentage rating to provide the Proponent with the potential flow paths and extent of the conceptual contamination plume, should one develop from the V1 and V2 WRDs, see Figure 24.

The following assumptions have been incorporated into the numerical for the contamination plume scenario: The numerical model setup is described in the hydrogeological report by Digby Wells, dated June 2022;

- It is assumed that abstraction from the Uis mine water supply boreholes will cease pumping at the end of Life of Mine (LoM), allowing the groundwater levels to recover;
- The daily abstraction for the Brandberg Rest Camp borehole was assumed as 200 m3 /d, and 100 m3 /d for the NamClay borehole. It is understood that the abstraction from the Brandberg Rest Camp is only expected to continue for the next 18 months, however the assumed abstraction values for both third party boreholes were modelled for the duration of the Life of Mine and 100 years post closure as a worst case scenario;
- The contaminant plume scenario was simulated using the combined 127 440 m3 /a abstraction yields for the Andrada water supply boreholes. This abstraction yield was chosen to represent a conservative approach in the model as the lower yields would recover quicker allowing the potential contaminant plume to migrate from the WRD sooner (compared to the previously simulated sustainable yields. Please refer to the Additional Modelling Scenario memorandum by Digby Wells, dated October 2022);
- The WRDs were assigned a recharge potential of 20% MAP for the LoM;
- Based on the closure strategy provided below, the WRDs are assumed to have a recharge potential of 15% MAP for the post closure.
- The Total Dissolved Solids (TDS) concentrations were applied to the WRDs for the duration of the project life and for 100 years post closure. This was taken as a conservative approach in the model due to the lack of geochemical information; and
- The TDS concentrations was applied to the third layer in the model (which was the first saturated layer in the numerical model). This approach allows for a worst-case direct infiltration into the groundwater scenario, as in reality the contaminant would be transported through the unsaturated zone allowing for interactions, dispersion, advection and diffusion to reduce the contaminant concentration prior to reaching the groundwater aquifer.

The closure strategy for the WRD is as follows:

- Reshape the side slopes to 1:4 gradient and revegetate passively;
- Remove deposition systems and ponded water will be drained or dried;

- A berm (approximately 5 m wide and 1.5 m high) will be constructed around the top of the WRD to contain storm water from overtopping onto the side slopes of the WRD;
- Berms (approximately 1 m and 1 m high) will be placed in a crisscross pattern across the top of the WRD to form 50 x 50 m paddocks. The aim of these paddocks is to act as evaporation ponds and evapotranspiration sinks (when vegetation is established) to manage storm water and wind erosion; and
- The upper surface of the WRD will be revegetated passively.

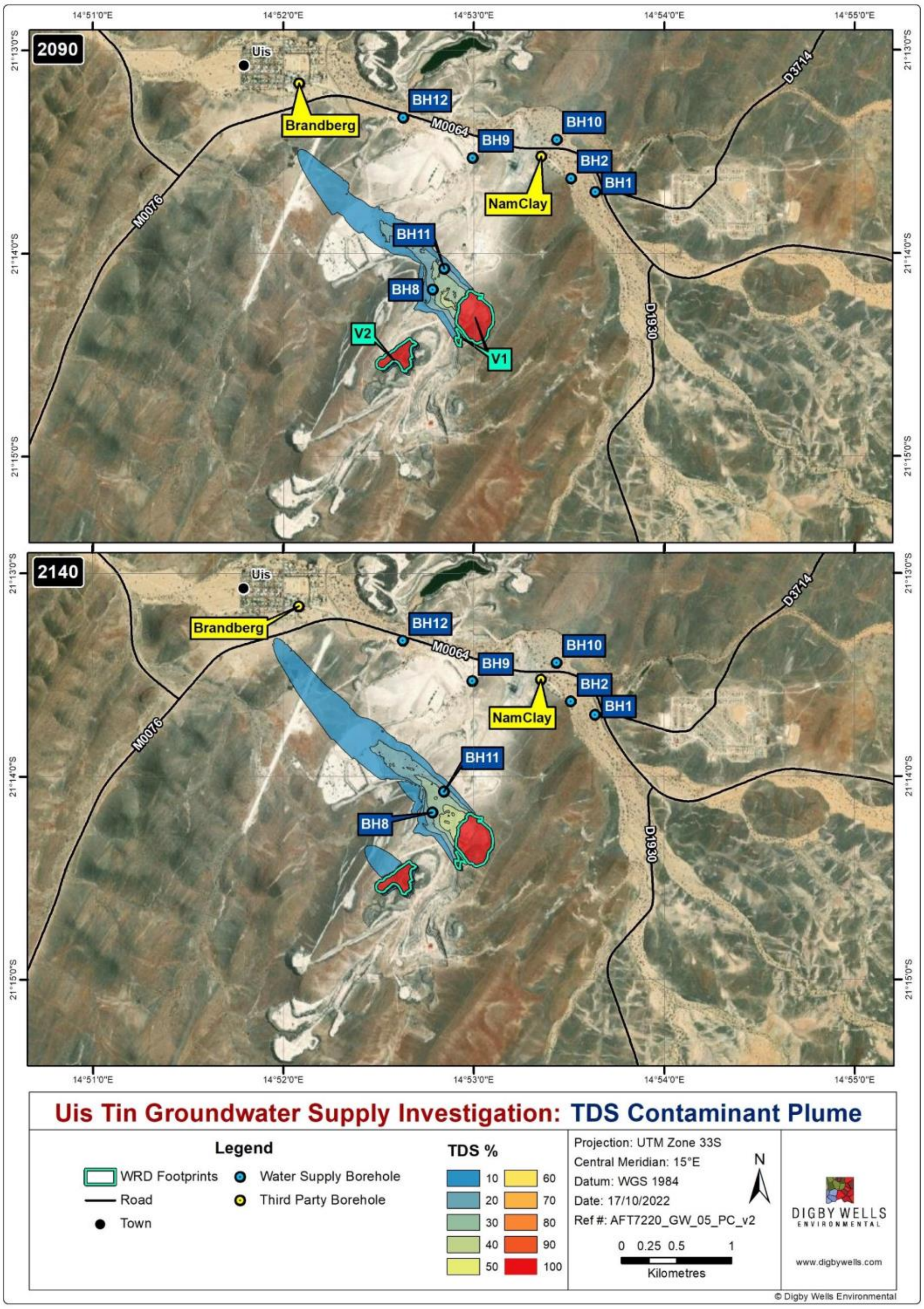


Figure 24 - Contamination plume at Year 2090 and 2140

4.16.5 INTERPRETATION OF THE CONTAMINATION PLUME MODELLING RESULTS

The simulated contaminant plume for the V1 and V2 WRD's are shown for 50 years post closure (the year 2090) and for 100 years (the year 2140). It is assumed that the general direction in which a contaminant plume will follow from the V1 WRD will is northwest for the project towards boreholes 8 and 11. This is as a result of both the natural gradient that falls toward the northwest and the active abstraction from borehole 8.

Based on the numerical model simulations, a 10% increase in TDS is expected to reach approximately 2 km downgradient of the V1 WRD by the year 2090 and 2.4 km by the year 2140. The Uis Wellfield boreholes are located approximately 500 m to the north-northeast of the V2 WRD and therefore have less of an impact on the migration of a plume from V2 WRD in comparison to the V1 WRD. Based on the numerical model simulations, a 10% increase in TDS is expected to reach approximately 350 m downgradient of the V2 WRD by the year 2140 (Digby Wells, 2022).

The third-party boreholes at the Brandberg Rest Camp and NamClay are not expected to be impacted by the 100-year post-closure contaminant plume (with a 10% increase in TDS). However, should the abstraction volumes for the third-party boreholes increase from the assumed model volumes the contamination plume impacts to these boreholes will need to be reassessed (Digby Wells, 2022).

Once the geochemical information from the waste samples is available the contamination plume model will be updated accordingly with new source input data of the reagents used in the petalite flotation circuit.

4.16.6 GENERAL WASTE

Waste is separated at source, stored in a manner to avoid discharge of contaminants to the environment, and either recycled or reused where possible. On-site facilities will be provided at a dedicated waste storage facility for sorting and temporary storage prior to removal and disposal to appropriate recycling or disposal facilities off-site (Windhoek for general waste and Walvis Bay for hazardous waste).

Industrial waste will be sorted on-site and disposed of at appropriate facilities. Hazardous waste includes, but is not limited to, the following: fuels, chemicals, lubricating oils, hydraulic and brake fluid, paints, solvents, acids, detergents, resins, brine, solids from sewage, and sludge. A waste specification will be developed and included in the EMP.

4.16.7 EFFLUENT AND WASTEWATER

Project-generated sewage is collected and uses gravity reticulation via buried sewer pipes and transported to the new BioMite sewage treatment facility. Sewage is treated in this purpose-built sewage treatment plant. Prior to the ESIA being conducted, the old Clarus system had not been operating effectively and was replaced after UTMC commissioned a root cause analysis of the capacity issues and requested an upgraded sewage treatment facility. The water output from the plant will be suitable for use in dust suppression, vehicle washing, irrigation, fire suppression water, and process water.

The wastewater treatment plant produces a small quantity of sludge, which will be dried in a sludge-drying bed located at a point lower than the plant. Dried sludge could be used as fertiliser for rehabilitation of mining landforms.

4.17 Water supply alternatives considered

The primary alternative to be assessed is the water supply for mining operations in Stage II.

All the available water supply boreholes for the Uis Tin Mine were assessed and will be required to meet the water demand for the Phase 1, Stage II requirements, the following alternative options can be considered:

- Andrada plans to dewater the K5 pit which contains an estimate volume of 190 634 m3. The timeframe for this has not been confirmed but it is recommended to plan this as far in advance as possible to reduce discharging the stored water to the environment and accommodate any dilution of the pit water may be required. The pit water has higher concentrations compared to the groundwater aquifer as a result of evaporation, which may limit its use in the plant unless this can be diluted;
- Andrada could consider establishing a covered water storage area nearby to the plant, with a minimum capacity of 1 week (~2 700 m3) supply for emergency water supply;
- There are potentially three boreholes located within ~13 m of the mine, which could be located and tested for an additional water supply to the mine and to assist with downtime associated with maintenance on the water supply boreholes. The estimated yield from these boreholes could provide an additional 23.7 m3/hr for the project but this would need to be confirmed;
- Should the above borehole not be located, it is recommended that Andrada establish additional water supply boreholes for emergencies or to allow flexibility on the current water supply network. These should preferably be outside the Uis River Catchment to reduce cumulative drawdown impacts within this catchment;
- As part of the water supply assessment a geophysical survey was undertaken for Andrada, identifying eight (8) borehole locations that are proposed for further investigation. It was also recommended to try and locate existing boreholes within the identified regional target areas and determine if these could be used and if so, what their sustainable yields would be. If yields would be sufficient, these could provide an alternative groundwater supply source to the mine. Drawing large yields of groundwater for prolonged periods may have significant drawdown impacts for the regional aquifers.

- Where processes allow for it, water used in the plant should be recovered and reused as much as possible. The reticulation system must be maintained to reduce losses from the system;
- If possible water from the Uis wastewater treatment works could be recovered and used to supplement the water supply for the plant; and
- When possible Andrada could consider collecting and storing rainwater in non-operational pit areas which could provide a temporary supplement to the plant (Digby Wells, 2022).

For every alternative option there is a trade-off or an impact on another aspect of the Project. The detailed baseline environmental studies in the appendices, and summarised in the environmental baseline chapter, provide further information to the decision-making process.

4.18 Rehabilitation and Closure

The Proponent will commit to establishing a rehabilitation plan as part of the mine closure plan. A conceptual mine closure plan with costing is under development by UTMC in association with ECC and forms part of the EMP requirements and will be updated into the assessment phase.

The final mine closure plan currently under development is structured according to infrastructure placement on-site and what to do with them at specific time stamps. Each domain outlines the type of infrastructure present within it. The domain is then further broken down into possible uses under certain conditions for example, care and maintenance, premature closure, and post closure.

The different domains that have been developed are listed below:

- Waste rock dumps and the co-disposal facility
- Processing plant and salvage yard
- Surface roads and linear infrastructure
- Fuel depot
- Open pit and mining
- Workshops

UTMC undertook targeted consultations with relevant community stakeholders to establish the closure framework including appropriate cost schedules per domain. The development of this closure plan is a standalone exercise and not formally part of the current ESIA, however, some of the concerns raised overlapped with the ESIA scope and were subsequently addressed in this report. Some of these concerns were ground vibration complaints from blasting and dust nuisances from the same source as well as social issues related to economic empowerment. See Appendix B which contains the attendance registers of the workshops held in Uis between 9 and 11 August 2022.

5 ENVIRONMENTAL AND SOCIAL BASELINE

5.1 BASELINE DATA COLLECTION

Initial desktop baseline studies relevant to the Project formed part of the initial environmental assessments conducted for the mining licence on which the Project is situated. As part of this assessment, baseline conditions were studied in detail, with inputs from specialist studies commissioned as part of the environmental and social impact assessment process.

5.2 DESKTOP AND FIELD SURVEYS

Initial desktop baseline studies were completed between 2018 and 2021 for the Project. Additional desktop and field-based baseline studies were conducted between March and November 2021 and builds onto the dataset of site environmental monitoring data being collected since 2019.

This section sets out the biophysical and socioeconomic environments in which the Project is situated. It is an important part of the scoping component of the assessment, as it determines if there are any knowledge gaps that require additional information prior to the assessment phase being completed.

5.3 SPECIALIST STUDIES

The specialist studies as outlined in Table 11 were commissioned and completed to determine the current state of the baseline environments and conduct impact assessment studies.

Table 11 - Specialist and baseline studies conducted for the ESIA

Study area	Purpose	Specialists
Terrestrial ecology	Biodiversity and habitat. Identification of species of concern and sensitive areas. Impacts of mining construction and operations on habitats and biodiversity (if any).	Peter Cunningham
Hydrology	Water supply. Storm protection. Impact on heritage aspects. Clean and dirty water management systems.	Nurizon Consulting (Pty) Ltd
Groundwater	Assess the potential for contamination of aquifers from TSF & WRD. Provide a model to determine impacts of drawdown and plume mobility. Assess the sustainability of boreholes for water supply.	Digby Wells and ECC

Study area	Purpose	Specialists
Air quality	Provide emission standards and dust suppression requirements. Assess prevailing wind directions and possible effects of emissions on the process and/or personnel. Model potential air quality impacts.	Airshed
Noise and sense of place	Identification of possible receptors and assess levels of noise to which they may be exposed during construction and operations.	Airshed ECC
Traffic	The traffic impact assessment will study the potential traffic impacts and loading on routes associated with the mining activities. Assessing the capacity of infrastructure and safety aspects of the mine entrance. Assessing the need for an intersection upgrade at the mine entrance and providing a concept layout plan if necessary.	ITS Global
Heritage and culture	A heritage assessment is required, to comply with Namibian national legislature.	Dr John Kinahan
Visual and tourism	Assessing the potential visual impacts of a proposed Project on the receiving environment.	ECC
Social and economic	Includes the assessment of impacts on the social and economic landscape within the sphere of influence of the Project.	ECC
Geochemical sampling and analysis	The geochemical analysis of waste rock, tailings, and overburden will be undertaken to assess the mineralogical composition, acid mine drainage potential, and metal concentration of the leachate of waste rock and tailings.	ECC: Mine Waste and Management Consultants
Blast vibration impact	Assessing the impact of blasting on receptors in the area within the measured blast zone.	Blast Management and Consulting

5.4 LOCATION

The proposed Project is located approximately 120 km inland from the Atlantic coastline. The site is within the settlement of Uis in the northern part of the Erongo Region and not within proximity to any other major town. Omaruru is situated east of Uis by approximately 122 km along the C36 gravel road. A small village called Okombahe is situated approximately 60 km southeast of Uis. The B2 main road can be accessed via the D1930 gravel road heading southeast from Uis toward Usakos for approximately 132 km.

5.5 LAND USE

The Project is situated in a predominantly subsistence agricultural region dominated by small stock farming land uses and to a lesser extent small-scale mining. Figure 25 outlines the proposed mining licence area map with surrounding land ownership status. Farming activities on surrounding properties will be able to continue relatively undisturbed by the proposed Project. The Project area is part of a communal reserve called the Okombahe Reserve and falls within the Tsiseb conservancy.

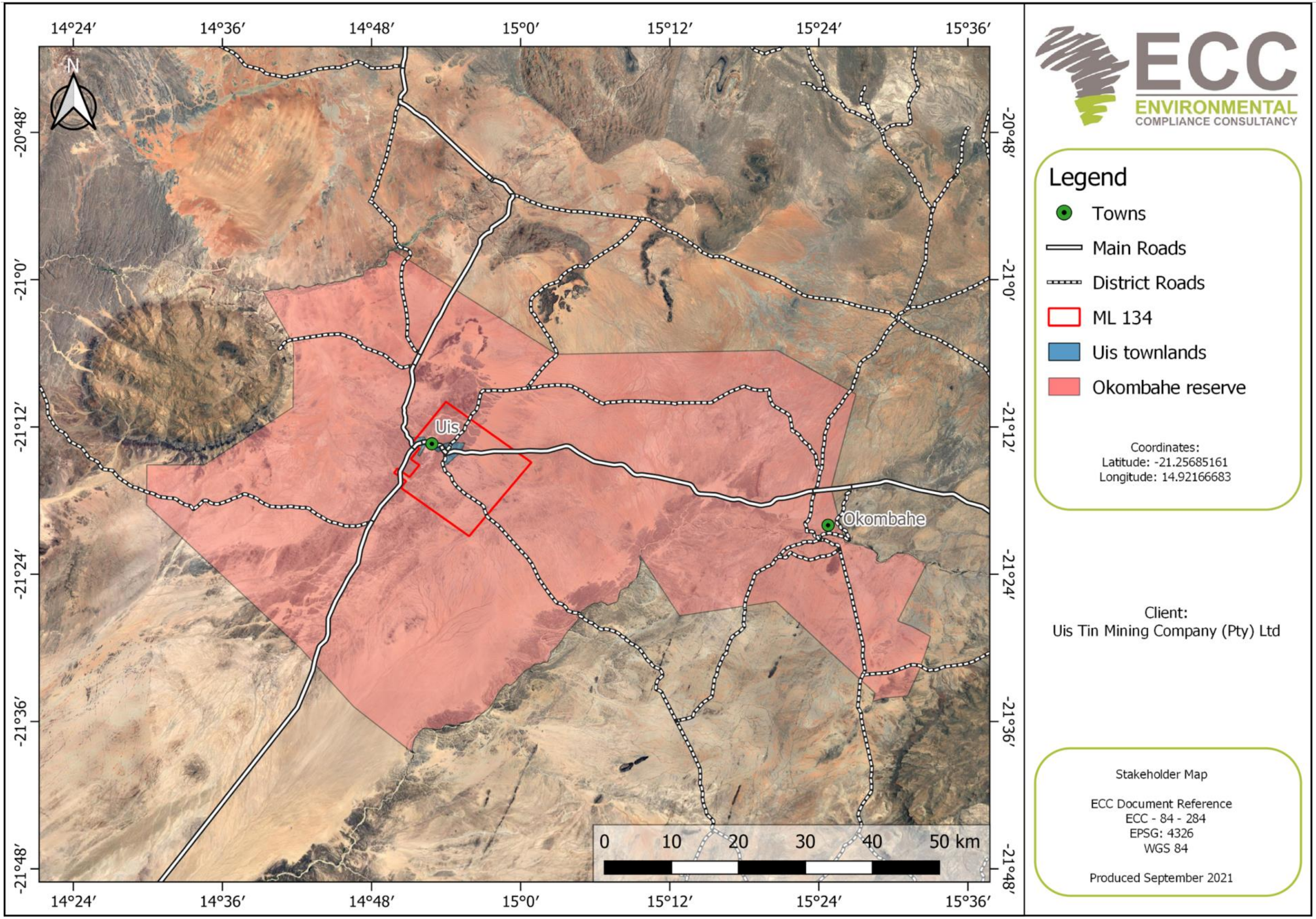


Figure 25 - A map showing the Project location within the Okombahe Reserve and in proximity to nearby villages.

5.6 GEOLOGICAL SETTING

The regional geology of the ML 134 area consists mainly of the Swakop Group and a very small section to the eastern side of the ML overlap Damara granites. The main rock types of this area are schists, dolomites, and granite. Granite hosts pegmatite dykes, within which are localised occurrences of tin and tantalum minerals, cassiterite and columbite-tantalite group. The Swakop Group is part of the Damara Supergroup and Gariep Complex (Bubenzer, 2002). The Uis Tin Mine focusses its mining activities on the cassiterite bearing pegmatites and produces a tin concentrate that also contains tantalum and lithium.

The different geological group formations associated with the ML are illustrated in Figure 26. Additional geology and mineralization details can be found above in Chapter 4.

5.7 TOPOGRAPHY

The topography of the ML is relatively flat with various rock outcrops and the elevation gradually decreases from the south-eastern side of the ML towards the north-western side (towards Uis), varying between 1050 m to just below 700 m above mean sea level. This ML is situated close to the Brandberg which is highly elevated at about 2475 m above mean sea level. This is illustrated in Figure 27.

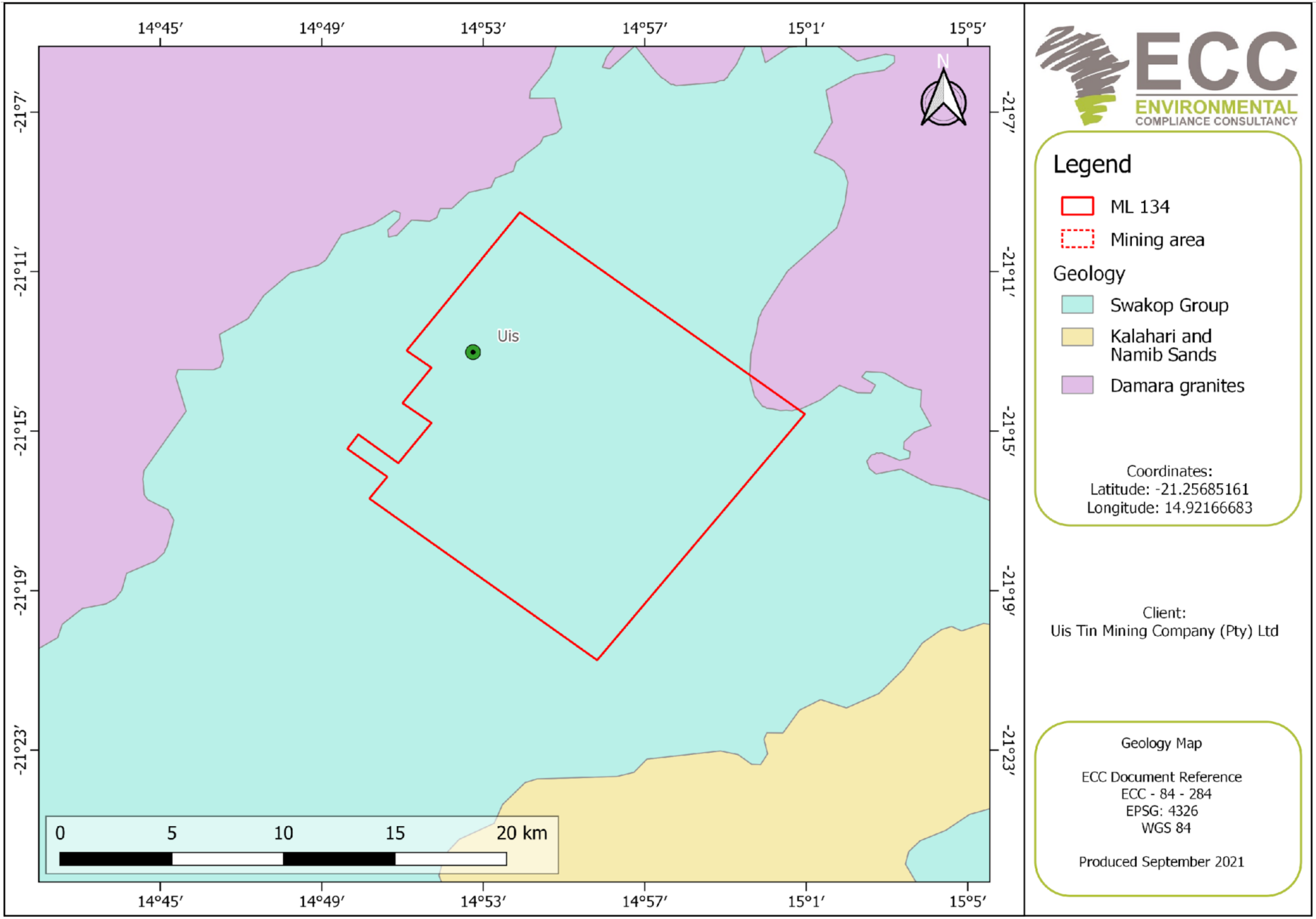


Figure 26 - A map showing the project location geological setting

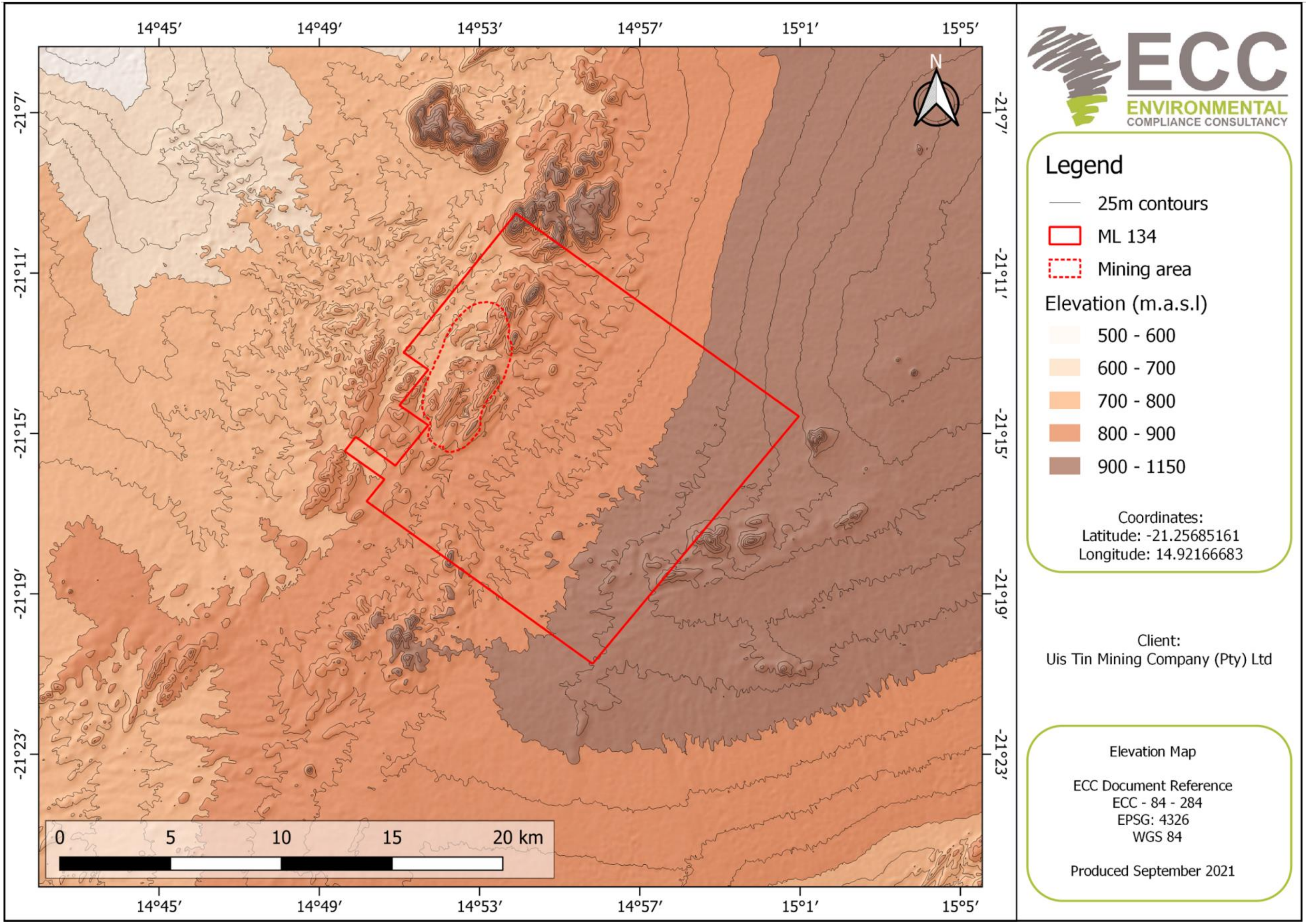


Figure 27 - Elevation map for ML 134.

5.8 SOILS

ML 134 is largely covered by rock outcrops and the area to the south-eastern side of the ML is covered by eutric regosols soil (Figure 28) (Bubenzer, 2002). Namibian soils vary a great deal, and variations occur on a broad scale but there is even a great deal of variability at a local level.

The first part of the soil name provides information on the properties of the soil, namely: eutric soils are fertile with high base saturation. The second name reflects the conditions and processes which have led to the formation of the soils (Mendelsohn et al., 2002). Regosols are medium to fine-textured soils of actively eroding landscapes. These soils are not as shallow as leptosols, but these soils never reach depths of more than 50 cm. This type of soil cannot provide vegetation with sufficient minerals or water (Mendelsohn et al., 2002).

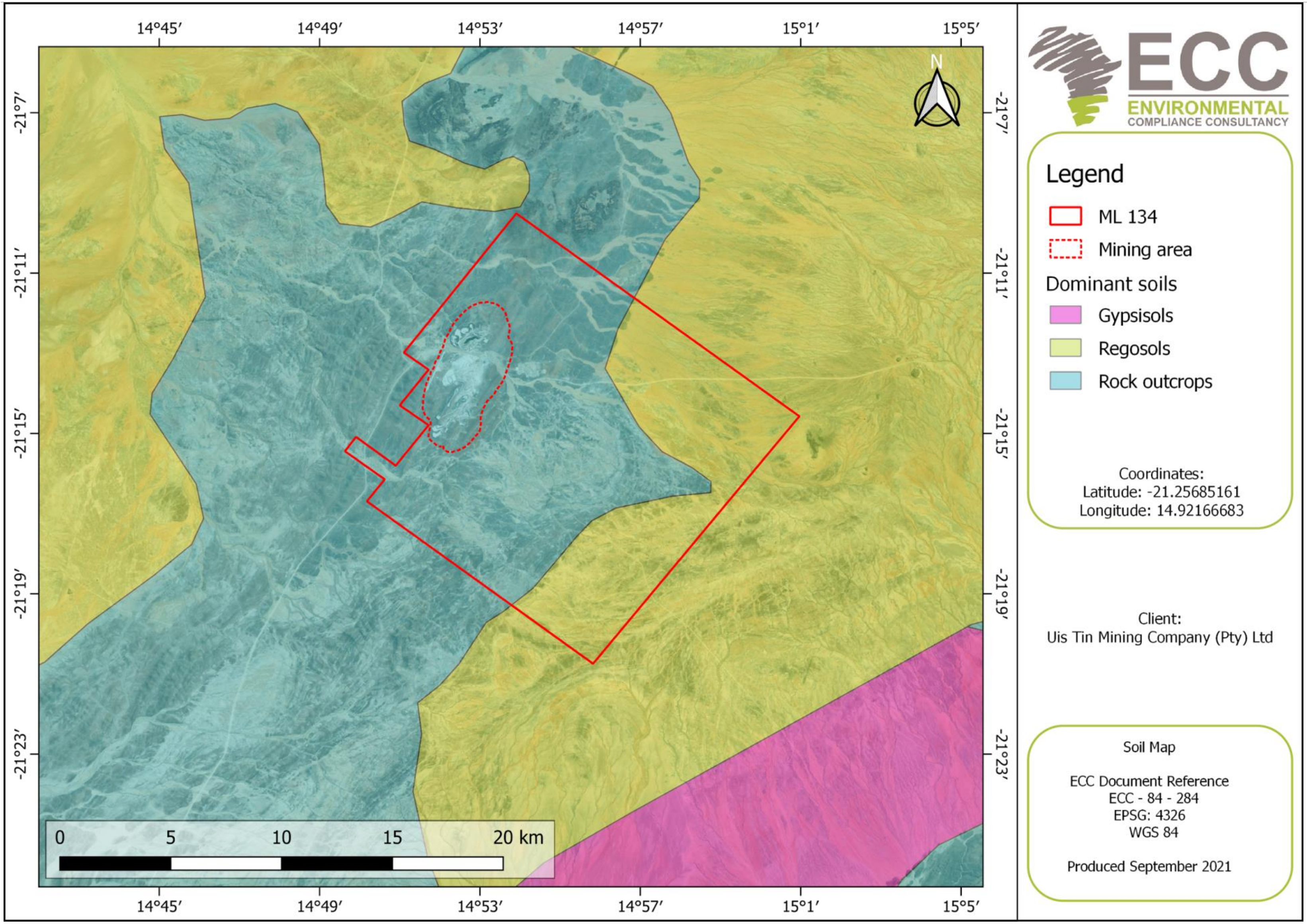


Figure 28 - Soil map of ML 134

5.9 Hydrology and Geohydrology

ML 134 falls within the Ugab catchment area and over the Kunene South groundwater basin. In general, this region has little groundwater. Groundwater in the Project area (ML 134) is primarily associated with the interception of structures such as fractures (joints & faults) within subsurface hard rock (marble) bodies at various depths. On the ML there are a total of 11 boreholes of which four (4) are capped. Water is abstracted from seven production boreholes (Figure 29).

The Erongo Region in the central-western part of Namibia receives between 350 mm to less than 50 mm of rainfall per year. Most of the ML area is in the arid part of the Erongo Region with rainfall of less than 150 mm per year (Bubenzer, 2002). Evaporation is 2100 - 2240 mm per year. All river courses flow in a south-easterly direction through the ML (Figure 30).

5.9.1 LIMITATIONS OF THE HYDROGEOLOGICAL ASSESSMENT

Aquifer test study limitations:

- Although boreholes were scheduled to be switched off prior to aquifer testing the cluster area, observation borehole data may be influenced by abstraction in other cluster areas; and
- The community, landowners, and other business operations may have boreholes in the riverbed near the Uis and Southern wellfields. Abstraction from these third-party boreholes may influence the aquifer test results.

5.9.2 PHASE 1 STAGE II WATER DEMAND

With the increased production of tin concentrate to approximately 120 tonnes per month, the water requirement will also increase to 18.1 m3/hr.

5.9.3 RESULTS OF NUMERICAL MODELLING TO DETERMINE SAFE YIELD PARAMETERS

A provisional report (2019) was issued on the safe yield of water from the Uis aquifer. However, the results needed to be subjected to further bore field testing to deliver a final estimate (Van Wyk, 2019). That report represents the baseline conditions and was used as such by Digby Wells in designing its new pump testing regime, executed in early 2022. The current estimate based on the 2019 test pumping exercise conducted by Dawnmin Africa Investments (Pty) Ltd approximates to 340 000 m/a to 45 000 m/a over a 5-year cycle (2019 - 2023).

Andrada have two wellfields from which water can be drawn to supply the processing plant. The Uis wellfield is located in the Uis River, which runs through the northern part of mine area. There are seven boreholes located in this wellfield which are currently being used to supply water to the plant. The Uis wellfield boreholes are located within 2 km of each other and are expected to provide a combined average sustainable yield of 16.4 m3/hr. The Southern wellfield is located within a river channel approximately 6 km south of the mine and comprises three boreholes. A fourth low yielding borehole was drilled in this wellfield but has subsequently collapsed. The Southern wellfield is not currently operational. The three boreholes in the southern wellfield are located within 700 m of each other and are expected to provide a combined average sustainable yield of 2.3 m3/hr. These boreholes are in the process of being legalised with the Ministry of Agriculture, Water, and Land Reform. Once legalised, the abstraction volumes from these bores will be added to the overall project needs and will allow UTMC to submit a revised abstraction permit for an increased abstraction volume of 150 000 m3 per annum.

Initial groundwater levels measured in 2018 indicate that the water table typically occurs within the weathered zone of the fractured aquifer. The weathering profiles for the water supply boreholes indicate that the fractured aquifer is weathered to an average depth of 25 m and has a higher frequency of fractures between 20 – 50 m. Although the fracture frequency decreases after 50 m the fractures that are intersected can still be high yielding (i.e., borehole 8) (Digby Wells, 2022) (Appendix F).

Abstraction from the Uis wellfield boreholes since operations began in 2020 has drawn down the water levels in these boreholes by between 2.4 – 7.8 m. Groundwater levels within the Southern wellfield have decreased by an average of 1.4 m between 2018 and 2022, even though these boreholes are not operational (Digby Wells, 2022).

The results of the additional pump testing done on the Uis and southern wellfields by Digby Wells quantified a sustainable yield figure of 18.7m3/hr while the mine will require only 18.1 m3/hr over the LoM.

The sustainable yield for the available water supply boreholes were assessed as part of the hydrogeological assessment. simulates a cumulative sustainable abstraction yield of 18.7 m3 /hr for a 24-hour period for the ten (10) abstraction boreholes available to Andrada. This simulation would abstract a total annual volume of 163 812 m3/a from the aquifer. The sustainable yield per borehole (in m3) is provided in Table 12. These values were simulated as abstraction values for the water supply boreholes for an 18-year Life of Mine period. See Section 4.17 outlining potential additional water source figures to augment the current water supply regime for the mine.

Table 12 - Sustainable yield per borehole

Borehole	Average sustainable yield (units)	Borehole	Average sustainable yield (units)
BH1	0.4	BH8	8.5
BH2	0.2	BH9	0.9
BH3	0.3	BH10	4.0
BH4	1.0	BH11	1.4
BH6	1.0	BH12	1.0
Total Yield		18.7	

The resulting drawdown cone will extend ~6.5 km from the mine and will have a drawdown of ~4.5 m in the area of the wellfield. The numerical model results indicate the abstractions will be sustainable, however, they will stress the aquifer due to the low recharge potential of the area. Hence, the need for alternative water supply sources later during operations. The Proponent is considering the establishment of a desalination plant

Based on the rainfall data available for the area (from 1979 to date), there are regular peak rainfall events that assist with recharging the aquifer, as was observed during the first few months of 2022 after a major rainfall event. Groundwater level observations on site showed an increase in groundwater levels in the water supply boreholes of between 0.8 m – 8.3 m, in response to the site receiving ~90 mm of rainfall (Digby Wells, 2022).

5.9.4 GROUNDWATER QUALITY

The project area is characterised by fractured igneous and metamorphic rock aquifers which are overlain by shallow alluvial aquifers in river channels. The aquifers receive low recharge (less than 0.7% MAP or 0.61 mm/a), and the hydrochemistry is, therefore, representative of groundwater with a long residence time or slow-moving groundwater allowing rock interaction processes to occur over long periods which affords groundwater more time to mineralise subsurface (Digby Wells, 2022). Therefore, groundwater hydrochemistry is characterised by high concentrations of sodium chloride and sulphate. Interpretation done by Dawnmin Africa Investments is based on a tri-linear diagram (piper plot) and classifies the Uis groundwater as “sodium chloride” (brackish) type water (Van Wyk, 2019).

The isotope samples were collected to trace links between the water located in the K5 pit with surrounding groundwater locations. The five water samples represent groundwater (BH8, BH10, BH12), pit water (K5) and rainwater (Rain 2). Two samples were collected from each site, 1 x 1 l sample for the tritium analysis and 1 x 40 ml sample for the stable hydrogen (δ2H) and oxygen (δ18O) analysis. No additives or preservatives were added to the samples. The samples were submitted to Ithemba Laboratories in South Africa for Analysis. Subsequently during the recent Digby Wells hydrogeological assessment water quality samples were taken from the water supply boreholes between December 2021 and January 2022. These are compared with 2018 water quality data collected during van Wyk’s drilling and aquifer testing project. pH, electrical conductivity, and total dissolved solids were used to describe the general condition of the groundwater. The trends for pH and electrical conductivity and total dissolved solids indicate that the results for the water supply boreholes are of a similar range to the boreholes tested in 2018 (Digby Wells, 2022).

Stable isotopes of oxygen (18O) and hydrogen (2H) can be used as environmental tracers. The composition of stable isotopes in natural waters can change based on physical, chemical, and biological processes that occur within the hydrological cycle as a result of isotope fractionation.

Tritium is a radioactive isotope of hydrogen which has been applied in age determinations of groundwater and trace amounts of this isotope have been picked up in the water samples taken from the northern pit (K5).

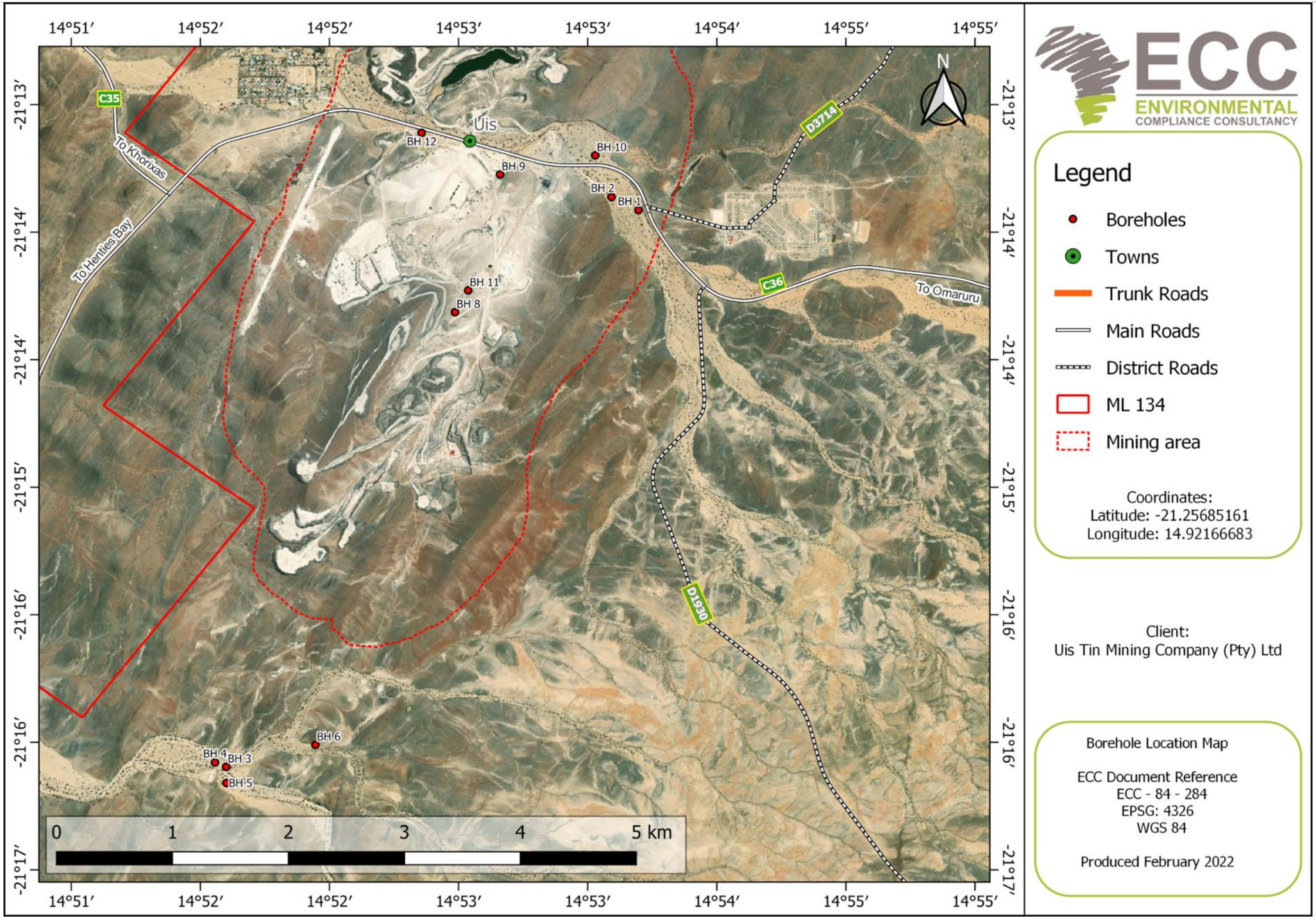


Figure 29 - Borehole locations

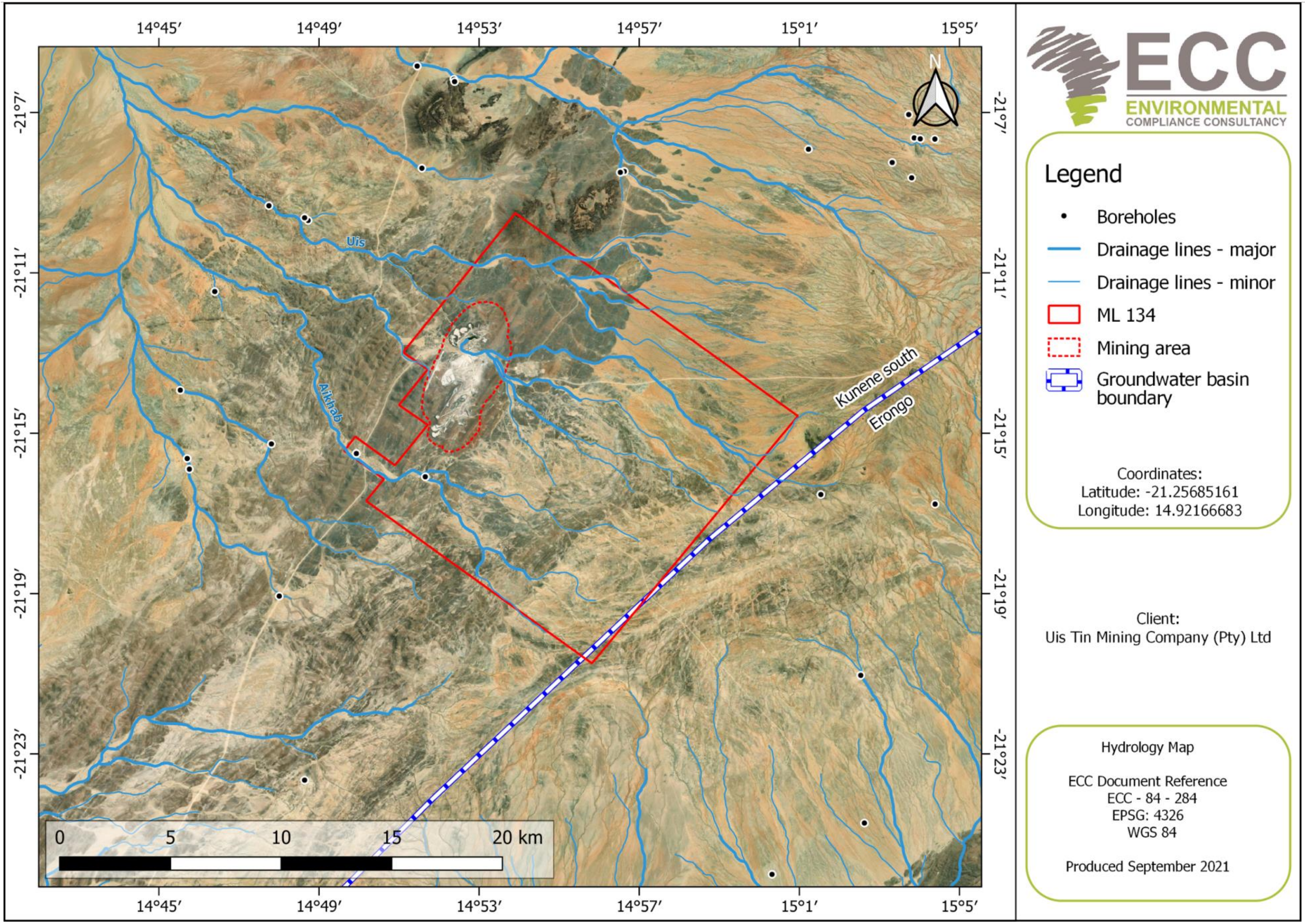


Figure 30 - Hydrology map of ML 134

5.9.5 BOREHOLE RECOVERY LIMITS

The numerical model simulations indicate that when the end of mine life is reached, and the abstraction requirements cease, the drawdown cone will extend ~6.5 km from the mine with a drawdown of ~4.5 m in the wellfield area. The drawdown contours were used to calculate the area for the dewatered extent and the dewatered volume using ArcGIS version 10.8.1. This was used in conjunction with the porosity factor (numerical model) and recharge to calculate that the estimated water level recovery period would be 58 years post closure (Digby Wells, 2022). See Table 13 extracted from the Digby Wells hydrogeological assessment report.

Table 13 - Analytical calculation inputs

Input	Value	Unit
Area of influence	65 075 284	m2
Dewatered volume	228 472 561	m3
Porosity3	0.01	%
Volume of pore space to be filled	2 284 726	m3
Recharge	0.61	Mm/a
Recharge over area of influence	39 696	m3/a
Time to fill area of influence	58	years

5.10 BIODIVERSITY

Environment and Wildlife Consulting (2021) undertook a specialist assessment study of the vertebrate fauna and flora on ML 134. The dry season assessment report was completed late 2021, and the wet season assessment conducted in early 2022 after initial rains have fallen in Uis. The baseline studies for both seasons is the basis upon which the full assessment will be carried out, notwithstanding the relevant information gathered and recorded in from publicly available information sources. An assessment of the potential impacts was carried out using the impact assessment methodology used by ECC.

5.11 VEGETATION

Vegetation type and structure in Namibia is strongly influenced by rainfall. The plant diversity and tallest trees are most lush in the north-eastern parts of the country and contrast sparser and shorter to the west and south of the country. This gradient is not simple as other factors such as soil types and landscape also influence the vegetation. The dominant vegetation structure of ML 134 is sparse shrubland and grasses (Figure 31) (Bubenzer, 2002 & Mendelsohn et al., 2002).

The area has unique vegetation and wildlife species including reptiles and avifauna, many of which are endemic to the Namib Desert. ML 134 lies within the Nama-Karoo Biome and central-western escarpment type, which tends to have sparse shrubs and grassland occupying the gravel plains. The grass cover is sparse but dominates the little vegetation that grows on the gravel plains. The plant diversity of the areas is moderate (between 150 to 300 species) and the endemism is moderate to high (between 6 and 35 endemic species), with the higher number of species estimated to the northwestern side of the mine licence, near the mine site (Bubenzer, 2002 & Mendelsohn et al., 2002).

A list of plant species that could be found within and surrounding ML134 has been provided by the National Botanical Research Institute (NBRI) and can be seen in Appendix G. As in the NBRI tables, there is a low to moderate plant diversity and high endemism within these areas; of all the species found within these areas, 11 species are near-endemic, 20 species are endemic, and five (5) species are protected.

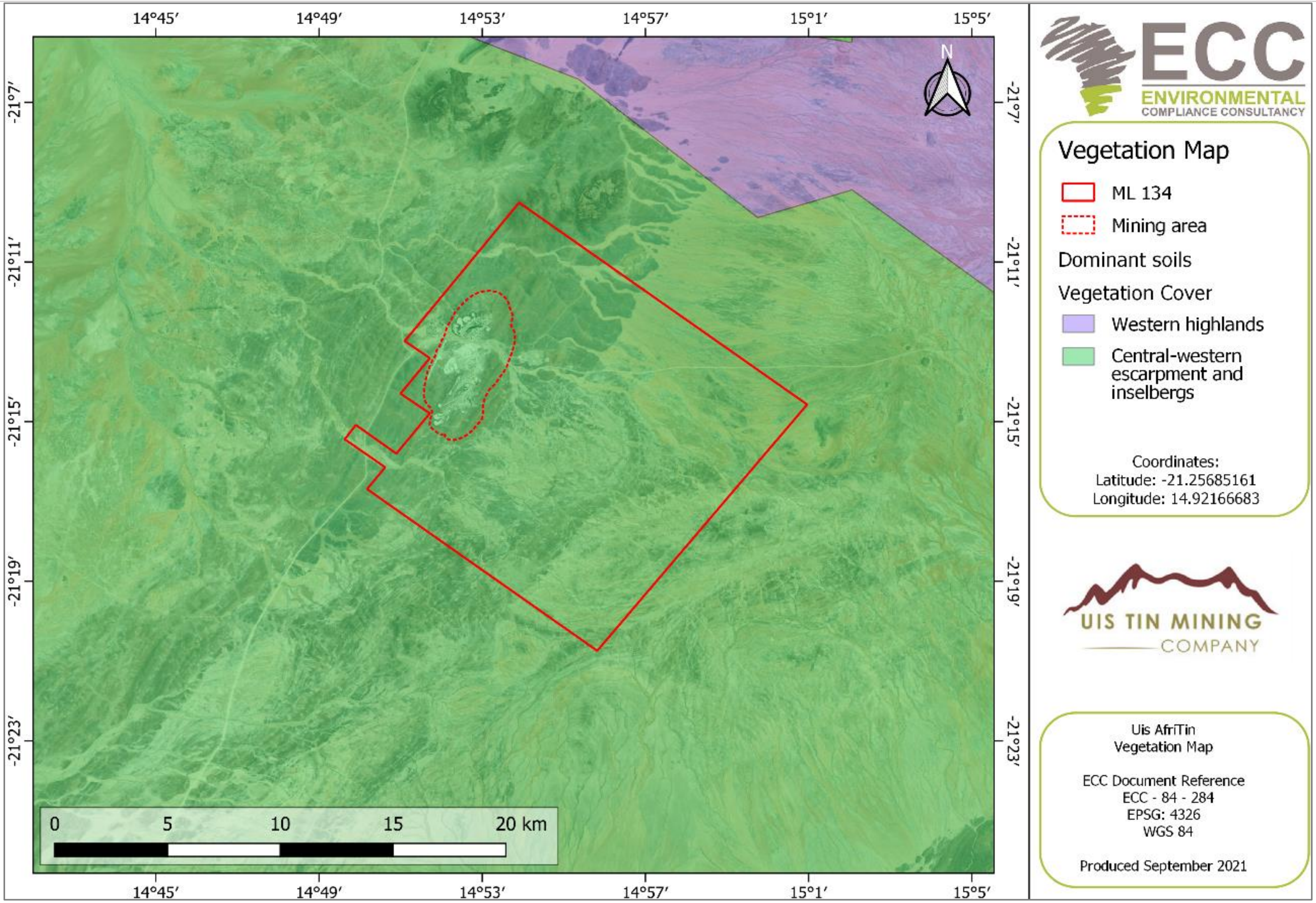


Figure 31 - Vegetation map of ML 134

5.12 FAUNA SPECIES

The area within and surrounding the ML has 111 to 140 bird species (moderate to high endemism with six to seven species), which is of medium diversity in comparison to the rest of Namibia, which has a total of up to 658 recorded bird species. The number of observed lizard species for this area is between 32 to more than 35 different species (high endemism with 12 to 14 species) and the mammal diversity of this area has been recorded to be from 61 to 75 species (high endemism with 7 to 8 species). The large carnivore diversity is approximately four (4) species for this area, thus the overall terrestrial diversity for this area is low in comparison with the rest of the country, but this area has an overall high species endemism (Bubenzer, 2002 & Mendelsohn et al., 2002).

Furthermore, the rodent diversity ranges between 16 to 23 species as recorded for this area and the different snakes recorded are between 20 to 29 different species (Bubenzer, 2002 & Mendelsohn et al., 2002).

The diversity of mammals and reptiles in the area is generally low and low with respect to the rest of Namibia, but this area is represented by various important species that need to be protected, some of which are critically endangered, such as the White-backed Vulture (Bubenzer, 2002, IUCN, 2021 & Mendelsohn et al., 2002). Although this area does not have the highest diversity of species in Namibia it clearly has a unique and sensitive ecosystem with high endemism and some High Conservation Value (HCVs) species (Bubenzer, 2002, IUCN, 2021 & Mendelsohn et al., 2002).

This part of the Erongo Region is relatively untouched, as most people that live within the area are confined to settlements, lodges/camps or larger towns like Uis. Within this area (Brandberg and Ugab River), there are also desert-adapted Elephants, which is not a distinct species, they are African bush elephants (Loxodonta africana), that are also specifically adapted to these harsh desert environments. There are approximately 62 desert adapted elephants left within the southern Kunene and northern Erongo regions; they mainly move within the ephemeral rivers, where they get water, food, and shelter under larger trees. A 32% decrease was seen since 2016 among the desert-adapted elephants, residents to the Ugab River, which was partly due to anthropogenic and natural reasons (major drought) (Elephant-Human Relations Aid, 2020).

In the Ugab and Huab rivers between 2014 and 2018, nine (9) out of 14 newborn elephant calves died, the exact causes were unknown, but human-caused stress factors and harsh environmental conditions may have contributed to this. These elephants are keystone species that play an essential role within these local desert ecosystems as they usually dig for water, making these resources available to other animals, as they break off large branches from trees, that assists smaller animals to also get access to green fodder in the drier seasons. Their deep tracks in the mud during the short rainy season provide an ideal environment for seedlings, which is essential for vegetation growth. Thus, these desert-adapted ecosystem engineers form an essential part of the balance within the desert ecosystem. The African Bush Elephant is an endangered species which contributes to the annual revenue of Namibia through tourism (Elephant-Human Relations Aid, 2020).

5.13 BUILT ENVIRONMENT AND INFRASTRUCTURE

5.13.1 INFRASTRUCTURE AND BULK SERVICES

The tarred C36 road transecting the town carries significant traffic volumes between Windhoek and Henties Bay and is considered an important tourism route to the Brandberg massif and surrounding attractions. This is also the primary access route to the site.

The D1930 and D3714 gravel roads converge on the town from the east and northeast and connect to the C36 tarred road, which is the main road east to Omaruru, and to Henties Bay the route to which is shared as the C36 and M76. The D1930 is used to connect to the B2 highway that runs between Swakopmund and Windhoek. The D3714 branches off onto the D3715 and connects to Omatjete in the Kunene Region further northeast.

NamWater currently has an unused wellfield in the upper Uis River, with an associated reservoir and pipeline laid towards Uis.

Bulk water to Uis is pumped by NamWater from the Nei-Neis Water Supply Scheme south of Uis to a reservoir within Uis. This is used to supply potable water to the residents of Uis.

The town is supplied by a 66kV overhead power line by ErongoRED. The power supply for the Uis Tin Mine is derived from the grid consisting of a 66kv power line (approximately 1 km long) and a substation with associated infrastructure (Figure 32).

The power line and infrastructure are located within the Accessory Works Permit area, permitted by the Ministry of Mines and Energy (16 October 2018) in terms of Section 90 (3) of the Minerals Act 33, 1992 and has a valid environmental clearance certificate.

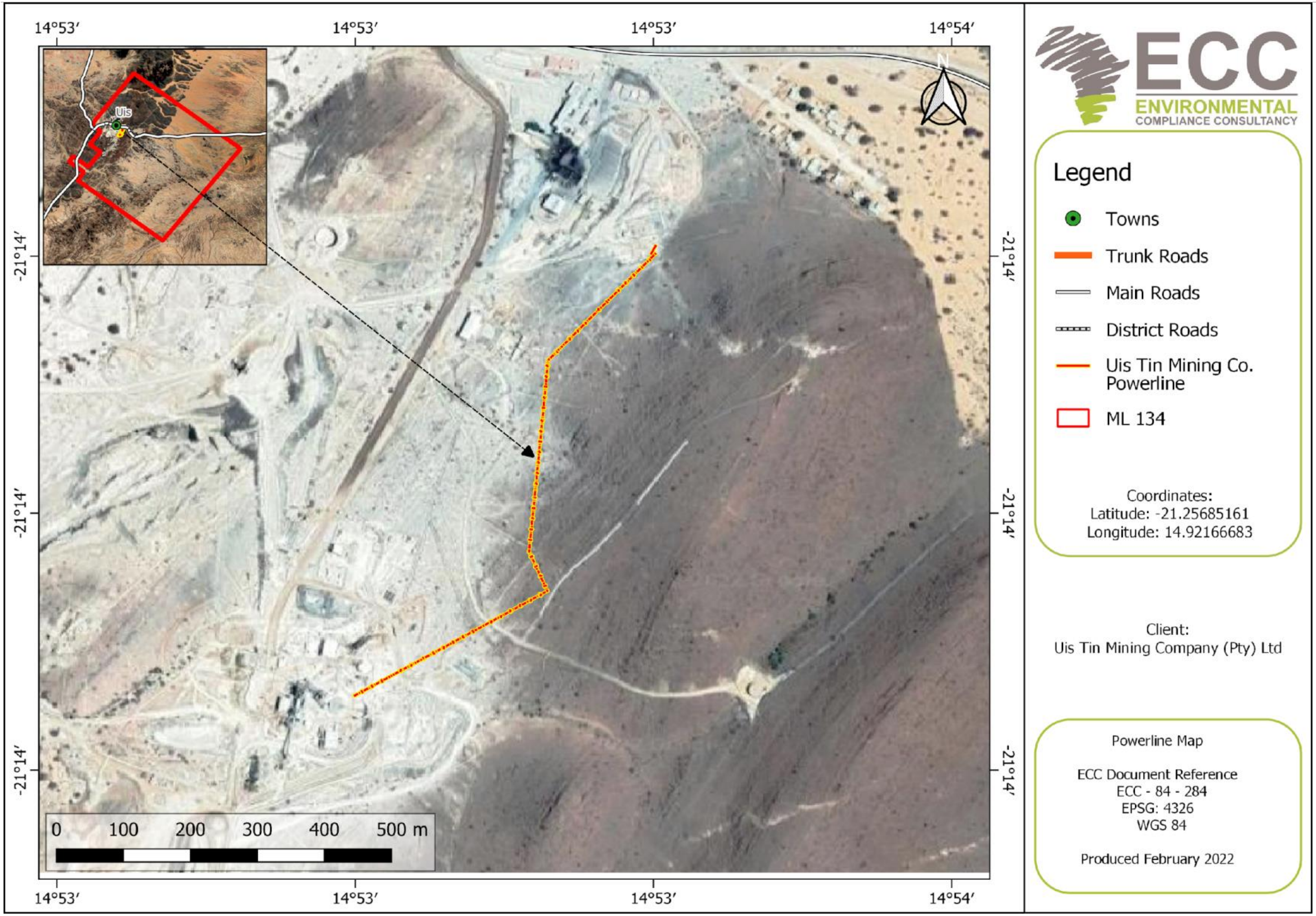


Figure 32 - A map showing the power line infrastructure

5.14 TRAFFIC AND TRANSPORT

Innovative Transport Solutions (ITS Global) was commissioned by ECC to assess the road traffic baseline of the project area (Figure 33). The major existing roadways in proximity to the Project area include:

- The C36 Road (T0203) (blue line) – Class 2 major arterial, with a surfaced lane (approx. 3.5 meters wide) per direction. Gravel shoulders and a speed limit 80 km/h within Uis, and
- The D1930 and D3714 Roads (red line) – Class 4 distributor, with a gravel lane per direction.

Figure 33 - Class routes assessed for the study indicated in blue and red lines

These routes were assessed for capacity to handle road traffic from the mine fleet and the public during two timestamps, 06h00 to 08h00 in the morning and 16h00 and 18h00 in the evening. Parameters that were assessed included shoulder sight distance at the access intersection to the mine, speed limits and road conditions and the expected number of traffic contributed by the mine on the roads being assessed.

5.14.1 METHODOLOGY

The C36 mine entrance intersection is a “T” intersection, with free flow along the C36 and a stop control on the mine exit, and a single lane on each approach. See Figure 34 showing the existing lane configuration and traffic control.

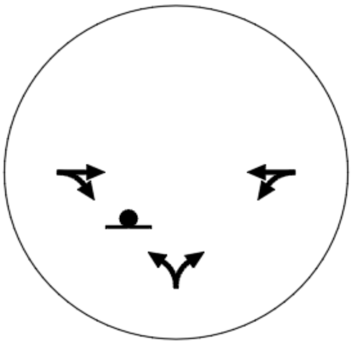


Figure 34 - Existing site geometry (ITS global, 2021)

The C36 mine access intersection was surveyed / counted on 18 November 2021. The 2021 existing traffic conditions are based on the current intersection geometry / control, as well as the existing traffic volumes. Based on the existing traffic capacity analysis results, this intersection currently operates acceptably, from a capacity analyses point of view, with the following results:

- Level of Service (LOS) A during all peak periods,
- Delays less than 10 seconds on average during peak periods, and
- Volume to Capacity (v/c) ratio is less than 5 percent during peak periods.

The volume to capacity ratio is an indication of whether an intersection is operating under-or over-capacity. With a very low v/c ratio of less than 5 percent, it means that there is more than 95 percent spare intersection capacity currently available.

See Figure 35 showing the existing traffic conditions for the weekday morning, midday and evening peak hours respectively.

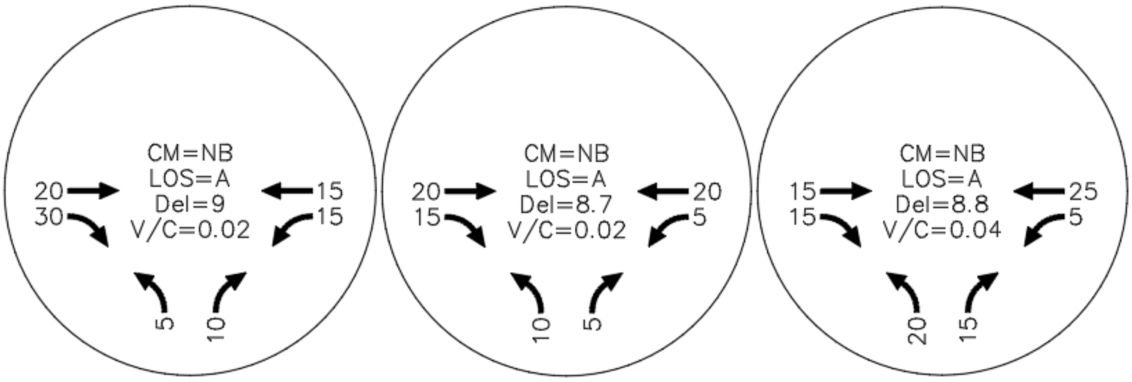


Figure 35 - Existing traffic operations (CM =Critical Movement) (ITS global, 2021)

5.14.1.1 Scenarios analysed

Scenario 1: 2021 Existing Traffic conditions. Based on existing geometry and traffic volumes. Based on the existing capacity analysis results, the study intersection operates acceptably. Hence, no upgrades are required from a capacity analysis point of view.

Scenario 2: 2026 Background Traffic conditions (Based on Scenario 1 traffic volumes, escalated with a 3% growth rate per year.) Based on the background traffic capacity analysis results, the study intersection would continue to operate acceptably. Hence, no upgrades are required from a capacity analysis point of view.

Scenario 3: 2026 Total Traffic conditions (Based on Scenario 2 traffic volumes, PLUS the additional trips for the proposed mine expansion). Based on the Total Traffic capacity analyses results, the study intersection would continue to operate acceptably. Hence, no upgrades are required from a capacity analysis point of view.

Intersection analyses were done with Traffix version 8.0 Software, which is based on the Highway Capacity Manual (HCM).

Surrounding Roads: The condition of the C36 roadway, near the development, is in relatively poor condition with various spots of cracking and failure.

Existing Operations: The C36 / mine access intersection currently operates acceptably, from a capacity analysis point of view.

Heavy Vehicles: Approximately 4 trucks enter/leave the site per day. This is about 30 percent of trucks per day from the total traffic at the C36 / mine access intersection.

Public Transport: Approximately 17 buses enter/leave the site per day. This is about 55 percent of buses per day from the total traffic at the C36 / mine access intersection.

Pedestrians: A minimum of 250 meters shoulder sight distance is available, and pedestrians can easily cross the roadway as there are less than 100 vehicles in an hour traveling along the C36. Pedestrians can walk along the C36 roadway on the wide gravel shoulders which are approximately 4 meters wide.

5.15 Socioeconomic baseline

Namibia's GDP is recorded at 14 billion US Dollars as of 2019 (Plecher, 2020). The development of the services sector, which directly includes tourism-related products and services have created a significant positive impact on domestic and national economic growth levels; employment; and local and regional development. Examples of this are the continued development of small and medium-sized tourism-based accommodation developments throughout the country as well as large-scale tourism developments, including eco-tourism with a strong focus on wildlife marketing.

ML 134 is located within the Erongo Region, named after Mount Erongo, a well-known landmark in Namibia. Erongo contains the municipalities of Walvis Bay, Swakopmund, Henties Bay and Omaruru, as well as the towns Arandis, Karibib and Usakos. All of the main centres within this region are connected by tarred roads, the capital is Swakopmund. The area surrounding the town Uis and ML 134 are less developed than some of the larger towns in the Erongo Region, as mentioned above.

The ML overlaps the communal conservancy Tsiseb. A communal conservancy represents a conservation area that is managed by a local community that aims to manage the natural resources within their conservancy in a sustainable way to generate returns and other benefits (MET/NACSO, 2018). The local residents are mainly employed by lodges, rest camps, and livestock or game farms. Tourism and consumptive wildlife use is the main benefit contributor to these local communities, as well as income generated from plant products and local crafts (MET/NACSO, 2018).

According to MET/NACSO (2018), "Wildlife is central in generating returns for conservancies", thus it is essential to ensure that the ecosystem and biodiversity are healthy within these communal conservancies to ensure a bright future for both wildlife and Namibia's local communities. Any major environmental or ecological impacts within these areas could compromise the success and future of the Community Based Natural Resource Management (CBNRM) program, which mainly depends on healthy wildlife populations for tourism and consumptive wildlife use.

Once the new bulk sampling, sorting, and testing facility is ready to be operationalised, between 10-15 additional operators will be employed from the pool of local labourers in Uis where feasible. The operators will be trained as required to ensure safe operational practices during the ramp-up phase of the project.

The EPC contractor for the facility's construction is a specialised role and will be performed by a suitable company that UTMC will appoint.

With the expected overall production output from 80 to 120 tph of ore from the mine it is expected that internal revenue generation will also increase in the form of payments received for mineral products sold worldwide. The company in turn will continue to pay taxes, levies, and royalties payments to the government. The mine's capital expenditure and operational expenditure will also be channelled into the local, regional, and national spheres, therefore, contributing directly and indirectly to the micro and macro-economies.

It is notable that the tin price in USD has tripled in the last 15 years which is evidence of a growing market for the resource. Coupled with the fairly stable exchange value of the NAD to USD the overall revenue in NAD may increase.

5.16 Governance

Namibia was established in 1990 and is led by a democratically elected and stable government. The country ranked fifth out of 54 African countries in the Ibrahim Index of African Governance in 2015 for indicators that include: the quality of governance and the government's ability to support human development, sustainable economic opportunity, rule of law, and human rights (National Planning Commission, 2017).

As a result of sound governance and stable macroeconomic management, Namibia has experienced rapid socioeconomic development. Namibia has achieved the level of 'medium human development' and ranks 125th on the Human Development Index out of 188 countries (National Planning Commission, 2017).

Namibia is divided into 14 regions and subdivided into 121 constituencies. The Erongo Region is divided into seven constituencies. The proposed Project is in the Karibib constituency of the Erongo Region. The Erongo Regional Council is responsible for the planning and development of the region in a sustainable manner for the benefit of its inhabitants by establishing, managing, and controlling settlement areas and focusing on core services. The council is accountable for an area of 63 586 km2, which is about 7.7% of the total area of Namibia (Erongo Regional Council, 2017).

5.17 Demographic profile

Namibia is one of the least densely populated countries in the world (2.8 persons per km2). Vast areas of Namibia are without people, in contrast to areas of dense concentrations, such as the central-north and along the Kavango River. Windhoek, the capital, is not only the main urban area with the largest population, but the concentration of private and public head offices attracts Namibians from all parts of the country in search for a better life.

The national population growth rate is estimated at less than two percent, which is lower than that of most African countries. Namibia's population is young – although 57% falls into the age group 15 to 59, 37% of the total population is younger than 15 years old (Namibia Statistics Agency, 2017). Since 2005, there has been a steady improvement in life expectancy, which is currently estimated at 65 years. In 2018, it was estimated that 50% of all Namibians are urbanised, i.e. living in an urban settlement (retrieved from www.worldpopulationreview.com). The last national census was conducted in 2011, and counted 2.1 million Namibians (Namibia Statistics Agency, 2011). An inter-censal demographic survey was conducted in 2016 and estimated the total population at 2.3 million (Namibia Statistics Agency, 2017).

It is predicted that urbanisation will continue, with an increase and move from 43% of the population living in urban areas in 2011, to 67% in 2041. The populations of the Khomas and Erongo regions are projected to increase the most, with over a third of Namibia's population expected to live in these two regions (Namibia Statistics Agency, 2011).

In the 2011 census, the population of the Erongo Region was 150 809, with a growth rate of 28.6% since 2001. The population of Namibia has been growing steadily; the population growth rate between 2001 and 2011 (the two censuses) was 1.4%, with urban areas growing quicker than rural areas. The highest growth rate in Namibia was recorded in the Erongo region (3.4%). This was mainly influenced by in-migration; more than 40% of residents in these regions were born elsewhere. Situated in the central Namib Desert, Swakopmund is the capital of Erongo and the fourth-largest town in Namibia with 44 725 inhabitants (Namibia Statistics Agency, 2011). In 2010, Uis had a population of approximately 3 600 inhabitants.

The potential impacts associated with the introduction of the Project to the area will be assessed as part of the ESIA, taking the baseline conditions and the Project into consideration during the assessment, to determine the magnitude of change from the baseline, and the potential impacts associated.

5.18 Health

Since independence in 1990, the health status of Namibia has increased steadily, with a remarkable improvement in access to primary health facilities and medical infrastructure. In 2015, the World Health Organization (WHO) recommended strategic priorities for the health system in Namibia, which entailed improved governance, an improved health information system, emergency preparedness, risk reduction and response, preventative healthcare, and the combating of HIV/AIDS and TB (WHO, 2016).

According to the MoHSS health facility census (MoHSS, 2009), the Erongo Region has a record of approximately 150 facilities which include individual private health care practices, group private health care practices, primary health care clinics and workplace clinics. Erongo has a high life expectancy which, as of 2011, was 63 years.

As with elsewhere in Namibia, HIV/AIDS remains a major reason for low life expectancy and is one of the leading causes of death in the region. HIV/AIDS remains the leading cause of death and premature mortality for all ages, killing up to half of all males and females aged 40 to 44 years in 2013 (IHME, 2016).

Tuberculosis (TB) is a leading killer of people infected by HIV/AIDS, and Namibia had a high burden in 2018 – 35% of people with TB were infected with HIV. The country is included among the top 30 high-burden TB countries in the world, with an estimated incidence rate of 423 per 100 000 people, and 60 fatalities per 100,000 people in 2018 (retrieved from www.mhss.gov.na).

As at the beginning of 2020, the coronavirus (COVID-19) caused illness in humans at a pandemic scale, and has resulted in an increasing number of deaths worldwide. The viral outbreak has adversely affected various socioeconomic activities globally, and with reports of a continually increasing number of people testing positive, it is anticipated that this may have significant impacts on the operations of various economic sectors in Namibia too. The disease caused many countries to enter a state of emergency, which included various levels of lockdown restrictions that had dire economic consequences. In addition, these measures have had a detrimental effect on tourism, and Namibia is, in both cases, no exception.

Furthermore, COVID-19 has also resulted in a loss of learning and socialising opportunities for children in Namibia and there was a lack of access to school feeding programs and parents had to provide or find alternative care for children. There has also been a six percent increase in health worker appointments across Namibia as a result of the pandemic (United Nations Namibia 2020).

5.19 Employment

The Erongo Region is one of the most affluent regions in Namibia, with the second highest per capita income in Namibia at N$ 16 819 per annum (Environ Dynamics, 2010). In Walvis Bay, most employment is through the harbour, fishing industry, and the processing of sea salt (Walvis Bay Municipality, 2008).

The labour force participation rate is the proportion of the economically active population, given as a percentage of the working age portion of the population (i.e. older than 15 years of age). The rate of labour force participation for the Erongo Region was 80.9% compared to the average of 71.2% for Namibia in 2018 (Namibian Statistics Agency, 2019).

In 2018, 53.4% of all working Namibians were employed in the private sector, and 21.5% by the state. State-owned enterprises employ a further 7.6% and private individuals 16.6%. Agriculture (combined with forestry and fishing) is the economic sector with the most employees – 23% of all employed persons in Namibia work in this sector. Wages and salaries represented the main income source of 47.4% of households in Namibia (Namibian Statistics Agency, 2019).

Low education levels affect employability and prevent many households from earning a decent income. Of all employed people in Namibia, 63.5% do not have more than a junior secondary level qualification (Grade 10 and lower), and 11.8% of all employed people have no formal education. In total, 29.1% of all employed people fall into the category of “elementary occupation”, and 15.2% into the category of “skilled agriculture”.

Overall, the rate of unemployment is estimated at 33.4 % for Namibia. The unemployment rate in rural and urban areas is almost the same: 33.4% in urban areas and 33.5% in rural areas. The highest unemployment rates are found amongst persons with education levels lower than junior secondary. The unemployment rate of persons with no formal education is 28.6%, with primary education at 34.6%, and junior secondary education at 32.7% (Namibian Statistics Agency, 2019).

According to the Namibian Chamber of Mines 2020 annual review, the mining industry employs over 9,000 people directly in the industry – 800 temporary employees and over 6 500 contractors. The Namibian mining industry spent almost two million Namibian dollars on skills expenditure, including operating mines, and exploration and development companies such as UTMC.

5.20 Crime

Namibia's crime rate has been on the decline, in general and in the Erongo Region, since 2011.

Namibia has a large market for ivory, rhino horn and pangolins. Since 2016 it has lost an average of 50 rhinos per year to poaching. Although it draws less attention than other wildlife species, the poaching of hippos is prevalent in Namibia. Illicit fauna products are often hidden among illegal stacks of timber on smuggling missions. Criminal syndicates appear to be increasingly involved in poaching and wildlife trafficking. While most poachers in the country are Namibians, foreign citizens from countries such as Zimbabwe and Angola are also involved. Illegal fishing also takes place in Namibian waters, primarily by foreign vessels (Global Organised Crime Index).

5.21 Economic and business activities

Key economic activities of the Erongo Region include agriculture, forestry, and fishing, mining and quarrying, manufacturing, tourism, and retail.

Mining plays a pivotal role in the economy of Namibia. Since independence, it has consistently been the biggest contributor to Namibia's economy in terms of revenue, and accounts for 25% of the country's income. Mining is one of the main contributors to GDP, and one of the largest economic sectors of Namibia. Mining is a prominent industry in the Erongo Region with the main commodities being uranium, gold, salt, and dimension stones, in addition to tin. Elsewhere, diamond, zinc, and copper are also important mineral commodities.

The economy of the Erongo Region is dominated by the local economies of Swakopmund and Walvis Bay. In the rural parts of the region, extensive livestock farming is a common activity, but intensive farming is also practiced along the lower part of the Swakop River, and at Omaruru. Several fresh crops are produced, mainly for local consumption.

In the Erongo Region, 67.5% of all households depend on salaries and wages as the main income (Namibian Statistics Agency, 2019). Exact figures do not exist, but this high percentage can be ascribed to the dominance of the mining, fishing, and manufacturing, and processing sectors, together with the prominence of state departments and the administrative sectors in the Erongo Region. A total of 12.6% of households receive their income from business activities (Namibian Statistics Agency, 2019).

5.22 HERITAGE AND CULTURE

In Namibia, several mountains are closely coupled to heritage values. The Namib Desert has rich archaeological and heritage value and presents valuable information about the occupation of the area dating back 700 000 years. Archaeological remains in Namibia are protected under the National Heritage Act 27 (2004) and National Heritage Regulations (Government Notice 106 of 2005).

An archaeological field site visit and reconnaissance survey was conducted on ML 134 by Dr John Kinahan, from the 18th to 23rd October 2021 to identify possible sensitive archaeological sites that could be affected by the proposed Project activities. The surrounding area of the proposed Project is a long-established mining settlement, which lies close to (approximately 40 km west) the Dâures massif or Brandberg Mountain, which is considered a feature of archaeological importance, in the western parts of Namibia.

The archaeological assessment report, issued on the 1st of November 2021, forms the basis of recommended management actions to avoid or reduce potential negative impacts, as part of the environmental assessment, refer to Appendix H for the full archaeological assessment report.

The objectives of the archaeological assessment were to address the following elements:

- Identification and assessment of potential impacts on archaeological/heritage resources, including historical sites arising from the proposed exploration and mining activities
- Identification and demarcation of highly sensitive archaeological/heritage sites requiring special mitigation measures to eliminate, avoid, or compensate for possible destructive impacts
- Formulation and motivation of specific mitigation measures for the Project to be considered by the authorities for the issuance of clearance certificates
- Identify permit requirements as related to the removal and/or destruction of heritage resources.

The archaeological survey on ML 134 documented evidence of mid and late Holocene settlement within the broader ML, as well as evidence of more recent settlement, which is mainly in the form of cemeteries associated with the history of the mining settlement at Uis after 1946. The recent cemetery sites are not of archaeological significance and their conservation would be required under the Burial Place Ordinance (27 of 1966) rather than the National Heritage Act (27 of 2004). The earlier sites fall directly under the protection of the Heritage Act.

The dark red-brown monochrome painting of bundles at Site 312/889 has been identified as an area of potential heritage significance. As with nearby late Holocene seed gathering sites, it is likely that the focal area to which the rock art at Site 312/889 belongs, lies outside the ML 134 lease and probably to the north. Based on these observations the area's Holocene archaeology is unlikely to be affected by mining activities.

Further investigation of the lease may be warranted should the activities extend beyond the current active footprint. Mitigation of such extended activities that may affect protected archaeological sites will be guided by the required permitting from the National Heritage Council. In the meantime, the Proponent will adopt the Chance Finds Procedure as part of the EMP.

None of the recorded archaeological or heritage sites are found within the active mining area. See Figure 36 and Figure 37.

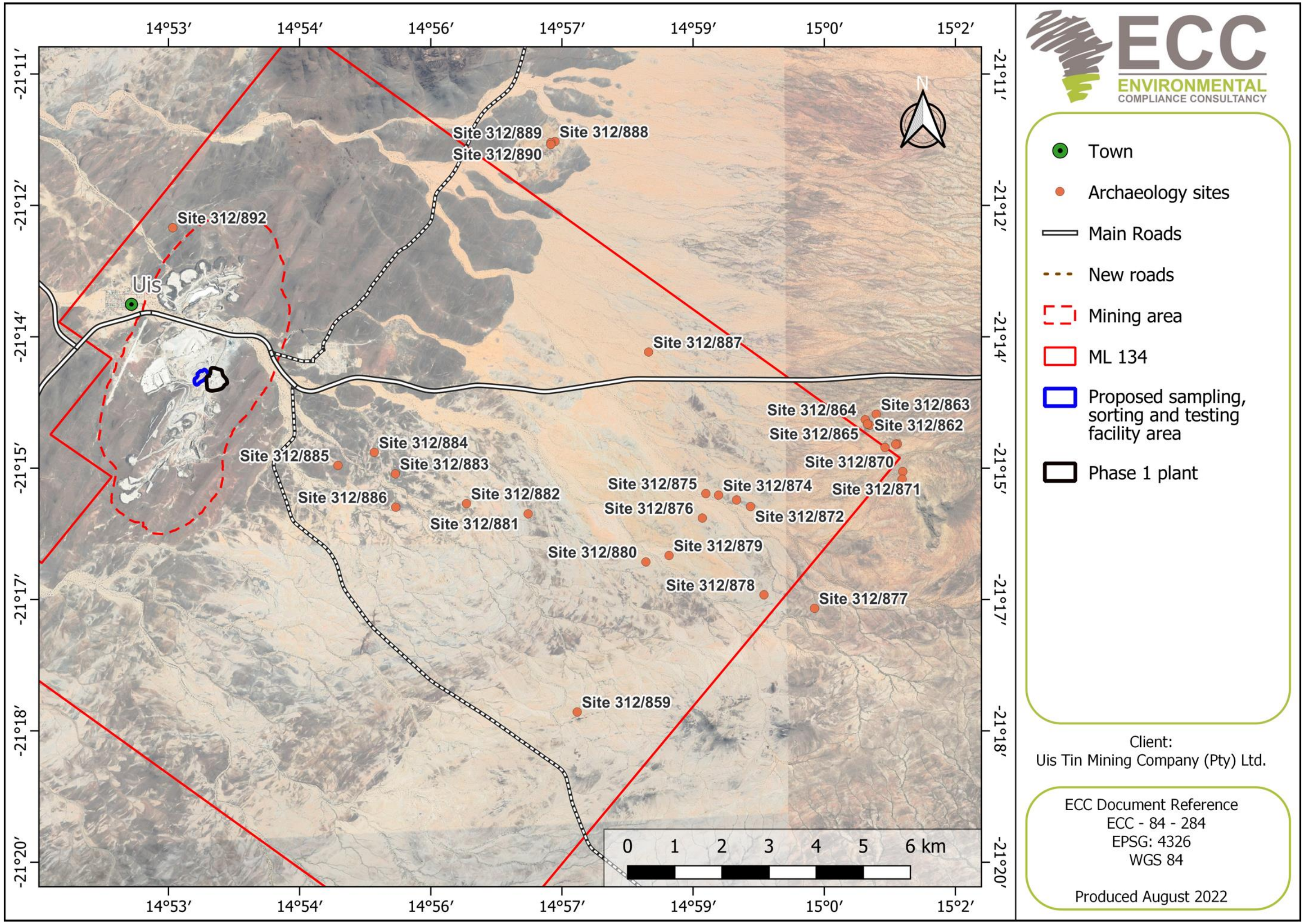


Figure 36 – Archaeologic sites in the Project area (Kinahan,2022)

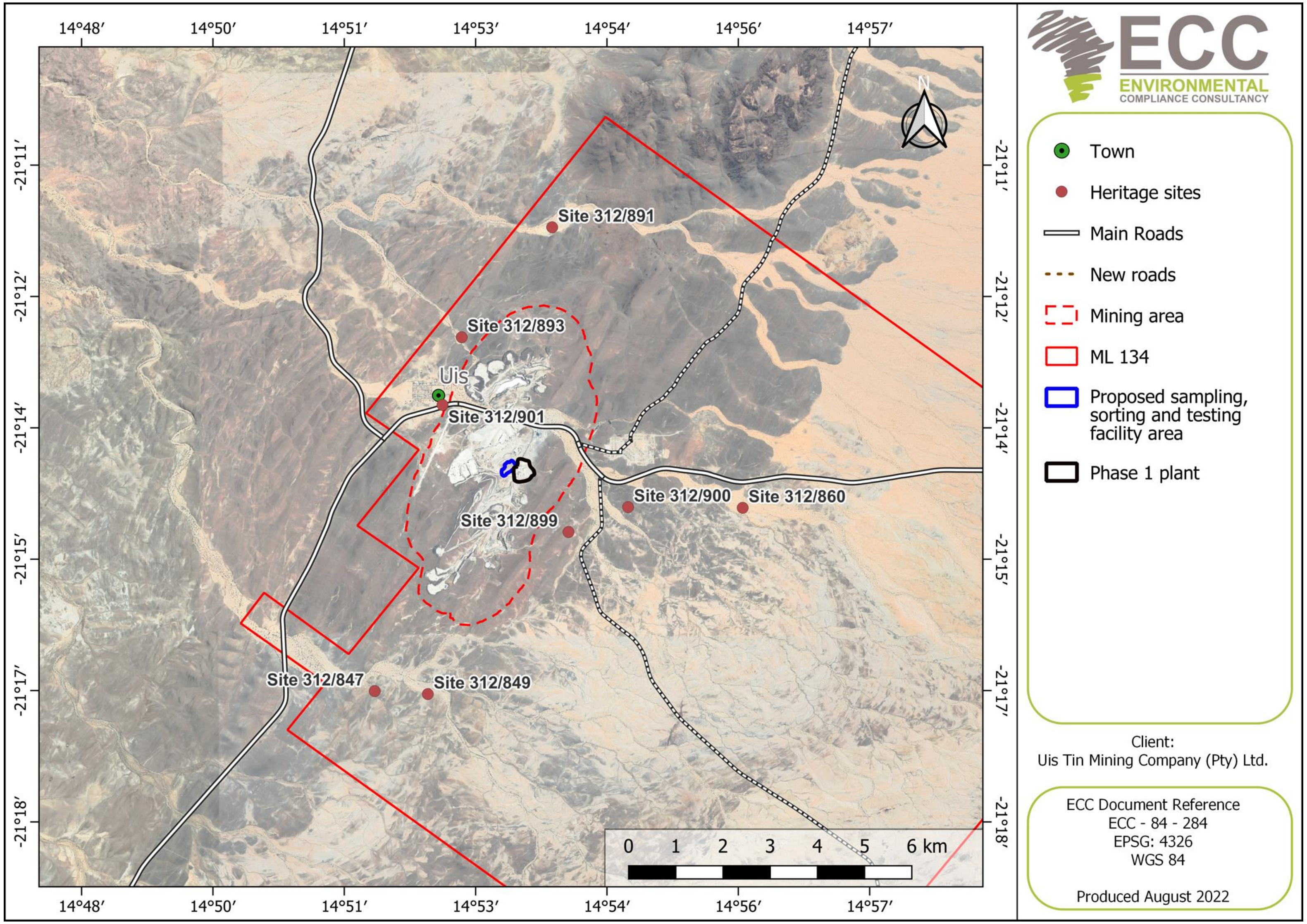


Figure 37 – Heritage sites in the Project area (Kinahan,2022)

5.23 NOISE AND VIBRATION

Noise is generally defined as unwanted sound transmitted through a compressible medium such as air. Sound, in turn, is defined as any pressure variation that the ear can detect. Human response to noise is complex and highly variable, as it is subjective rather than objective.

The IFC General Environmental Health and Safety Guidelines on noise addresses the impacts of noise beyond the property boundary of the facility under consideration and provides noise level guidelines. The IFC states that noise impacts should not exceed levels or result in a maximum increase above background levels of 3 dBA at the nearest receptor location off-site (IFC, 2007). For a person with average hearing acuity, an increase of less than 3dBA in the general ambient noise level is not detectable. The 3 dBA change is, therefore, a useful significance indicator for a noise impact.

5.23.1 ATMOSPHERIC ABSORPTION AND METEOROLOGY

Meteorological data purchased by Airshed for the past three years dating back to 2019 and used in their assessment will inform the baseline parameters. The measured data sets will indicate dominant wind flow patterns during day and night-time. Therefore, noise impacts can be predicted for Project activities.

Temperature gradients in the atmosphere create effects that are uniform in all directions from a source. On a sunny day with no wind, temperature decreases with altitude and creates a 'shadowing' effect for sounds. On a clear night, temperatures may increase with altitude, thereby 'focusing' sound on the ground surface. Noise impacts are therefore generally more notable during the night.

5.23.2 TERRAIN, GROUND ABSORPTION AND REFLECTION

Noise reduction caused by a barrier feature (i.e., natural terrain, installed acoustic barriers, buildings) depends on two factors, namely: the path difference of a sound wave as it travels around the barrier compared with direct transmission to the receiver, and the frequency content of the noise (Brüel & Kjær Sound and Vibration Measurement A/S, 2000). Sound reflected by the ground interferes with the directly propagated sound. The effect of the ground is different for acoustically hard (i.e., concrete or water), soft (i.e. grass, trees or vegetation), and mixed surfaces. Ground attenuation is often calculated in frequency bands, to consider the frequency content of the noise source and the type of ground between the source and the receiver (AirShed, 2021a).

The impact of an intruding industrial/mining noise on the environment rarely extends over more than 5 km from the source. The closest residential developments to the proposed project consist of Uis (~1.9 km to the northwest), Uis Mining Village (~1.7 km to the east) and Tatamutsi (~3.4 km to the east). Individual communal farmsteads also surround the project area.

5.23.3 METHODOLOGY APPLIED

Airshed was appointed to conduct the assessment of simulated noise levels, and reference was made to the IFC noise level guidelines for residential, institutional and educational receptors (55 dBA during the day and 45 dBA during the night). To assess annoyance at nearby places of residence, the increase in noise levels above the baseline at NSRs were calculated and compared to guidelines published in the SANS 10103 (Airshed, 2022). See Appendix J for the noise specialist study conducted.

The baseline acoustic environment was described in terms of the location of NSRs, the ability of the environment to attenuate noise over long distances, as well as existing background and baseline noise levels. The following was found:

- The closest residential developments to the proposed project consist of Uis (~1.9 km to the northwest), Uis Mining Village (~1.7 km to the east) and Tatamutsi (~3.4 km to the east). Individual farmsteads also surround the project area, and
- Measured baseline noise levels were between 32.9 and 46.1 dBA during the day and between 25.6 and 55.2 dBA during the night.

Airshed identified sites to be monitored for day and night-time noise level measurements, for the noise baseline assessment. Survey sites were selected after careful consideration of future activities, accessibility, potential noise sensitive receptors, and safety restrictions. A total of six survey sites were selected. Local meteorological conditions and information on topography and local land use to populate the noise propagation model (CadnaA, ISO 9613). The propagation of noise was calculated over an area of 9.68 km east-west by 10.02 km north-south. The area was divided into a grid matrix with a 20-m resolution and NSRs were included as discrete receptors (Airshed, 2022).

A noise baseline survey was conducted on the 5th to 7th of May 2021, at designated points as shown in Figure 39 for the proposed Project site.

These sites were chosen based on the sensitivity of the areas in terms of proximity to properties within the Project site. Noise-sensitive receptors (NSRs) generally include private residences, community buildings such as schools and hospitals, and any publicly accessible areas. The ability of the environment to attenuate noise as it travels through the air was studied by considering land use and terrain. Figure 38 shows the sensitive receptors near and at the proposed Project site.

The noise sources of the proposed Project are typical of opencast mining and ore processing facilities. Sources of noise at the Project site will include the following:

- Drilling

- Blasting – the character of noise generated by blasting is mentioned. Blasting can cause noise and vibration, which can have an impact upon neighbouring noise receptors. Blasting usually results in both ground and airborne vibration
- Ore and waste handling (loading, unloading, dozing) in open pits, on waste dumps, and in crusher/plant areas
- Crushing and screening of ore
- Haul truck traffic
- Diesel mobile equipment use (including reverse warnings)
- Ore processing activities such as crushing, screening, and milling.

5.23.4 BASLINE RESULTS

Simulations indicate that exceedance of the daytime IFC guideline of 55 dBA for residential, educational, and institutional receptors will occur up to 450 m from the project site. The night-time simulated noise-levels exceed night-time IFC guidelines of 45 dBA for residential, educational, and institutional receptors up to ~1 km from the project site. The closest residential NSR is ~1.7 km east of the site, which is the Uis mining village. Figure 40 shows the simulated day-time noise levels recorded, while Figure 41 displays the simulated night-time noise levels recorded.

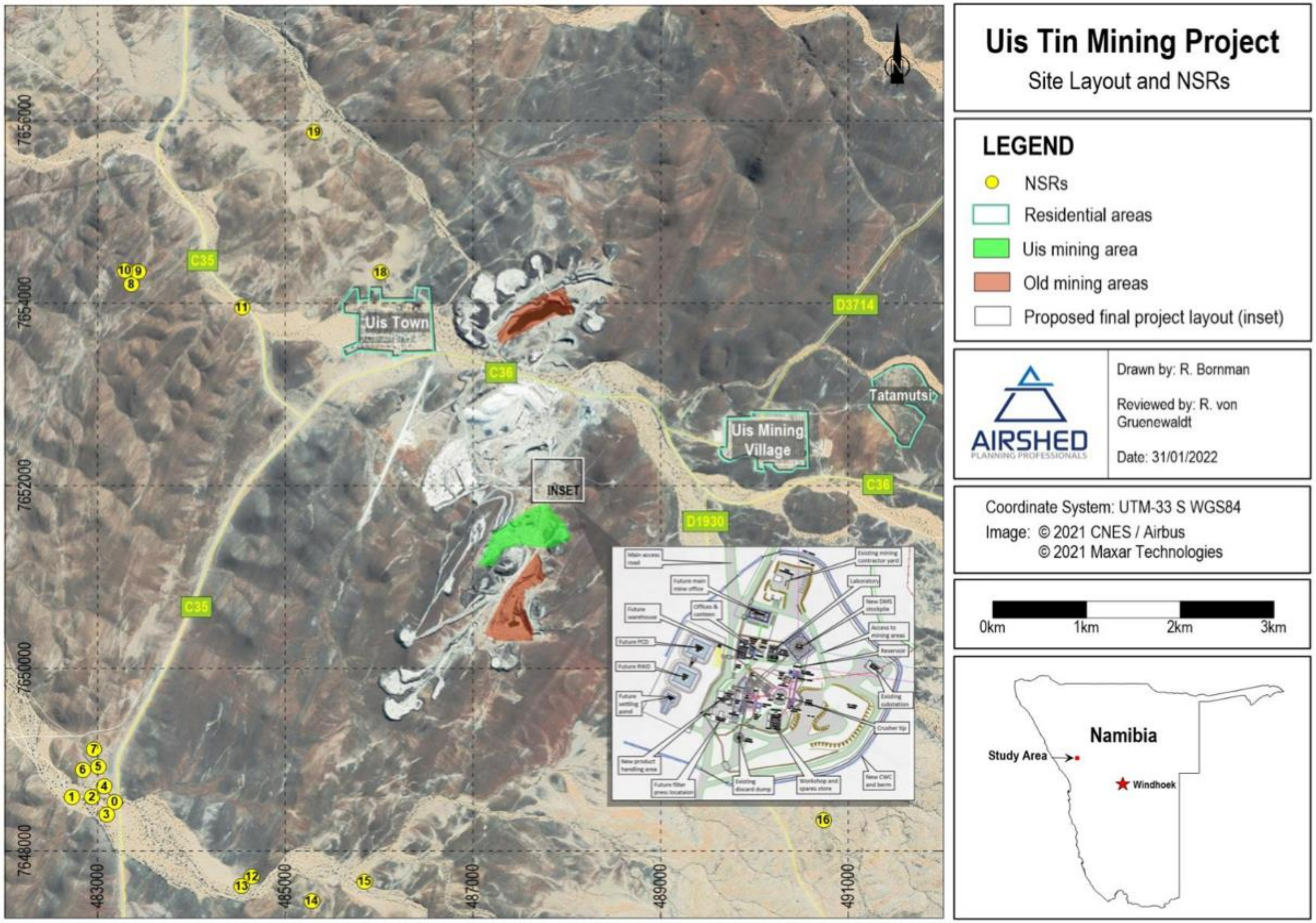


Figure 38 - Noise sensitive receptor locations (Airshed,2022)

Figure 39 - Noise sampling points

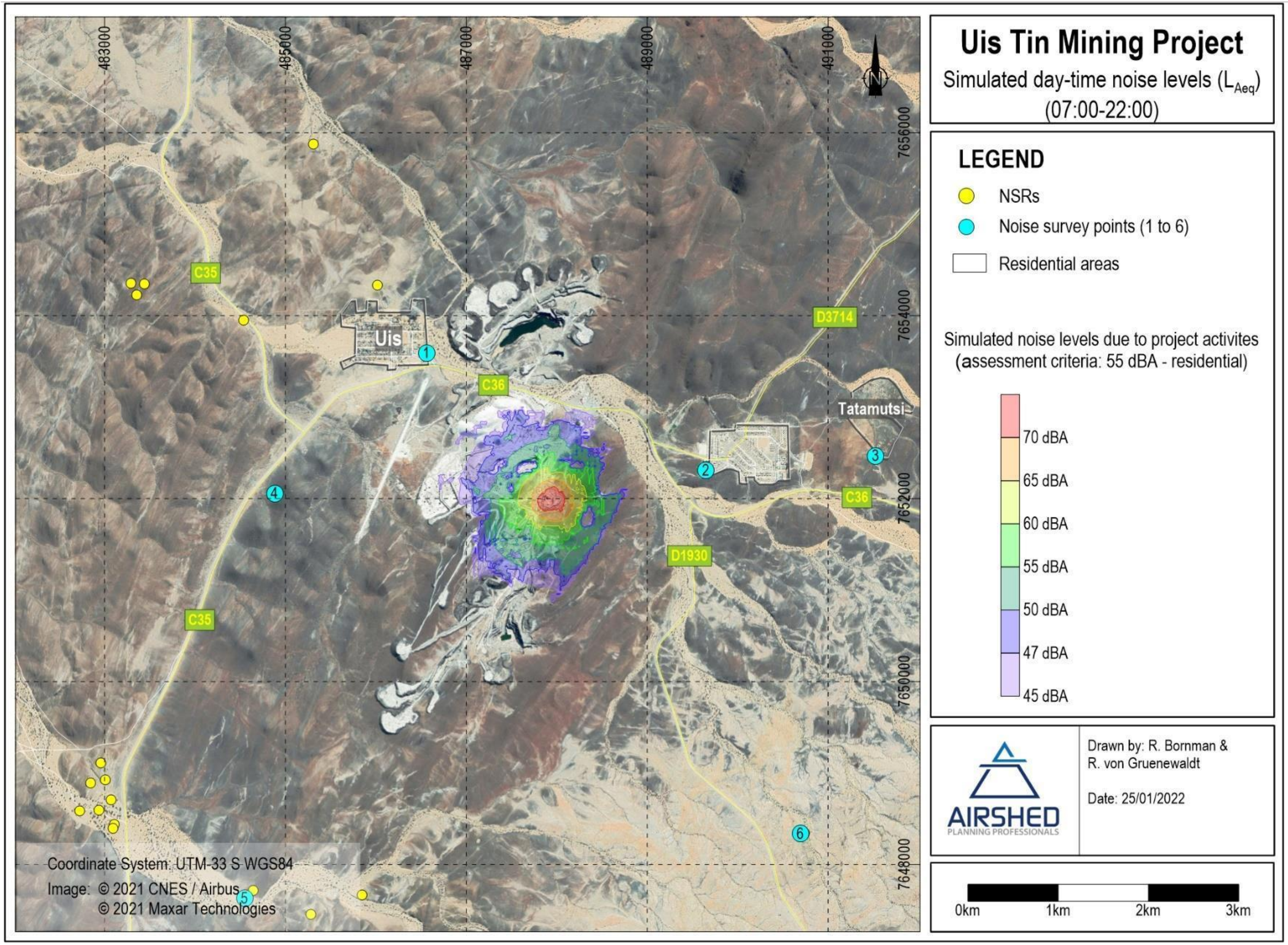


Figure 40 - Simulated day-time noise levels proposed operations (Airshed, 2022)

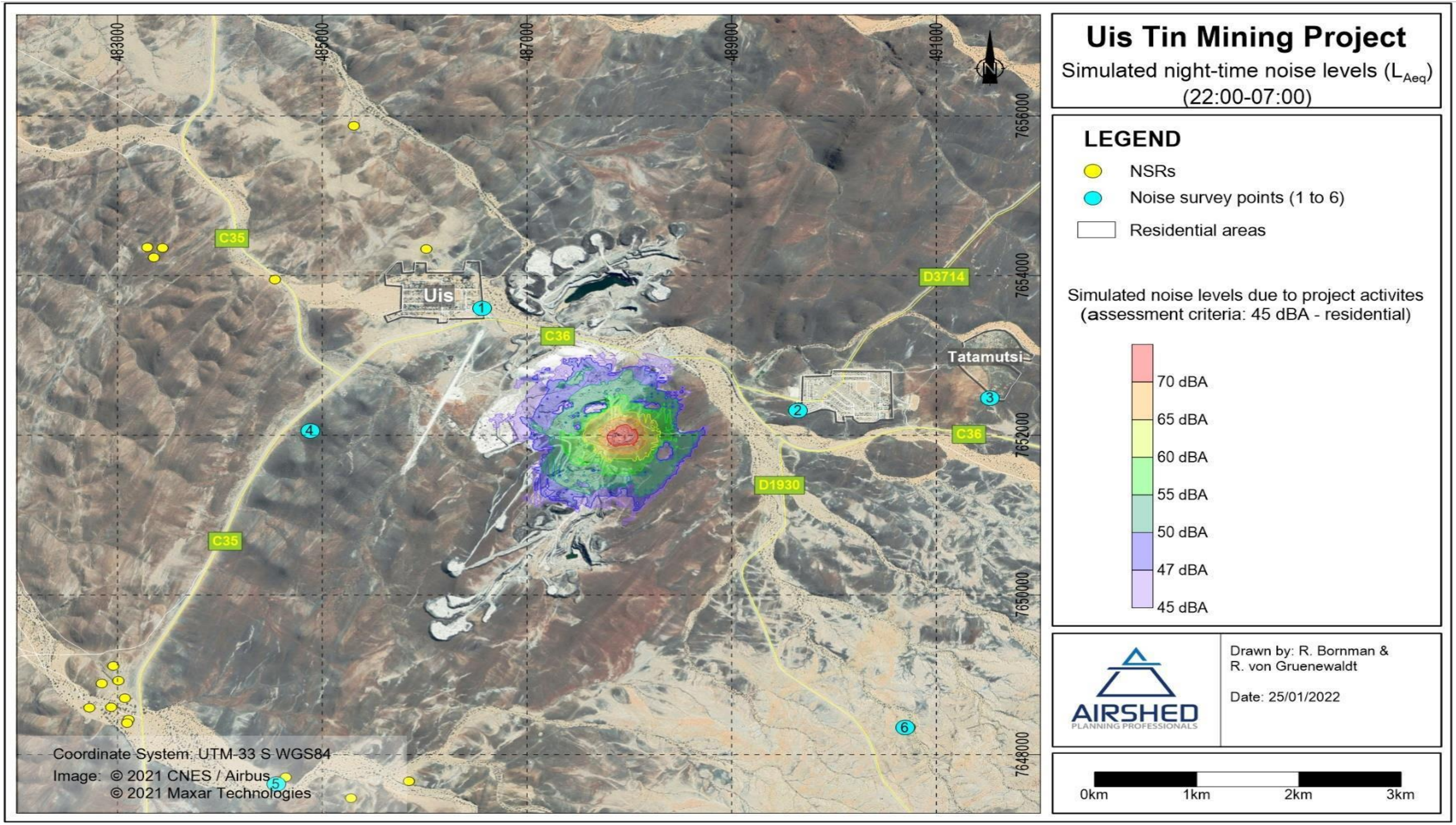


Figure 41 - Simulated night-time noise levels due to the proposed project operations

Table 14 - Summary of simulated noise levels results (provided as dBA) for the proposed project operations at NSRs within the study area (Airshed, 2022)

Noise Sensitive Receptor	Project operations [a]		Baseline		Increase Above Baseline [c]	
	Day	Night	Day	Night	Day	Night
Uis	18.2	19.2	39.2	44.1	0.0	0.0
Uis Mining Village ~1.7 km east of the plant	35.6	34.8	37.1	55.2	2.3	0.0
Tatamutsi	0	0	46.1	33.2	0.0	0.0
Individual homesteads at and to the east of sampling site 5 (NSR12, NSR13, NSR14, NSR15 – Figure 1)	0	0	32.9	47.5	0.0	0.0
Individual homesteads at sampling site 6 (NSR16 – Figure 1)	0	0	38.9	26.5	0.0	0.0
Individual homesteads ~1.6 km northwest of sampling site 5 (NSR0, NSR1, NSR2, NSR3, NSR4, NSR5, NSR6, NSR7 – Figure 1) (baseline measurements at site 5 assumed representative of the site)	0	0	32.9 [b]	47.5 [b]	0.0	0.0

Notes:

(a) Exceedance of day- and night-time IFC guideline for residential areas is provided in bold

(b) Baseline measurements based on closest sampling sites.

(c) Likely community response in accordance with the SANS 10103:

< 3 dBA	< 5 dBA	< 10 dBA	< 15 dBA	< 20 dBA
Change imperceptible	*No reaction*	*'Little' reaction with sporadic complaints*	*'Medium' reaction with widespread complaints*	*'Strong' to 'very strong' reaction with threats of community action or vigorous community action.*

5.24 VISUAL AND SENSE OF PLACE

The proposed UTMC Project is situated in a disturbed area enclosed by mountain ranges. No residential houses or tourist sites are accessed through the mine area. Therefore, there is no visual impact stemming from the proposed expansion Project on these receptors. The sense of place of the Project area has already been disturbed by the existing mining and processing activities of previous and existing mining as well as other industrial operations north of the mine site. The mountain ridge east of the mine area separates the mine from the informal residential area east of Uis. Similarly, the large WRD historically created by ISCOR effectively screens the viewshed of the western portion of Uis inhabitants and road users from the mine site. All road users of the C36 road driving past the entrance road of UTMC will not be able to see the entrance to the mine or any infrastructure of the mine as their view will be blocked by the infrastructure of the local brick factory.

Based on the modelled viewshed (Figure 42) of the proposed bulk sample, sorting, and test facility, the facility will not be of an intrusive nature within the existing township scenery, neither will it be visible from anywhere outside the immediate boundary of the mine area.

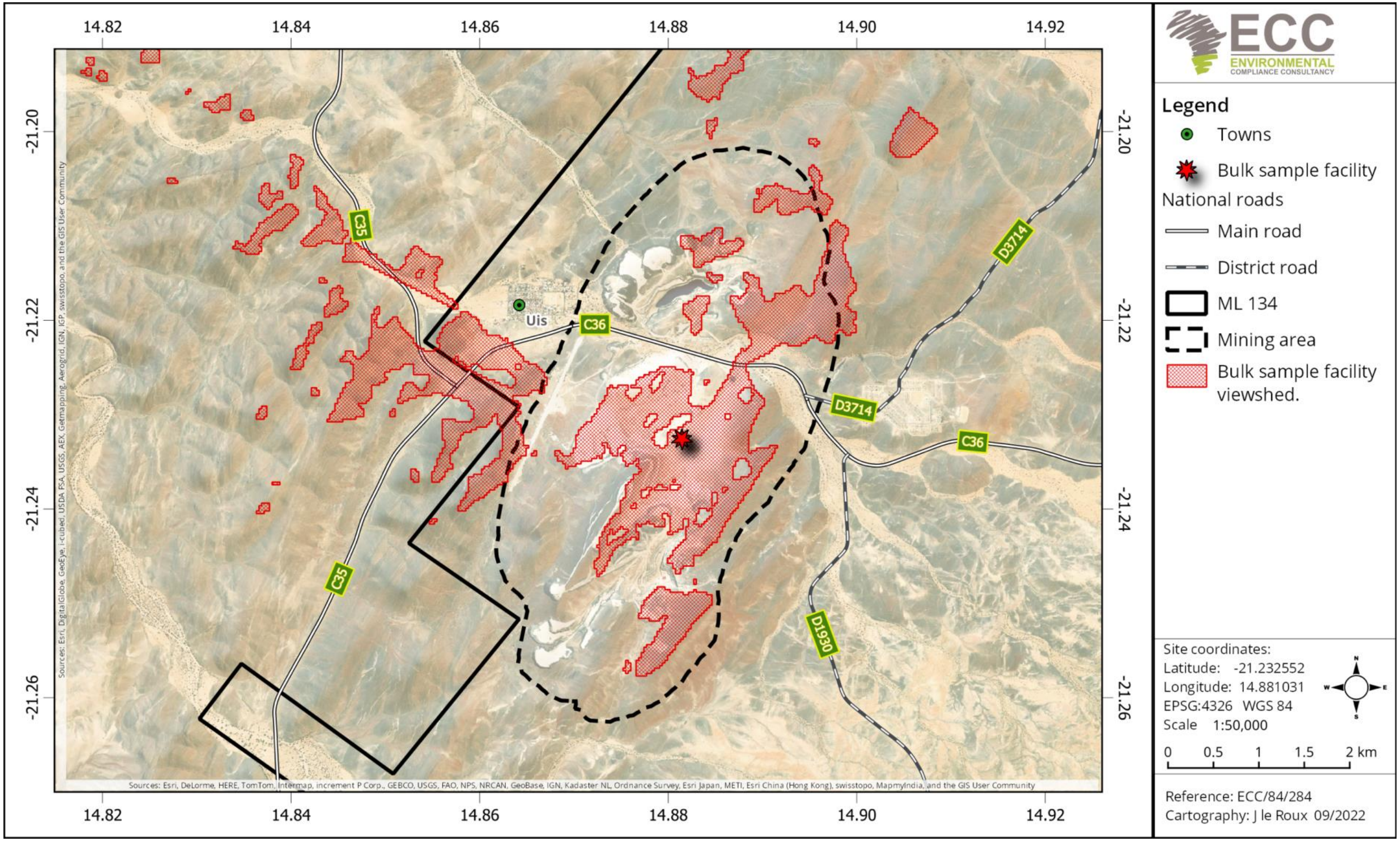


Figure 42 - Sense of place map of the bulk sample, sorting, and test facility as the highest point within the mining area for physical infrastructure.

The presence of the nearby airfield (Figure 43) west of the mine site is also not affected as it is visually screened from view by the interconnected historical WRD dump created by ISCOR and the mountain ridge west of the existing mine pits (V1 and V2).

Figure 43 - View of the airfield from the west facing slopes of the mountain ridge

The Brandberg mountain range which is located approximately 40 km west of Uis cis not easily visible from the Project site, unless one is standing on an elevated height looking westward.

5.24.1 LIGHTING

The night sky in the area is undisturbed. Namibia is known for its clear night skies and excellent stargazing settings. Artificial lighting, floodlights, and lighting for mining activities are not visible, although there are sites in proximity to the Project (north facing onto the C36: local brick factory) that are using lights for security purposes during nightfall. The baseline of undisturbed night skies will not be altered excessively during the construction and operations of the Stage II Project. Impacts associated with site lighting, and the appropriate management and mitigation measures are addressed in the EMP.

5.25 Biophysical Environment Baseline

5.25.1 Climate and Meteorology

Namibia is arid to semi-arid and locally a hyper-arid country. Regionally, there is a growing demand for water due to climate change, population growth, economic development, and urbanisation, which increases pressure on existing water sources. The proposed Project is in central Namibia, an area that experiences generally hot daytime temperatures throughout the year, while the nights are mild to cool in winter.

Temperatures can reach up to 39.9°C while minimum temperatures can drop to 1.2°C and average temperatures fluctuate at 22.5°C (Airshed, 2022). The winter months, June, July and August, are rainless and the average daytime temperatures range between 18 to 22 degrees Celsius. Rain is more frequent in the months from January to March as shown by recent historic data (Figure 44). In general terms the climate of Uis can be described as hot and dry, with more than 300 sunshine days per year. Solar radiation ranges from 6.0 - 6.4 kWh/m2/day (see Figure 45).

Winds of a westerly direction are predominant with average wind speeds between 12 and 19 km/h, mainly because of its proximity to the Atlantic Ocean and Namib Desert. The months of October to January are known to have the strongest winds. Wind can occur any time of the day and the most predominant wind directions for this area are ENE, SW and SSW (Figure 46).

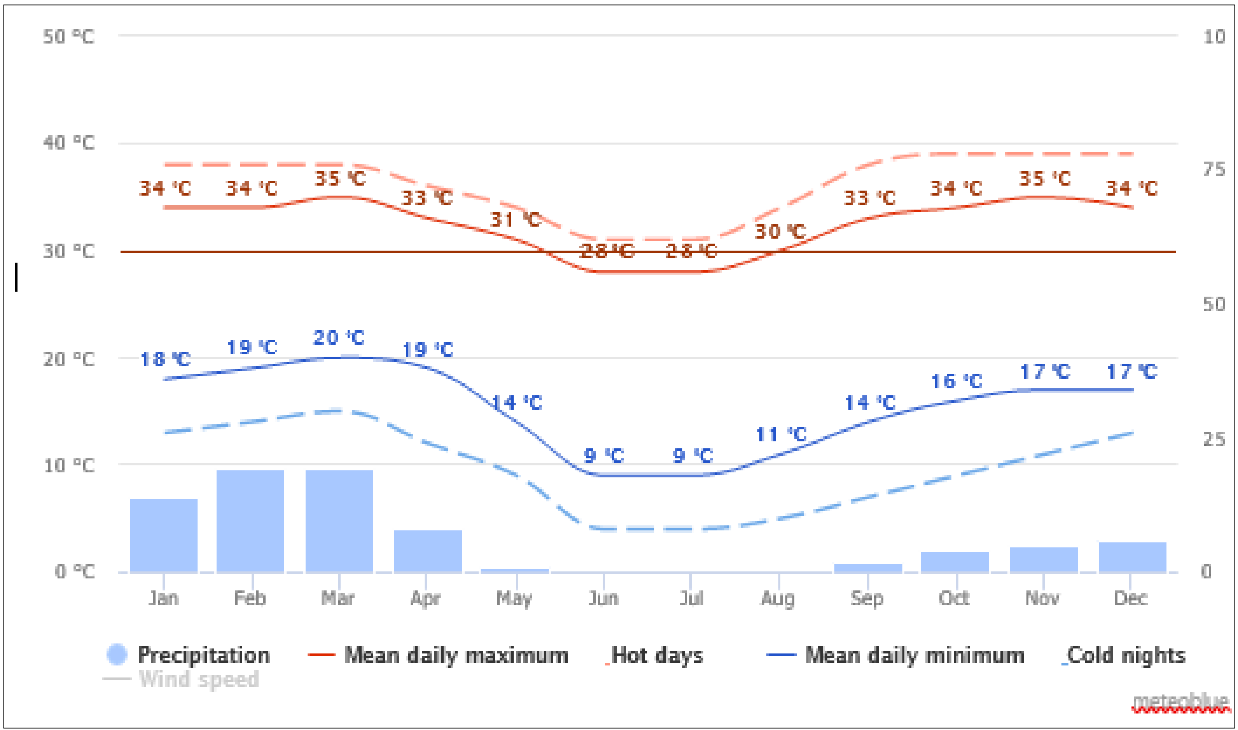


Figure 44 - Average temperatures and precipitation at Uis (source: Meteoblue)

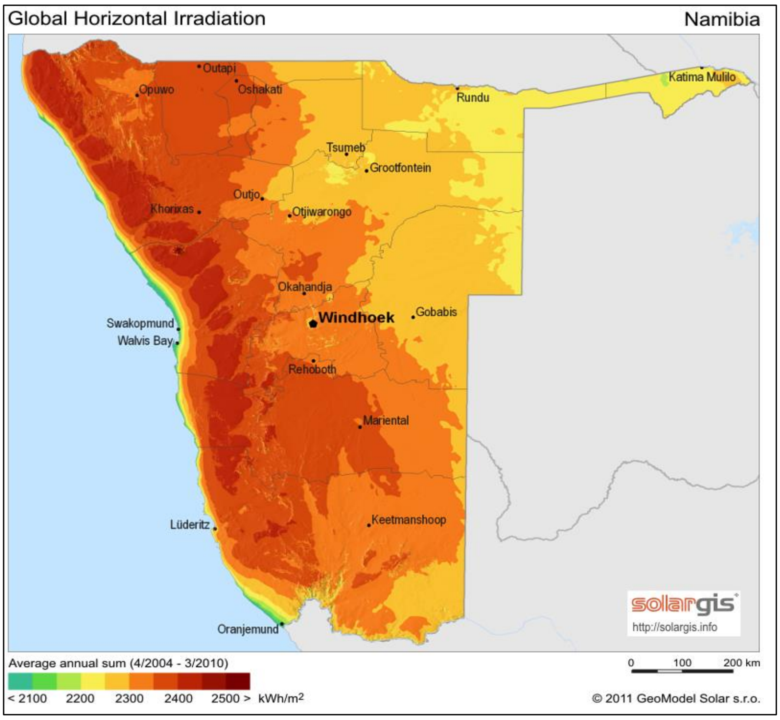


Figure 45 - Solar radiation Namibia (source: atlas of Namibia)

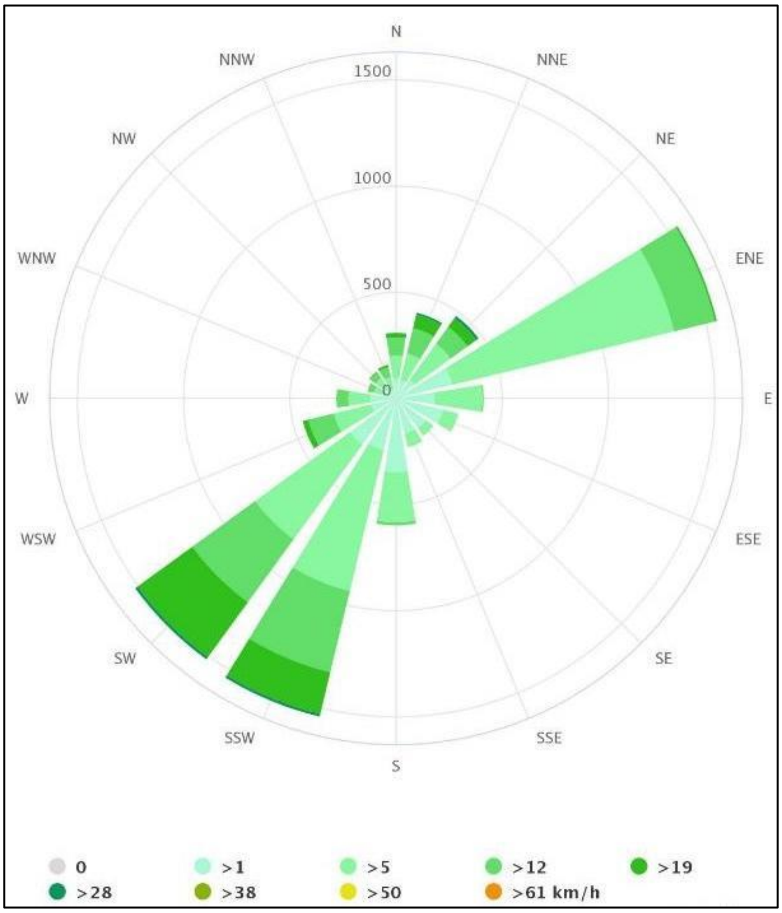


Figure 46 - Wind direction and speed for Uis, Erongo Region (source: Meteoblue, 2021)

5.25.2 AIR QUALITY

Since February 2019, Environmental Compliance Consultancy has been conducting environmental monitoring and assessments for UTMC, for the purpose of tracking depositional dust, at 14 dust monitoring stations located on the Project site. Air quality monitoring is crucial for determining the potential impacts that planned mining and processing operations may have on an environment.

5.25.3 AIR QUALITY BASELINE CHARACTERISATION OF THE UIS AREA

Baseline characterisation was done by Airshed who conducted the air quality specialist study for the ESIA. The below baseline features apply.
The wind field in the area is dominated by winds from the southwest during the day and night, with an increase in winds from the south-southwest and south during the night. Day- and night-time average wind speeds are 4.6 m/s and 5.0 m/s respectively. Calm conditions occur 3.0% of time during the day and 2.5% during the night. On average, air quality impacts are expected to be slightly more notable to the north and north-east of the Project.

The predominant south-south-westerly, southerly and north-north-easterly winds in the study region may be explained by the topography of the study area. Uis is ~800 m above sea level with the highest point at 900 m above sea level. The terrain is fairly flat in the immediate vicinity of the plant site, with steeper and higher relief areas confined to the northeast and south. The highest wind speeds (more than 6 m/s) were recorded during summer and springtime and are mostly from the south-southwest and southwest.

Maximum, minimum, and mean temperatures were given as 39.9°C, 1.2°C and 22.5°C respectively from the WRF data for the period Jan 2018 to Dec 2020.

Average annual rainfall at Uis town for the period 2009 to 2021 was given as 656 mm, with most rain recorded during the summer (December to March) and least during the winter months from May to September.

The main pollutant of concern in the region is particulate matter (TSP; PM10 and PM2.5) resulting from vehicle entrainment on the roads, windblown dust, mining and exploration activities.

Sources of atmospheric emissions in the vicinity of the Project include small-stock farming, small-scale mining, activities of the Namclay Brick and Pavers factory, dust generated from historically mined areas and, to a lesser extent, emissions from vehicle tailpipes along the C36 and D1930 public roads. Other regional sources that may have an influence on the ambient air quality around the Project are biomass burning (natural bush fires or those employed for agricultural purposes) and de-bushing to increase the grazing capacity of farmland. Given these activities, it is expected that fugitive dust may be present during dry, windy conditions. However, the contribution of all these sources to existing ambient air quality is considered very low, especially in a low-density population area such as the one where the Uis Tin Mine is located.

Regional scale transport of mineral dust and ozone (due to vegetation burning) from the north of Namibia is a potential contributing source to background PM concentrations.

There is no ambient air quality data available for the study site. PM concentrations measured as part of the SEMP AQMP monitoring network were limited to the coastal towns of Swakopmund, Walvis Bay and Henties Bay with a station in the central western part of the region on the farm Jakalswater. None of these locations are representative of the air quality in the Uis area.

The potential expected sources of dust include but are not limited to construction activities on settling ponds, the return water dam (RWD); mineral material handling and processing, the construction of a bulk sampling, sorting and testing facility; and mining activities within V1 and V2 open pits) such as drilling, blasting, and hauling. Therefore, depositional dust monitoring station locations were based on the proposed infrastructure locations likely to generate dust, considering prevailing wind. Figure 34 shows the locations of the 14 dust fall sampling locations. Initially eight dust buckets were installed around the site in February of 2019; thereafter six buckets were added to the pool of dust monitoring buckets.

Dustfall deposition rates from the Uis monitoring network (Figure 48) are generally low for the sampling period and well within the dustfall limit of 600 mg/m2/day (adopted limit for residential areas) and 1 200 mg/m2/day (adopted limit for non-residential areas), with the exception of AQ 01 (5 exceedances in 2020 and 4 exceedances in 2021), AQ 05 (2 exceedances in 2019, 5 exceedances in 2020 and 1 exceedance in 2021), AQ 08 (1 exceedance in 2019) and AQ 14 (1 exceedance in 2020) (Figure 47).

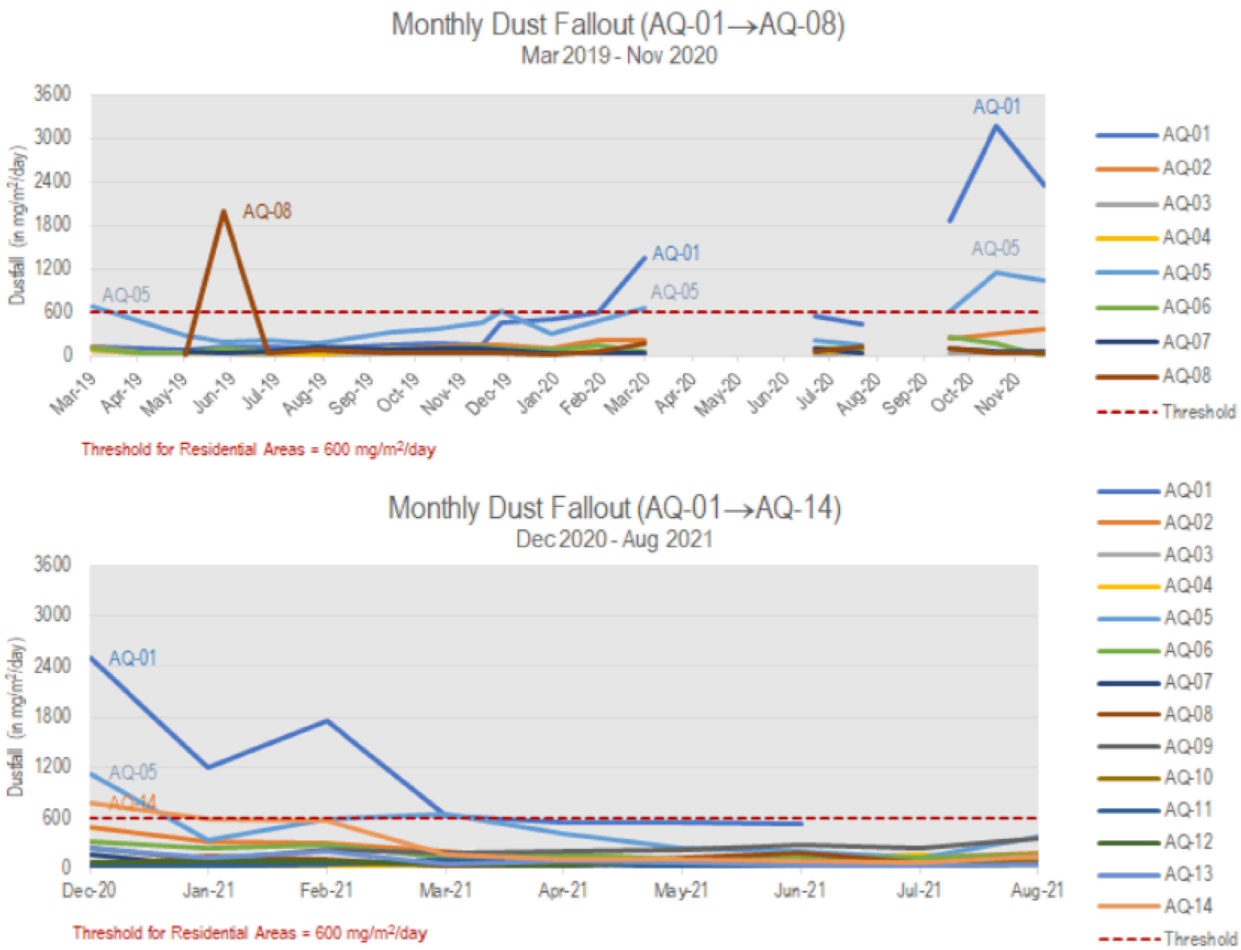


Figure 47 - Dustfall rates for Uis Tin Mine monitoring (March 2019 - August 2021)

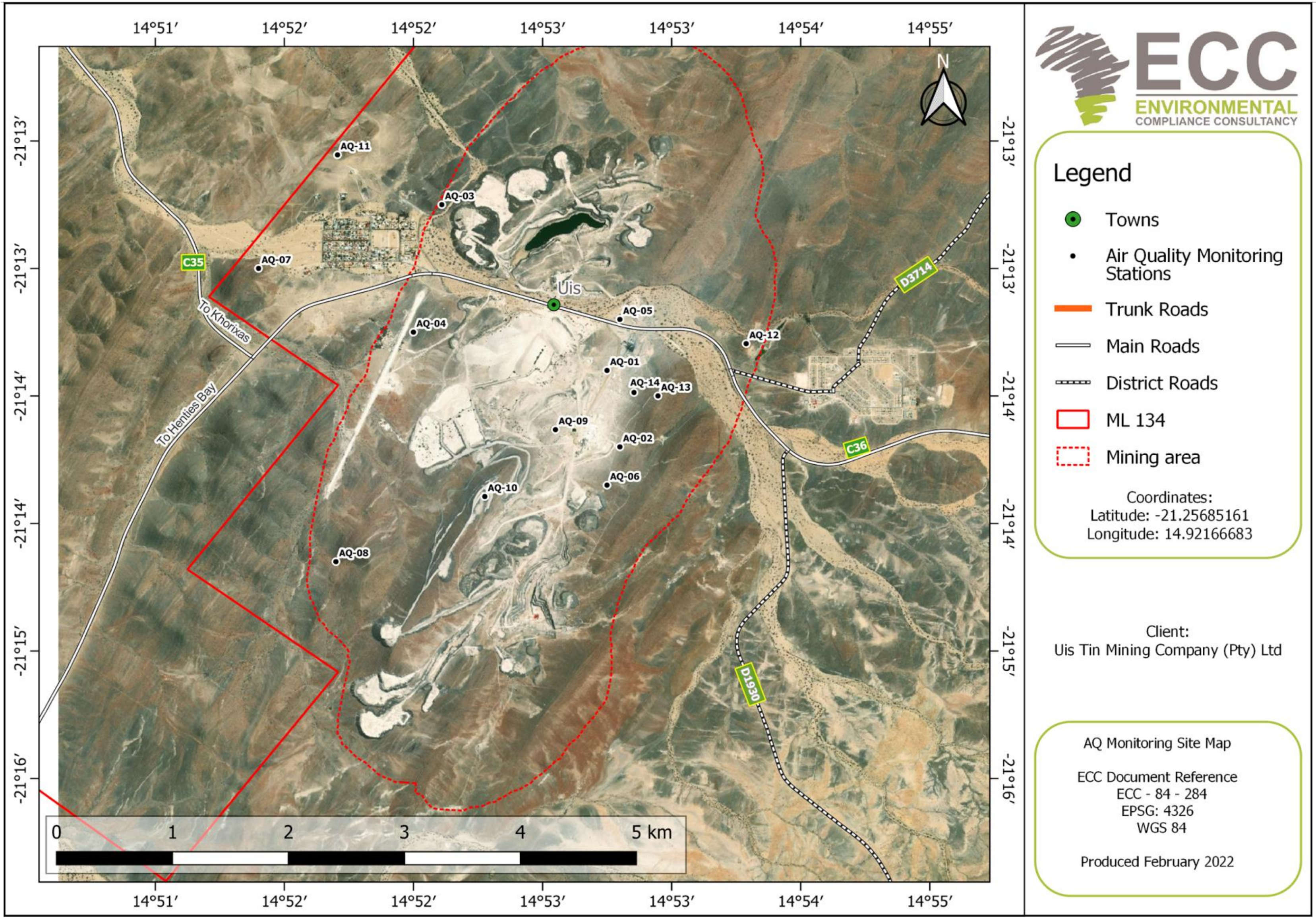


Figure 48 - A map showing the dust-fall monitoring locations

Natural environments are complex systems that can be affected by anthropogenic interference such as mining activities, including mineral exploration. To understand the confounding factors and interpret the findings based on the baseline of the receiving environment, deductive and inductive approaches are used. The wind vectors, topography (i.e. mountains and valleys), seasonal rainfall, and drought are identified as the potential factors that are likely to influence air quality. Dust particulate matter fallout can be correlated with wind direction and speed. Wind direction and speed are the primary factors determining the distance of travel of a dust particle and the distribution of particles falling out. See Section 5.25.

Moreover, as part of the ESIA for the proposed Stage II, an air quality specialist study was deemed necessary to confirm the baseline characterisation of the site and determine the potential impacts of atmospheric pollution from the Project. Airshed Planning Professionals were engaged to model and assess and provide a technical report for the air quality assessment. The ambient air quality guidelines of the IFC and EHS guidelines of 2007 was applied to the assessment.

The Uis Mining Project does not have a weather station and use was made of Weather Research and Forecasting Model (WRF) modelled meteorological data for the Uis study area for the period 1 January 2018 – 31 December 2020, to (a) describe the dispersion potential of the site and (b) as input into the ADMS dispersion model (Airshed, 2022).

5.25.4 ASSUMPTIONS ON THE MODELLING RESULTS

Only routine emissions were estimated and modelled and was done for the provided operational hours. Working hours were provided 24-hour days, 7 days a week for open-pit mining activities. Total operating hours per annum were provided for different sections of the plant operating on a continual basis. This was used as the worst-case scenario base (Airshed, 2022).

To determine the significance of air pollution impacts from the Project, emissions were estimated for a baseline scenario (based on Stage I throughputs) and a Project scenario (based on Stage II throughputs) (Airshed, 2022).

The modelling results do not include a determination of the significance of air pollution impacts on the immediate environment from the bulk sampling, sorting and testing facility in the absence of operational design data.

5.25.5 AIR DISPERSION MODELLING

The establishment of a comprehensive emission inventory formed the basis for the assessment of the air quality impacts from the Project's emissions sources on the receiving environment. In the quantification of emissions, use was made of emission factors that associate the quantity of release of a pollutant to the activity. Emissions were calculated using emission factors and equations published by the United States Environmental Protection Agency (US EPA) and Environment Australia

(EA) in their National Pollutant Inventory (NPI) Emission Estimation Technique Manuals (EETMs) (Airshed, 2022).

The significance of air quality impacts from the tin and tantalum process was assessed, considering both an unmitigated and mitigated scenario.

5.25.6 BASELINE CHARACTERISATION FROM MODELLING

Air pollutants will originate from opencast operations at two pit areas (V1 and V2 open pits) and the associated processing operations including the bulks sampling, sorting and testing facility. Ore and waste will be removed with haul trucks and taken to the Run of Mine (RoM) stockpile area and waste rock dump (WRD)/Co-disposal facility (CPF), respectively. Ore will be crushed at a primary crusher whereafter it will undergo secondary crushing, fines crushing and milling at the processing plant. The waste from the processing plant will be hauled to the CPF. Ore production is currently estimated at 567 kilo tonnes per annum (ktpa); this will increase to 850 ktpa to support the expanded materials handling and concentrating plant (MHCP) capacity (Airshed, 2022).

Considering the surface wind field (variability of direction and the extent of crosswind spreading), over the Project site, various colours were used to depict the different categories of wind speeds and direction. See Figure 49 and Figure 50.

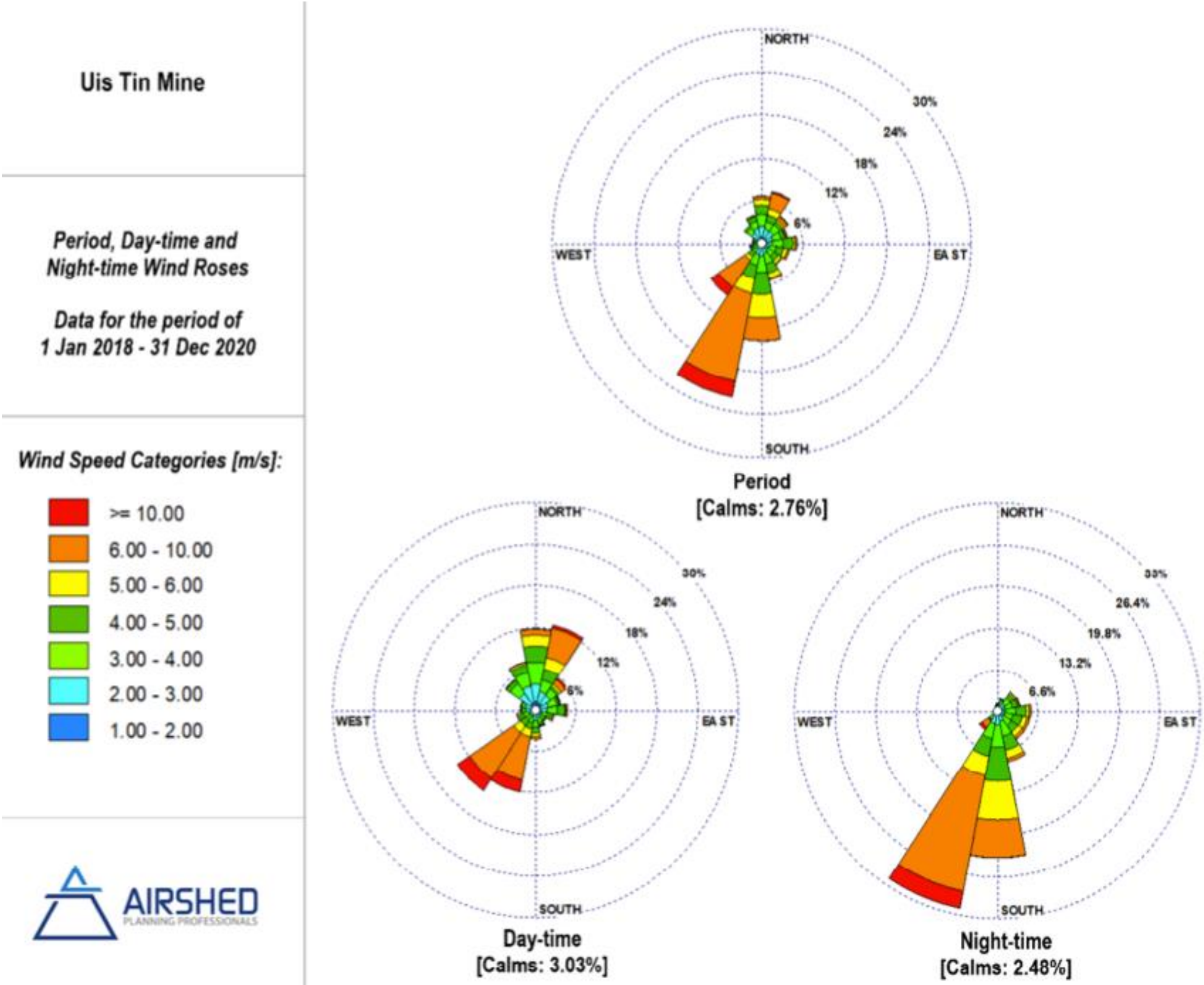


Figure 49 - Period, day- and night-time wind roses based on modelled WRF data for Uis Tin Mine (Jan 2018 - Dec 2020) (Source: Airshed, 2022)

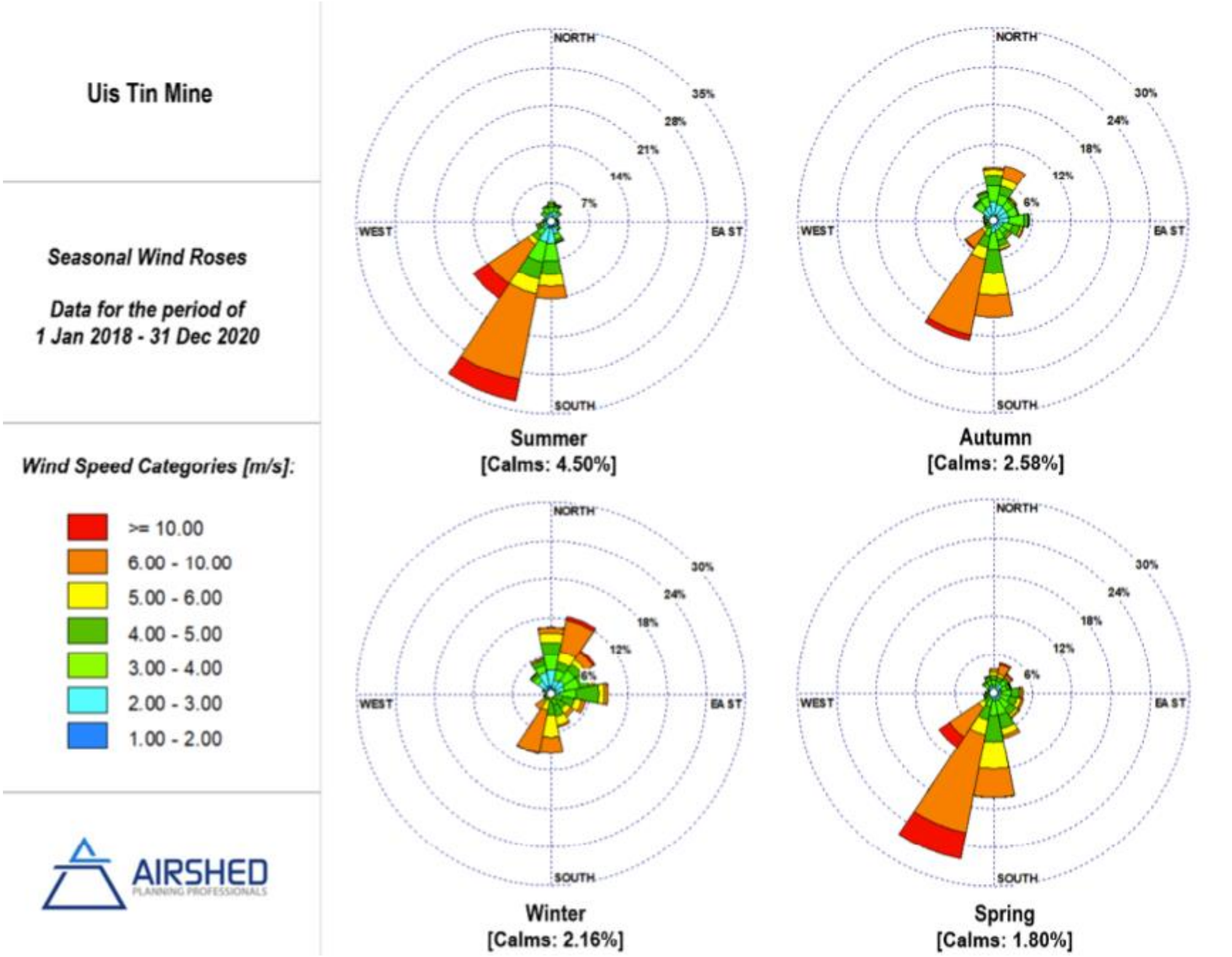


Figure 50 - Seasonal wind roses based on modelled MM5 data for Uis Tin Mine (Jan 2018 - Dec 2020) (Source: Airshed, 2022)

The main pollutant of concern in the region is particulate matter (TSP; PM10 and PM2.5) resulting from vehicle entrainment on the roads, windblown dust, mining, and exploration activities (Airshed, 2022).

Sources of atmospheric emissions in the vicinity of the Project include small-stock farming, small-scale mining, activities of the NamClay Brick and Pavers factory, dust generated from historically mined areas, and to a lesser extent, emissions from vehicle tailpipes along the C36 and D1930 public roads.

Other regional sources that may have an influence on the ambient air quality around the Project are biomass burning (natural bush fires or those employed for agricultural purposes) and de-bushing to increase the grazing capacity of farmland. Given these activities, it is expected that fugitive dust may be present during dry, windy conditions. However, the contribution of all these sources to existing ambient air quality is considered very low, especially in a low-density population area such as the one where the Uis Tin Mine is located (Airshed, 2022).

The wind field in the area is dominated by winds from the southwest during the day and night, with an increase in winds from the south-southwest and south during the night. Day- and night-time average wind speeds are 4.6 m/s and 5.0 m/s respectively. Calm conditions occur 3.0% of time during the day and 2.5% during the night. On average, air quality impacts are expected to be slightly more notable to the north and north-east of the general area. The highest wind speeds (<6m/s) occur during summer and springtime and mostly from south-westerly to south-south-west directions, which may be explained by the topography of the study area (Airshed, 2022).

Construction Phase

The construction phase during Stage II was designed to allow pre-assembly while the plant is in operation. Construction work include civil works, in-plant erection, piping, erection of conveyors and gantries, conveyor mechanical installation, and electrical, control and instrumentation work. The largest construction works (in terms of land area) are the construction of a new secondary crushing and screening plant and a DMS feed stockpile. The total land area was determined from georeferenced site plans as approximately 1 320 m2.

Operational Phase

Two mining scenarios were assessed to determine the increase in impacts due to the Project, namely a Baseline scenario and Project Scenario. It was assumed that Stage I throughputs as provided in the Definitive Feasibility Study (DFS) summary represent the Baseline scenario (current mining rates) and that Stage II throughputs represent the Project scenario (future mining rates required to support the expanded MHCP). V1 and V2 opencast areas were assumed to be mined concurrently in a 57: 43 tonnage split.

Airshed (2022) quantified emissions for the Uis project which were restricted to fugitive releases (non-point releases) with particulates the main pollutant of concern. Emissions were quantified based on provided information on mining rates and the mine layout plan. See specialist study report for the detailed methodology framework used (Appendix I).

Table 15 - Summary of emissions due to baseline and project scenarios (Airshed, 2022)

Description	Baseline Scenario						Project Scenario					
	Unmitigated			Mitigated			Unmitigated			Mitigated		
	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP
In-pit (including drilling)	51.34	75.99	186.41	49.91	62.24	139.35	52.76	89.71	233.38	50.62	69.10	162.84
Blasting	0.06	1.04	24.40	0.06	1.04	24.40	0.06	1.04	24.40	0.06	1.04	24.40
Materials handling	0.72	4.74	10.01	0.36	2.37	5.01	1.32	8.74	18.47	0.54	3.55	7.51
Crushing and screening	16.85	85.84	572.61	7.00	15.93	182.35	25.27	112.01	796.40	0.43	3.74	12.80
Unpaved roads	8.77	87.69	306.84	2.19	21.92	76.71	13.15	131.46	459.99	3.29	32.86	115.00
Wind erosion	3.59	12.97	49.91	3.59	12.97	49.91	3.59	12.97	49.91	3.59	12.97	49.91
Total	**81**	**266**	**1141**	**63**	**114**	**468**	**96**	**354**	**1573**	**58**	**121**	**363**

Notes:

(a) BASELINE: Mitigation includes 75% control efficiency (CE) on unpaved surface roads and 50% CE on unpaved in-pit roads (using water sprays), 50% CE on primary and secondary crushing and materials handling operations (using water sprays), >75% CE for tertiary and fines crushing and screening (wet process)

(b) PROJECT: Mitigation includes all control measures listed in (a), but with 99% CE on primary and secondary crushing operations (dual scrubber).

The contributions of individual source groups to total tons per annum for the baseline and Project scenarios are illustrated in Figure 51 below.

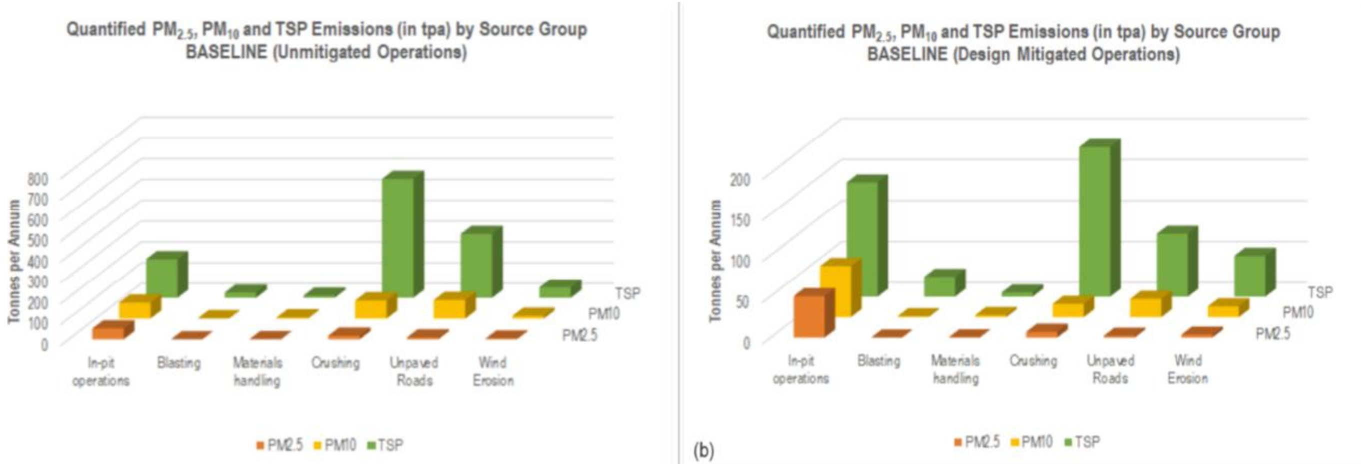


Figure 51 - Contribution of particulate emissions per source group (unmitigated – left and mitigated - right) (Airshed, 2022)

Table 16 - calculated emission rates due to unmitigated and mitigated activities for the incremental and cumulative bulk sampling, sorting and testing facility scenarios respectively from emissions source groups (source: Airshed, 2022).

Description	Incremental Project Scenario						Cumulative Project Scenario					
	Unmitigated			Mitigated			Unmitigated			Mitigated		
	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP
In-pit (including drilling)	–	–	–	–	–	–	52.76	89.71	233.38	50.62	69.1	162.84
Blasting	–	–	–	–	–	–	0.06	1.04	24.4	0.06	1.04	24.4
Materials handling	0.04	0.28	0.58	0.02	0.14	0.29	1.36	9.02	19.05	0.56	3.69	7.8
Crushing and screening	0.91	1.83	25.55	0.46	0.91	12.78	26.18	113.84	821.95	0.89	4.65	25.58
Drying and Classifying	1.44	2.97	7.32	0.12	0.24	0.53	1.44	2.97	7.32	0.12	0.24	0.53
Unpaved roads	0.33	3.33	11.72	0.08	0.83	2.93	13.48	134.79	471.71	3.37	33.69	117.93
Wind erosion	0.02	0.15	0.30	0.02	0.15	0.30	3.61	13.12	50.21	3.61	13.12	50.21
Total	**3**	**9**	**45**	**1**	**2**	**17**	**99**	**364**	**1628**	**59**	**126**	**390**

Notes:

(a) Incremental Project: Mitigation includes 75% control efficiency (CE) on unpaved surface roads (using water sprays), 50% CE on primary and secondary crushing and materials handling operations (using water sprays), >90% CE for drying, classifying and product storage (using fabric filters)

(b) Cumulative Project: Mitigation includes all control measures listed in (a), but with additional measures listed under Table 13 (PROJECT scenario).

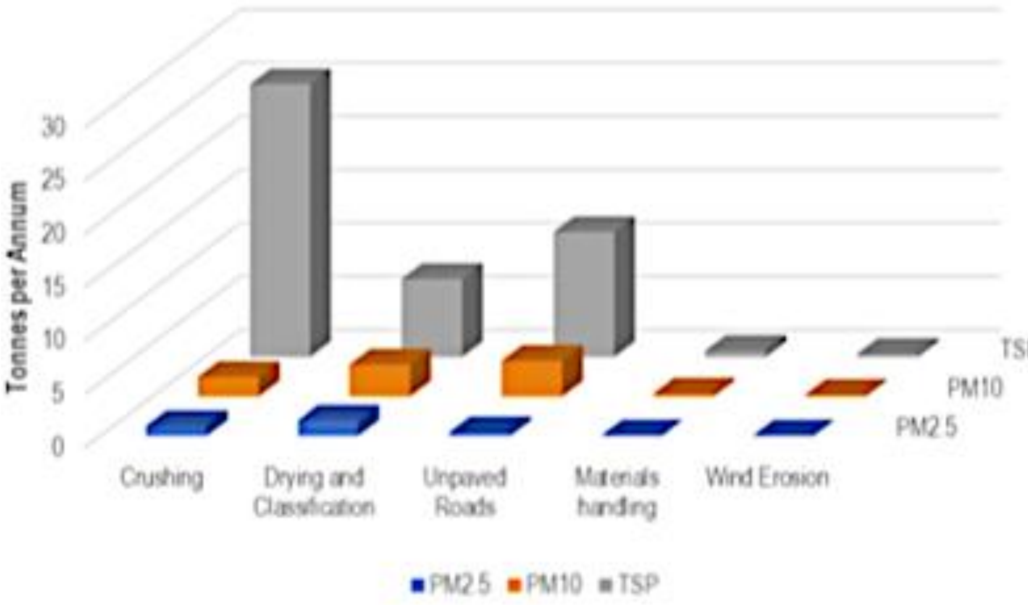


Figure 52 - Contribution of particulate emissions per source group (unmitigated)

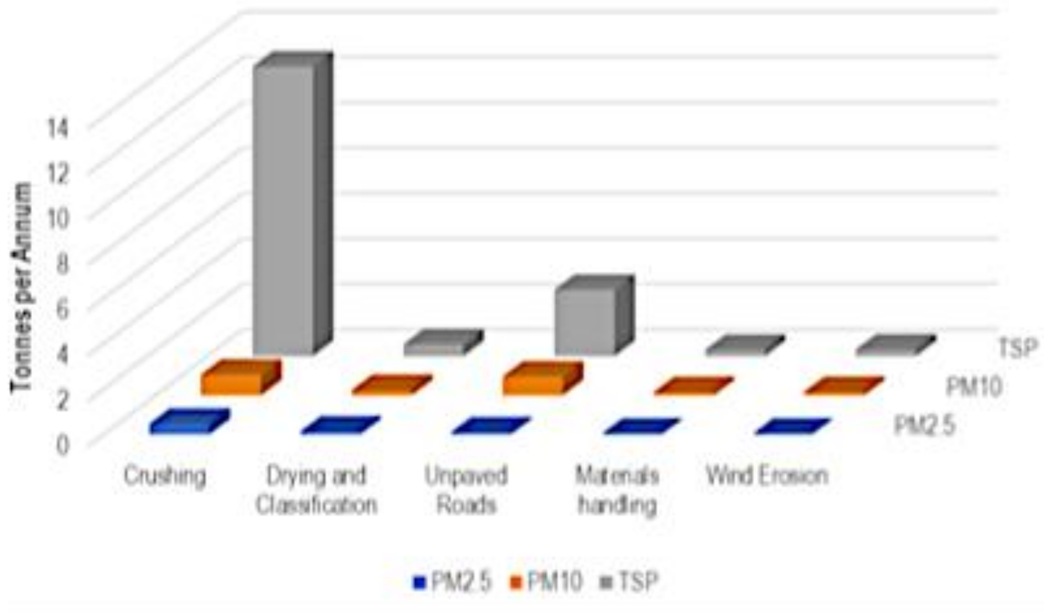


Figure 53 - Contribution of particulate emissions per source group (design mitigated) Source: Airshed, 2022

Based on the simulation results (

Figure 52 and Figure 53) from the source group emissions modelling the biggest emissions sources are from the unpaved roads, the crushing plant, and the drying and classification plant at the bulk sampling, sorting, and testing facility. However, the modelled results are lowered with mitigation measures put in place.

5.26 STORMWATER CONTROL

Nurizon Consulting Engineers used the approach of Best Practice Guidelines G1 Stormwater Management as published by the South African Department of Water Affairs (DWA) to formulate the stormwater management plan strategy for the Stage II expansion Project. The strategy is to separate and channel dirty water from clean water. Dirty water will be channelled in a closed system into a pollution control dam (PCD) and clean water will be channelled from the site and discharged into the natural environment.

The facilities are delineated in dirty and clean stormwater run-off areas, with the dirty water collected and conveyed to the PCD for re-use. The mine will be operated as a closed system (in terms of the dirty stormwater run-off); with stormwater run-off within the dirty water areas being collected and conveyed to a silt trap and discharged into the PCD. The water from the PCDs will be transferred to the RWD re-used. No water from the PCDs will be released into the environment. Clean stormwater runoff is diverted away from the Project site into existing streams (Nurizon, 2020). Additional functional stormwater control will be applied to the perimeter of the new bulk sampling, sorting and testing facility similar to the current processing plant CWC designs. The purpose of stormwater.

5.26.1 STORMWATER MANAGEMENT PRINCIPLES PROPOSED

The following basic principles form an integral part of the development of the stormwater management strategy:

- Dirty and clean stormwater catchments shall be delineated and separated so that clean stormwater run-off is diverted around contaminated areas and to natural water courses
- Impacts on the existing groundwater resources, in terms of quality and quantity shall be minimised through the use of impermeable membranes in the design of dirty stormwater infrastructure, i.e. High-density polyethylene (HDPE) liners for the pollution control and concrete linings for the dirty water drainage channels
- Prevention of erosion of the existing water courses, particularly at clean stormwater system discharge points
- Mitigation of flooding to neighbouring properties in the areas due to the proposed facility's footprint and activities
- The required capacity of the individual elements comprising the dirty water system considered the following:
    - Projected water balance, with the aim of retaining the contaminated (dirty) water within a closed system
    - Maximum estimated stormwater peak flow generated by a storm event with a 1 in 50-year recurrence interval
    - Maximum estimated 24-hour runoff volume with 1 in 50-year recurrence interval.

5.26.2 FLOOD LINE DETERMINATION

Flood line determination is used to indicate the level to which a certain flood magnitude will inundate an area along the stream or any watercourse, or which area of land will fall within the floodplain of a particular flood frequency. Flood frequency or the return period (T) is the average period over n-years, which an event repeats or exceeds itself; it may be described as the percentage of the annual probability of the occurrence of a flood event (Digby Wells, 2022).

To determine the extent of flood events within natural drainage systems in the project area, baseline hydrology and climatic data was used to model flood event behaviour by Digby Wells. Catchment delineation was undertaken using Ras Mapper software and referenced to the central meridian 33 Datum.

Peak flows were also determined using land cover and soil type parameters which informed the modelling data. Six catchments were delineated for modelling purposes for the streams that are in the vicinity of the project area. The focus of the study was to delineate the 1:50 and 1:100-year return period flood lines in the vicinity of the mine. The peak discharge characteristics of each catchment is shown in the final flood determination report prepared by Digby Wells (2022) (Appendix F).

5.26.3 ASSUMPTIONS AND LIMITATIONS OF THE STUDY

The following are assumptions made by the specialist and limitations of the study:

- The flood lines were developed for environmental and indicative purposes only and not for detailed engineering design purposes;
- The main watercourses traversing through the project area have been considered for flood lines modelling, as it has a sizable contributing catchment. However, drainage lines north of the project area originating along the boundaries of the site were not modelled because they were deemed small and therefore could not collect any significant amount of runoff that can potentially cause flooding;
- It is assumed that survey data obtained from the client is accurate and an up-to-date representation of the ground-level terrain;
- A steady-state (1-dimensional/1-D) hydraulic model was run, which assumes that flow is continuous at the determined peak flow rates. This is a conservative approach, which results in higher flood levels than if transient state modelling was performed;
- The lidar survey provided is assumed to represent the terrain/elevations and other features correctly (e.g., berms);
- The berms should cover all the areas that are prone to flooding, such as the open pit;

The flood lines were modelled for sections of the unnamed streams traversing through the project area and only within the boundaries of the surveyed area;

- No abstractions from the river section or discharges into the river section were considered during flood modelling; this study only focuses on the flood lines scenarios and;
- Although flood calculations are executed with great care, the possibility always exists that a more severe flood could occur or that flooding as a result of non-hydrological events could take place.

5.26.4 RESULTS

Although the final modelled results indicate that both the 1:50 and 1:100-year flood events will mostly not inundate the mining areas, the lidar survey conducted indicates a potential flood risk at Berm 8 is possible. Indicative results show that both the 1:50 year and 1:100 year modelled flood events will surpass the edge of Berm 8 and flow into the mining pit area which is at a lower natural ground level (805.6 m AMSL) than the natural ground level at Berm 8 (807 m AMSL). The specialist recommendation would then be to extend Berm 8 further around the mine area see Figure 54.

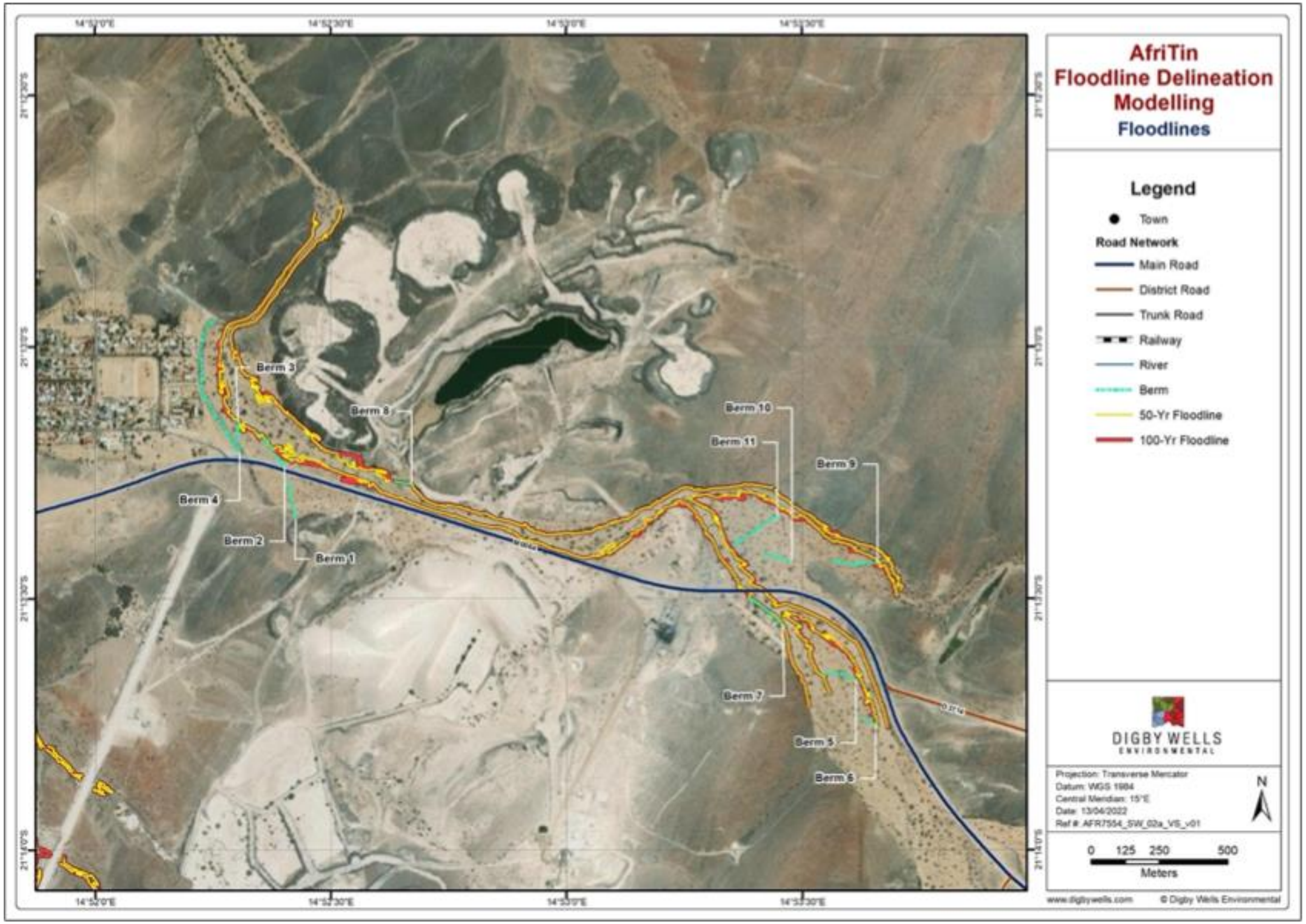


Figure 54 - Floodlines for the 1:50-year and 1:100-year flood events (Digby Wells, 2022)

6IMPACT IDENTIFICATION AND EVALUATION METHODOLOGY

6.1 INTRODUCTION

Chapter 2 provides an overview of the approach used in this ESIA process, and details each of the steps undertaken to date. Predication and evaluation of impacts is a key step in the ESIA process. This chapter outlines the methods that will be followed to identify and evaluate the impacts arising from the proposed Project. The findings of the assessment will be presented in the full assessment report.

This chapter provides comprehensive details of the following:

- The assessment guidance that will be used to assess impacts
- The limitations, uncertainties, and assumptions with regards to the assessment methodology
- How impacts will be identified and evaluated, and how the level of significance will be derived
- How mitigation will be applied in the assessment, and how additional mitigation will be identified
- The cumulative impact assessment (CIA) method that will be used.

The aims of this assessment will be to determine which impacts are likely to be significant; to scope the available data and identify any gaps that need to be filled; to determine the spatial and temporal scope; and to identify the assessment methodology.

The scope of the assessment was determined through undertaking a preliminary assessment of the proposed Project against the receiving environment, and was obtained through a desktop review, available site-specific literature, monitoring data, and site reports, as set out in this scoping report.

6.2 ASSESSMENT GUIDANCE

The following principal documents will be used to inform the assessment method:

- International Finance Corporation standards and models, in particular performance standard 1: ‘Assessment and management of environmental and social risks and impacts’ (International Finance Corporation, 2012 and 2017)
- International Finance Corporation Cumulative Impact Assessment (CIA) and Management Good Practice Handbook (International Finance Corporation, 2013)
- Namibian Draft Procedures and Guidance for EIA and EMP (Republic of Namibia, 2008).

6.3 Limitations, uncertainties and assumptions

The following limitations and uncertainties associated with the assessment methodology will be considered in the assessment phase:

- Topic specific assessment guidance has not been developed in Namibia. A generic assessment methodology will be applied to all topics using IFC guidance and professional judgement
- Guidance for CIA has not been developed in Namibia, but a single accepted state of global practice has been established. The IFC's guidance document (International Finance Corporation, 2013) will be used for the CIA.
- The assessment of impacts related to air quality, soil and potential groundwater contamination from acid de-containment from the bulk sample, sorting and testing facility is based on conceptual engineering designs of the flotation circuit. The definitive design of the circuit will be completed in due course but will not materially influence the process flow of the ore extraction regime.

6.4 Assessment methodology

The ESIA methodology applied to this assessment has been developed by ECC using the International Finance Corporation (IFC) standards and models, in particular Performance Standard 1: 'Assessment and management of environmental and social risks and impacts' (International Finance Corporation, 2017); Namibian Draft Procedures and Guidance for EIA and EMP (Republic of Namibia, 2008); international and national best practice; and over 25 years of combined ESIA experience. The methodology is set out in Figure 55 and Figure 56.

The evaluation and identification of the environmental and social impacts require the assessment of the Project characteristics against the baseline characteristics, ensuring that all potentially significant impacts are identified and assessed. The significance of an impact is determined by taking into consideration the combination of the sensitivity and importance/value of environmental and social receptors that may be affected by the proposed Project, the nature and characteristics of the impact, and the magnitude of any potential change. The magnitude of change (the impact) is the identifiable changes to the existing environment that may be negligible, low, minor, moderate, high, or very high; temporary/short-term, long-term or permanent; and either beneficial or adverse.

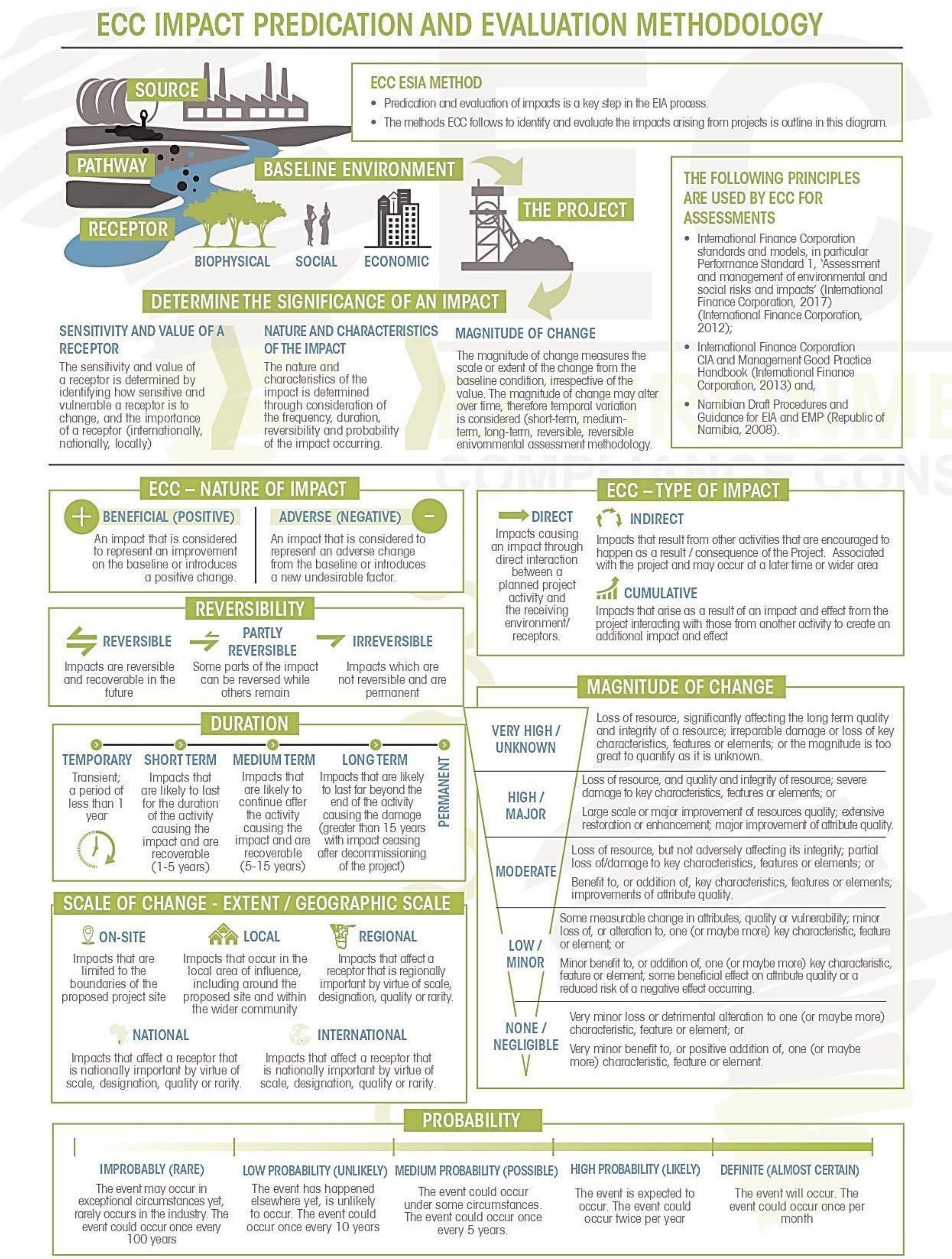


Figure 55 - ECC ESIA methodology based on IFC standards

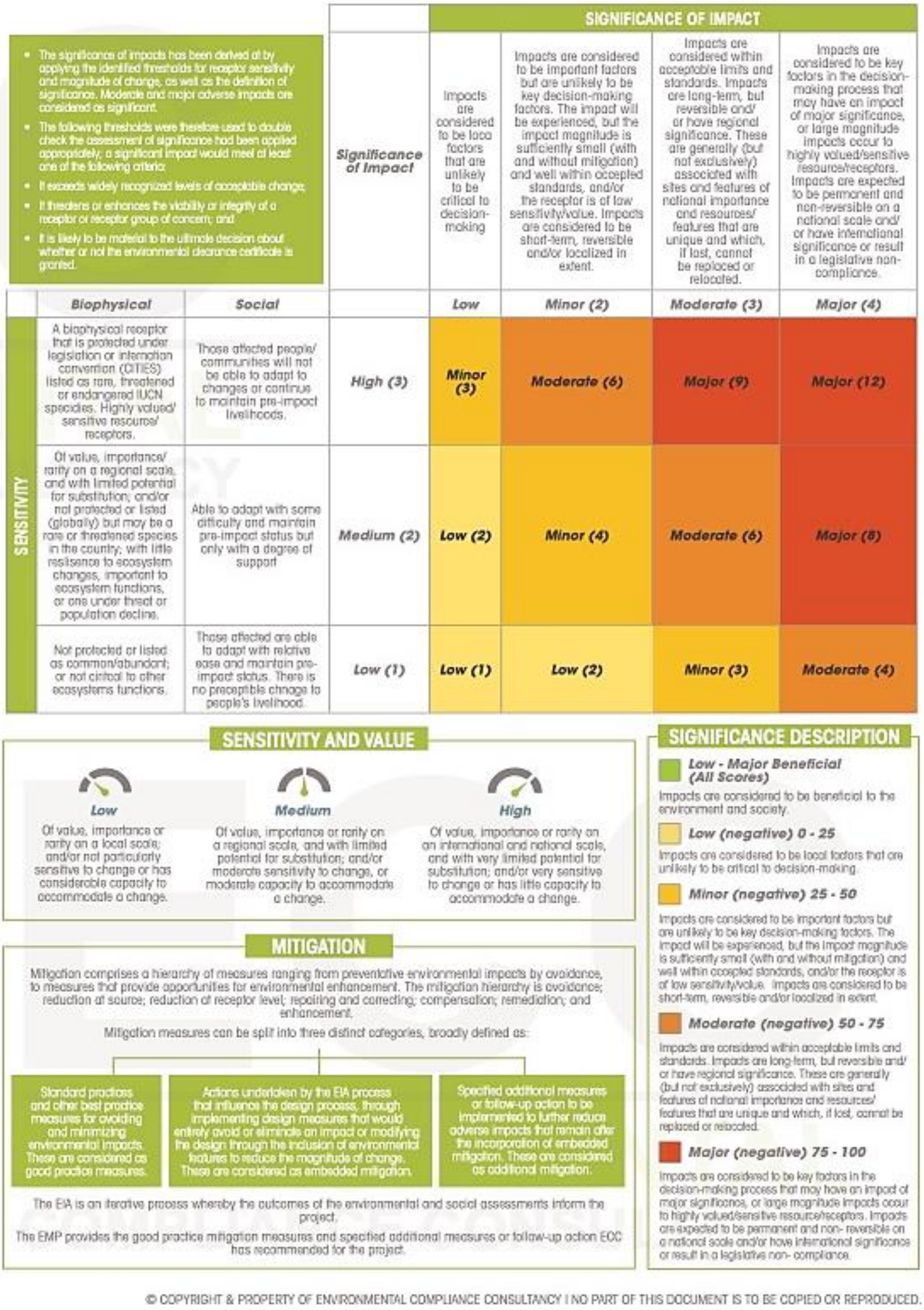


Figure 56 - ECC ESIA methodology based on IFC standards

6.5 MITIGATION

Mitigation comprises a hierarchy of measures ranging from preventative environmental impacts by avoidance, to measures that provide opportunities for environmental enhancement. The mitigation hierarchy is: avoidance; reduction at source; reduction at receptor level; repairing and correcting; compensation; remediation; and enhancement.

Mitigation measures can be split into three distinct categories, broadly defined as:

1. Actions undertaken by the ESIA process that influence the design process, through implementing design measures that would entirely avoid or eliminate an impact or modifying the design through the inclusion of environmental features to reduce the magnitude of change. These are considered as embedded mitigation
2. Standard practices and other best practice measures for avoiding and minimising environmental impacts. These are considered as good practice measures
3. Specified additional measures or follow-up action to be implemented, in order to further reduce adverse impacts that remain after the incorporation of embedded mitigation. These are considered as additional mitigation.

The ESIA is an iterative process whereby the outcomes of the environmental assessments inform the Project. Considerable mitigation has been built into the proposed Project, as potentially significant adverse environmental impacts have been identified and design changes have been identified to overcome or reduce them.

The final EMP (Appendix A) provides the good practice measures and specified additional measures or follow-up action.

Embedded mitigation and good practice mitigation will be considered in the assessment. Additional mitigation measures will be identified when the significance of impact requires it and causes the impact to be further reduced. Where additional mitigation is identified, a final assessment of the significance of impacts (residual impacts) will be carried out, taking into consideration the additional mitigation.

7IMPACT ASSESSMENT FINDINGS AND MITIGATION

The impact assessment considered stakeholder input and specialist studies, and a preliminary environmental management plan was produced. The report focuses on significant impacts and presents a summary of impacts that are not considered significant. Each potential significant or sensitive impact is summarised, including the activity that would cause the impact, potential impacts, mitigation measures, sensitivity of receptors, severity, duration, and probability of impacts, and significance before and after mitigation. The report is structured to describe potential socioeconomic and biophysical impacts.

The structure of the assessment Chapter as per the main impacts assessed are as follows:

1. Socio-economic: Economic
2. Socio-economic: Social
3. Biophysical environment

7.1 IMPACTS NOT CONSIDERED SIGNIFICANT

As a result of an iterative project evolution process, mitigation has been incorporated and embedded into the project plan, thereby designing out potential environmental and social impacts or reducing the potential impact so that it is not significant. The EMP provides best practice measures, management, and monitoring for identified impacts. Impacts that have been assessed as not being significant are summarised in Table 17 and are not discussed further unless otherwise indicated.

Table 17 –Impacts not considered significant

Environment or social topic	Potential impact	Summary of assessment findings
Groundwater quality	Exposed tailings minerals to oxidising conditions and residual acids from petalite processing may potentially result in contamination to groundwater.	Based on the specialist assumptions and subsequent results from the contamination plume model, the impact from disposing of the tailings on the WRD has been assessed as negligible (Digby Wells, 2022) (Appendix F). A per the specialist findings groundwater quality in the project area is not expected to be negatively influenced during the Stage II operations. It is important to note that once the flotation circuit is ready to be included in the bulk sample, sorting, and testing facility the contamination plume model must be re-ran

Environment or social topic	Potential impact	Summary of assessment findings
		with new input parameters and impacts reassessed. Prior to a flotation circuit being consider by the proponent an amendment to the overall ESIA for its inclusion must be completed. This must then be submitted to the competent authority and MEFT for a record of decision.
Noise and vibrations	Potential increased noise impacts to neighbours	The potential for the mine to generate noise adversely impacting neighbours is unlikely given the distance from the operations to the nearest noise-sensitive receptor (+1km away) and the natural buffer effect of the sound attenuation features surrounding the active mine area, both natural and anthropogenic. The receptors are there as a product of historical mine developments therefore projected noise levels are not considered to significant alter the baseline and as such impacts not considered significant.
	Potential for ground vibrations from blasting activities on the surface	Vibrations from mining are variable, depending on the blast size, location within the site (depth), and blasting and mining methods. With mining there is the potential for vibration to follow fault lines and sometimes vibrations can be felt some distance away from the operation. The site will monitor vibrations and ensure vibrations are below allowable limits. Blast vibration assessment (Appendix D).
Avifauna	Bird habitat alteration or destruction	Although general disturbances could affect bird species of concern – i.e. species classified as endangered (violet wood-hoopoe, Ludwig's bustard, white-backed vulture, tawny eagle, booted eagle, martial eagle, secretary bird, black stork), vulnerable (lappet-faced vulture) and near threatened (Rűppel's parrot, kori bustard, Cape eagle owl, Verreaux's eagle, peregrine falcon) – birds are considered

Environment or social topic	Potential impact	Summary of assessment findings
		mobile and not limited to the project area. Their habitat is not present in the project area as the site is located within the current mining footprint. (Cunningham, 2022) Appendix G.
Dust emissions from current operations	Suspended dust plumes over the mine area, NamClay, Metal Mills, Uis, Tatamutsi Township areas and motorists driving on the C36 and C35 roads during construction and operation	Potential sensitive receptors are located northeast (~1.7 km) and northwest (~1.9 km) of the ML and not within the prevailing wind field (Airshed 2022). Therefore, it is not expected that dust plumes generated from construction and operation activities will cover the airspace over these receptors. Practical mitigation measures to ensure effective dust management is in place over the project area, and must be maintained.
Dust emissions from bulk sampling, sorting and testing facility	Suspended dust plumes over the project area during construction and operation stages	Due to the intermittent nature of construction operations, construction impacts are expected to have a small but potentially significant impact at the nearest AQSRs depending on the level of activity. With mitigation measures in place these impacts are expected to have minor significance. For both the Uis baseline and project scenarios, the significance is expected to be minor with and without mitigation in place during the operational stage (Airshed 2022)
Flood events	Potential destruction of mine and surrounding infrastructure	The results of the flood determination assessment indicate that the modelled floods for the 1:50-year and 1:100-year flood events will not inundate any mining area or surrounding infrastructure (Digby Wells, 2022), therefore this impact is considered non-significant.

Environment or social topic	Potential impact	Summary of assessment findings
Traffic volume to road capacity allowance and quality of road	Traffic congestion and road surface deterioration on the C36	The traffic impact assessment conducted by ITS global concluded that the C36 road operates at a very low capacity even with the addition of future vehicles from mine operations. The study showed that only 5% of its capacity will be utilised by this project, therefore the significance of this impact is considered very low and not assessed further (ITS, 2022) – Appendix K.
Archaeology and cultural heritage	Potential impact to known and unknown archaeological and heritage significant sites.	The proposed project activities will have no influence on known heritage sites within ML134 therefore no further assessment is required.
Climate change – adaptation	The potential for climate change to impact the proposed project, for example, extreme fire, heat or (extreme) storm events	The proposed Project will not be significantly impacted by the impacts of climate change as the design has considered measures in the event of increasing temperatures, emergency response plans will be in place in the event of a fire, and sufficient dewatering systems will be in place for managing potential water inflows into the mine workings. This impact should be reassessed once the final plant and design is complete.
Climate change – cause / contribute to	The proposed project contributes to climate change through the discharge of greenhouse gas emissions	The proposed project will generate greenhouse gases and therefore emissions however the emissions from the mining and processing operations are expected to be low due to its small production volume and footprint. The Equator Principles carbon dioxide equivalent (CO_2e) trigger limit of 100,000 tonnes CO_2e / year is one that medium scale mines could reach. At and beyond the trigger, a thorough climate change assessment is typically required by lenders and investors.

Environment or social topic	Potential impact	Summary of assessment findings
		The emissions calculated for UTMC included in a high-level estimate conducted by Promethium Carbon in 2021 relate to the combustion of diesel, explosive use, and consumption of electricity. The emissions from the diesel and explosive use have been categorised under Scope 1 emissions while those associated with the consumption of electricity have been categorised under Scope 2 emissions. The appropriate emission factors have been used in calculating these emissions, with the Scope 2 emission factor based on the Southern African Power Pool factor. The activity data used for the calculations are based on the information provided by Environmental Compliance Consultancy. This data consisted of invoices for diesel, explosives and electricity for a period spreading 2020 and 2021. The consumption figures were extracted from these invoices and annualised to obtain an average annual consumption. This average was multiplied by the emission factor to obtain the emissions. The estimated Scope 1 and 2 emissions from the UTMC mine amounts to 8 622 tCO_2e per year which falls below the threshold of 100 000 tCO_2e. UTMC has commissioned a climate change risk assessment of their current and future operations to better understand their operational impact on climate change to prepare for and drive future business strategy.

7.2 SOCIO ECONOMIC ENVIRONMENT: ECONOMIC IMPACTS

Impacts associated with the continued operation of the mine have been identified and have undergone the assessment process to derive the significance value of each impact. The impacts are classified into economic and social influences and assessed separately. The sensitivity of the economy is considered medium, as economic development is an important regional issue, albeit with limited progress within the district to date.

With the expected overall production output ranging from 80 to 120 tph of ore from the mine, it is anticipated that internal revenue generation will also increase in the form of payments received for mineral products sold worldwide. The company will continue to pay taxes, levies, and royalty payments to the government. The mine's capital expenditure and operational expenditure will also be channelled into the local, regional, and national spheres where feasible, thereby contributing directly and indirectly to the micro and macro-economies.

The term socio economic impact assessment embraces both social impacts and economic impacts. Economic impacts include issues such as employment, changes in economic activity such as mining and tourism, and increased expenditure. The significant economic impacts or impacts that have specific interest to the community and stakeholders, before mitigation, are summarised in Figure 57 for illustrative purposes only. Details related to each specific impact is discussed further in this Section.

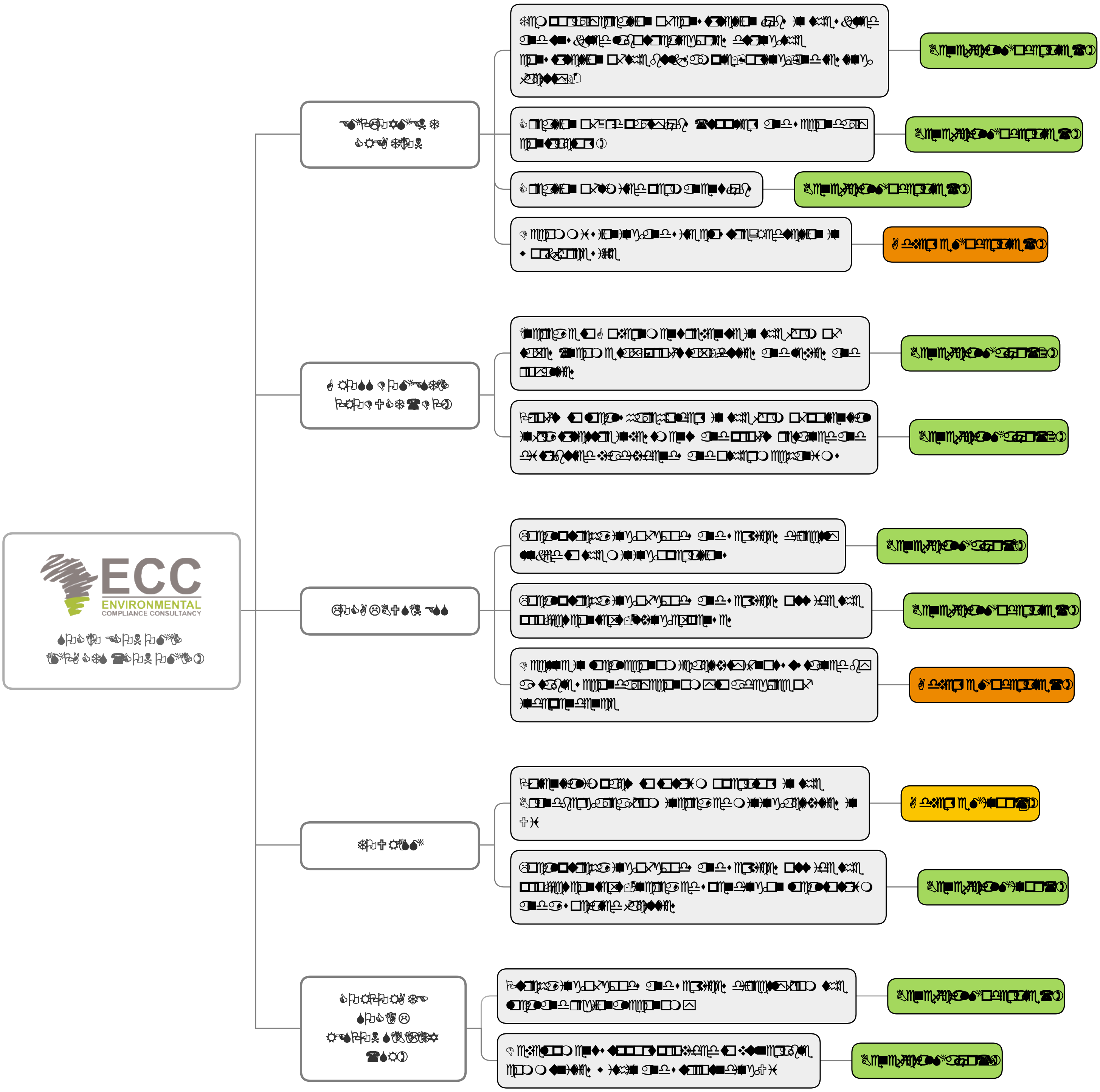


Figure 57 – Economic impacts

7.2.1 EMPLOYMENT CREATION

While Namibia generally has a high unemployment rate, the Erongo Region stands out with a below-average rate of 30% due to its affluent status. One measure of affluence is the per capita income of residents in each region, and the Erongo Region has the second-highest per capita income at N$16,819 per annum.

Mining in the Erongo Region makes a significant contribution to employment, surpassing all other sectors, with a 14% contribution to the national GDP. The populations of the Erongo and Khomas regions are projected to experience the most growth due to an upward urbanisation trend, with over a third of Namibia's population expected to reside in these two regions, according to the Namibia Statistics Agency (2011). The value and sensitivity of employment in these regions are considered high, as it is crucial to the country's overall development, regardless of project-specific quantities. Impacts on employment are detailed below and in Table 18.

7.2.1.1 DIRECT EMPLOYMENT IMPACTS – CONSTRUCTION

During the construction phase of the bulk sample, sorting and testing facility, a limited number of semi-skilled and unskilled labour jobs will be generated to support the construction activities. Additionally, the specialised services of a main contractor will be employed to oversee the construction program. This phase of the project is expected to last approximately six months.

7.2.1.2 DIRECT EMPLOYMENT IMPACTS – OPERATIONS

The operational phase of the Stage II expansion project's bulk sample, sorting and testing facility is expected to generate approximately 15 jobs. As a result, the magnitude of change during operations is considered moderate, given the duration and frequency of spending within the local economies, resulting in medium-term impacts and a moderate beneficial impact on the community and economy.

7.2.1.3 INDIRECT EMPLOYMENT IMPACTS

The UTM Stage II expansion project, encompassing the construction, operation, and decommissioning phases, is expected to create indirect employment opportunities throughout its Life of Mine (LOM). The engagement of various service providers will result in increased indirect employment opportunities for locals and individuals in the wider region beyond the district level.

As part of the project, an external transport company will be contracted to transport raw materials from outside the mining licence (ML) to the bulk sample sorting and testing facility on an intermittent basis throughout the month. Preliminary estimates suggest that this may involve up to 100 trucks.

7.2.1.4 EMPLOYMENT DURING THE DECOMMISSIONING AND CLOSURE STAGE

In the event that an extension of the Life of Mine (LoM) for the UTM Stage II expansion project is not possible, the mine will enter the decommissioning and closure stages. As part of this process, downsizing of the workforce is anticipated, with non-essential and production personnel being made redundant sequentially. The loss of employment is considered highly sensitive to the affected individuals, and therefore the significance of this impact is deemed moderate, as it would not prevent them from seeking and obtaining future employment.

The impact on the local and regional economy is also considered of moderate significance, with a sensitivity rating of medium expected. The impact is expected to be long-term, with limited opportunities to maintain the pre-impact status unless a similar project is brought to the area as a replacement.

Table 18 – Impact assessment on employment and job creation

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction of the Bulk sample, sorting, and testing facility	Community	Creation of temporary construction jobs in the skilled and unskilled labour categories	Beneficial Direct Regional Temporary Reversible	High	Minor	Beneficial Moderate (6)
Downstream job creation	Community Local economy	Creation of 3rd party jobs (suppliers and secondary contractors)	Beneficial Indirect Regional Medium Term Reversible	High	Moderate	Beneficial Moderate (6)
Operations of the proposed project	Community Job seekers Local economy	Creation of limited permanent jobs	Beneficial Direct Regional Medium Term Reversible	High	Moderate	Beneficial Moderate (6)
Decommissioning and closure	Community	Reduction in workforce size.	Adverse Direct Regional Permanent Irreversible	High	Moderate	Adverse Moderate (6)

7.2.2 IMPACTS TO GROSS DOMESTIC PRODUCT (GDP)

Revenue for the Namibian government consists of income tax, profit tax, value added tax, withholding tax, duties and levies, royalties (in the case of mining projects) and other taxes. Profits to local shareholders are also expected in the form of potential infrastructure developments and profits retained and distributed via dividends and other mechanisms. Revenue and profits are expected to improve the local economy and the contribute towards the mining sectors positive impact on the Namibian gross domestic product (GDP).

It is expected that in the first year (FY2024) revenue will amount to USD 26.8 million p.a. (~NAD 484,000,000) and by the second year (FY2025) and beyond to USD 28.7 million p.a. (~NAD 518,000,000). However, the financial model is continuously changing and will be finalised by the Proponent when operations ramp up. Currently mining contributes to 10% of the GDP in Namibia. The impacts to the GDP are further described in the section below and Table 19.

7.3 IMPACTS ON REVENUE FOR GOVERNMENT

All revenue requirements are legally required to be paid by mining companies during operations and therefore the Proponent will contribute to the GDP in this manner and the probability is definite. Sales will be in US dollars and therefore in-turn this will be a positive contribution by bringing is USD into the country and will assist with balancing out of payments.

The impact is expected to be direct, long term for the duration of mining activities (LOM 2039) and irreversible. Monies are paid to local business, regional and national government institutes. The value of sensitivity is high as the revenue income will contribute positively to the overall countries GDP. The magnitude of change is rated as high/major due to the contributions of this new sector within the mining industry. The significance of the impact is expected to be beneficial major.

7.3.1 IMPACTS ON PROFIT TO LOCAL SHAREHOLDERS

It is expected that the Proponent will contribute to profits of local shareholders by infrastructure development and investment, and profits retained and distributed through dividends or other financial mechanisms. This in turn contributes to the local economy. The impact therefore may be direct, long term for the duration of mining activities (LOM 2039) and irreversible. The probability is rated as definite. The value of sensitivity if rated as high due to the positive influence on local livelihoods. The magnitude of change is rated as high/major due to the positive impacts on the local economy. The significance of the impacts if therefore rated as beneficial major.

Table 19 – Impact assessment for gross domestic product (GDP)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Operations	Nationals and local government	Government revenue in the form of taxes (income tax, profit tax, value added tax), duties and levies and royalties.	Beneficial Direct National Long term Irreversible	High	High/Major	Beneficial Major (12)
Operations	Local shareholder and local economy	Profits to local shareholders in the form of potential infrastructure investments and profits retained and distributed via dividends and other mechanisms.	Beneficial Direct National Long term Irreversible	High	High/Major	Beneficial Major (12)

7.3.2 IMPACTS TO TOURISM

Tourism is an important industry in the Erongo Region, particularly in the coastal towns of Swakopmund and Walvis Bay. Uis, a town that serves as a link between the coastal towns and Namibia's highest mountain, the Brandberg, is also a popular tourist destination. Uis is the gateway to Damaraland an area well known for its famous desert-adapted lion and elephant populations. Uis is known for the remnants of the world's largest tin mine and the infamous "white" dune, which is a popular location for tourists to enjoy sunset views of the Brandberg.

The changes associated with Stage II of the project are not expected to have a negative impact on tourism, as the operational mining in Uis is already active and the town's existence is historically linked to mining. The mining operations are not in close proximity to the tourist attractions, except for the "white dune," which is a historic mining waste stockpile. The impacts on tourism as a result of the proposed project are detailed in the section below and Table 20.

There is a high probability that the additional staff and revenue generated from the mining operation will increase local spending in establishments that also cater to the tourism markets. The staff supporting the project will require accommodation and may use these tourism establishments for board and lodging. This has been welcomed by the Uis community in the past, as it supported local businesses during the global COVID-19 pandemic when the tourism market was shut down.

Therefore, this impact will have an indirect and long-term effect on the tourism industry for the duration of the project, and partly irreversible. The spending is expected to not only occur within Uis but also in other towns in the region, such as Swakopmund and Walvis Bay. The tourism market in Uis is considered to have low sensitivity, as the additional income provided to local businesses and the economy from the operational staff will occur on an ad hoc basis. The magnitude of change is considered moderate, as spending on the tourism industry is expected to take place regularly. The probability is considered definite, as spending will occur.
Tourist perception of mining can vary depending on various factors such as the location, type of mining operation, and the impact of mining on the local environment and community. Some tourists may view mining as a negative impact on the natural and cultural heritage of a destination, as it may alter landscapes, disrupt ecosystems, and potentially impact local communities and their way of life. They may be concerned about the environmental and social sustainability of mining activities and may perceive it as a threat to the authenticity and integrity of a destination. On the other hand, some tourists may be interested in the historical, cultural, and economic significance of mining, and may view it as a unique aspect of a destination's heritage and identity. They may be interested in learning about the history, technology, and processes of mining, and may see it as a source of local livelihoods and economic development. Overall, tourist perception of mining can be complex, and it is important for the proponent and stakeholders to carefully manage and

communicate the impacts of mining to ensure a positive perception among tourists, especially in Uis where mining plays a pivotal role in local economic and social welfare.

The overall significance of the impact is expected to be minor, but beneficial. No mitigation measures are required to be implemented.

Table 20 – Impact assessment on tourism

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Operations	Local tourism and local economy	Purchasing of goods and services outside the project context such as spending on local tourism and establishments	Beneficial Indirect Regional Long term Partly reversible	Low	Moderate	Beneficial Minor (3)
Operations	Local tourist perception of mining	Negative tourist perception of mining and impacts on the environment	Negative Indirect Regional Long term Partly reversable	Medium	Low	Adverse Minor (4)

7.3.3 IMPACTS TO LOCAL BUSINESSES

The operational mining activities will require support by local business. This will be in the form of direct and indirect impacts on the local economy. The impacts on local business are further discussed in the Sections below and Table 21.

7.3.3.1 DIRECT IMPACTS – LOCAL PURCHASING OF GOODS AND SERVICES DIRECTLY LINKED TO THE MINING OPERATIONS

Mining operations require purchasing goods and services to sustain the operation and support its staff. In 2021, Uis generated over NAD 141 million in local procurement, as reported by the Chamber of Mines. This significant contribution to local procurement provides long-term benefits not only for Uis but also for the wider region and Namibia as a whole. This injection of local procurement is considered irreversible, as it will continue for the duration of the project (LOM 2039). It will directly support local businesses and the economy, and may even extend to a national scale if goods or services are not available locally and need to be sourced from other areas like

Windhoek. The sensitivity of this impact is expected to be medium, and the magnitude of change is expected to be high, as businesses will be engaged and supported throughout the project's duration. The overall significance of this impact is expected to be major and beneficial. No mitigation measures are required to be implemented.

7.3.3.2 Direct impacts – purchasing of goods and services outside the project context such as living expenses

A large majority of the mining staff reside in Uis and contribute to the local economy by purchasing goods, services, and accommodation for themselves and their families. This indirect impact is expected to be long-term for the duration of the project, but partially reversible. Local businesses could benefit at a regional scale, as spending may occur outside the immediate scope of Uis. The probability of this impact occurring is considered highly probable. The sensitivity of this impact is expected to be low, and the magnitude of change moderate, as local spending within the local economy is anticipated. Overall, the significance of this impact is expected to be beneficial but minor. No mitigation measures are required to be implemented.

Table 21 – Impact assessment for direct and indirect spending on local business

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Operations	Local businesses Sub-contractors	Local purchasing of goods and services directly linked to the mining operations	Beneficial Direct National Long term Partly reversible	Medium	High/major	Beneficial Major (8)
Operations	Local businesses	Local purchasing of goods and services outside the project context - living expenses	Beneficial Indirect Regional Long term Partly reversible	Low	Moderate	Beneficial minor (3)
Decommissioning and closure	Local and regional economies	Decline in local economic activity if not sustained by a stable	Adverse Direct Regional Long term Partly reversible	Medium	High	Adverse Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
		secondary economy				

7.3.4 CORPORATE BASED INVESTMENTS

UTMC has been actively engaged in the Uis community since the start of its operations in 2019, implementing inclusive and supportive approaches to contribute to the economic and social wellbeing of the local community (ESG, 2022). The Proponent has been proactive in supporting local small and medium-sized businesses by providing procurement opportunities, as well as sponsoring local sports clubs, the traditional authority, and wildlife conservation initiatives in the greater area. The magnitude of change to the receiving social environment, as indicated in Table 22, is considered high, given the economic vulnerability of the receptors in the status quo. As a result, it is expected that there will be an increase in attribute quality, which will have a positive impact on the local community.

Table 22 – Impact assessment for corporate social responsibility

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Direct Procurement	Local economy	Purchasing of goods and services directly from the local and regional economy on an assumed equal basis	Beneficial Direct Local Medium Term Reversible	Medium	Moderate	Beneficial Moderate (6)
Corporate social responsibility	Community	Development support provided to vulnerable communities	Beneficial Indirect Regional Medium Term Partly reversible	High	High	Beneficial Major (9)

7.4 SOCIO ECONOMIC ENVIRONMENT: SOCIAL IMPACTS

A social impact assessment is an essential tool for understanding the potential impacts of a mining project on the surrounding communities and stakeholders. It aims to identify potential social risks and benefits associated with the project and suggests measures to mitigate any adverse effects. This report presents the keys social impact for the proposed changes at Uis Tin Mine. The mine is located in a region with a significant population that relies on the natural resources (minerals and mineral extraction) for their livelihoods. The purpose of this assessment is to evaluate the potential social impacts of the proposed mine changes on the surrounding communities and stakeholders.

This section of the report analyses the potential impacts of mining activities on various social aspects, including traffic, nuisance air and noise impacts, employment, health, education, culture, and community development. The assessment will also identify potential risks and benefits associated with the mine and suggest measures to mitigate any adverse effects and enhance the positive impacts. The assessment will provide valuable information for decision-making and ensure that the mine operates in a socially responsible manner, minimising its impact on the surrounding communities and stakeholders while maximising the benefits of the project. The significant social impacts or impacts that have specific interest to the community and stakeholders, before mitigation, are summarised in Figure 58 for illustrative purposes only. Details related to each specific impact is discussed further in this section.

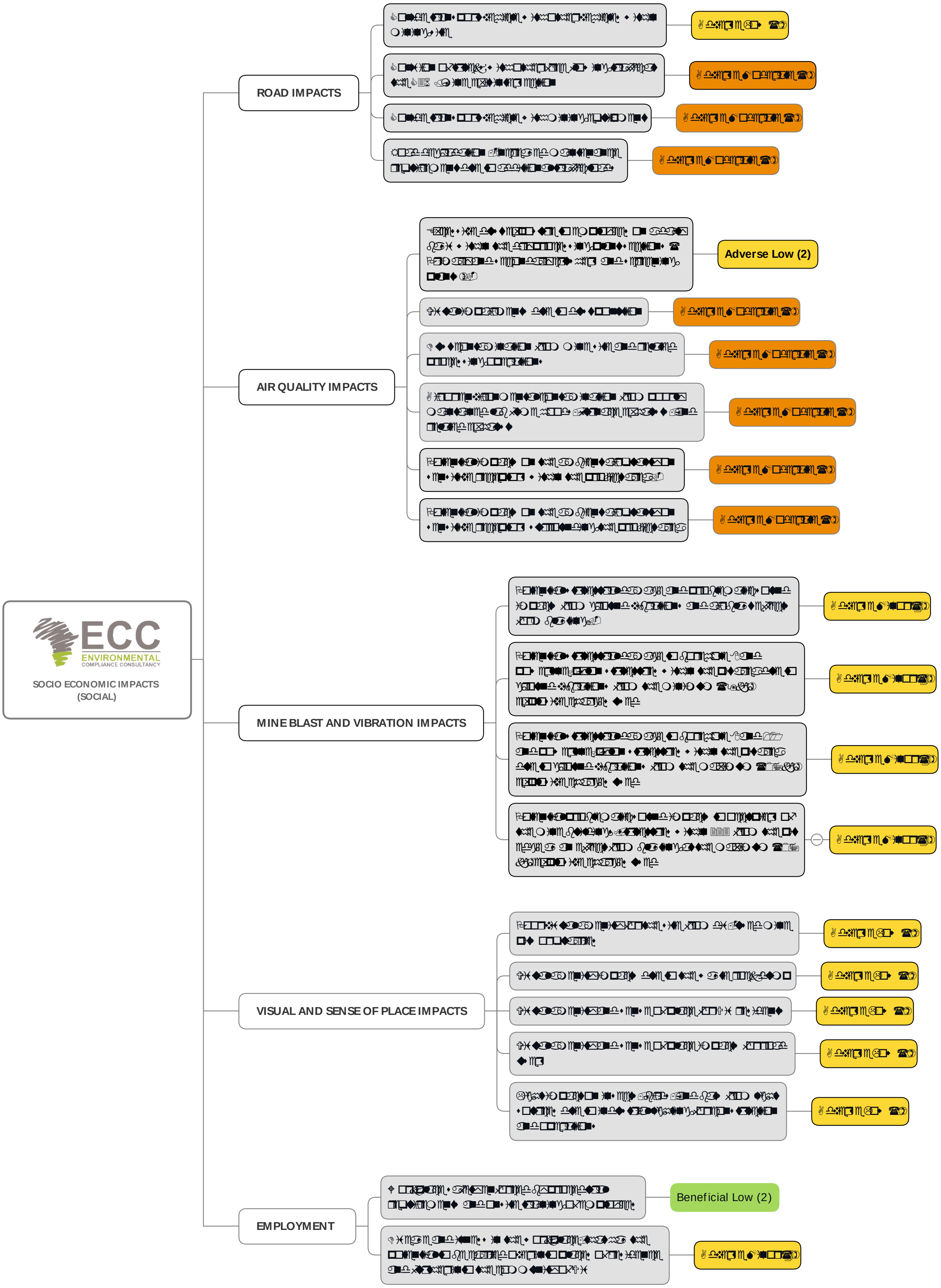


Figure 58 – Social impacts

7.5 Traffic and Road Safety

Traffic safety: Mine entrance/exit - The area of concern is located at the mine access intersection leading off from the C36 towards the boom-control access gate of the mine. The current speed limit along the C36 roadway is 100 km/hr. However, the required shoulder sight distance (SSD) for this operational speed is 200 meters for cars and 300 meters for a single unit truck. The available SSD at this exit is approximately 240 meters, which is sufficient for cars, but insufficient for trucks (ITS, 2022).

The pre-mitigation impact significance of potential collisions involving trucks at this intersection is considered moderate within the social environment once it occurs as set out in Table 23.

Table 23 - Expected impacts related to traffic conditions at mine entry / exit point along the C36

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Access and roads	Community	Collision of trucks with other free flowing traffic past the C36 / mine entry intersection.	Adverse Direct Local Medium Term Reversible	Medium	High	Moderate (6)

The significance of the impact on the safety of drivers of vehicles and trucks and the public along the C 36 / mine entrance intersection can be lowered to a minor ranking with the effective implementation of the recommended mitigation measures by the traffic assessment specialist as shown in Table 24. Mitigation measures include installing street lighting at this intersection to promote high visibility during night-time hours and reduce the risk of collisions between cars and trucks from the mine or otherwise privately owned. it is further recommended that the speed limit along the C36 should be reduced to 80 km/hr for approximately one km on either side of the mine intersection. This will increase the SSD along this section to a sufficient distance. A further recommendation Is for the proponent to resurface the road for that 1km distance on either side of the mine entrance intersection.

Table 24 - Expected impact related to traffic conditions post mitigation

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Access and roads	Community	Collision of trucks with other free flowing traffic	Adverse Direct Local	Low	Minor	Minor (3)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
		past the C36 / mine entry intersection.	Short Term Reversible			

7.6 AIR QUALITY IMPACTS

7.6.1 EXPOSURE TO DUST

The main pollutant of concern associated with the mining operations is particulates. Particulates are divided into different particle size categories with total suspended particulates (TSP) associated with nuisance impacts and the finer fractions of PM10 (particulates with a diameter less than 10 µm) and PM2.5 (diameter less than 2.5 µm) linked with potential health impacts. Gaseous pollutants (such as sulphur dioxide, oxides of nitrogen, carbon monoxide etc.) will derive from vehicle exhausts and possibly from the mineral processing operations but are regarded as negligible in comparison to particulate emission.

The potential expected sources of dust particulate matter resulting from the operational activities include but are not limited to construction activities on settling ponds, the return water pond (RWP); mineral material handling and processing; and mining activities within V1 and V2 open pits) such as drilling, blasting, and hauling.

Analysis of depositional dust volumes in AQ02 and AQ09 which are the closest stations to the processing area showed thresholds for residential and industrial exposure standards are not exceeded for the last twelve months ending July 2022. This can be attributed to dust suppression methods effectively employed at the comminution areas. Table 25 presents the dust exposure thresholds for residential and industrial areas. From the laboratory results obtained these thresholds are well below half the standard for industrial areas and therefore pose no threat to employee health surrounding these stations. However, fugitive emissions at the source (i.e., comminution areas (primary and secondary crushers and screens), and open conveyor systems) are concentrated and do require employees to always wear the correct PPE.

Two operational scenarios were assessed, namely the incremental and cumulative Petalite Beneficiation Plant scenarios, each with an unmitigated and mitigated sub-scenario.

- Emissions for the plant were quantified based on provided information on processing rates and plant layout. o Drying and Classifying is the main source of PM10 and PM2.5 emissions from this process, followed by unpaved roads for PM10 and crushing and screening for PM2.5. The main source of TSP emissions is crushing and screening, followed by unpaved roads.

- Dispersion modelling results for the incremental plant Simulated values for PM10, PM2.5 and maximum daily dustfall rates at AQSRs are negligibly small.
- PM10 and PM 2.5 daily GLCs, for unmitigated activities, result in exceedances of the 24-hour air quality objective (AQO) over a maximum distance of ~90 m from on-site activities.
- The footprint of exceedance of maximum daily dustfall rates exceed the AQO within 125 m from the facility's activities.

Table 25 - Dust exposure thresholds for residential and industrial areas

Level	Dust fall rate (mg/m2/day)	Averaging period	Permitted frequency of exceeding dust fall rate
Action Residential	D < 600	30 days	Three within any year, no two sequential months
Action Industrial	D < 1200	30 days	Three within any year, not sequential months
Alert Threshold	D < 2400	30 days	None. First incidence of dust fall rate exceeded requires remediation and compulsory report to relevant authorities

Airshed (2022) determined that due to the intermittent nature of construction operations, construction impacts are expected to have a small but potentially harmful impact at the nearest AQSRs depending on the level of activity. With mitigation measures in place these impacts are expected to have a minor significance and not assessed further.

For receptors closest to the sources of dust, and with the use of relevant PPE, dust suppressants to minimize dust at the source, the impact is reduced to minor from moderate, considering the moderate to a high magnitude of the potential impact, its certainty, and moderate sensitivity of the receptor. The scale of the impact associated with the potential deterioration in air quality from particulate matter is considered direct and limited to onsite areas, the nature of the potential impact is considered medium-term and reversible - when operations cease the potential impact also ceases, therefore the magnitude of change is considered minor to moderate as shown in Table 26.

Table 26 - Impacts on employees during operations from processing activities

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Existing operations	Environment – people	Dust contamination from mine site and related existing processing operations	Adverse Direct Reversible Medium term Onsite Almost certain	Medium	Moderate	Adverse Moderate (6)
Construction of the bulk sampling, sorting and testing facility	Environment – people	Dust contamination from the construction of the bulk sample, sorting and testing facility	Adverse Direct Reversible Medium term Onsite Almost certain	Medium	Moderate	Adverse Moderate (6)

7.7 GROUND VIBRATION AND AIR BLAST IMPACTS

The potential impacts of ground vibration from blasting activities on nearby receptors (communities included as set out in Appendix D) were assessed. The level of impact was determined by the explosive charges used by the mine (minimum charge of 69 kg and the maximum charge of 207 kg). The impact to infrastructure is contained onsite with a long-term duration as blasting is an integral part of the mining process.

Based on the simulated results from the ground vibration evaluation for the minimum charge, boreholes 8 and 11, and the power line/pylon structures within the pit area may be at risk of damage. All other structures beyond this point presented an acceptable level of tolerance against ground vibrations. The results from the simulated maximum charge impacts on structures within the project area indicated that boreholes 8 and 11 as well as the power line/pylon structure within the mine pit area to be at risk potentially.

The nearest public houses are located 1070 m from the pit boundary. Ground vibration levels predicted at these buildings where people may be present is 0.9 mm/s for the maximum charge. In view of this no specific mitigations will be required (Zeeman, 2022).

The magnitude of change as a result of ground vibration influences on mine infrastructure, including boreholes are deemed as minor because of the expected minor loss of, or alteration to, one (or maybe more) key characteristic of the boreholes and the power line/ pylon structure.

Sound pressure levels in excess of the maximum threshold of sound exposure (134 dBs) are expected to occur within a distance of 223 m from the open pit. Mine buildings (office) are found within this zone and the calculated sound pressure level of 134.7 dBs may present a problematic influence on the occupiers of the office buildings and surrounding infrastructure areas within the distance limit applied. The magnitude of change on the receptors is deemed as medium due to the fact that exposure duration is intermittent and sound levels are not exceeded by a big margin over the threshold. However, the duration of the impact is long-term and warrants some attenuation measures to be considered see Table 27. With proper mitigation applied it is anticipated that the significance of these impacts can be adjusted to low (2).

Table 27 - Ground vibration and air blast impacts

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Blasting (open pit mining)	Mine infrastructure	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	Adverse Direct Reversible Long-term Onsite Possible	Medium	Minor	Minor (4)
Blasting (open pit mining)	Mine infrastructure	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) explosive charges used	Adverse Direct Reversible Long-term Onsite Possible	Medium	Minor	Minor (4)
Blasting (open pit mining)	Occupiers of mine buildings / structures	Potential problematic sound impacts to occupiers of the mine buildings/structures within 223 m from the pit edge as an effect from blasting at the maximum (207 kg) explosive charges used causing sound levels more than 134dBs.	Adverse Direct Reversible Long-term Onsite Possible	Medium	Minor	Minor (4)
Fly rock created from	Structures / POI within	Potential problematic fly	Adverse Direct	Low	Low	Low (1)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
incorrect blasting (i.e., stemming height)	500m from blast zone	rock induced damage to structures within a 500m radius around the blast zone aka. the safe zone, from incorrect blasting activities	reversible Temporary Onsite Improbable			

7.7.1 GROUND VIBRATION AND AIR BLAST IMPACTS MITIGATION MEASURES.

Mitigation of ground vibration effects can be done by applying the following methods:

- 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 – mine owned.

The blasting method that exerts the least amount of environmental and social influence on Project receptors as well as to produce smaller rock fragments was recommended through specialist input. In most cases basic planned design does not need to change but timing can be adjusted as well as using electronic timing to reduce the charge mass per delay. This must be confirmed with monitoring of ground vibration at the POI.

A monitoring programme for recording blasting operations is recommended by the specialist and the following elements should be part of such a monitoring programme:

- Ground vibration and air blast results;
- Blast Information summary;
- Meteorological information at the time of the blast;
- Video Recording of the blast;
- Fly rock observations.

Most of the above aspects do not require specific locations of monitoring. Ground vibration and air blast monitoring requires identified locations for monitoring. Monitoring of ground vibration and air blast is done to ensure that the generated levels of ground vibration and air blast comply with recommendations.

Proposed positions were selected to indicate the nearest points of interest at which levels of ground vibration and air blast should be monitored for compliance within the accepted norms and standards as proposed in the specialist's report. The monitoring of ground vibration will also qualify the expected ground vibration and air blast levels and assist in mitigating these aspects properly. This will also contribute to proper relationships with the neighbours.

Three monitoring points were identified as possible locations that will need to be considered. Monitoring positions are indicated in Figure 59 lists the positions with coordinates. These points will need to be re-defined after the first blasts are done and the monitoring programme defined.

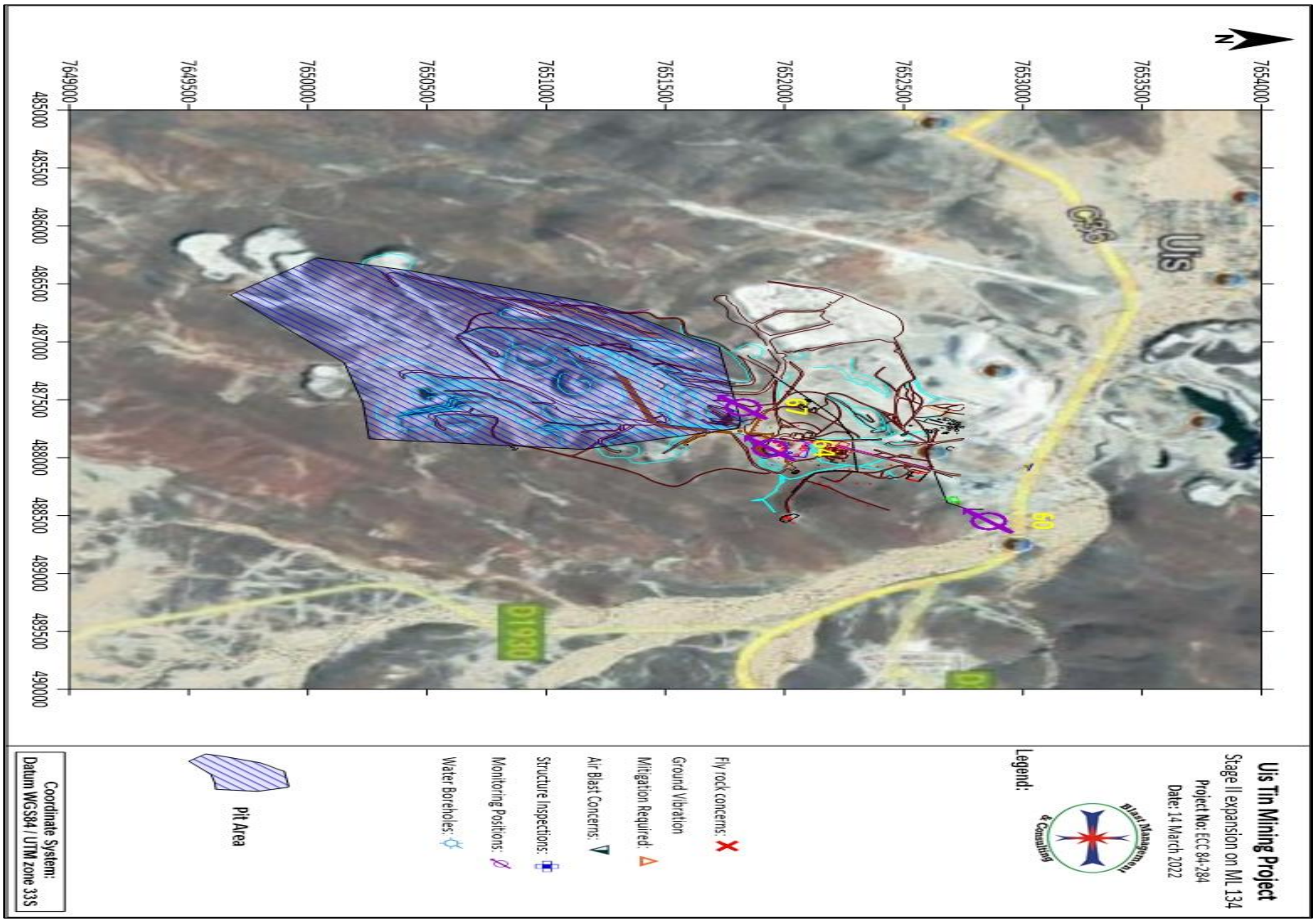


Figure 59 - Recommended monitoring positions (60, 64, 67) (Zeeman, 2022)

7.8 VISUAL AND SENSE OF PLACE IMPACTS

The visual and sense of place impact assessment evaluated the potential impacts of mining activities on the surrounding communities' visual aesthetics and sense of place. The following is a summary of the potential impacts identified and measures to mitigate them.

Landscape alteration: Mining activities alter the landscape which can significantly impact the visual aesthetics of the surrounding area. This is mitigated for the project as the site is located within an area outside of the standard viewshed for residents as described in section 5.24 the site is surrounded by historic mine waste rock dumps and is shielded by mountains.

Noise: Noise generated from mining activities can result in nuisance noise impacts to residents leading to a loss of sense of place and impact the residents' quality of life. Although these project changes do not alter the current baseline noise levels, this should be monitored by physical measurements and recording of public concerns or complaints. If the project does start receiving noise complaints, the project should implement a noise management plan, such as the use of barriers, redirecting mining activities at sensitive times such as night, or implementing strict noise limits if required.

Visual pollution: Mining activities can generate visual pollution, including dust, light and emissions. These can impact the visual aesthetics of the surrounding area, leading to a loss of sense of place and impact on the quality of life of residents. This can be mitigated by implementing measures to reduce visual pollution, such as using water sprays to control dust, implementing emission controls on mining equipment, using downward pointing lights and using natural barriers to screen mining activities.

Overall, the visual and sense of place impacts of a new mine can be significant. These project changes, however, are not deemed significant. By addressing these impacts, the proponent can ensure that their operations are socially responsible and respectful of the surrounding communities and stakeholders, thus preserving the visual aesthetics and sense of place of the area.

7.9 BIOPHYSICAL ENVIRONMENT IMPACTS

A biophysical impact assessment is a critical component of any mining project as it aims to evaluate the potential physical and biological impacts of the project on the surrounding environment. This assessment provides valuable information that helps the reader and decision makers identify and mitigate potential risks and impacts associated with the project. This section presents the biophysical impact assessment for the proposed change to the Uis Tin mine.

As described in the baseline chapter, the mine is located in a region with diverse flora and fauna, and water resources, making it critical to assess the potential impact of mining activities on the biophysical environment. The purpose of this assessment is to evaluate the potential impacts of the proposed changes to the mine on the surrounding environment, including soil, water, air quality, vegetation, and wildlife. The section of the report analyses the potential impacts of mining activities on each of these components and suggest measures to mitigate any adverse effects. The assessment will provide valuable information for decision-making and will ensure that the mine operates in an environmentally responsible manner, minimising its impact on the biophysical environment.

The term biophysical impact assessment embraces the potential impacts on the biophysical environment including the abiotic and biotic environments. The significant biophysical impacts or impacts that have specific interest to the community and stakeholders, before mitigation, are summarised in Figure 60 for illustrative purposes only. Details related to each specific impact is discussed further in this section.

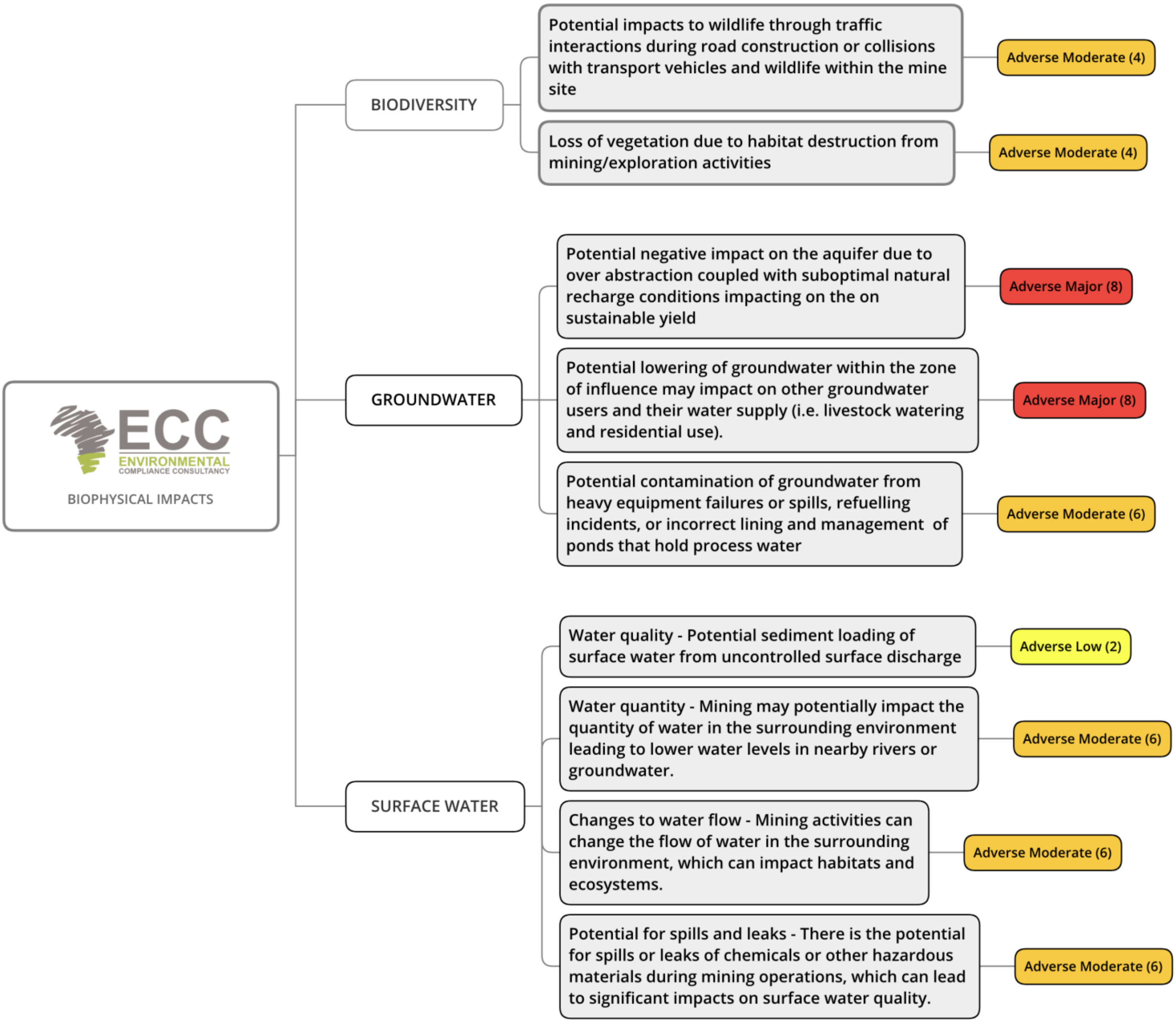


Figure 60 – Biophysical impacts

7.10 BIODIVERSITY IMPACTS

7.10.1 WILDLIFE COLLISIONS WITH MINE VEHICLES

The impact of fauna interactions with mining vehicles can have significant consequences on both the wildlife and the mining operations. Such interactions can lead to injury, death, or displacement of the animals, which can disrupt the ecosystem and affect biodiversity. Additionally, mining vehicles can suffer damage, which can result in downtime, delays, and increased costs for the mining operations.

The severity of the impact would be localised and limited to the extent of the mine operations see Table 28. It is possible that some species such as Kudus could be involved in such localised events, similarly to other parts of Namibia and road interactions. This impact wouldn't be unique to the site.

To mitigate the impact of fauna interactions with mining vehicles, it is important to implement effective management practices. This can include establishing exclusion zones or barriers around sensitive habitats, minimising vehicle movements during peak animal activity times, and implementing speed limits or other traffic control measures to reduce the risk of collisions.

Overall, the impact of fauna interactions with mining vehicles is minor as no areas of sensitive habitat has been identified that interacts with the mining traffic routes. Sensitive habitats i.e. drainage lines and rocky ridges are not used for transportation. This should be reviewed as transport routes change during operations to ensure the sustainability of both the mining operations and the surrounding ecosystem.

Table 28 - fauna impacts

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Continued mining and exploration activities within the mining areas	Fauna	Collisions with wildlife	Adverse Direct Partly reversible Long-term On-site Probable	High	Moderate	Minor (4) (with mitigation)

7.10.2 FLORA DISTURBANCES

Flora disturbance for the proposed mining/exploration activities would be localised to unique habitats (e.g. drainage lines, hills/ridges) with associated flora that would bear the brunt of this proposed development, but be limited in extent and only permanent at the actual mining site(s) and access routes and infrastructure sites.

As all development have potential negative environmental consequences, identifying the most important flora species including high risk habitats beforehand, coupled with environmentally acceptable mitigating factors, lessens the overall impact of such development. It is not expected that further mining/prospecting developments will adversely affect any unique flora in the ML 134 area, especially if the proposed recommendations (mitigation measures) are incorporated which are contained in the EMP (Cunningham, 2022).

Typically, one of the most significant impacts of mining on flora is habitat loss. Mining activities often involve clearing large areas of land, removing vegetation and disrupting soil ecosystems. This can lead to the loss of plant species, especially those that are endemic to the area or that have specific habitat requirements. As per Cunningham 2022 the site is already heavily disturbed and the potential risk for significant flora or habitat loss is unlikely as the site has undergone significant disturbance.

Mining activities can also cause soil erosion, which can further exacerbate the loss of plant life in the area. Soil erosion can lead to a loss of nutrients, compaction of the soil, and changes to the water regime, which can all have negative impacts on plant growth and survival. The soils within the site are heavily disturbed, however in new areas where mining hasn't occurred the proponent will ensure that clearing is kept to a minimum, and soil is stockpiled for future rehabilitation purposes. It is almost certain soil impacts will occur in areas where mining infrastructure will be located, the impact will be long term but localised, and partially reversable the significance of the impact is minor.

Mining activities can also increase the risk of invasive species entering the area. The disturbance caused by mining can create new niches for invasive species to establish themselves, which can displace native plant species and alter the ecological balance of the area. This would have a significant impact on the biodiversity in the area and has the ability to spread regionally, the impact would be partially reversable, long term and adverse see Table 29. The proponent will ensure all equipment is washed down prior to coming to site and that a weed and seed inspection is completed for each piece of equipment when it arrives at the mine site from another area.

Table 29 - Flora impacts

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Vegetation removal to clear areas for mining infrastructure	Flora	Loss of vegetation due to habitat destruction from mining/exploration activities	Adverse Direct Partly reversible Long-term On-site Probable	High	Moderate	Minor (4) (with mitigation)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Removal of natural areas for mining infrastructure	Flora	Loss of habitat from mining/exploration activities	Adverse Direct Partly reversible Long-term On-site Probable	High	Moderate	Minor (4) (with mitigation)
Cleared areas expose soils and increase risk of soil erosion	Flora	Soil erosion from removal of vegetation	Adverse Direct Partly reversible Long-term On-site Probable	High	Moderate	Minor (4) (with mitigation)
Use of machinery for mining operations and introduction of invasive species	Flora	Loss of vegetation due to habitat destruction from mining/exploration activities	Adverse Direct Partly reversible Long-term On-site Probable	High	Moderate	Minor (4) (with mitigation)

7.11 Ground and Surface Water Impacts

7.11.1 Groundwater Impacts

The groundwater levels (post abstraction) in the area of the mine workings range from 20 - 35 meters below the surface (mbs). The project area is characterised by fractured igneous and metamorphic rock aquifers which are overlain by shallow alluvial aquifers in river channels and as surface cover in some areas (Digby Wells, 2022). The water supply boreholes have been drilled in the Uis River and an unnamed river tributary south of the mine, comprising the Uis and Southern wellfields (Digby Wells, 2022).

From the groundwater supply investigation report prepared by Digby Wells it is concluded that the aquifer can sustain a yield of 18.7 m3/hr over the 18-year life of mine for the Phase 1 Stage II expansion requirements. The mine requires a yield of 18m3/hr to sustain its operations over the 18-year life of mine, which equates to 127 440 m3 per year at a 20-hour per day pump rate and assuming both the Uis and Southern wellfields are utilised. Based on the simulation result from the numerical model the abstraction of water from the aquifer is sustainable. Should there be any significant increases in water demand from the aquifer the long-term sustainable yield needs to be re-calculated.

The expansion of the pilot processing plant to Phase 1 Stage II will increase production at the mine to ~100 tonnes of tin concentrate per month, which will increase the water demand of the plant to ~0.432 Ml/day (18 m3/hr). Water is currently sourced from water supply boreholes in the Uis River channel as well as contributions from water stored within the K5 pit and the investigation assessed whether the water supply boreholes can meet the increased demand for the planned 18-year Life of Mine of the Phase 1 Stage II expansion (Digby Wells, 2022). In addition, based on the numerical model simulations the water supply abstractions over the 18-year period will stress the aquifer due to the low recharge potential of the region.

The cumulative abstractions (from third party users) for the proposed 18-year Life of Mine will create a drawdown cone with a maximum extent of ~6.5 km and a drawdown of ~4.5 m. Including the third-party water supply for the duration of the Phase 1 Stage II life of mine provides a cumulative impact for the area as a worst-case scenario for Andrada. As the third-party abstractions are not anticipated to take place for the full duration of the Phase 1 Stage II life of mine, the extent of the drawdown cone and drawdown in the aquifer may be less than the predicted outcome in the hydrogeological report, which affords Andrada some flexibility to adjust to potential changes in user behaviour.

Table 30 shows the significance rating of the potential adverse water supply impacts before mitigation (pre-impact status). Table 31 shows the lowering of the significance rating after mitigation measures as described in 7.3.2 have been applied.

Table 30 - Water availability impacts

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Over-abstraction for mining and processing activities	Water (availability)	Negative impact on the sustainable yield of the aquifer due to over-abstraction coupled with sub-optimal natural recharge conditions	Adverse Direct Partly reversible Long-term Regional Probable	High	High	Adverse Major (8)
Groundwater cone of depression from potential	Water (availability)	Lowering of the groundwater within the zone of influence may impact on other	Adverse Direct Partly reversible Long term Regional	High	High	Adverse Major (8)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
cumulative abstractions		groundwater users and their water supply (i.e., livestock watering and residential use).	Probable			
Potential large-scale hydrocarbon spills from machinery and equipment on site	Groundwater quality	Potential hydrocarbon contamination of groundwater from heavy equipment failures or spills, or incorrect servicing procedures	Adverse Direct Partly reversible Long term Regional Probable	Medium	High	Adverse Moderate (6)

7.11.2 WATER SUPPLY MITIGATION MEASURES

The following mitigation measures are recommended by the hydrogeological specialist to be put in place with regard to mitigating the impact of reduced water supply:

- Ensure that flow meters are installed at boreholes and tanks to enable the recording of water consumption for water balance purposes. Flow meters must be serviced annually.
- 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 (Section 6);
- Schedule borehole maintenance every 2 years unless the monitoring data (yield vs drawdown) indicates more frequent cleaning is required (Section 6.2);
- 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);
- Establish a covered water storage area nearby to the plant which contains water storage tanks with a minimum capacity of 1 week (~2700 m3) 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 m3/hr (127 440 m3/a) required by the plant for the Phase 1 Stage II expansion;

- 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;
- It is recommended to 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 in the pit has higher concentrations of calcium, magnesium, sodium, potassium chloride, sulphate, iron, manganese and electrical conductivity compared to the groundwater samples which may dictate how much of the pit water can be used during a month (if this needs to be diluted with clean or groundwater contributions). 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.
- Drawing large yields of groundwater for prolonged periods may have significant drawdown impacts for the regional aquifers. Alternative water supply options such as piping water from the Orano Desalination plant or directly from the sea should also be considered for the project.

Table 31 - Water availability impacts post mitigation

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Over-abstraction for mining and processing requirements	Water (availability)	Negative impact on the sustainable yield of the aquifer due to over-abstraction coupled with sub-optimal natural recharge conditions.	Adverse Direct Reversible Short-term Local Probable	Medium	Moderate	Moderate (6) (after mitigation)

7.12 Surface water impacts

Sediment loading within surface water streams from flood events may have the potential to alter stream bed morphology and pose a risk to nearby property. In arid areas like Uis this can be exacerbated without the proper diversion channels in place around property and infrastructure. The risk of floods inundating the bulks sample, sorting, and testing facility is rated low with proper mitigation in place. If a flood event does occur the duration of the impact will be temporary and limited to onsite infrastructure possible influence.

One of the most significant impacts of mining on surface water is the potential for water quality degradation Table 32. Mining activities can generate contaminants that can enter nearby water sources and lead to pollution. These contaminants can include sediment, heavy metals, and chemicals used in mineral processing. Polluted water can harm aquatic life and create health risks for people who rely on the water for drinking, irrigation, or other purposes. The site has stormwater management and diversions in place to prevent stormwater making contact with mining infrastructure thereby significantly reducing this risk.

Mining activities can impact the quantity of water available in the surrounding environment. Water may be used for mining operations or may be displaced due to mining activities, leading to lower water levels in nearby rivers or groundwater. This can impact the availability of water for other uses and potentially harm ecosystems that rely on consistent water levels. The only aquatic habitat in proximity to the site, is that of the fish farm in the northern open pit, this activity has ceased and therefore there is no longer a receptor relying on constant water supply. The areas is arid and receives seasonal rainfall and rivers do not run permanently. The site utilised a combination of water from the open pits and groundwater and does not intend to abstract water from rivers, therefore this impact is not considered significant.

Mining activities can change the flow of water in the surrounding environment, which can impact habitats and ecosystems. This can occur due to changes in the topography of the land or by diverting water for mining activities. Changes in water flow can impact the quality and quantity of water available in the environment, leading to changes in ecosystems. This is almost certainly going to occur as the site will require some water diversion mechanisms, the impact would be local, reversible and affected in the short term during large rainfall events.

There is the potential for spills or leaks of chemicals or other hazardous materials during mining operations and construction, which can lead to significant impacts on surface water quality. Spills can result in immediate harm to water quality, and can also have longer-term impacts if chemicals persist in the environment.

Overall, the impact from these project change to surface water remains largely unchanged from the current operations. The proponent will need to ensure surface water mitigation measures outline in the EMP are implemented. Such measures include the use of best management practices, implementing appropriate water treatment technologies, and monitoring water quality and quantity regularly.

Table 32 - Surface water impacts

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Surface water runoff during rainfall events or flood events.	Surface water streams and property	Sediment loading from flood events that may change stream morphology thereby affecting nearby property or infrastructure	Adverse Direct Irreversible Temporary Onsite Possible	High	Moderate	Low (2) (with mitigation)
Surface water mining activities can generate contaminants that can enter nearby water sources and lead to pollution	Surface water quality	Potential for contaminants such as sediment, heavy metals, and chemicals used in mineral processing impacting on surface water quality	Adverse Direct Partly reversible Temporary Onsite Possible	High	Moderate	Minor (3) (with mitigation)
Mining activities can impact the quantity of water available in the surrounding environment	Surface water quantity	Water may be used for mining operations or may be displaced due to mining activities, leading to lower water levels in nearby rivers or groundwater	Adverse Direct Irreversible Temporary Onsite Possible	High	Moderate	Moderate (4)
Mining activities can change the flow of water	Surface water change in water flow	Changes in water flow can impact the quality and	Adverse Direct Partly reversible	High	Moderate	Moderate (4)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
in the surrounding environment, which can impact habitats and ecosystems		quantity of water available in the environment, leading to changes in ecosystems	Temporary Onsite Possible			
There is the potential for spills or leaks of chemicals or other hazardous materials during mining operations, which can lead to significant impacts on surface water quality.	Surface water – spills or leaks of chemicals	Spills or leaks of chemicals or other hazardous materials during mining operations, which can lead to impacts on surface water quality	Adverse Direct Partly reversible Temporary Onsite Possible	High	Moderate	Moderate (4)

8 CONCLUSION

A full and comprehensive Environmental and Social Impact Assessment (ESIA) has been undertaken for the UTM Phase 1 Stage II expansion Project. All aspects have been considered in the impact assessment. These aspects have been thoroughly investigated against planned activities. Public participation has been positive with all issues raised considered in the report for the decision making and impact assessment. All specialist input has been considered and the recommended mitigations have been incorporated into the environmental and social management plan (ESMP).

The scoping phase of the ESIA described the receiving environment adequately. Alternatives were provided in terms of water management and water sourcing, these were also assessed by the specialists, of which the results are encapsulated within this report. MEFT granted project approval on the scoping phase however a detailed ESIA has been conducted due to the project significance.

In closing, this ESIA report adequately outlines the process of impact assessment for the UTM Phase 1 Stage II expansion project and lists all the foreseeable outcomes and recommended mitigations to reduce the potential impacts. One impact remained high and rightly so as the Proponent has no influence over external parties abstracting from the same source. The ESMP includes the required monitoring of the project at all stages of the project.

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APPENDIX A – ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

APPENDIX B – PUBLIC CONSULTATION RECORDS

APPENDIX C – EAP CVS

APPENDIX D – BLAST AND VIBRATION STUDY

APPENDIX E – WATER ABSTRACTION PERMIT - OCT 2021 GRANTED

APPENDIX F – GEOHYDROLOGY AND HYDROLOGY AND FLOOD DETERMINATION STUDY

APPENDIX G – BIODIVERSITY BASELINE AND ASSESSMENT STUDY

APPENDIX H – HERITAGE BASELINE AND ASSESSMENT STUDY

APPENDIX I – AIR QUALITY BASELINE AND ASSESSMENT STUDY

APPENDIX J – NOISE BASELINE AND ASSESSMENT STUDY

APPENDIX K – TRAFFIC IMPACT BASELINE AND ASSESSMENT STUDY