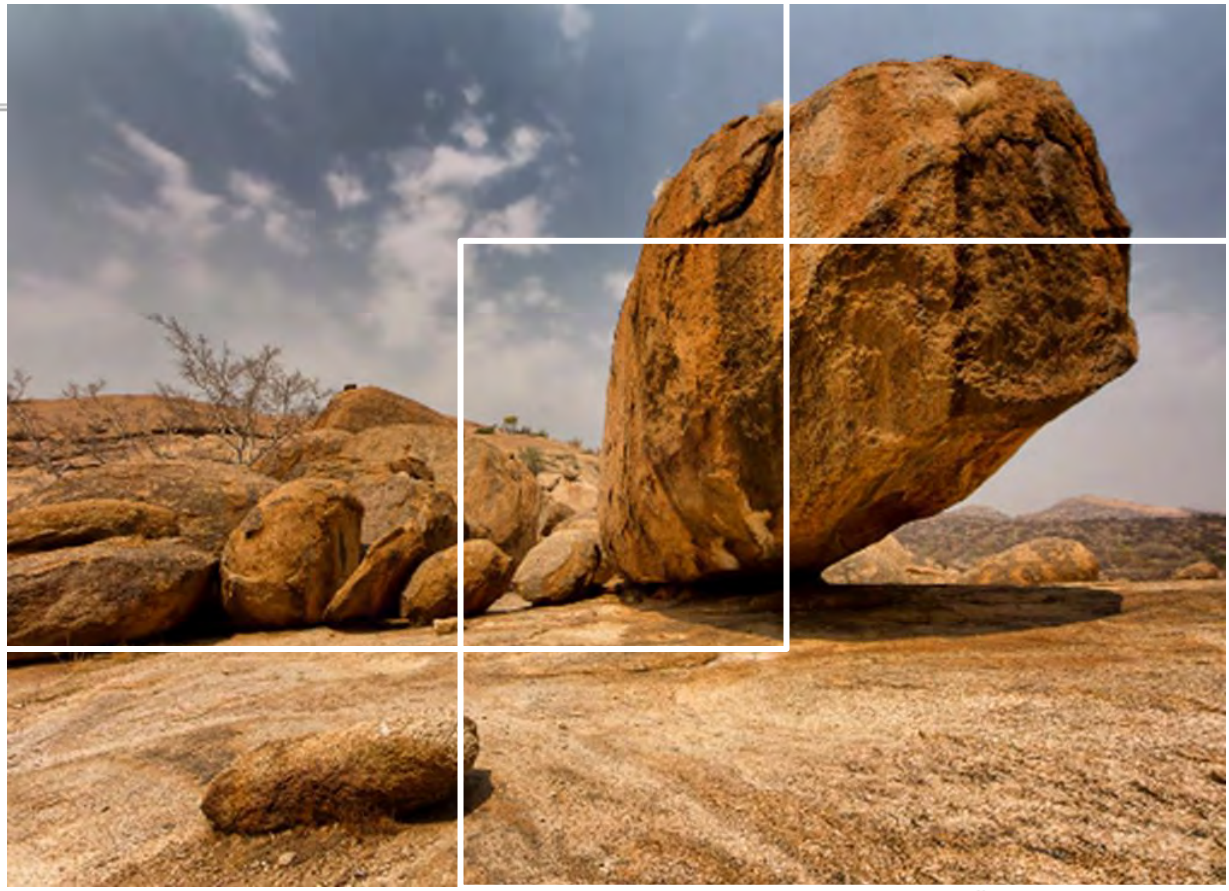

DAMARAN EXPLORATION

Submitted to: Mandarin Investments (Pty) Ltd.
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REPORT:

KOKOSEB GOLD MINE PROJECT ON ML 274 WITHIN EPL 4818 – FINAL ESIA REPORT

PROJECT NUMBER: ECC-143-471-REP-34-D

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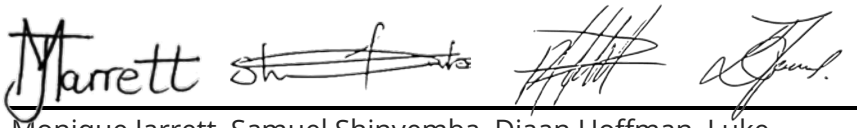

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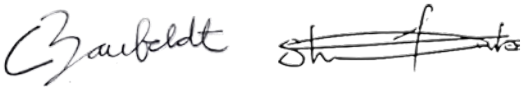

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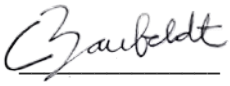

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EXECUTIVE SUMMARY

Environmental Compliance Consultancy (Pty) Ltd (ECC) has been engaged by Mandarin Investments (Pty) Ltd ("the Proponent") to conduct an environmental and social impact assessment (ESIA) and compile an environmental and social management plan (ESMP) for the proposed construction and operation of the Kokoseb Gold Mine Project ("the Project") on mining licence (ML) 274 within exclusive prospecting licence (EPL) 4818, Erongo Region, Namibia. The Project borders the Ohungu and Tsiseb Conservancies, within the Okombahe Reserve.

Damaran Exploration, a subsidiary of WIA Gold Limited (WIA Gold), together with Epangelo Mining Company (Pty) Ltd (Epangelo), form the joint venture (JV) Mandarin Investments (Pty) Ltd. Through this JV, Damaran holds EPL 4818. An application for mining licence (ML) 274 falling within EPL 4818 boundaries, was submitted to the Ministry of Industries, Mines and Energy (MIME) on 10 October 2025 and is currently being reviewed.

PROJECT OVERVIEW

The Project is a proposed greenfield, large-scale open pit gold mining operation located on ML 274 in the Erongo Region, Namibia. The Project will be developed as a conventional open pit mine with processing facilities and supporting infrastructure, designed for a life of mine (LoM) of approximately 12 years. Construction is expected to take approximately two (2) years.

Exploration activities commenced in late 2021 and confirmed a significant gold mineralisation system hosted within metasediments of the Kuiseb Formation of the Damara Orogenic Belt. Progressive drilling campaigns resulted in a Mineral Resource Estimate (MRE) of 2.93 million ounces of gold at an average grade of 1.0 grams per tonne of gold (g/t Au) (June 2025), including a higher-grade component of 2.07 million ounces (Moz) at 1.4 g/t Au. The deposit remains open along strike and at depth, indicating potential for future resource expansion.

Mining will be undertaken using conventional drill-and-blast, load-and-haul open pit methods, with ore and waste selectively mined. The operation will extract approximately 58.9 Mt of ore and 369 Mt of waste, with an average strip ratio of ~6.3:1. Total recovered gold over the LoM is estimated at approximately 1.65 Moz. High-grade ore will be processed directly, while low-grade ore will be stockpiled for later processing.

Ore processing will be undertaken at an on-site 5.25 Mtpa gold processing plant, utilising a conventional SAG–Ball mill–Crusher (SABC) circuit, gravity gold recovery, carbon-in-leach (CIL) technology and Anglo-American Research Laboratories (AARL) elution process, followed by electrowinning and doré production. Carbon regeneration and secure gold handling facilities will be included.

Mine infrastructure will comprise of a main open pit and satellite pit, three (3) waste rock dumps (WRDs), explosives magazine(s), a filtered dry-stack tailings storage facility (TSF), processing plant, a helipad, workshops, change houses, offices, fuel storage, water and power infrastructure, access road, haul roads and service roads and a 710-bed accommodation village. A diversion of the existing D3714 district road will be required to enable safe mining operations. Note that the water pipeline and permanent overhead powerline infrastructure does not form part of this ESIA process and separate applications will be submitted.

Tailings will undergo cyanide destruction to meet International Cyanide Management Code requirements prior to thickening and filtration. Filtered tailings will be transported to a dry-stack TSF, reducing water consumption and long-term environmental impact. Waste rock and topsoil will be managed separately to support progressive rehabilitation.

The operational workforce is expected to total approximately 656 personnel, comprising staff and contractors. Preference will be given to Namibian employees where feasible, with most personnel accommodated on site.

The Project is expected to contribute to national and regional economic development through employment creation, skills transfer, procurement of goods and services and fiscal contributions to government. Progressive rehabilitation and closure planning are integral to the Project design to ensure long-term environmental stability post-mining.

SCREENING PHASE

The Environmental Management Act, No. 7 of 2007 (EMA) and its associated 2012 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. A high-level desktop study, previous data and scientific reports were utilised during the screening phase to determine the potential environmental and social impacts of the Project, which are listed below:

- Potential impacts on heritage artifacts and buildings;
- Potential impacts on water supply;
- Potential impacts on water use and management resulting in water contamination;
- Potential impacts on waste management resulting in pollution;
- Potential impacts on the baseline visual environment;
- Potential impacts on biodiversity;
- Potential impacts on air quality;
- Potential impacts on baseline noise levels due to vibration and blasting impacts;
- Potential impacts on the socioeconomic environment and social impacts, such as job creation, skills transfer, local economic development and upliftment benefits for local and regional communities;
- Potential to increase the traffic on the C36 gravel road;
- Potential contribution to climate change;

- Potential influx of people moving to Uis, Okombahe or immediate Project area;
- Potential value for development of an already lucrative gold mining sector industry; and
- Potential impacts from rehabilitation.

The Project was registered on the Ministry of Environment, Forestry and Tourism (MEFT) environmental clearance certificate application online portal on 22 February 2024 and was issued the application number APP-240222002855. The Project was reregistered on 13 February 2026 to include ML 274 within the title as per the request of the MEFT in collaboration with MIME and was given the application number APP-260213007030.

SCOPING PHASE

The objective of the scoping phase was to obtain a thorough understanding of the biophysical and socioeconomic environment in which the Project is located, through the review of publicly available literature, monitoring data and previous specialist studies, allowing the identification of potential impacts and gaps in the available information and data. It also provided an opportunity for the public to provide inputs into the scope of the assessment. The technical inputs combined with the inputs from interested and affected parties (I&APs) led to the development of the terms of reference (ToR) for the assessment phase.

The International Finance Corporation (IFC) Performance Standards (PS) collectively guided the ESIA process by embedding an internationally recognised, risk-based framework for managing environmental and social impacts. PS1 structured the overall assessment process, stakeholder engagement and ESMP development. PS3 informed resource efficiency, pollution prevention and greenhouse gas assessments. PS4 guided the evaluation of community health, safety and security risks. PS5 shaped land acquisition, compensation and resettlement planning. PS6 directed biodiversity conservation and sustainable resource management. PS7 ensured the protection of indigenous peoples' rights, culturally appropriate engagement, application of free, prior and informed consent (FPIC) in relation to relocation. PS8 safeguarded cultural and heritage resources. Together, these standards strengthen the ESIA by elevating it beyond national compliance to align with international best practice, ensuring responsible, transparent and socially accountable project development.

Legal and policy context

The Project is governed by Namibia's environmental and mining legislation and has been assessed in compliance with national legal requirements and international good practice, including the IFC Performance Standards and the Equator Principles. Project implementation is contingent on obtaining statutory approvals, with compliance managed through the legally binding environmental and social management plan (ESMP).

Key legislation includes:

- Environmental Management Act, No. 7 of 2007 – requires an environmental clearance certificate and governs the ESIA process;
- Minerals (Prospecting and Mining) Act, No. 33 of 1992 – regulates mining rights, land access, environmental obligations and rehabilitation;
- Water Resource Management Act, No. 11 of 2013 (and 2023 Regulations) – controls groundwater abstraction, dewatering, wastewater discharge and activities within watercourses;
- Explosive Act, No. 26 of 1956 and the Explosive Regulations of 2014 – controls the erection of explosive magazines and covers the transport, storage manufacture, use and distribution of explosives;
- National Heritage Act, No. 27 of 2004 – protects graves, archaeological and cultural heritage and requires heritage consent;
- Forestry Act, No. 12 of 2001 – regulates vegetation clearance, including riparian areas;
- Labour Act, No. 11 of 2007 – governs employment conditions and occupational health and safety; and
- Civil Aviation Act, 2016 (Act No. 6 of 2016) – regulates civil aviation in Namibia, sets out the requirements for the licencing, design, infrastructure, and safe operation of aerodromes and heliports in Namibia.

Key national policies include:

- Vision 2030 – national framework for sustainable development;
- Sixth National Development Plan (NDP6) – promotes economic growth, employment and environmental sustainability; and
- Minerals Policy of Namibia – supports responsible mineral development and national benefit sharing.

Baseline environment

The environmental and social baseline chapter (chapter 5) define the existing biophysical and socio-economic conditions within and surrounding ML 274 and EPL 4818. The baseline was established through desktop studies, site-specific field surveys and specialist investigations conducted between 2024 and 2025 and provides the reference framework for assessing Project-related impacts.

The Project area is located within a predominantly rural and sparsely populated landscape, characterised by communal land tenure and subsistence livestock farming. The terrain comprises undulating gravel plains, rocky outcrops and ridges, intersected by ephemeral drainage systems that flow only during rainfall events. No permanent surface water features occur within the Project footprint.

The climate is semi-arid, with low and variable rainfall, high summer temperatures and increasing climate variability consistent with regional climate change trends. Baseline air quality and noise levels are low, reflecting the absence of major industrial activities in the area. Sensitive receptors are limited and widely dispersed.

Geologically, the Project is situated within the Northern Central Zone of the Damara Orogenic Belt. Soils are shallow and coarse textured with limited agricultural potential. Geochemical characterisation indicates that most mine materials are non-acid forming (NAF), with sufficient neutralising capacity, suggesting a low inherent risk of acid and metalliferous drainage.

Surface water resources are limited to ephemeral channels, while groundwater occurs in fractured and weathered aquifers of local importance for rural water supply. Baseline groundwater quality is generally suitable for domestic and livestock use.

The biological environment supports arid-adapted vegetation and fauna, with biodiversity largely typical of the region. Ecologically sensitive habitats are mainly associated with rocky hills, ridges and ephemeral drainage lines, which support higher habitat complexity and species diversity.

Heritage surveys identified twelve (12) archaeological and cultural heritage sites, including graves, historic water points, rock art and remnants of historic mining activity. These features are protected under national legislation and inform Project design and mitigation measures.

The socio-economic baseline reflects high unemployment, youth vulnerability and income inequality, particularly in rural constituencies. Household livelihoods primarily depend on wage, subsistence farming and informal activities. Access to social services is limited in nearby rural settlements, with broader social challenges including gender-based violence, alcohol abuse and limited institutional capacity.

Overall, the baseline indicates that the Project is located in a low-density, environmentally sensitive and socio-economically vulnerable setting, requiring careful management to avoid, minimise and mitigate potential environmental and social impacts.

Public consultation

Public participation and consultation was undertaken in compliance with Section 21 of the EMA and its 2012 Regulations and form a core component of the ESIA process. Consultation was designed to support transparent decision-making, inform stakeholders about the Project, identify relevant authorities, record community concerns, explain the ESIA process and timelines and establish mechanisms/platforms for ongoing engagement.

Public consultation commenced on 23 April 2024. Adverts were published in three (3) national newspapers whereby I&APs were invited to register for the Project. Additional advertisements were made via the radio (NBC Kaisames FM). Public meetings were held in Okombahe and Uis in May 2024, supported by focused engagements with the Daure Daman Traditional Authority and the Tsiseb Conservancy Central Committee. On request of the stakeholders, additional focus group meetings were conducted in September 2024 with the !Oe#Gan Traditional Authority and the Swartklip ≠nūs community.

For this Project, PS7 has been incorporated through extensive and ongoing consultation with traditional authorities and affected households, targeted social baseline studies, and integration of mitigation measures into the ESMP. Stakeholder engagement included affected households, local communities, traditional authorities, conservancies, regional and national government departments and other relevant institutions. A structured stakeholder mapping exercise was undertaken to guide engagement methods and full records of consultation activities, attendance, issues raised and responses are provided in the I&APs comments and response report (Appendix C .

A housing survey was conducted by ECC from 24 November 2025 – 25 November 2025. The aim of the survey was to collect baseline socio-economic information of the communities located within the ML. Approximately (30) households are directly affected by the Project. Fourteen (14) houses (one (1) concrete house and thirteen (13) unoccupied corrugated iron shacks) are located within the proposed pit footprint, while nineteen (19) households are located within a 2 km radius. One (1) household was relocated during the exploration phase and engagements are underway with the remaining affected households regarding relocation arrangements and compensation.

Given that households require relocation due to their proximity to the orebody and planned pit, the assessment commits to a resettlement action plan (RAP) that will be developed by the Proponent through meaningful participation, fair compensation, livelihood restoration, protection of vulnerable households and culturally appropriate engagement. This approach ensures that relocation is not treated as a purely logistical exercise but as a rights-based process aligned with international standards and respectful of indigenous community structures and ancestral ties to land.

Further public consultation by means of proposed focus group meetings were held from 10 March 2026 to 12 March 2026 during the draft ESIA public review period with the Daure Daman Traditional Authority, the Tsiseb Conservancy Central Management Committee, the !Oe#Gan Traditional Authority and the Katora Community (directly affected community as they are located in and adjacent areas of the orebody and planned pit). The purpose of these focus group meetings was to discuss the findings of the draft ESIA report and supporting appendices and to provide I&APs with the opportunity to provide feedback and comments on

the draft ESIA and draft ESMP. The feedback from these focus group meetings is compiled in the addendum report presented in Appendix C .

Terms of reference

The ToR within the scoping report was proposed for the assessment phase and covered the following:

- Surface and groundwater impact assessment;
- Noise impact assessment;
- Visual impact assessment;
- Socioeconomic impact assessment;
- Heritage impact assessment;
- Biodiversity impact assessment;
- Traffic impact assessment;
- Climate change impact assessment;
- Geochemistry impact assessment;
- Air quality impact assessment;
- Soils impact assessment;
- Social impact assessment;
- Mine-induced blast and vibration assessment; and
- Cumulative impact assessment.

The draft scoping study was submitted to the mining commissioner (MC) at the Ministry of Industries, Mines and Energy (MIME) (formerly the Ministry of Mines and Energy (MME)) as the competent authority, the environmental commissioner (EC) at the Ministry of Environment, Forestry and Tourism (MEFT) and registered I&APs for a fourteen (14) day public review period from 18 November 2024 – 02 December 2024. The final scoping report was then submitted to the MC at MIME (then MME) and the EC at MEFT on 16 December 2024.

Alternatives:

The key alternatives assessed during the Project planning process include:

- Alternative mine designs (different pit configurations and development approaches);
- Alternative processing plant technologies;
- Alternative plant and infrastructure layouts;
- Alternative tailings management strategies;
- Alternative mine layout configurations, considering constraints such as EPL boundaries, the D3714 district road, ephemeral drainage lines, archaeological sites, mountainous terrain and ridge habitats;
- Alternative energy supply option – integration of a PV solar power system with a battery energy storage system (BESS);
- Alternative water supply source – abstraction from groundwater resources associated with the Omaruru River; and

- Alternative waste management option – disposal of general (non-mineralised) waste at a permitted off-site landfill facility.

IMPACT ASSESSMENT PHASE

The next stage of this assessment was to conduct the impact assessment, which included incorporating specialist findings, as well as relevant amendments to the Project preliminary environmental and social management plan (ESMP). The methodology used for assessing impacts was described in the scoping report and is included in chapter 6 of this report. A hierarchical decision-making process was followed, to prevent or eliminate, reduce or offset, mitigate or manage potential impacts. A high-level summary of the assessed impacts indicates that post mitigation, no impacts have a potential major adverse impact on the surrounding social and bio-physical environment. Assessed impacts that have an adverse minor impact post mitigation include resettlement, biodiversity and ecology and climate change. Assessed beneficial socio-economic impacts include employment creation, skills development, local and regional economic growth and Project contributions to Namibia's gross domestic product (GDP).

The draft ESIA report and draft ESMP were be submitted to the MC at MIME and the EC at MEFT, Erongo Regional Council (ERC) and the registered I&APs for a fourteen (14) days review and commentary period from 26 February 2026 – 12 March 2026. All I&APs comments have been captured and responded to by providing an explanation or further information in the comments and responses table, which has been attached as an addendum report to this report (Appendix C). This report has been finalised along with the ESMP for submission to the competent authority - MIME and MEFT for review and RoD.

The phases of the ESIA are provided in Figure 1.

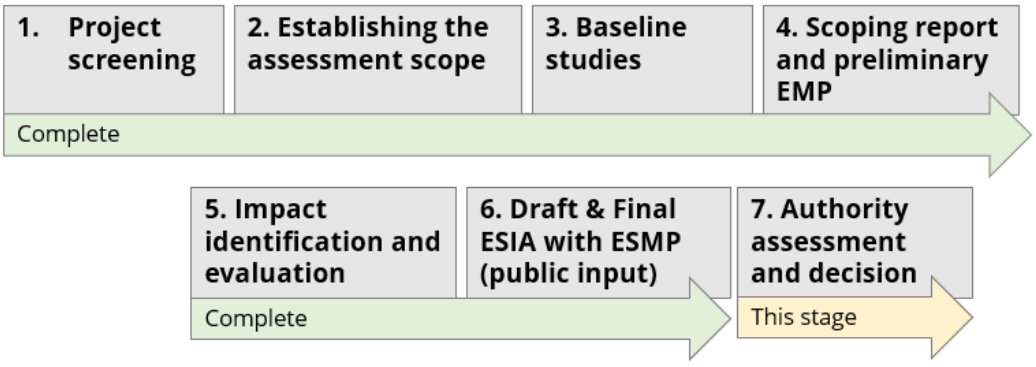

Figure 1 - Simplified Namibian ESIA process for the Project

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ABBREVIATIONS

Abbreviation	Description
Ø	diameter
%	percentage
%S	percentage of sulphur
%SCR	percentage of sulphur content remaining
<	less than
>	greater than
≤	less than or equal
°C	degree celcius
µm	micrometre
µS/cm	microsiemens per centimetre
AARL	Anglo-American Research Laboratories
ABA	acid base accounting
A-horizon	topsoil horizon (uppermost soil layer)
AIDS	acquired immunodeficiency syndrome
Airshed	Airshed Planning Professional (Pty) Ltd
Al	aluminium
AM	ante meridiem (morning peak period)
AMD	acid and metalliferous drainage
ANC	acid neutralising capacity
ANFO	ammonium nitrate fuel oil
ANS	ammonium nitrate solution
APP	air pressure pulse
AQSRs	air quality sensitive receptors
As	arsenic
ASTM	standard test method for collection and measurement of dust fall
Au	gold
B2	B2 trunk road
BESS	battery energy storage system
BIA	biodiversity impact assessment
BID	background information document

Abbreviation	Description
BMC	Blast Management and Consulting
BWh	Hot desert climate (Köppen climate classification)
C33	district road C33
C34	district road C34
C35	district road C35
C36	district road C36
Ca	calcium
CCIA	climate change impact assessment
Cd	cadmium
CIA	cumulative impact assessment
CiI	carbon-in-leach
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
cm	centimetre
CO	carbon monoxide
CO_2	carbon dioxide
COVID-19	Coronavirus Disease of 2019
CSR	corporate social responsibility
CTMP	construction traffic management plan
D2344	district road 2344
D3712	district road 3712
D3714	district road 3714
D3715	district road 3715
Damaran Exploration	Damaran Exploration Namibia (Pty) Ltd
dB	decibel
dB(L)	decibel (linear)
dBA	A-weighted decibel
DEAF	Department of Environmental Affairs and Forestry
DoF	Directorate of Forestry
DTH	down-the-hole
DWA	Department of Water Affairs
E	east
e.g.	for example
EAP	environmental assessment practitioner
EC	electrical conductivity
ECC	Environmental Compliance Consultancy (Pty) Ltd
ECD	early childhood development
EHS	environmental, health and safety

Abbreviation	Description
EIA	environmental impact assessment
EIA Regulations	Environmental Impact Assessment Regulations of 2012
EIR	estimated infiltration rate
EM	electromagnetic (geophysical survey method)
EMA	Environmental Management Act, No. 7 of 2007
EMP	environmental management plan
ENE	east northeast
Epangelo	Epangelo Mining Company (Pty) Ltd
EPL	exclusive prospecting licence
ERC	Erongo Regional Council
ErongoRed	Erongo Regional Electricity Distributor Company (Pty) Ltd
ERT	emergency response team
ESG	environmental, social and governance
ESIA	environmental and social impact assessment
ESMP	environmental and social management plan
ESMSs	environmental and social management systems
F^-	fluoride
FD	fugitive dust
FEFLOW	finite element subsurface flow system
FEL	front-end loader
Fm	formation
Fp	soil particle sizes
Fperm	profile permeability class factor
FPIC	free, prior and informed consent
g/ml	gram per litre
g/t Au	grams per tonne of gold
GBV	gender-based violence
GDE	groundwater-dependent ecosystem
GDP	gross domestic product
GGA	gas generating additives
GHG	greenhouse gas
GNI	gross national income
GPS	global positioning system
GRP	gas release pulse
ha	hectares
HCN	hydrogen cyanide
HDI	human development index
HDPE	high-density polyethylene

Abbreviation	Description
HEC-RAS	Hydrologic Engineering Center – River Analysis System
HG	high grade
HIA	heritage impact assessment
HIV	human immunodeficiency virus
HSE	health, safety and environmental
HV	heavy vehicle
Hz	Hertz
I&APs	interested and affected parties
i.e.	that is
ICF	Inner City Fund
ICMC	International Cyanide Management Code
ICMM	International Council on Mining and Metals
ID	identity
IFC	International Finance Corporation
IFC PSs	International Finance Corporation Performance Standards
IFRS	International Financial Reporting Standards Foundation
IIAG	Ibrahim Index of African Governance
ILR	inline leach reactor
IMR	inferred mineral resources
IPP	Indigenous Peoples Plan
ISEE	International Society of Explosives Engineers
ISO	International Organisation for Standardisation
ISO/IEC 17025:2017	Testing and Calibration Laboratories Standard
IT3	interim targets
ITS	Innovative Transport Solutions
IUCN	International Union for Conservation of Nature
JKSimblast	Joint Knowledge Simulation Blast Design Software
JV	joint venture
K	potassium
K-factor	soil erodibility factor (Universal Soil Loss Equation parameter)
kg	kilogram
kg H_2SO_4/t	kilograms of sulphuric acid per tonne
kg/h	kilogram per hour
km	kilometre
km/h	kilometre per hour
km^2	square kilometre
kt	kilotonne
kV	kilovolts

Abbreviation	Description
kW	kilowatt
L	litre
LG	low-grade
Li	lithium
LoM	life of mine
LoR	laboratory limit of reporting
LOS	level of service
Ltd	limited
LV	light vehicles
Lw	sound power level in decibel
m	metre
m/s	metre per second
m^3	cubic metre
m^3/a	cubic metre per annum
m^3/day	cubic metre per day
MAFWLR	Ministry of Agriculture, Fisheries, Water and Land Reform
mamsl	metres above mean sea level
MAR (contextual)	managed aquifer recharge
masl	metre above sea level
MEFT	Ministry of Environment, Forestry and Tourism
Mg	magnesium
mg/l	milligram per litre
$mg/m^2/day$	milligrams per square metre per day
MGEPESW	Ministry of Gender Equality, Poverty Eradication and Social Welfare
MHAISS	Ministry of Home Affairs, Immigration, Safety and Security
MIME	Ministry of Industries, Mines and Energy
Mio m^3	million cubic metre
ML	mining licence
ML	megalitres
mm	millimetre
mm/s	millimetre per second
Mm^3	million cubic metre
Mm^3/a	million cubic metre per annum
m^3/d	million cubic metre per day
MoHSS	Ministry of Health and Social Services
Moz	million ounces
MPA	maximum potential acidity
MRE	mineral resource estimate

Abbreviation	Description
mRL	maximum residue limit
MSDS	material safety data sheet
Mt	megatonne
Mtpa	million tonnes per annum
$Mtco_2eq$	million tonnes of carbon dioxide equivalent
MW	megawatts
MWT	Ministry of Works and Transport
N	north
N_2O	nitrous oxides
Na	sodium
Na–Cl	sodium–chloride
NaCN	sodium cyanide
NAF	non-acid forming
NAF-Barren	non-acid forming – barren
$Na–HCO_3$	sodium-bicarbonate
NAMCARs	Namibian Civil Aviation Regulations
NAMPHIA	Namibia Population-Based HIV Impact Assessment
NAMPOL	Namibian Police Force
NamPort	Namibia Port Authority
NamPower	Namibia Power Corporation (Pty) Ltd
NamWater	Namibia Water Corporation Ltd
NaOH	sodium hydroxide
NAPP	net acid producing potential
NBC	Namibian Broadcasting Corporation
NCCA	Namibia Civil Aviation Authority
NDP6	Sixth National Development Plan
NE	northeast
NHC	National Heritage Council
NMD	neutral and metalliferous drainage
NNE	north northeast
No.	number
NOx	nitrogen oxide
NPC	National Planning Commission
NPI	non-process infrastructure
NSA	Namibia Statistics Agency
NSRs	noise sensitive receptors
NW	northwest
OHSD	occupational health and safety and department

Abbreviation	Description
OMAP	Omaruru alluvial plain
P	phosphorus
Pa	pascal
PAF	potentially acid forming
PAG	potentially acid generating
PCD	pollution control dam
PEGA	Public Enterprises Governance Act, No. 2 of 2006
PEPFAR	President's Emergency Plan for AIDS Relief
pH	potential for hydrogen
PM	particulate matter
PM	post meridiem (Afternoon Peak Period)
PM_{10}	particulate matter ≤ 10 micrometres
$PM_{2.5}$	particulate matter ≤ 2.5 micrometres
POI	point of interest
Pom	percentage of organic matter content
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PPV	peak particle velocity
PS	performance standard
Pty	proprietary
Pty Ltd	proprietary limited
PV	photovoltaic
Q2	second quarter
RA	Roads Authority of Namibia
RAP	resettlement action plan
RDJ Consulting	RDJ Consulting Services CC
RFD	rigid frame dump
RGS	RGS Environmental Consultants (Pty) Ltd
RI	recurrence interval
RoD	record of decision
ROM	run of mine
RPP	rock pressure pulse
S	south
S	sulphur
SABC	SAG-Ball mill-Crusher
SAG	semi-autogenous grinding
SANAS	South African National Accreditation System

Abbreviation	Description
SANS	South African National Standards
SARDB	Southern African Red Data Book
SD	saline drainage
SE	southeast
SG	specific gravity
SGBV	sexual and gender-based violence
SLR	SLR Consulting (Pty) Ltd
SMBS	sodium meta-bisulphite
SMEs	small and medium enterprises
Sn	tin
SO_2	sulphur dioxide
SO_4^{2-}	sulphate
SSD	shoulder sight distance
Sstruc	soil structure index
SSW	south southwest
STDs	sexually transmitted diseases
STP	sewage treatment plant
SW	southwest
SWF	slot wire fabric
t	tonnes
t/a	tonnes per annum
TA	Traditional Authority
TB	tuberculosis
TCFD	Task Force on Climate-related Financial Disclosure
tCO2eq	tonnes of carbon dioxide equivalent
TDH	total dynamic head
TDS	total dissolved solids
TIA	traffic impact assessment
ToR	Terms Of refence
TransNamib	TransNamib Holdings Limited
TSF	tailings storage facility
U	uranium
UNAIDS	United Nations Programme on HIV/AIDS
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nation Population Fund
USAID	United State Agency for International Development

Abbreviation	Description
USBM	United States Bureau of Mines
USLE	universal soil loss equation
UTMC	Uis Tin Mine Company
v	version (software version reference, e.g., v6.6)
VHF	very high frequency
VOCs	volatile organic compounds
W	west
w/w	weight by weight
WHO	World Health Organisation
Wia Gold	Wia Gold Limited
WMP	waste management plan
WR	waste rock
WRDs	waste rock dumps
WRF	Weather Research and Forecasting
WSS	water supply scheme

1 INTRODUCTION

1.1 COMPANY BACKGROUND

Environmental Compliance Consultancy (Pty) Ltd (ECC) has been engaged by Damaran Exploration Namibia (Pty) Ltd (referred to as the Proponent or Damaran Exploration) to conduct an environmental and social impact assessment (ESIA) and compile an preliminary environmental and social management plan (ESMP) (Appendix A) for the proposed construction and operation of the Kokoseb Gold Mine Project (herein referred to as the Project) on exclusive prospecting licence (EPL) 4818, Erongo Region, Namibia. The environmental assessment practitioners (EAPs) CVs have been included as an appendix to this report (Appendix O

Mandarin Investments (Pty) Ltd is a joint venture (JV) between Damaran Exploration and Epangelo Mining Company (Pty) Ltd (hereafter referred to as Epangelo) and is the holder of EPL 4818. WIA Gold Limited (Ltd) (hereafter referred to as WIA Gold), is the parent company of Damaran Exploration. Epangelo is the exclusive shareholder of the company on behalf of the Government of the Republic of Namibia, as it was officially designated as a State-owned Enterprise under the Public Enterprises Governance Act (PEGA) (No. 2 of 2006) in 2013. The relationship between the parent company, its subsidiary, and the JV between Damaran Exploration and Epangelo is displayed in Figure 3.

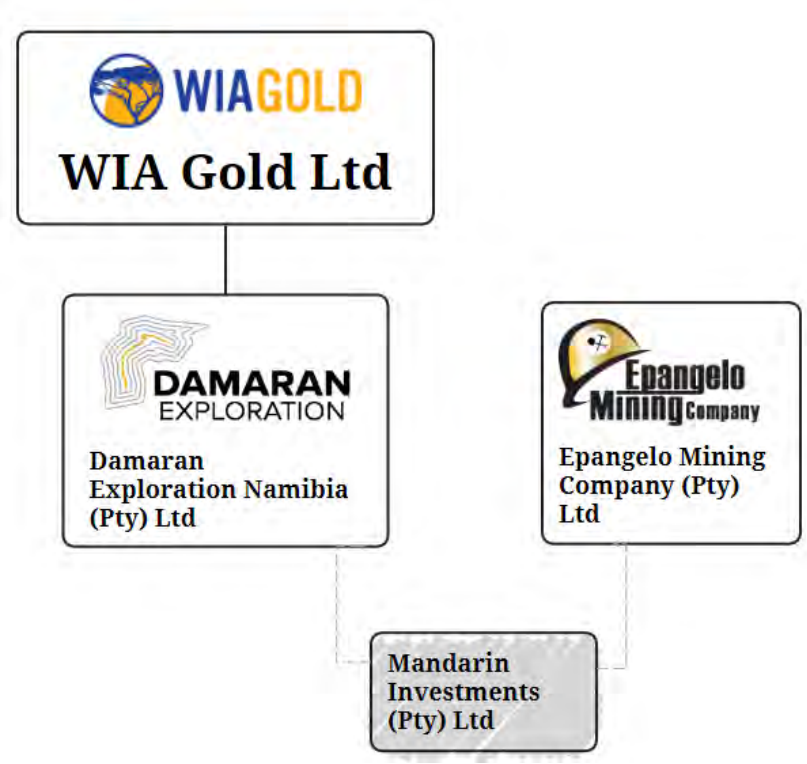


Figure 2 - The relationship between the parent company and its subsidiaries

The Proponent has focused on the development of potential gold projects throughout Namibia through extensive exploration programmes. WIA Gold is an Australian company with exploration licences in Namibia and Côte d'Ivoire (Ivory Coast). In Namibia, the Project emerged as a significant deposit, with the announcement of a maiden inferred mineral resource estimate (MRE) and subsequent exploration results confirming the potential for growth in the Kokoseb MRE. The current life of mine (LOM) for the Project is estimated at a minimum of 11 years.

The proposed Project is located on EPL 4818, where a mining licence 274 (ML 274) application over EPL 4818 has been submitted to the Ministry of Industries, Mines and Energy (MIME). EPL 4818 is situated approximately 15 km from Okombahe and 30 km from Uis in the Erongo Region (-21.193888, 15.277164) and is bordered by the C36 main road. The EPL falls within the Okombahe Reserve, with the southwestern (SW) portion of the EPL falling within the Tsiseb Conservancy and the northwestern (NW) corner of the EPL bordering the Ohungu Conservancy (Figure 3).

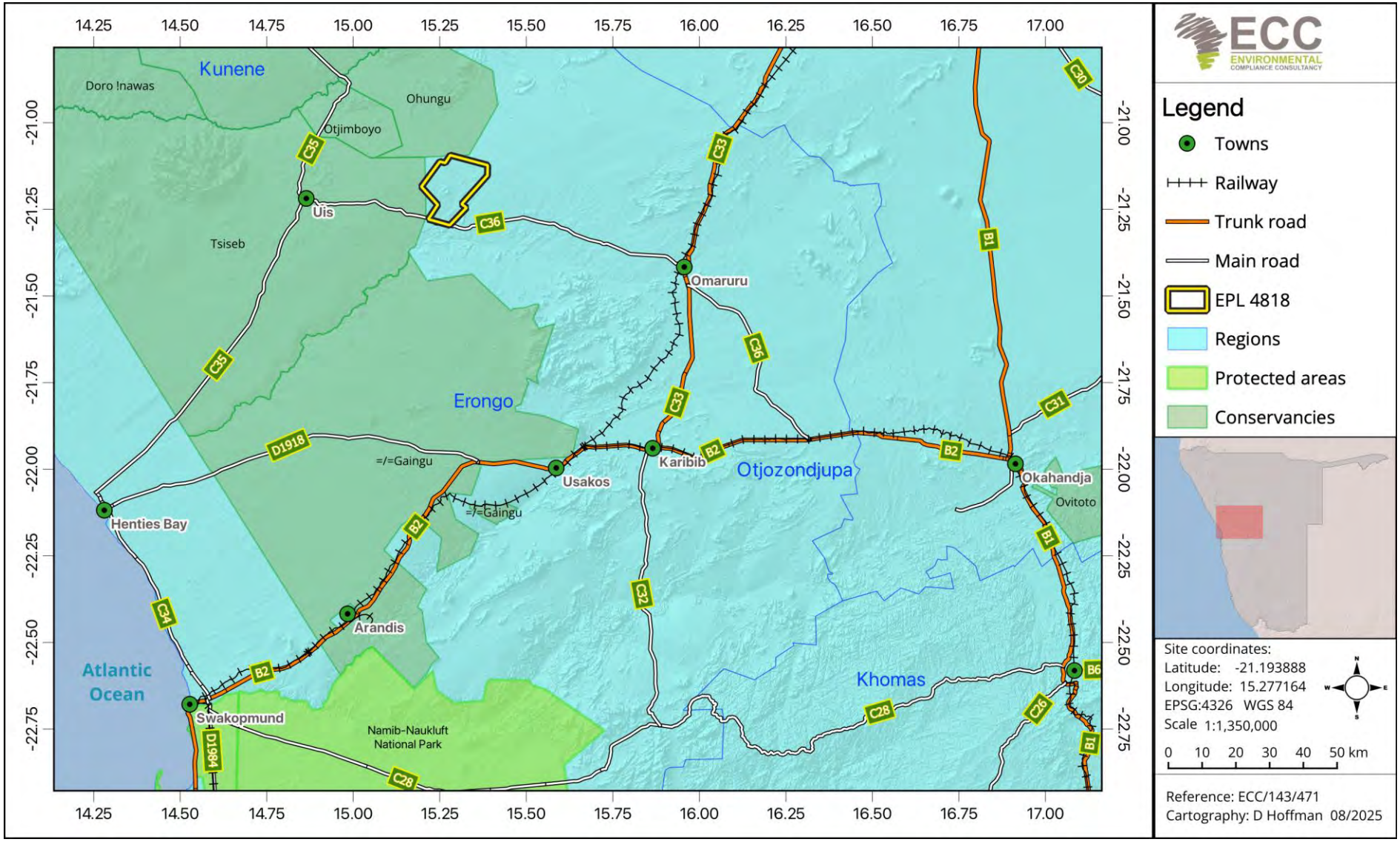


Figure 3 – Project location and regions

1.2 PURPOSE OF THE FINAL ESIA REPORT

The purpose of this final ESIA report and the ESIA process is to identify, predict, evaluate and describe the potential environmental and social impacts of the proposed Project before a record of decision (RoD) can be made by the competent authority and MEFT to grant the Project environmental clearance and approval. The development of this report achieves that by outlining the ESIA process, presenting the description of the Project, documenting in detail the biophysical and socio-economic baseline of the receiving environment and presenting the identified potential impacts together with recommended mitigation measures, which are further described in detail in the final ESMP (Appendix A). This final ESIA report has been compiled in compliance with the Namibian Environmental Management Act, No. 7 of 2007 (EMA) and its 2012 Regulations and to the International Finance Corporation (IFC) Performance Standards.

The draft ESIA report was submitted for review and comment in accordance with the EMA. It was circulated to the mining commissioner at the Ministry of Industries, Mines and Energy (MIME) as the competent authority, the Environmental Commissioner at the Ministry of Environment, Forestry and Tourism (MEFT), as well as identified and registered interested and affected parties (I&APs) and relevant stakeholders i.e. the Erongo Regional Council (ERC) from 26 February 2026 to 12 March 2026. The feedback received during the public review process has been considered and incorporated, where appropriate, into the final ESIA report.

The scope of the assessment was determined through undertaking a screening exercise, followed by scoping the proposed Project against the receiving environment, obtained through a desktop review, available site-specific literature, monitoring data and site reports. As part of this process, the relevant specialist studies were conducted to comply with the EMA and IFC requirements, as per the terms of reference (ToR) prescribed per assessed aspect. These studies further inform the baseline and assessment chapters.

The draft scoping report and appendices were submitted to identified stakeholders and registered interested and affected parties (I&APs) for a public review period from 18 November 2024 to 02 December 2024. Input on the identified impacts and the related ESIA terms of reference was received from the public to inform the scope of this ESIA. After the public review period, on 12 December 2024, the final scoping report with public input was submitted to the mining commissioner at MIME (then Ministry of Mines and Energy (MME)) as the competent authority for the Project, and to the environmental commissioner at MEFT, Department of Environmental Affairs and Forestry (DEAF), for a record of decision (RoD). The final scoping report was approved on 12 December 2025 by MEFT and ECC was informed to proceed with the draft ESIA report.

The draft ESIA and ESMP was further developed and was issued for public and government review for a period of 14 days from 26 February 2026 – 12 March 2026. After the completion

of the 14-day public review period of the draft ESIA and ESMP, considering feedback from stakeholders and I&APs, the final ESIA report, ESMP and supporting appendices will be submitted to the competent authority MIME and MEFT for a final record of decision on the Project.

This final ESIA report is further split into the following chapters:

- Chapter 1 of this report is an introduction to the proposed Project and ESIA;
- Chapter 2 provides detail about the ESIA approach, including the roles of the public and specialists;
- Chapter 3 provides additional detail on the legal environment and requirements;
- Chapter 4 provides sufficient detail on the Project to identify and assess potential impacts;
- Chapter 5 provides an overview of the screening and scoping results and related baseline information identifying all relevant biophysical and social aspects;
- Chapter 6 provides an overview of the methodology for identifying and evaluation impacts;
- Chapter 7 provides the findings of the impact assessment;
- Chapter 8 covers the conclusion; and
- Chapter 9 is the bibliography.

1.3 The Proponent of the proposed Project

The Proponent's details are provided in Table 1.

Table 1 – Proponent's details

Company representative:	Contact details:
Mr Keith Webb Country Manager	Damaran Exploration Namibia (Pty) Ltd.: Private Bag 12012, Ausspannplatz Windhoek kwebb@wiagold.com.au +264 81 302 2167

1.4 Project screening – environmental legislative requirements

The Environmental Management Act, No. 7 of 2007, and its associated 2012 regulations, stipulates 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 Kokoseb Gold Mine Project

Source: Environmental Management Act, 2007, and its Regulations

Listed activity	As defined by the Regulations or 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.	– The Project will need to transmit electricity for its operations. – It is very likely that the mine will connect to the national power grid supplied by NamPower. – Power generated will be used to supply the mine operations, and potential surplus could be redirected into the national grid. – There is a possibility that a solar photovoltaic (PV) plant may also be constructed to supply additional power to the mine and make up their energy mix. (Section 4.10.18.1)
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 Project will require waste sites (temporary or permanent) for the disposal of mineralised and non-mineralised waste. – Hazardous and hydrocarbon waste will be generated by the operation. – Facilities for the disposal of waste (temporary or permanent) will need to be constructed. – In terms of the Atmospheric Pollution Prevention Ordinance Act, the bulk storage and handling of mineralised or metallic ore on waste dumps designed to hold 100 000 metric tonnes or more, is defined as a scheduled process.

Listed activity	As defined by the Regulations or Act	Relevance to the Project
		(Section 4.12)
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.	– This listed activity infers the provisions of the Minerals (Prospecting and Mining) Act 33 of 1992. The very nature of the Project is mining (precious metals), which therefore triggers this listed activity. (Section 4.10)
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. – During operations, vegetation clearing will be required as the Project develops. – Protected species will require permits from DEAF before the safe removal and/or relocation of this individuals or groups. (Section 4.5)
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. 8.4 Construction of canals and channels, including the diversion of the normal flow of water in a riverbed, and	– Groundwater will be abstracted to support the operational activities through identified abstraction boreholes, with an approved abstraction licence, from the Department of Water Affairs, as required by the Water Resources Management Act, No. 11 of 2013 and the Water Management Regulations of 2023 (GN 269/2023).

Listed activity	As defined by the Regulations or Act	Relevance to the Project
	water transfer schemes between water catchments and impoundments. 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.	– A groundwater discharge licence will be required for the dewatering of the open pit. – Process water ponds will be constructed to provide water for the processing plant. – A pollution control dam (PCD) will be constructed to catch and contain dirty water on site, situated in the processing plant. – Pipeline systems will be used to transport water or slurry within the site. – A domestic wastewater treatment plant will be constructed during the construction phase of the Project for use during both construction and operational phases of the Project. – Septic/conservancy tanks are to be constructed for remote areas. – A wastewater and effluent discharge licence will be required for the wastewater treatment plant, waterworks and septic/conservancy tanks. – A licence will also be required to remove riparian species, fill or excavate riparian zones or erect structural development within a riparian zone. – A licence will be required to obstruct a watercourse and for the construction of a dam (Sections 4.7.1.4, 4.7.1.15, 4.10.15, 4.10.18.2, 4.12.4 and 4.13.3)
Hazardous substance treatment, handling, and storage	9.1 The manufacturing, storage, handling, or processing of hazardous substances 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. – Bulk fuel may be required for refuelling the mining fleet.

Listed activity	As defined by the Regulations or Act	Relevance to the Project
	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. 9.5 Construction of filling stations or any other facility for the underground and above ground storage of dangerous goods, including petrol, diesel, liquid, petroleum, gas, or paraffin.	– Consumer installation certificates are required for bulk fuel storage and dispensing. – Hazardous reagents will be used within the gold extraction and processing plant. – A lined tailings storage facility (TSF) will be constructed. – The storage, handling and processing of the hazardous substances, including cyanide, that will be required in the processing plant. – Additionally, there will be a laboratory on site that will process both metallurgical and grade control samples. This lab may generate hazardous waste. (Sections 4.7.1.4, 4.7.1.7, 4.7.1.13, 4.7.1.14, 4.10.11, 4.12.2 and 4.12.3)
Infrastructure	10.1 The construction of: (b) public roads (d) airports and airports (j) masts of any material or type, and of any height, including those used for telecommunication broadcasting and radio transmission.	– Powerlines and telemetry for water and tailings pumping will be required for all operational activities. – Radio and telecommunication towers will be required for the site. – Diversion of the gravel road D3714. – An access road will be constructed from the C36 district road. – Construction and operation of a helipad. (Sections 4.7.1.14.8 and 4.10.18)

2 APPROACH TO THE ASSESSMENT

2.1 PURPOSE AND SCOPE OF THE ASSESSMENT

The aim of this assessment is 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 implement the identified assessment methodology (chapter 6). The process followed through the assessment is illustrated in Figure 1, and is detailed further in chapter 6.

2.2 THE ASSESSMENT PROCESS

The ESIA methodology applied to this assessment is compliant with Namibia's EMA 2007 and has been developed using the IFC standards and models.

2.2.1 IFC PERFORMANCE STANDARDS AND THEIR INCORPORATION INTO THE ASSESSMENT

The IFC Performance Standards (IFC PSs) are a set of internationally recognised benchmarks developed to guide companies and investors in managing environmental and social risks and impacts. For this Project, Performance Standards 1, 3, 4, 5, 6, 7 and 8 have been incorporated (International Finance Corporation, 2012 and 2017).

2.2.1.1 Performance Standard 1 (PS1): Assessment and management of environmental and social risks and impacts

PS1 focuses on identifying and managing a project's environmental and social risks and impacts through integrated assessments, ongoing performance management, and meaningful engagement with affected communities.

PS1 underscores the necessity of:

i. Undertaking integrated assessments to systematically identify and evaluate environmental and social risks, impacts, and opportunities associated with a project;
ii. Ensuring robust stakeholder engagement through transparent disclosure of project-related information and structured consultation processes with affected communities; and
iii. Establishing and maintaining effective mechanisms for the ongoing management of environmental and social performance throughout the entire project lifecycle.

PS1(i) has been achieved through the commissioning of various baseline and specialist studies outlined in section (section 5.3). The findings of these assessments have been used to understand the potential impacts that may develop from various Project activities and how such impacts may affect the receiving social and biophysical environment. The step-by-step

methodology for identifying, assessing and rating impacts (i.e. type, scale, duration, etc.) is outlined in detail within chapter 6.

PS1(ii) was completed through stakeholder mapping and rigorous stakeholder engagement for the Project, as detailed in section 2.4.

Lastly, PS1(iii) has been incorporated into the assessment through the development of an environmental and social management plan (ESMP). The Project's ESMP integrates environmental and social management systems (ESMSs) and mitigation measures, drawing on global best practices, industry expert recommendations, baseline and specialist assessments, and the EAP's extensive Namibian and international experience conducting mining sector ESIAs.

2.2.1.2 Performance Standard 3 (PS3): Resource efficiency and pollution prevention

PS3 highlights that economic growth and urbanisation increase pollution and resource pressures, posing risks to human and environmental health, while noting that effective resource efficiency, pollution control, and greenhouse gas (GHG) mitigation measures are increasingly feasible globally.

The objectives of PS3 are to:

i. Minimise adverse impacts on human health and the environment by controlling pollution from project activities;
ii. Promote sustainable use of resources, including energy and water;
iii. Reduce project-related GHG emissions; and
iv. PS3(i) and PS3(ii) have been addressed through the development of the ESMP as stated under PS1(iii).

PS3(iii) has been incorporated into the assessment through the commissioning of the climate change impact assessment (CCIA) (Appendix M). This assessment evaluates the baseline GHG emissions of the area, estimates the Project's Scope 1 emissions (i.e. direct emissions from sources owned or controlled by the Proponent) and Scope 2 emissions (i.e. indirect emissions from sources that produce energy which the Proponent purchases and uses) across its life of mine, and considers the potential impacts (e.g. increased average daily temperatures, more intense and frequent droughts, flash floods, more severe veld fires, etc.) of climate change on the Project.

Further to this, the possible impacts of climate change on the Project are also assessed in section 7.10. The assessment also considers potential climate change impacts on the Project, with recommended emission reduction and adaptation measures being incorporated into the ESMP.

2.2.1.3 Performance Standard 4 (PS4): Community health, safety and security

PS4 addresses the management of community health, safety and security risks associated with a project, including impacts from project operations, security arrangements, and potential hazards, while promoting safe and responsible practices.

The objectives of PS4 are to:

i. Prevent health and safety risks to affected communities; and
ii. Ensure protection measures align with human rights while minimising potential impacts.

PS4(i) is addressed through the social impact assessment conducted by ECC, with all identified impacts and corresponding mitigation or management measures integrated into the Project ESMP. PS4(ii) is addressed by drawing on international best practices and industry expert guidance, which have been applied directly or used to inform the development of social impact mitigation and management measures within the ESMP.

2.2.1.4 Performance Standard 5 (PS5): Land acquisition and involuntary resettlement

PS5 focuses on land acquisition and involuntary resettlement, requiring projects to avoid, minimise, or compensate for displacement while supporting the livelihoods and well-being of affected people.

PS5 provides clear guidance regarding the relocation of homes and villages in order to:

i. Mitigate social and economic impacts of land acquisition through fair compensation, transparent consultation, and active participation of affected persons; and
ii. Restore or enhance the livelihoods and living standards of displaced persons, including providing adequate housing with secure tenure at resettlement sites.

A thorough social baseline assessment has been conducted by ECC, detailed in chapter 5, which has been incorporated into the assessment. The Project is situated on communal land and therefore requires consent from the traditional authorities presiding over the area. PS5 is of particular significance as 24 households are subject to relocation due to the location of their residences either being directly above the identified orebody or within a 2 km radius of the planned pit area. Owing to this spatial constraint, no viable alternative Project designs could be established.

PS5(i) and PS5(ii) have been integrated into the ESIA process through extensive stakeholder engagement with I&APs, traditional authorities, and the local community outlined in Appendix B and Appendix C . Land access, compensation agreements, and resettlement arrangements

will be coordinated with all affected parties, and appropriate mitigation measures for potential impacts from relocation will be incorporated into the final ESMP.

Subsequent to the submission of the environmental clearance certificate application and subject to the approval of the Project application, a resettlement action plan (RAP) will be prepared. The RAP will be developed through meaningful consultation, ensuring the active participation of affected stakeholders in decision-making and development of the plan. The RAP will detail how the relocation process will be implemented, including timelines, support measures, and monitoring. Special care will be taken to protect vulnerable households and ensure they are not disproportionately affected.

2.2.1.5 Performance Standard 6 (PS6): Biodiversity conservation and sustainable management of living natural resources

PS6 focuses on protecting biodiversity and ecosystem services by avoiding or minimising impacts on natural habitats, promoting sustainable resource management, and conserving ecosystem functions critical to people and the environment.

The overarching objectives of PS6 are to:

i. Ensure the continued provision of ecosystem services; and
ii. Encourage sustainable use of natural resources by applying practices that balance conservation requirements with development objectives.

PS6 objectives (i) and (ii) have been incorporated into this assessment through the commissioning of a biodiversity impact assessment (BIA) (Appendix N). The recommendations from the BIA, along with the expertise of the EAPs as well as global best practices have been used to develop the necessary mitigation and management measures that have been incorporated into the ESMP. This has been done to ensure continued conservation of fauna, flora, sensitive habitats and ecological services, while also promoting sustainable development and efficient resource management.

2.2.1.6 Performance Standard 7 (PS7): Indigenous peoples

PS7 focuses on protecting the rights, dignity, and culture of Indigenous Peoples, ensuring their participation, and promoting equitable benefits from projects that affect them.

The overarching objectives of PS7 are to:

i. Ensure respect for the rights, dignity and culture of Indigenous Peoples;
ii. Avoid or minimize adverse impacts on Indigenous communities resulting from project activities;
iii. Promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner;

iv. Obtain Free, Prior, and Informed Consent (FPIC) in circumstances where project impacts are significant or involve relocation, use of cultural heritage, or commercial development of natural resources; and
v. Foster ongoing engagement and participation of Indigenous Peoples throughout the project lifecycle.

PS7 has been integrated into the assessment through extensive public consultations with local community members and Traditional Authority leaders, as detailed in Section 2.4. In addition, an internal social impact assessment was undertaken to evaluate measures for avoiding or minimizing potential adverse impacts on Indigenous communities and to promote sustainable development benefits and opportunities for the Damara people, recognized as an Indigenous ethnic group in Namibia.

2.2.1.7 Performance Standard 8 (PS8): Cultural heritage

PS8 focuses on protecting cultural heritage by avoiding or mitigating adverse impacts from Project activities, while promoting its preservation and respecting the cultural values of affected communities.

The objectives of PS8 are to:

i. Safeguard cultural heritage from potential project-related impacts while contributing to it conservation; and
ii. Encourage the fair distribution of benefits derived from the utilisation of cultural heritage.

The assessment has incorporated PS8(i) by commissioning a heritage impact assessment (HIA), which inspected the Project area for any archaeological artifacts, heritage sites or graves. These findings are summarised in chapter 5 and the potential impacts to these findings are assessed in chapter 7. The full assessment is attached as Appendix J to this report. All recommendations, mitigation and management measures (e.g. the chance find procedure) from this assessment, along with global best practices have been incorporated into the ESMP.

Further to this, a heritage consent application has been applied for with the National Heritage Council. Heritage consent ensures that project activities affecting cultural or historical sites are legally approved, managed responsibly, and comply with the National Heritage Act to protect Namibia's heritage.

While the application of PS8(ii) remains at the Proponent's discretion, the ESMP incorporates provisions ensuring that any benefits arising from the use or promotion of archaeological objects or sites are equitably shared with the local community.

2.2.2 INCORPORATION OF NATIONAL REGULATIONS INTO THE ASSESSMENT

Beyond adhering to the IFC Performance Standards, the Proponent is required to comply with all relevant national legislation, including laws that enforce the host country's commitments under international agreements. Therefore, this assessment shown in Figure 4, was also undertaken in accordance with Namibian legal requirements, being the EMA, Namibian Draft Procedures (discussed in detail within section 6.2) and Guidance for EIA and EMP (Government Gazette of the Republic of Namibia, 2008). Where there are no national regulations or guidelines, international and regional (South African) best practice guidelines have been used.

The national, regional and international regulatory environment relevant for the Project are elaborated on within chapter 3.

At this time, it is important to note that the assessment has been carried out in accordance with the indicative plans received from the Proponent. Subsequent to completing the assessment, some aspects of the Proponent's plan may require changes to comply with the stated recommended mitigations or modifications to site layout for mining or processing activities.

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, to determine ways in which the Project might interact with the biophysical, social, and economic environments.

This phase also included extensive stakeholder engagement, which includes the following:

- Registration of the Project
- Preparation of the BID
- Public consultation, which includes the following
  - Notifying the public that an ESIA is being undertaken for the Project through adverts published in three local newspapers for two consecutive weeks,
  - Site notices erected at the Project site and radio advertisements,
  - Two public meetings held in Uis and Okombahe,
  - Swartklip ≠nūs community meeting, and
  - Focus group meetings with traditional authorities and conservancies.

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

- Air quality on the receiving environment
- Hydrology and geohydrology
- Biodiversity and avifauna
- Soils
- Geochemistry
- Climate change

SOCIAL ENVIRONMENT

- Social and socio-economic
- Air quality
- Traffic
- Operational drill and blast
- Heritage and archaeology
- Noise
- Visual and sense of place
- Tourism

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

- An assessment of occupational 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, 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; therefore, this literature was available to be used and referenced along with updated specialist studies for the previously listed biophysical and social environments. 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:
  - Air quality
  - Baseline noise and modelled noise data
  - Biodiversity and avifauna studies
  - Soil and land use baseline study (ECC)
  - Geochemistry assessment
  - Climate change assessment
  - Heritage and archaeological assessment
  - Hydrology and geohydrology assessment and modelling
  - Traffic impact assessment
  - Blast and vibration impact assessment
  - Social and socio-economic assessment (ECC)

The environmental and social baselines are provided in the scoping report and updated in the draft ESIA chapter 5.

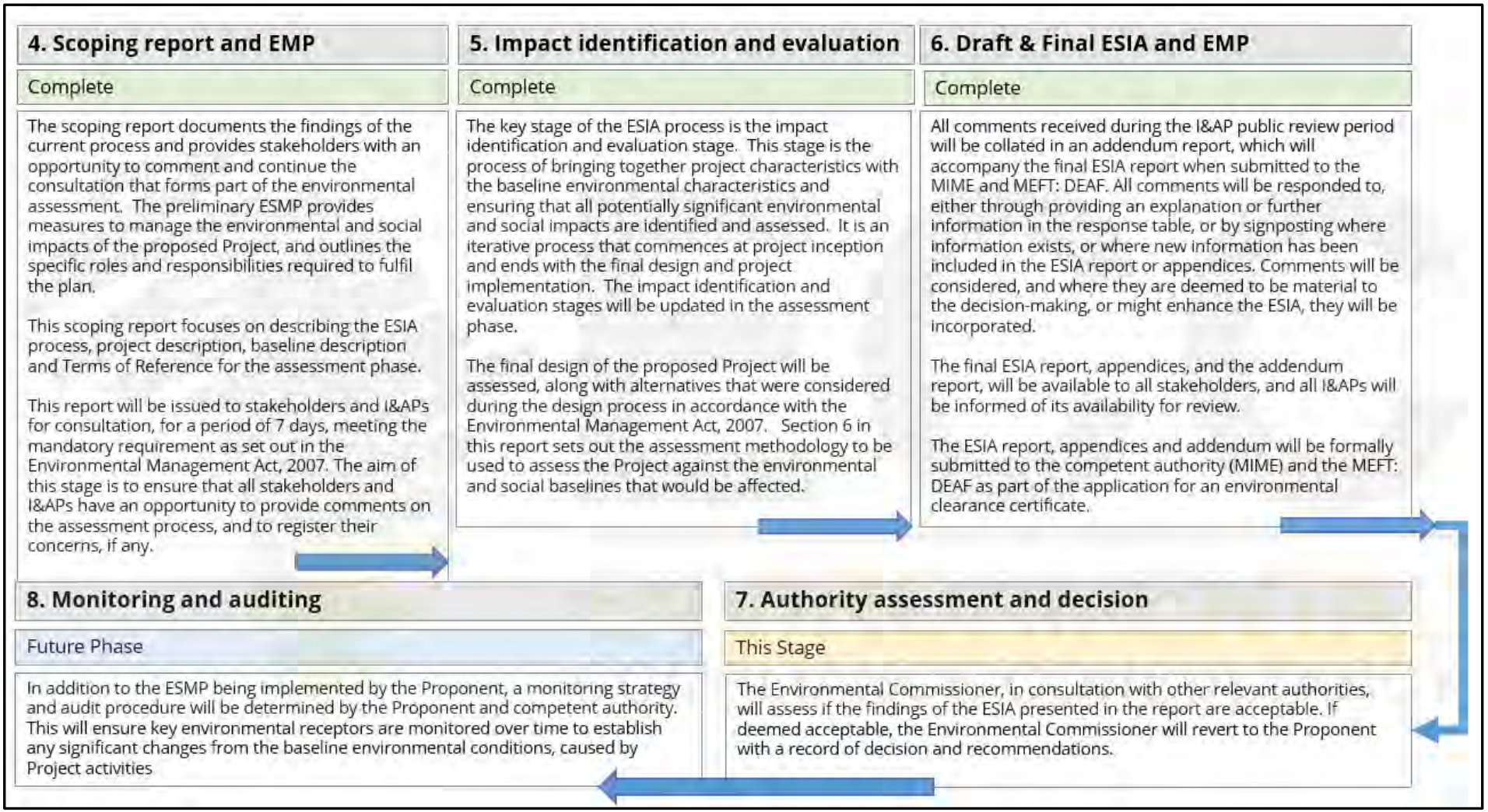


Figure 4 - ESIA process and stages complete

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 receiving environment is a summary term for the biophysical and socioeconomic environments described in the baseline chapter (chapter 5). The study area extends beyond the exclusive prospecting licence boundary to include nearby receptors, such as the towns of Uis and Okombahe, neighbouring conservancies such as the Tsiseb Conservancy and Ohungu Conservancy and biophysical environments such as the underlying groundwater basins, shown in Figure 5 and Figure 6, respectively.

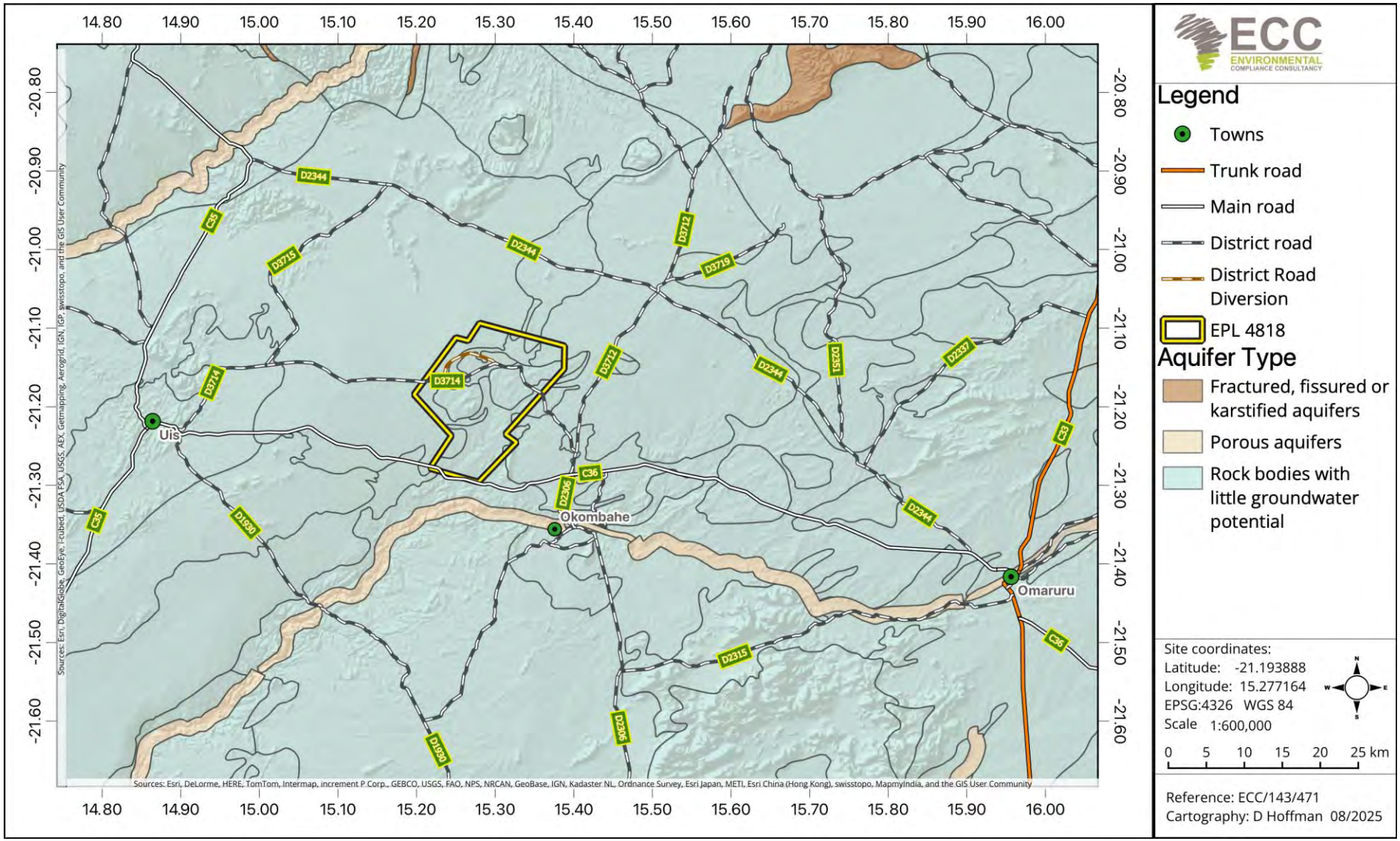


Figure 5 - Study area map including the hydrogeology of the area to be assessed beyond the Project area

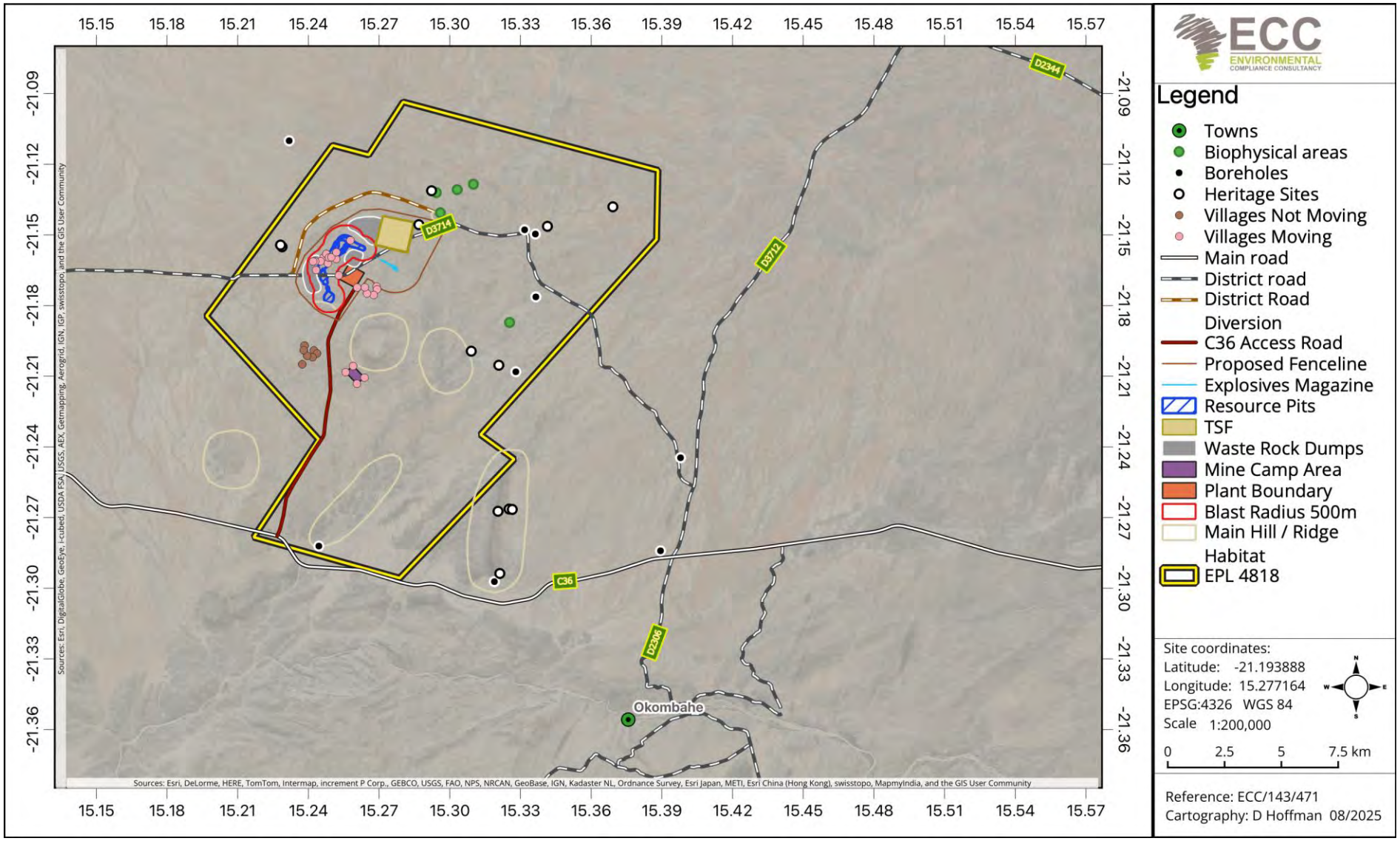


Figure 6 - Study area focused on the Project area

2.4 PUBLIC CONSULTATION

Public participation and consultation are a requirement stipulated in Section 21 of the Environmental Management Act, No. 7 of 2007 and its 2012 Regulations, 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) is included as an appendix to the public consultation document (Appendix B);
- Determine the relevant government, regional and local regulating authorities;
- Listen to and understand community issues while recording concerns and questions (Appendix C);
- Explain the process of the ESIA and the timeframes involved to stakeholders and I&APs; and
- Establish a platform for ongoing consultation.

Public consultation for the Project commenced on 23 April 2024, when the Project was advertised in the local newspapers to invite the public to register as I&APs.

Advertisements for public meetings held in Uis and Okombahe were read on the Damara NBC radio station during the first two weeks of May 2024. Additionally, the notification of the assessment in terms of Regulation 21 of the Act was published in the following newspapers for two consecutive weeks on 23 and 30 April 2024:

- The Republikein;
- The Namibian Sun; and the
- Allgemeine Zeitung.

Public meetings were held with the Okombahe and Uis town residents on 14 and 15 May 2024, respectively. Focus stakeholder engagements with the Tsiseb Conservancy and Uis traditional authority (TA) were held in Uis on 14 and 15 May 2024, respectively.

A second round of focus group meetings with the Okombahe TA and Project area residents, requested by I&APs during the May 2024 public meetings, then took place in Okombahe and the Swartklip ≠nūs community on 17 and 18 September 2024, respectively.

Meetings were held with the following stakeholders:

- Tsiseb Conservancy (focus meeting) in Uis – 14 May 2024;
- Okombahe Town Community (public meeting) in Okombahe – 14 May 2024;

- Daure Daman Traditional Authority (focus meeting) in Uis – 15 May 2024;
- Uis Town Community (public meeting) in Uis – 15 May 2024;
- Oe≠Gan Traditional Authority – 17 September 2024; and
- Swartklip ≠nūs community – 18 September 2024.

Appendix B provides a list of I&APs, evidence of consultation, including notices of advertisements in national newspapers, minutes of public and focus stakeholder meetings and a summary of the comments or questions raised by the public. Identification of the key stakeholders and I&APs is provided in section 2.4. A summary of the key concerns raised during the consultation process is provided in section 2.4.2.

As part of the consultation process, the draft ESIA was circulated for a period of 14-days to the MC at MIME, the EC at MEFT, other government stakeholders e.g. ERC and registered I&APs for their review and comment. Furthermore, physical consultation meetings were held with the following focus groups: the ! Oe#Gan Traditional Authority, Tsiseb Conservancy Central Management Committee, the Dâure Daman Traditional Authority and the Katora community residing in and adjacent to the Project footprint. The aim of these meetings was to present and discuss the findings of the draft ESIA with the affected communities and get their feedback and comments. The feedback received during this review process has been compiled into a comments and responses addendum report presented in Appendix C . All comments were considered and incorporated, where appropriate, prior to the finalisation of this ESIA report.

2.4.1 IDENTIFICATION OF KEY STAKEHOLDERS AND INTERESTED AND AFFECTED PARTIES (I&APS)

A stakeholder mapping exercise (Figure 7) was undertaken to identify individuals or groups of stakeholders and the method in which they are required to be 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:

- Homesteads located on and around the orebody that will have to be relocated;
- Directly and indirectly affected interested and affected parties;
- Tsiseb Conservancy;
- Ministry of Environment, Forestry and Tourism (MEFT);
- Ministry of Agriculture, Fisheries, Wate and Land Reform (MAFWLR);
- Ministry of Industries, Mines and Energy (MIME);
- National Heritage Council (NHC);
- Ministry of Works and Transport (MWT);
- Erongo Regional Council (ERC);

- Roads Authority (RA);
- Uis and Okombahe town residents and business owners;
- Daure Daman Traditional Authority;
- Oe≠Gan Traditional Authority; and
- Katora and Swartklip ≠nūs community.

A total of fourteen 14) village homes are situated directly on the orebody and within the footprint of the proposed pit area. Nineteen (19) village homes are located within a 2 km radius of the proposed open pit, as illustrated in Figure 6. These residences will be directly impacted by the Project and will require relocation. To date, one (1) household has already been relocated due to exploration activities, and discussions are ongoing with the remaining affected residents regarding relocation arrangements and associated compensation.

The draft scoping report was submitted to the competent authority (MIME), MEFT and all registered I&APs for their review on 18 November 2024. The public review period was open for a period of 14 days from 18 November 2024 to 02 December 2024. All comments received were recorded and incorporated into the summary report as an addendum to the final scoping report, as presented in Appendix B . The final scoping report was thereafter submitted to the competent authorities and I&APs for their records.

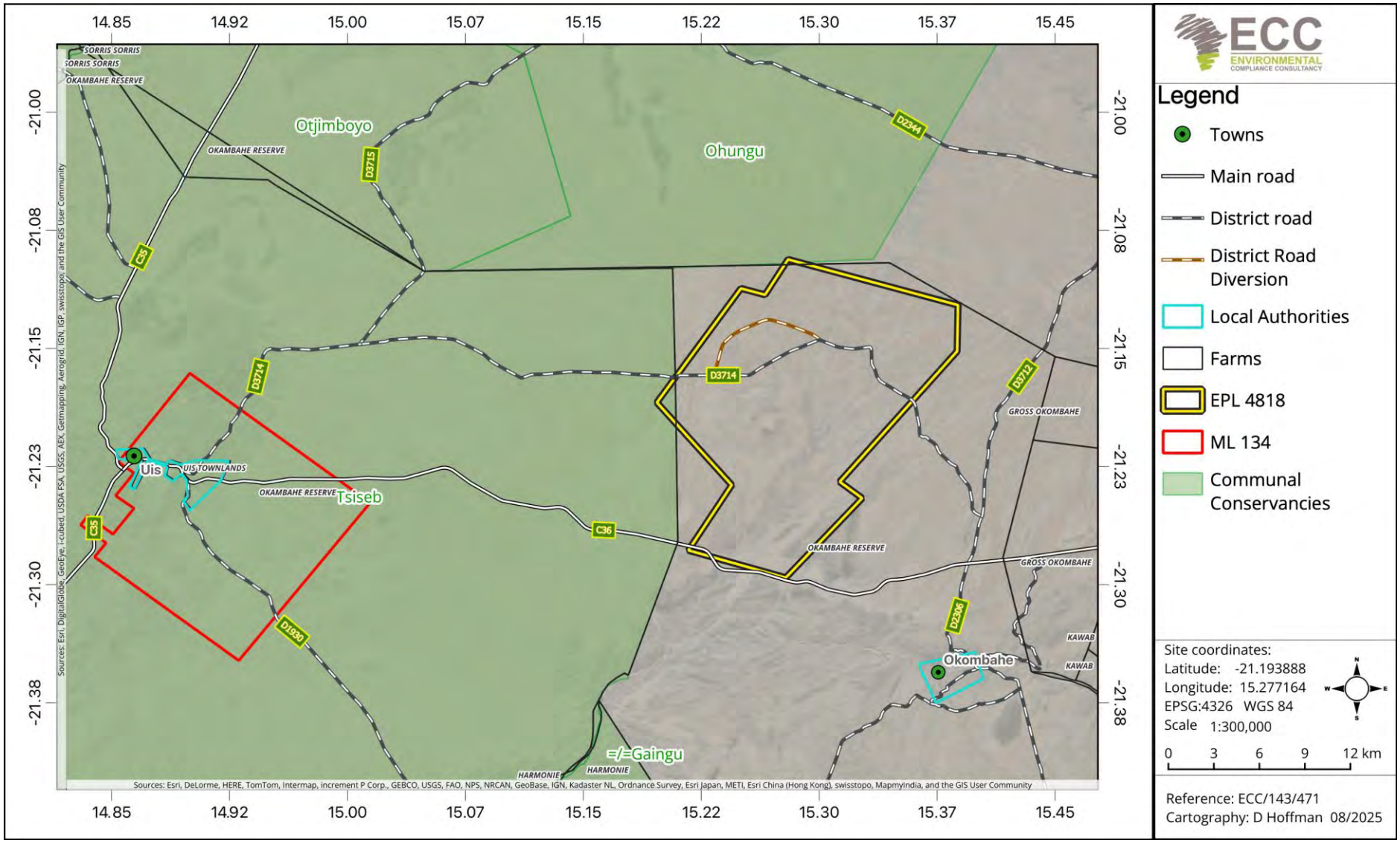


Figure 7 - Stakeholder map

2.4.2 SUMMARY OF CONCERNS RAISED

Matters raised by registered I&APs in relevant stakeholder consultations and the public meetings in Uis and Okambahe are relevant for the nature, location and scale of the Project, and these are summarised as follows:

- **Employment of residents:**
  - Concerns about the Project job numbers and recruitment strategy;
  - Strong emphasis on employing local, inexperienced youth for unskilled and semi-skilled roles to address high unemployment in Uis and Okombahe;
  - Required job numbers to be confirmed in the Project's feasibility study; and
  - Recruitment policies should prioritise local hires and include on-the-job training to enhance local resident skills.

- **Corporate social responsibility (CSR):**
  - Requests for commitments from the Proponent to provide scholarships, healthcare facility improvements and infrastructure upgrades (e.g. C36 gravel road) for local residents;
  - CSR commitments should be implemented once Project operations start to generate income; and
  - Requests to support existing community projects and initiate additional community development programmes.

- **Water crisis in the local area:**
  - Residents shared concerns over water shortages in Okombahe and Uis, and requested the Proponent drill new community boreholes;
  - Proponent noted the arid climate, frequent droughts and limited groundwater recharge as ongoing challenges; and
  - Past boreholes have gone dry so drilling new boreholes may prove to be an unlikely or sustainable solution to water shortage issues.

- **Relocation of affected farmers and communities:**
  - Concerns from farmers about relocation from ancestral lands with burial sites;
  - Heritage specialist study should identify and protect graves under the National Heritage Act (No. 27 of 2004);
  - Relocation of graves to be conducted with family consultation and compliance with the Burial Ordinance (No. 27 of 1966);
  - Ongoing engagement must continue with affected farmers; and
  - Relocation from the blast buffer zone must be facilitated by the Proponent to safer areas.

3 REVIEW OF THE LEGAL ENVIRONMENT

3.1 RELEVANT NATIONAL LEGISLATION

This chapter outlines the regulatory framework applicable to the proposed Project. As stated in chapter 1, an environmental clearance certificate is required for any activity listed in the Government Notice No. 29 of 2012 of the EMA. The Proponent currently holds a valid environmental clearance certificate for exclusive prospecting activities for base and rare metals, industrial minerals and precious metals on the Project site.

EPL 4818 falls within the Okombahe Reserve, with the southwestern (SW) portion of the EPL falling within the Tsiseb Conservancy and the northwestern (NW) corner of the EPL bordering the Ohungu Conservancy. Thus, necessitating the need for traditional authority and conservancy consents for the Project.

Additionally, since the promulgation of the Water Resource Management Act, No. 11 of 2013 in August 2023 and the Water Resource Management Regulations, 2023, Namibia has been declared a groundwater-controlled management area and therefore this proposed Project area also falls within a groundwater-controlled management area. This means there are strict measures which cover regulation of borehole construction, licensing, aquifer protection, record-keeping and prevention of wastage of groundwater.

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 plans. Table 5 lists specific permits and licences required for the Project.

3.2 RELEVANT NATIONAL POLICIES

Table 3 - Details of the regulatory framework as it applied to the Project

National regulatory framework	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 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, Mine Safety Regulations	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 proposed mining activity requires an ESIA to be carried out, as it triggers listed activities in the Environmental Management Act's regulations. Mining activities shall not commence until all conditions in the Act are met, which includes an agreement with the landowners and conditions of compensation, if applicable.

National regulatory framework	Summary	Applicability to the Project
	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 may be necessary to remedy such spilling, pollution, loss, or damage, at its own costs.	The Project shall be compliant with Section 76 of the Act regarding records, maps, plans and financial statements, information, reports and returns submitted.
Explosive Act, 1956 (Act No. 26 of 1956) and the Explosive Regulations of 2014 Minerals (Prospecting and Mining) Act 33 of 1992, Mine Safety Regulations Part X (10), explosives and blasting.	The Act covers any person who desires to erect or carry on a factory for the manufacture or a magazine for the storage of explosives, shall make application for a licence therefor to the chief inspector of explosives. Additionally, the Act covers the application process for the storage and use of explosives. The mine safety regulations detail the requirements for the transport, storage, manufacture, use and distribution of explosives in or at any mineral licence areas.	The Project will make use of one or two magazine(s) and transport, store and make use of explosives and burn packaging material. There is no permit required to burn explosives packaging or waste material as this requirement is stipulated in 10.23.7 of the Explosives Act and under 10.13 (3) of the Mine Safety Regulations.
Environmental Management Act, 2007 (Act No. 7 of 2007) and its regulations, including the Environmental Impact	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.	This ESIA report documents the impacts scoped into the assessment from the findings of the final scoping report. The assessment of these impacts is conducted

National regulatory framework	Summary	Applicability to the Project
Assessment Regulation, 2007 (No. 30 of 2011)	The Act states that an ESIA 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 ESIA process.	during the assessment phase of the ESIA undertaken for the proposed Project (this report). Mitigation and management measures and recommendations for the identified impacts are then incorporated into the final ESMP (Appendix A). The process has been undertaken in line with the requirements under the Act and its regulations.
Water Resource Management Regulations of 2023, Water Resources Management Act, Act No. 11 of 2013	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, Fisheries, Water and Land Reform (MAFWLR), 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 discussed in the ESMP. The Project is obliged to have all licences relevant to its operations under this Act. Abstraction of water from boreholes requires an abstraction licence to be obtained from the Ministry of Agriculture, Fisheries, Water and Land Reform (MAFWLR), Department of Water Affairs (DWA).

National regulatory framework	Summary	Applicability to the Project
		The Proponent will also have to apply for a licence to drill the boreholes, a licence for wastewater and effluent discharge, a licence to dispose of groundwater during the dewatering of the pit and a licence to excavate and construct infrastructure in a riparian zone. Additionally, the Project will require a licence for the obstruction of a watercourse and the construction of a dam.
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.	Land clearing is an unavoidable necessity for the proposed Project, as large areas will be cleared for mining infrastructure. Mitigation and management measures were included in the final ESMP to conserve soil and vegetation that will be 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 21 states that no person shall cut, destroy, or remove vegetation that is growing within 100 metres of a river, stream, or watercourse.	The Project activities will require vegetation clearing. The Proponent will ensure that all required permits are in place before vegetation removal commences.

National regulatory framework	Summary	Applicability to the Project
	Section 23 requires a permit from the Director for the clearance of vegetation on more than 15ha 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 one year.	
National Heritage Act, No. 27 of 2004	The Act provides provision for the protection and conservation of places and objects with heritage significance. 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.	There is the potential for heritage-related objects to be found in the Project area. Therefore, the relevant conditions in the Act have been taken into consideration and are incorporated into the final ESMP (Appendix A). In cases where heritage sites are discovered, the 'chance find procedure' will be used. Additionally, the Proponent will require heritage consent for the Project, which is to be renewed on an annual basis.
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 required in the Labour Act.

National regulatory framework	Summary	Applicability to the Project
		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 Act, No. 4 of 2025	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 transportation activities in support of mining activities. The employees and support business shall adhere to national road regulations on public roads. The Proponent will ensure that the diversion of the D3714 road will be conducted in compliance with the Act.
Hazardous Substances Ordinance, No. 14 of 1974	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. This applies to the manufacture, sale, use, disposal, and dumping of hazardous substances, as well as their import and export.	The planned Project will involve the handling and storing hazardous substances such as fuels, reagents and industrial chemicals. The Proponent 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.

National regulatory framework	Summary	Applicability to the Project
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.	The nature of mining activities generates 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 is included in the ESMP (Appendix A).
Civil Aviation Act, 2016 (Act No. 6 of 2016)	The Act, establishes the legal framework for regulating civil aviation in Namibia, including aircraft registration, licensing, air navigation services, aviation safety, security, and accident investigation. The Act establishes the Namibia Civil Aviation Authority (NCAA) as the regulatory body responsible for ensuring compliance, enforcing safety standards, and overseeing the development and control of civil aviation activities in the country.	The proposed Project will have a helipad to facilitate the transport of gold doré bars via helicopter to another location for further refining (fortnightly). In accordance with the Act, 2016, the helipad must be licensed and approved by the Namibia Civil Aviation Authority and comply with all relevant safety and operational standards to ensure safe helicopter operations.
Namibian Civil Aviation Regulations (NAMCARs), 2001	The NAMCARs are the comprehensive set of aviation regulations made under the former Aviation Act and now preserved under the Civil Aviation Act, 2016, covering a wide range of civil aviation matters in Namibia Part 139 of the regulations sets out the requirements for the licencing, design, infrastructure, and safe operation	The Proponent will be required to ensure that the proposed helipad is licensed and approved by the Namibia Civil Aviation Authority. Additionally, the helipad must meet safety, design, operational and emergency

National regulatory framework	Summary	Applicability to the Project
	of aerodromes and heliports in Namibia. It ensures that such facilities meet safety standards, obstacle limitations, operational control, and emergency preparedness, including fire and rescue measures, to guarantee safe aircraft and helicopter operations.	requirements under Part 139 to ensure safe helicopter operations for transporting gold doré bars.

3.3 RELEVANT NATIONAL PLANS, LICENCES AND PERMITS

Table 4 - Namibian national plans applicable to the 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).
Sixth National Development Plan (NDP6)	The NDP6 is the sixth in a series of seven five-year national development plans that outline the objectives and aspiration of Namibia's long-term vision. The NDP6 four pillars are: - Economic growth, transformation, and resilience; - Human development and community resilience; - Environmental sustainability; and - Good governance and effective public service delivery.	The planned Project supports meeting the objectives of the NDP6 through creating opportunities for continued employment.
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 policy strives to create an enabling environment for local and foreign investments in the mining sector and	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
	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 Sixth National Development Plan that includes the 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.

Table 5 - Relevant permits and licences for the Project

Permit or licence	Act / Regulation	Related activities requiring permits / licence	Relevant Authority
Environmental clearance certificate	Environmental Management Act, No. 7 of 2007	Required for all listed activities shown in Table 2 in chapter 1.	Ministry of Environment, Forestry and Tourism (MEFT): Department of Environmental Affairs and Forestry (DEAF)
Mining licence	Section 90 (2) (A) of the Minerals Act, No. 33 of 1992	Written permission from the mining commissioner.	Ministry of Industries, Mines and Energy (MIME): Directorate of Mines
Surface rights agreements (mine, infrastructure corridors)	Section 52(1)(A) of the Minerals Act, No. 33 of 1992	Will be included in the mining licence application as there needed to be an agreement between the Proponent and the traditional authorities. Additionally, there are several community residents residing on the proposed Project area,	Ministry of Industries, Mines and Energy (MIME): Directorate of Mines

Permit or licence	Act / Regulation	Related activities requiring permits / licence	Relevant Authority
		that will have to be relocated. There will have to be a relocation and compensation agreement set up between the Proponent and these residents.	
Accessory works permit	Section 52 (1) (D) of the Minerals (Prospecting and Mining) Act, No. 33 of 1992	Written permission for the erection of any accessory works will need to be submitted to the Chief Inspector of Mines and permission may be granted by the mining commissioner.	Ministry of Industries, Mines and Energy (MIME): Directorate of Mines
Drilling or construction of borehole or well	Section 56 of the Water Resource Management Act, (No. 11 of 2013) and Section 44. (1) and (2) of the Water Resource Management Regulations, 2023	The Proponent will require a licence to drill, construct, deepen, enlarge, alter, clean, rehabilitate a borehole or engage a borehole drilling programme.	Ministry of Agriculture, Fisheries, Water and Land Reform (MAFWLR): Department of Water Affairs (DWA)
Abstraction licence	Section 44 (1) – (3) of the Water Resource Management Act, (No. 11 of 2013) and Section 44. (1) and (2) of the Water Resource Management Regulations, 2023	The Proponent will require the abstraction of groundwater from various boreholes on site for water supply to their mining activities. Therefore, necessitating the need for this licence.	Ministry of Agriculture, Fisheries, Water and Land Reform (MAFWLR): Department of Water Affairs (DWA)
Licence to remove riparian species, fill or excavate riparian zone or erect	Water Resources Management Act, Act No. 11 of 2013), the Water	Infrastructure will be constructed in a water course requiring the removal and excavation of a riparian zone	Ministry of Agriculture, Fisheries, Water and Land Reform (MAFWLR):

Permit or licence	Act / Regulation	Related activities requiring permits / licence	Relevant Authority
structural development within riparian zone	Resource Management Regulations of 2023.		Department of Water Affairs (DWA)
Wastewater discharge licence	A licence is issued under Section 72 of the Water Resources Management Act, Act No. 11 of 2013, Water Resource Management Regulations of 2023.	Required for discharge of sewage and/or excess industrial or mine wastewater (effluent).	Ministry of Agriculture, Fisheries, Water and Land Reform (MAFWLR): Department of Water Affairs (DWA)
Groundwater disposal licence	Section 64 (1) – (5) of the Water Resource Management Act (No 11. Of 2013) and Section 47 (1) and (2) of the water Resource Management Regulations	The Proponent will need to dispose of water abstracted from the open pit necessitating the requirement for this licence.	Ministry of Agriculture, Fisheries, Water and Land Reform (MAFWLR): Department of Water Affairs (DWA)
Licence to obstruct a watercourse	Section 92 (1) & (2) of the Water Resource Management Act (No 11. Of 2013) and Section 47 (1) and (2) of the water Resource Management Regulations	The Proponent will require a licence to construct infrastructure in a watercourse.	Ministry of Agriculture, Fisheries, Water and Land Reform (MAFWLR): Department of Water Affairs (DWA)
Licence to construct a dam (or ponds)	Section 93 of the Water Resource Management Act (No 11. Of 2013) and Section 47 (1) and (2) of the water Resource	The Proponent will require a licence for the construction of settlement or pollution ponds or stormwater pond.	Ministry of Agriculture, Fisheries, Water and Land Reform (MAFWLR): Department of Water Affairs (DWA)
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 15 ha of	Ministry of Environment, Forestry and Tourism (MEFT):

Permit or licence	Act / Regulation	Related activities requiring permits / licence	Relevant Authority
		woody vegetation, or the removal of any protected plant species.	Department of Environmental Affairs and Forestry (DEAF)
Permit for the destruction of heritage objects and artefacts (heritage consent)	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, or along proposed pipeline or powerline routes.	National Heritage Council (NHC)
Application for power connection	Electricity Act, No. 4 of 2007	The mine will require power to be supplied to them by NamPower.	Namibian Power Corporation (NamPower)
Consumer installation certificate for bulk fuel storage	Petroleum (Exploration and Production) Act 2 of 1991 and Petroleum Products Regulation, 2000	A consumer installation certificate is required for bulk fuel storage and dispensing.	Ministry of Industries, Mines and Energy (MIME): Directorate of Petroleum Affairs
Used mineral oil permit	Section (21) of the Petroleum Products and Energy Act 1990 (Act 13 of 1990)	Required for the possession of more than 20 litres of used mineral oil for a continuous period exceeding 30 days. It is also required for the storage, transportation, or disposal of used oil exceeding these limits.	Ministry of Industries, Mines and Energy (MIME): Directorate of Petroleum Affairs
Licence for explosives magazine	Explosives Act, 1956 (Act No. 26 of 1956) and Explosive Regulations of 2014	This is also covered under the accessory works application.	Ministry of Industries, Mines and Energy (MIME): Directorate of Mines and Ministry of Home Affairs, Immigration, Safety and

Permit or licence	Act / Regulation	Related activities requiring permits / licence	Relevant Authority
	Minerals (Prospecting and Mining) Act 33 of 1992, Mine Safety Regulations Part X (10), explosives and blasting.		Security (MHAISS): Namibian Police (NamPol)
Permit for the storage, transport and use of explosives	Explosive Act, 1956 (Act No. 26 of 1956) of and Explosive Regulations of 2014 Minerals (Prospecting and Mining) Act 33 of 1992, Mine Safety Regulations Part X (10), explosives and blasting.	Necessary for explosives and blasting in a mining licence area.	Ministry of Industries, Mines and Energy (MIME): Directorate of Mines and Ministry of Home Affairs, Immigration, Safety and Security (MHAISS): Namibian Police (NamPol)
Amendment or adding of a route (change of route) (Road Diversion)	Road Act, No. 4 of 2025	Road diversion of the D3714 gravel road as it is currently intersecting the proposed pit area.	Ministry of Works and Transport (MWT): Roads Authority (RA)
High Value Mineral permit (HVM)	Section 105 of the Minerals (Prospecting and Mining) Act, No. 33 of 1992	Export of minerals by air to international markets.	Ministry of Industries, Mines and Energy (MIME): Directorate of Mines
Aerodrome licence	Part 139 of the Namibia Civil Aviation Regulations (NAMCARs).	Required for establishing, constructing, or operating a helipad to ensure compliance with NCAA safety standards.	Namibia Civil Aviation Authority (NCAA)

4 PROJECT DESCRIPTION

4.1 INTRODUCTION

This chapter provides a comprehensive overview of the Kokoseb Gold Mine Project, outlining its key components and operational framework. It presents a clear and detailed understanding of the underlying orebody geology, design considerations and anticipated lifecycle. The chapter further elaborates on the proposed mining method, mineral processing techniques and the supporting infrastructure required for full-scale operations. It also addresses critical operational inputs and systems such as the mine fleet, water and energy supply and waste management strategies. In summary, this chapter outlines the Project development timeline through the distinct construction, operational, closure and rehabilitation phases. This chapter provides the contextual basis against which the potential environmental and social impacts of the Project are assessed against the Project design and the baseline socio-economic and biophysical environment.

4.2 NEED FOR THE PROJECT

The mining sector makes significant contributions to the local, regional and national economies of Namibia. The sector supports the government in acquiring revenues through corporate taxes, royalties and export levies, particularly during the construction and operational phases. The Namibia Statistics Agency (NSA) reported in 2024 that the mining and quarrying sector declined by 1.2% in real value added, reversing the impressive 19.3% expansion achieved in 2023. Despite this short-term contraction, mining remains the cornerstone of Namibia's economy, and the sector contributed 13.3% to the gross domestic product (GDP) in 2024 (Chambers of Mines, 2025). The sector continues to play an instrumental role in driving economic growth and advancing national developmental goals.

As a greenfield development, the Kokoseb Gold Mine Project is expected to generate tangible benefits for individuals across the local and regional landscape through its life of mine (LoM). The Project will create employment opportunities, which will equip individuals with the skills and practical work experiences that are needed for their career advancements and future employment prospects. These benefits will empower communities and enhance the overall quality of life for those involved over the duration of the Project.

4.3 BACKGROUND OF THE PROJECT AND EXPLORATION HISTORY

4.3.1 MINERAL EXPLORATION ACTIVITIES

Exploration activities at the Kokoseb exploration site, located on exclusive prospecting licence (EPL) 4818, commenced in late 2021 with soil sampling and trenching, which revealed a significant and continuous gold anomaly (+100 ppb). In the second quarter (Q2) of 2022, a small-scale reconnaissance diamond drilling program was undertaken, whereby twelve (12) holes with a total depth of 1 747 metres (m) were drilled. The results confirmed the potential

for a major gold deposit, with multiple thick, shallow and high-grade intercepts. A series of reverse circulation (RC) and diamond drilling campaigns followed (Figure 8), which led to the gradual expansion and understanding of the mineralogical profile of the Kokoseb deposit.

Figure 8 - Photographs of exploration activities conducted on EPL 4818 (Source: WiaGold, 2024)

4.3.2 KOKOSEB MINERAL RESOURCE ESTIMATE (MRE)

The Kokoseb gold deposit has demonstrated consistent and progressive growth since its discovery. Mineral resources increased through successive estimation cycles. The maiden MRE released in May 2023 reported 1.3 million ounces (Moz) of gold (Au) (41 Mt at an average grade of 1.0 g/t Au). The MRE update released in April 2024, indicated the MRE increased to 2.1 Moz Au. In June 2025, WiaGold announced a further updated MRE for the Kokoseb Gold Project, reporting a MRE at 2.93 Moz at an average of 1.0 g/t Au, at a cut-off grade of 0.5 g/t Au. This updated resource estimate includes a higher-grade component of 2.07 Moz Au at an average of 1.4 g/t Au, defined at a cut-off grade of 0.8 g/t Au. A summary of the Kokoseb MRE for selected cut-offs as of June 2025 is presented in Table 6.

Table 6 - Summary of the Kokoseb Mineral Resource Estimate (Source: WiaGold, 2025)

Cut off Au g/t	Indicated			Inferred			Total		
	Tonnes million	Au g/t	Au Moz	Tonnes million	Au g/t	Au Moz	Tonnes million	Au g/t	Au Moz
0.18	110	0.67	2.37	78	0.62	1.6	188	0.65	3.92
0.30	82.6	0.82	2.18	58	0.75	1.4	141	0.79	3.58
0.50	54.2	1.04	1.81	35	0.99	1.1	89	1.0	2.93
0.80	29.1	1.39	1.30	17	1.4	0.77	46	1.4	2.07

The mineralised domains have a combined strike length of approximately 6.8 km, with average horizontal widths of approximately 70 m, 100 m, 70 m and 45 m for the south (S), northwest (NW), north (N) and east (E) domains. A block model of the Kokoseb deposit is shown in Figure 9, depicting the respective lengths pf each zone. Cross sections of the

northern zone, central and southern zones are shown in Figure 10, Figure 11 and Figure 12 respectively.

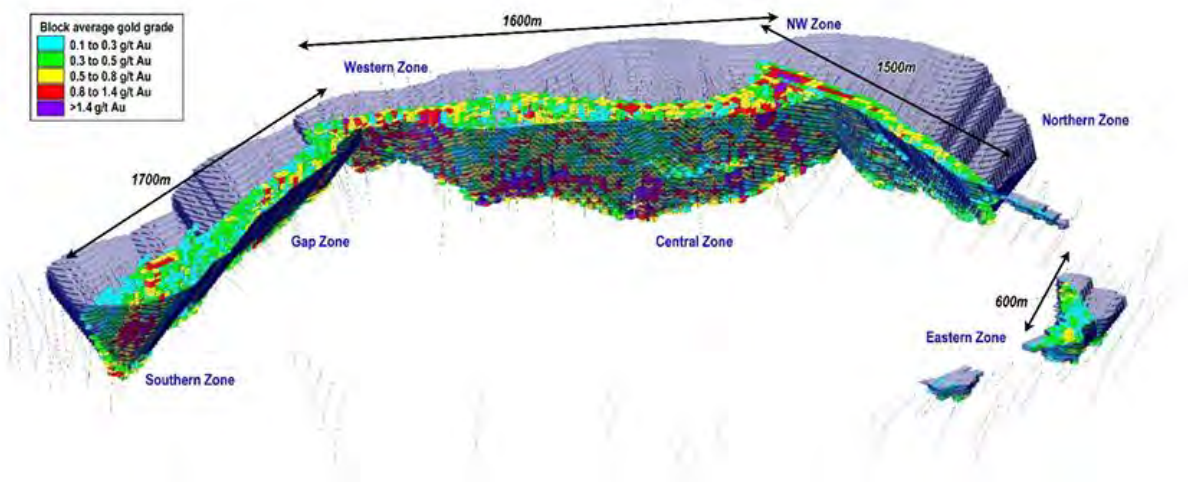


Figure 9 - Block model of the Kokoseb deposit (Source: WiaGold, 2025)

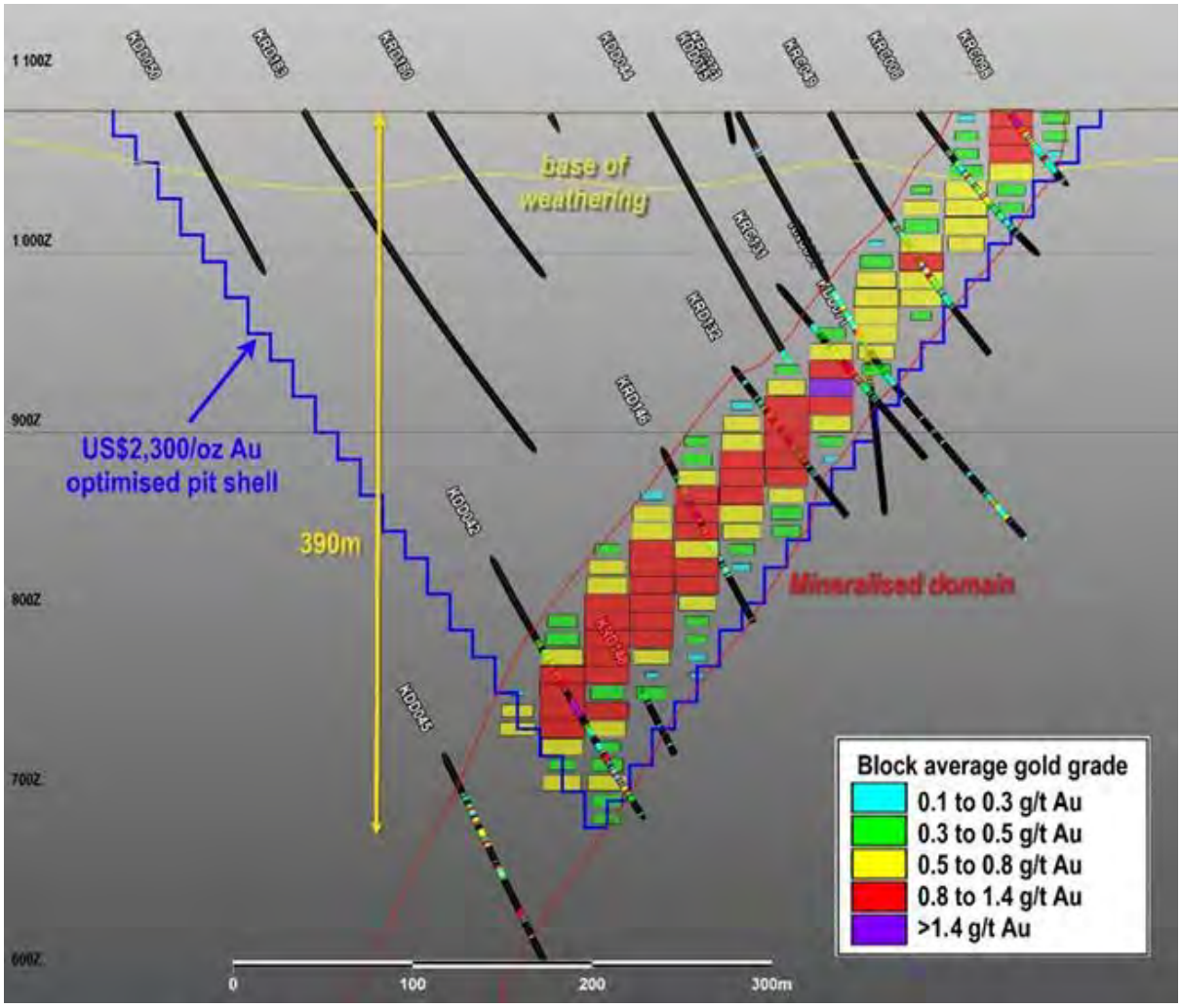


Figure 10 - Cross section of the northern zone, showing US2,300/oz pit shell, weathering base, mineralised domains and block model scaled by proportion at 0.5 g/t cut-off over drilling results (Source: WiaGold, 2025)

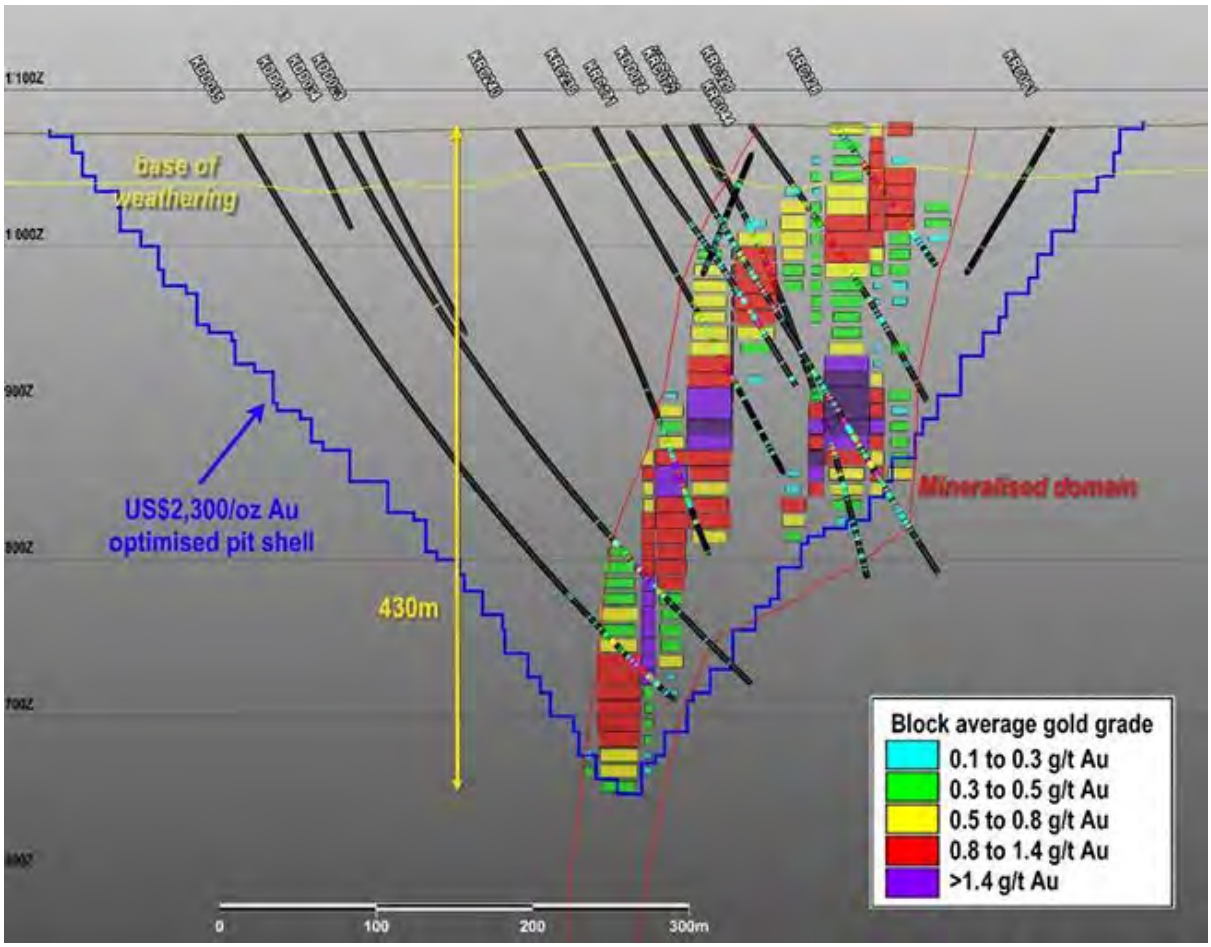


Figure 11 - Cross section of the central zone, showing US2,300/oz pit shell, weathering base, mineralised domains and block model scaled by proportion at 0.50 g/t cut-off over drilling results (Source: WiaGold, 2025)

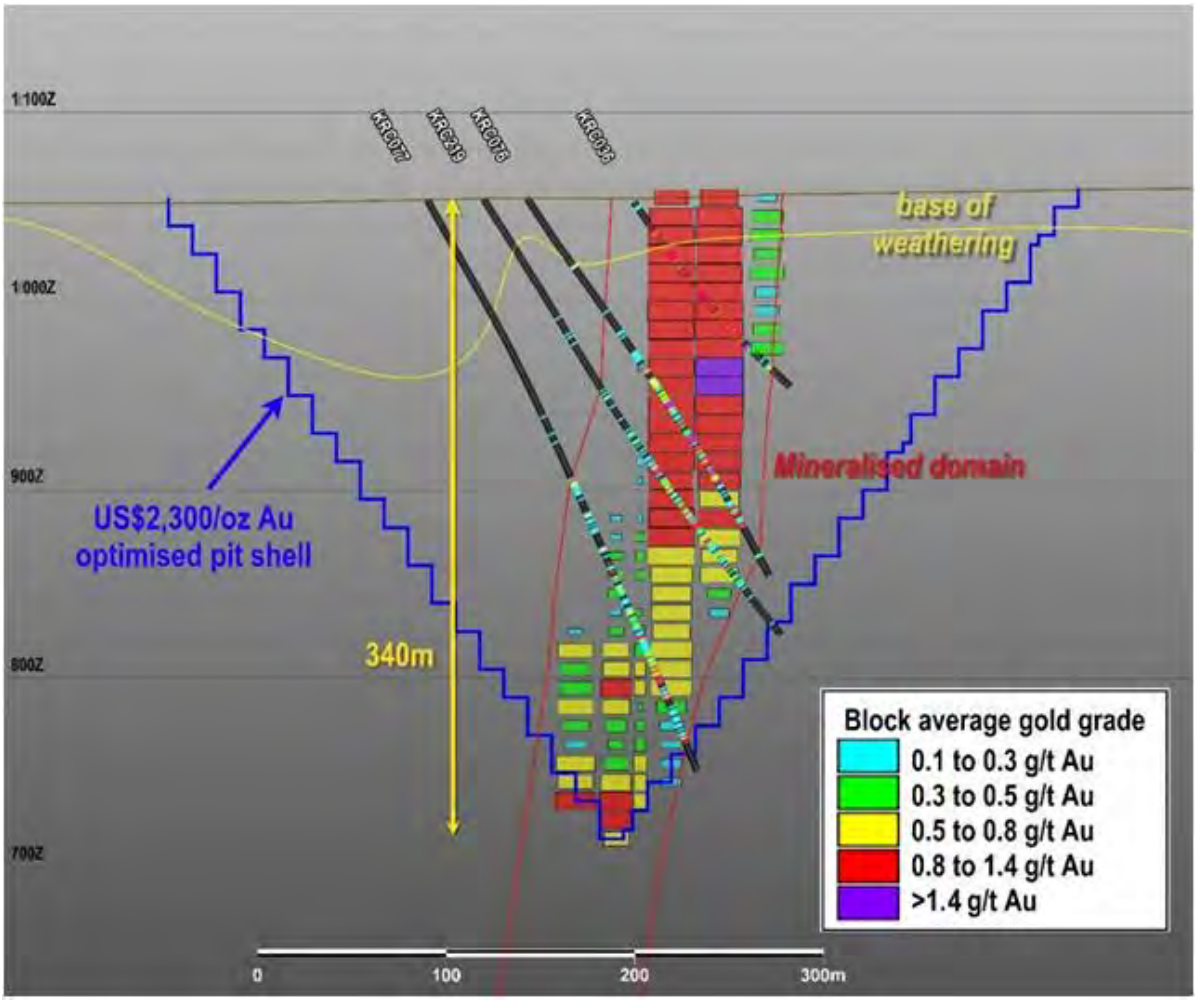


Figure 12 - Cross section of the southern zone, showing US2,300/oz pit shell, weathering base, mineralised domains and block model scaled by proportion at 0.50 g/t cut-off over drilling results (Source: WiaGold, 2025)

The Kokoseb gold deposit has shown continuous growth since its discovery. Future growth potential is identified across the following target areas:

- **New mineralised splays and sub-parallel zones**: drill results, including hole KRC331 (which included 27 m at 6.79 g/t) have confirmed significant gold mineralisation in the footwall of the deposit, interpreted as splays branching off the main mineralization domains. This high-grade area is included in the current MRE and remains open along strike. Additional isolated mineralised intercepts remain untested;
- **Depth extensions of the plunging shoots:** Kokoseb displays a series of high-grade coherent shoots which are all open at depth, around the bottom of the constraining pit shell, including significant results from KDD055, with 26 m at 7.9 g/t Au and from KDD064 with 9.7 m at 4.66 g/t Au at 4.66 g/t Au and 5.7 m at 5.82 g/t Au. These results define the lower extensions of mineralisation and support underground resource definition work, forming priority targets for ongoing diamond drilling; and

- **Shallow infill:** shallow infill drilling for further resource conversion, mainly at the gap zone and at the eastern side of the northern zone aims to further grow the indicated category estimated.

Drilling at Kokoseb is advancing with diamond drilling targeting deep extensions and reverse circulation exploration activities focused on completing the shallow infill coverage across the deposit.

4.4 GEOLOGY AND MINERALISATION

The Kokoseb gold deposit is situated within the Northern Central Zone of the Pan-African Damara Orogenic Belt. The area consists of Neo-Proterozoic metasediments belonging to the Arandis, Karibib and Kuiseb Formations of the Swakop Group. Gold mineralisation occurs in the metasediments of the Kuiseb Formation, which are significantly intruded by late syn-tectonic and post-tectonic granites, along with minor mafic dykes trending north-south (N-S) to north northeast – south southwest (NNE - SSW). While exposure across the exclusive prospecting licence area is moderate to good, the Kuiseb Formation is often only sub-outcropping and is typically covered by thin layers of soil, colluvium or pisolitic calcrete up to 2 m thick. In the Kokoseb area, the Kuiseb schist forms a dome structure, centred by a post-tectonic leucogranite referred to as the "Central Granite Pluton." This pluton is primarily composed of medium-grained quartz, K-feldspar, and plagioclase, with smaller amounts of biotite, muscovite, magnetite, garnet and tourmaline.

Granite dykes, granitic veinlets and pegmatites cutting through the Kuiseb schist are linked to this granite phase or later ones. Gold mineralisation forms an arc around this pluton, spanning approximately 3 km in diameter. A coarse-grained, pre-syn-tectonic porphyritic-feldspar granite encloses the mineralised schists to the west (W), east (E) and northeast (NE). The schist units are composed of dark grey, poorly foliated, quartz/plagioclase/K-feldspar-rich, biotite-bearing schists, as well as better-foliated black biotite schists. Gold occurs as native gold grains and, to a lesser extent, silver-bearing gold grains and is spatially associated with sulphides dominated by pyrrhotite, löllingite and arsenopyrite.

4.5 SITE LAYOUT

The Kokoseb Gold Mine Project will be designed as a large-scale open pit operation, consisting of the main open pit and a smaller satellite pit. The mine infrastructure will include three (3) waste rock dumps (WRDs), a tailings storage facility (TSF), a processing plant, ancillary infrastructure such as administrative offices, road networks, water and energy supply infrastructure and staff accommodation village (Figure 6).

The site layout is constrained by the D3714 gravel road, which currently crosses the mineral deposit and the footprint of the proposed open pit. As the orebody position is fixed, the

Proponent has proposed a road diversion route that is steered clear of the mine area and activities (Figure 13).

Ephemeral drainage channels and their associated catchment areas intersect with the proposed mine footprint. As required under the Water Resources Management Act, No. 11 of 2013, the Proponent will acquire a licence to remove riparian vegetation, fill or excavate riparian zones and erect structural development within riparian zones.

The WRDs and TSF are strategically located to provide a flexible waste rock and tailings materials dumping strategy through the life of mine (LoM).

The site layout of the Kokoseb Gold Mine has also been influenced by the need to avoid ecologically sensitive areas within the EPL boundaries. Infrastructure siting and mine planning have been carefully adapted to avoid and minimise disturbance to mountainous features such as prominent hills and ridge habitats to preserve their ecological integrity.

Figure 13 shows the Kokoseb Gold Mine site layout, highlighting the locations of the resource pits, TSF, WRDs, processing plant, roadways, accommodation village, linear infrastructure, magazine(s), water related infrastructure, proposed road diversion and proposed mining licence boundary.

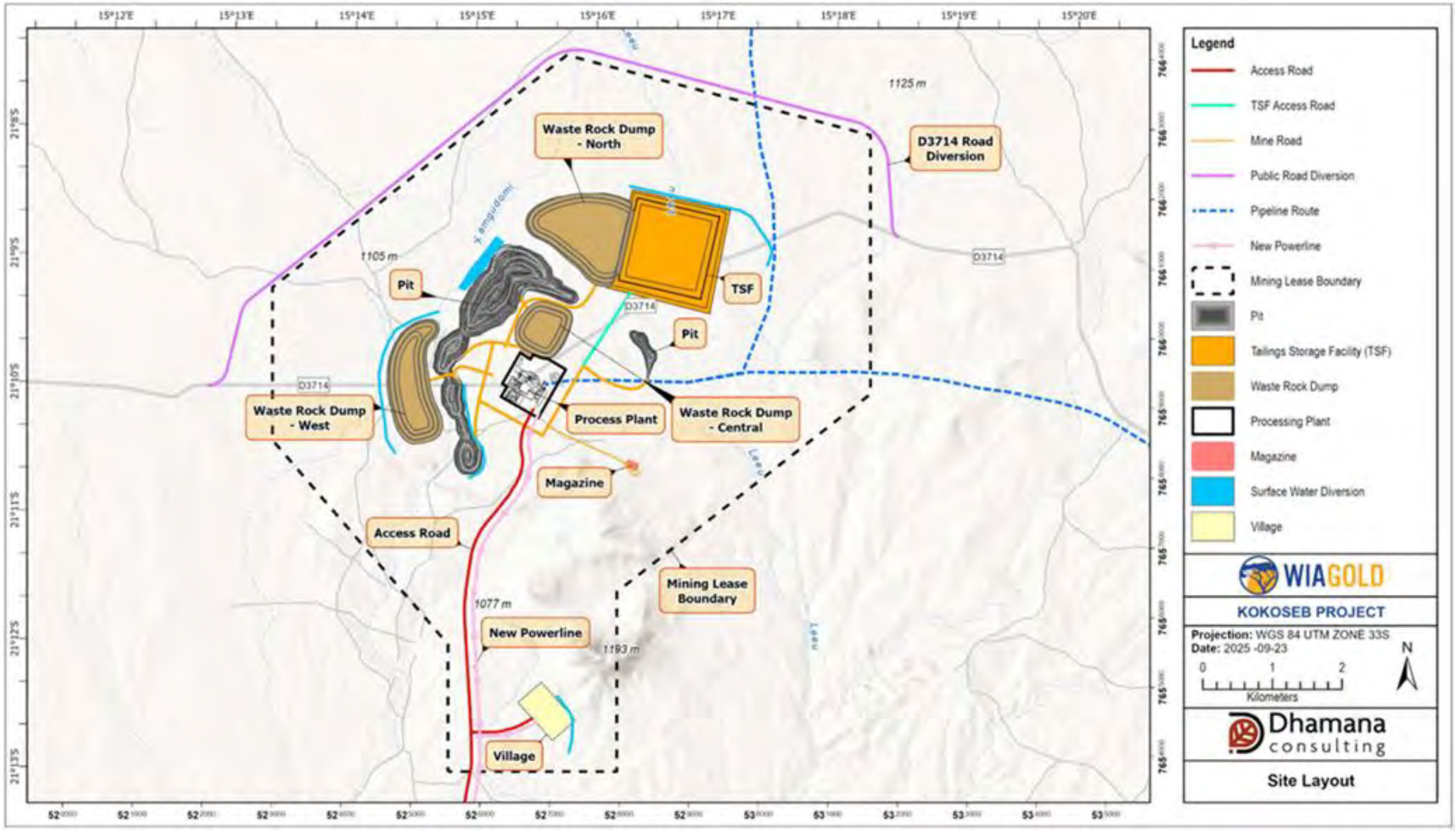


Figure 13 - Kokoseb Gold Mine site layout (Source: WiaGold, 2025)

4.6 EMPLOYMENT, ACCOMMODATION AND WORKFORCE TRANSPORT

4.6.1 EMPLOMENT

The mine management team will include a globally experienced contingent, to ensure that operational start-up is safe and efficient, and that ramp-up targets are met. The high-level organisation chart for the Project is presented in Figure 14.

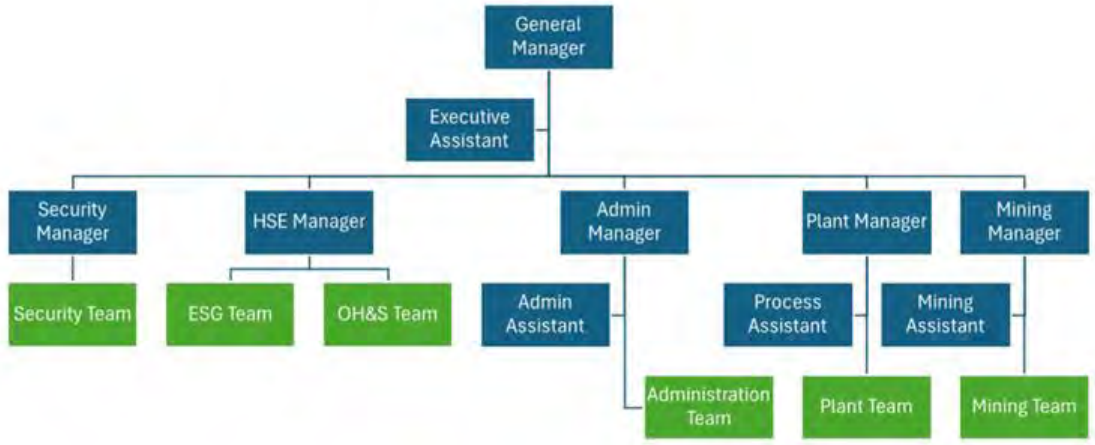


Figure 14 - High-level organisation chart for the Project (Source: WiaGold, 2025)

The operation will be split into five (5) key departments, which are:

- Mining, which includes:
  - Technical services comprising of geologists, mining engineers and surveyors; and
  - Open pit mining, managing the mining contractor and operations.
- Process plant, which includes:
  - Metallurgical and engineering resources;
  - Process plant operations team including shift operations team, day operations teams and a TSF operations team;
  - Process plant maintenance team, which includes mechanical and electrical maintenance crews, as well as maintenance planning and workshop support; and
  - Laboratory operations.
- Health, safety and environment, which includes:
  - Environmental management and community relations teams;
  - Occupational health and safety teams;
  - Medical paramedic and emergency response; and
  - Security, managing all aspects of site security.
- Administration, which includes:

- Human resources team;
- Finance team;
- Warehouse and procurement teams;
- Information and technology team; and
- Camp operations.

Table 7 presents a breakdown of the total Project operational workforce by department, distinguishing between staff and contractors, as well as expatriate and local personnel.

Table 7 - Operational workforce for the Kokoseb Gold Mine Project (Source: WiaGold, 2025)

Department	Expatriate	Namibian DIDO	Namibian local	Contract	Total
Management/administration	4	35	18	155	212
Mining	0	16	4	301	321
Processing	0	98	12	13	123
Total staff	**4**	**149**	**34**	**469**	**656**

Local Namibian labour living nearby Uis and Omaruru will be employed where practical. However, neither town was deemed practical to house the significant workforce expected. Therefore, the operational workforce and contractors will predominantly be housed in the accommodation village and will work on a fly in/fly out or drive in/drive out roster to site. Local employees living in Uis and Omaruru will be bussed to and from site daily.

The mine will operate all year round (i.e. 365 days) (allowing for lost days, public holidays or weather delays), on a 24-hour basis with three (3) shifts rotating on an 8-hour duration. Personnel not working in continuous shift rosters will generally work Monday to Friday on a 40-hour week.

4.6.2 ACCOMODATION VILLAGE

An accommodation village located approximately five (5) km to the south (S) of the process plant will be established for the Project workforce (employees and contractors). The accommodation village will include management rooms, senior staff rooms, standard (junior staff) rooms and common catering and recreational facilities. The site will be elevated to provide a 270-degree view to the west (W) and is separated from the mine and processing facilities by natural terrain.

Key features of the proposed 710 bed accommodation village include:

- 40 management rooms (40 beds);
- 70 senior rooms (70 beds);
- 150 dormitory accommodation rooms (600 beds);
- Kitchen dining facility;
- Gymnasium;

- Wet mess facility;
- Laundry;
- Recreational area;
- Maintenance workshop; and
- Water and sewage treatment facilities.

Management rooms include a bedroom, ensuite and sitting room. Rooms allocated to the most senior personnel will generally not be shared, unless there is a back-to-back arrangement or a necessity to house consultant level visitors.

Senior rooms will be similar in size to management rooms but will have bedrooms at either end with a shared ensuite between them. The rooms will be designed to accommodate back-to-back rosters and will include lockers for storing clothes and other items while away from the site.

Standard rooms will be dormitory style. Each building shall contain four (4) beds and lockers. They will be arranged such that each building will share laundries and ablutions with facilities for male and female employees separately. The laundries will be used by junior workers to wash their clothes.

Central to the accommodation village will be a dry mess and central laundry facility, constructed from sandwich board modules. The facility will contain:

- A 65-seat senior and 250-seat junior dining hall, complete with kitchen, larders and food storage areas (including a freezer, chiller room and dry store);
- Administration office including clinic and a small shop;
- A significant laundry area for washing bedding, towels and other domestic fabrics, as well as a laundry service for senior personnel clothing. This includes storage rooms for linen and also cleaning products;
- A covered docking bay for food and laundry deliveries;
- Modest wet mess (complete with an alfresco area), a gym/recreation building and some playing fields (a football pitch and a multipurpose hardstand pitch);
- Car park will also be located adjacent to the camp and will have provision for buses (including bus stops) and a parking bay dedicated to the clinic;
- Utility area in the camp contains fire and water distribution tanks, a step-down transformer and distribution board and a communication distribution building; and
- Dedicated water services area will include potable water and a sewage treatment plant. Treated effluent will be used for irrigation or discharged into a leach drain.

4.6.3 WORKFORCE TRANSPORT

As the majority of employees will reside in the on-site accommodation camp, they will be transported to their respective work areas by bus. Employees residing in Uis (60 km away)

and Omaruru (90 km away) will also be transported to and from the mine site by mine operated buses.

4.7 ANCILLARY INFRASTRUCTURE DEVELOPMENT

4.7.1 NON-PROCESS INFRASTRUCTURE

A range of non-process infrastructure (NPI) will be required to enable operations at the Project. This will include the following:

- Access roads;
- Office, warehouses, workshops and other buildings;
- Accommodation village;
- Mining infrastructure;
- Fuel storage facility; and
- Surface water infrastructure.

The non-process infrastructure buildings, office, warehouses and other buildings will include:

- Helipad;
- Plant maintenance and workshops;
- Reagent storage sheds;
- Laboratory;
- High security gatehouse and change rooms;
- Plant training room;
- Plant mess (on-site dining and meal facility);
- Plant office and control room;
- High voltage (HV) switchyard;
- Project/visitors security office and low security area training room;
- Low security area mess;
- Admin main office;
- Clinic/health, safety and environment (HSE)/emergency response team (ERT) building;
- Warehouse and storage yard; and
- Ablution facilities.

4.7.1.1 Helipad

Gold doré bars from the gold room will be taken from the plant via helicopter for further refining at another location. To enable this, a helipad will be located nearby to the gold room. This helipad will cover an area of approximately 3 300 m^2.

4.7.1.2 Plant maintenance and workshops

The plant will have a plant maintenance office, requiring a footprint of 160 m^2, and three (3) separate workshop buildings. The workshops shall cater for the maintenance of all process plant and infrastructure related equipment.

The three (3) workshops will separate plant maintenance activities into three (3) disciplines: electrical, boiler-making and mechanical. The workshops will have areas of 290 m^2, 290 m^2 and 525 m^2, respectively.

4.7.1.3 Reagent storage sheds

Three (3) reagent storage sheds will be established, each with a floor space of 1 000 m2. The reagent storage sheds have been sized to contain a minimum inventory of 30 days of select reagents for the process plant. Reagents will be delivered in bulk by truck in the form of bulk bags, IBCs or briquette boxes, depending on the associated reagent.

The reagent storage sheds will be open on two sides. The first side will be adjacent to the road which delivery trucks will come in by. The second side will be adjacent to the reagent mixing facilities to allow for handling of bulk reagents over short distances.

4.7.1.4 Laboratory

A laboratory will be provided as required for the process plant and will cover an area of approximately 300 m^2.

4.7.1.5 High security gatehouse and change room

A 400 m^2 gatehouse will be located between the high and low security areas. This gatehouse will serve as the sole checkpoint where security clearances will be validated before entrance into the high security area.

4.7.1.6 Plant training room

The plant training room will cover an area of approximately 150 m^2. The training room will consist of a large lecture room, kitchen and toilet facilities. The purpose of this training room is to provide facilities whereby employees on site can undertake health and safety training, yearly re-entry inductions or any other developmental programmes.

4.7.1.7 Plant mess/dining and meal facility

A mess hall will cover an area of approximately 430 m^2. This facility will be used primarily for the serving of food to employees on site and will also be used for holding functions.

4.7.1.8 Plant office control room

The plant will feature a 620 m^2 building for office and control room uses. The control room will be required to monitor and facilitate process plant operations. Typical office settings will be allowed for, i.e. open plan and private offices, board rooms, meeting rooms, small kitchen facilities and toilet facilities.

4.7.1.9 Switchyard

The switchyard will cover an area of approximately 15 800 m^2. This area will be in the form of a rectangle approximately 131 m long and 120 m wide. This switchyard will be located nearby the milling area, where the greatest electrical loads are expected.

4.7.1.10 Project/visitors security office and low security area training room

The project/visitor's security office will occupy an area of approximately 100 m^2. This office will also be used as a training room in the low security area which may be used for inductions or other educational activities.

4.7.1.11 Low security area mess

Similar to the plant mess, a mess hall in the low security area covers a footprint of approximately 235 m^2.

4.7.1.12 Admin main office

The admin main office will cover a footprint of approximately 400 m^2. This will be the main administrative office for the plant and will include: a main entrance with reception and waiting area, open plan and private offices, board rooms, meeting rooms, small kitchen facilities and toilet facilities.

4.7.1.13 Clinic/HSE/ERT

A first aid and emergency response building will cover an area of approximately 485 m^2. The main purposes of this building will be paramedical and firefighting services. Provisions will be made for an ambulance parking area, examination room, ward, storeroom, kitchen, toilets, reception/waiting area and fire truck parking.

4.7.1.14 Warehouse and storage yard

The warehouse will include an admin office and storage yard. The warehouse and office will require a combined area of approximately 2 100 m^2, while the storage yard /laydown will cover an area of approximately 6 200 m^2.

The spare shed will cover an area of approximately 206 m^2. This area will be used as a storage area for critical spares, operational spares, construction materials as required for the process plant.

4.7.1.15 Ablution facilities

There will be three (3) ablution facilities constructed around the site. Each will be approximately 40 m^2. Each facility will have toilets and hand wash basins.

4.7.1.16 Onsite parking

Parking bays will be established in several locations, namely nearby to the admin main office, mess halls or training rooms. Parking bays will be 5 m long by 3 m wide, suitable for light vehicles.

4.8 MINE ACCESS ROAD

Access to the mine will be from the unsealed C36 gravel road between Omaruru (to the east) and Uis (to the west) (Figure 13). The proposed site access road will consist of a new all-weather surface, approximately 12.7 km long to enable access to both the accommodation village and the mine/plant site.

4.9 D3714 ROAD DIVERSION

The Project infrastructure will traverse the D3714 district road, which will require re-routing around the mine site. Re-routing of the D3714 district road will occur during construction and will be approximately 9.7 km in length. The planned diversion route is shown in Figure 13.

4.10 MINING PROCESS, SERVICES AND UTILITIES

4.10.1 OREBODY

The gold mineralised metasediments of the Kuiseb Formation are heavily intruded by late syntectonic and post-tectonic granites, as well as minor mafic dykes trending from N-S to NNE-SSW. The EPL 4818 area generally shows moderate to good exposure, though the orebody is mostly sub-outcropping and often covered by thin layers of soil, colluvium, or pisolitic calcrete up to 2 m thick. Mineralisation is developed from surface to depths in excess of 350 m.

The orebody forms an arcuate dome-shaped feature, approximately 3 km across, wrapped round a central core of post-tectonic leucogranite, and truncated in the south by a major thrust zone. Granite dykes, granitic veinlets and pegmatites that cut through the orebody are related to the central granite core or later phases of intrusion. The mineralised schists to the W, E and NE are enclosed by coarse-grained, pre-syntectonic porphyritic-feldspar granite.

Gold mineralisation, present as native gold grains and lesser silver bearing gold grains, is spatially associated with sulphides dominated by pyrrhotite, löllingite and arsenopyrite in order of abundance. Sulphides manifest as foliation-controlled blebs, stringers and disseminations and löllingite is always spatially associated with arsenopyrite and pyrrhotite where a retrograde reaction rim of arsenopyrite is always developed at the contact between pyrrhotite and löllingite. This contact zone between löllingite and arsenopyrite is typically where gold grains are developed, though they can also occur as partial inclusions within löllingite and rarely within pyrrhotite. Gold is also sometimes associated with bismuthinite

and native bi-mineralisation and is also identified within altered quartz/diopside veins and veinlets.

The degree of stability for slopes in an open pit mine is critically important to minimise the risks related to the safety of operating personnel and equipment, as well as the economic risk to the resource. Ore recovery must be maximised and waste stripping kept to a minimum throughout the productive life of the operation. The resulting compromise is typically a balance between formulating designs that can be safely and practically implemented in the operating environment and establishing slope angles that are as steep as possible and consistent with the ore body geometry and rock conditions.

4.10.2 OPEN PIT DESIGN AND PLANNED MINING STAGES

To facilitate scheduling, the ultimate pit design is split into ten (10) stages (Figure 15) that prioritise the highest value areas, ensure ore access continuity and defer waste stripping requirements. The three (3) small southern section of the design are distinct modular pits that have their own independent ramp systems. The main section of the ultimate pit has three (3) phases of cutback with each phase split into two (2) parts. The internal phases were identified in shells from lower revenue factors, followed by southern cutbacks prioritised over northern cutbacks based on value. The 10th stage is included as a satellite pit from the main pit area.

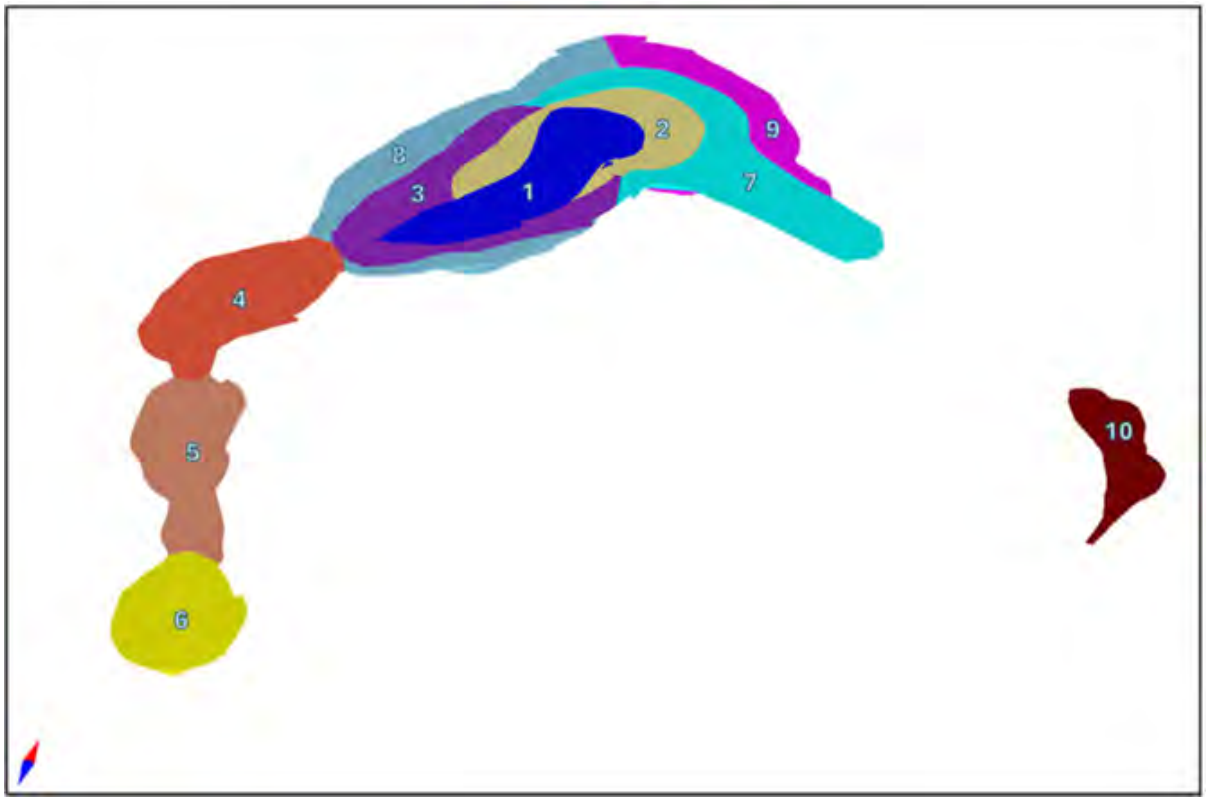


Figure 15 - Isometric view of ultimate pit showing numbered stages (Source: WiaGold, 2025)

Table 8 summarises the mine inventory by stage. These are reported using a cut-off of 0.45 g/t in line with the final scheduling option.

Table 8 - Stage design inventories (Source: WiaGold, 2025)

Stage	Total ore			Waste	Total rock	Strip ratio
	Mt	g/t Au	koz	Mt	Mt	t:t
Stage 1	8.0	1.00	258	12.8	20.8	1.6
Stage 2	7.3	0.98	231	32.0	39.3	4.4
Stage 3	10.2	1.04	342	59.1	69.3	5.8
Stage 4	5.7	1.04	190	27.4	33.1	4.8
Stage 5	2.6	0.78	65	21.0	23.6	8.1
Stage 6	3.6	1.01	117	21.4	25.0	5.9
Stage 7	9.6	0.82	254	58.6	68.2	6.1
Stage 8	7.6	1.09	268	87.8	95.4	11.5
Stage 9	3.4	0.90	98	43.2	46.6	12.7
Stage 10	0.7	0.73	17	5.8	6.5	7.9
Total	**58.9**	**0.97**	**1 833**	**369.0**	**427.8**	**6.3**

4.10.3 PRODUCTION SCHEDULE

The mine production schedule defines a twelve (12) year mine life, delivering a total 1.65 Moz of recovered gold. The annual mine production is summarised in Table 9 and the processing summary is summarised in Table 10.

Table 9 - Annual mine production summary (WiaGold, 2025)

Source	Unit	Total	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12
Total tonnes	Mt	427.8	3.0	40.6	44.9	45.0	43.1	43.0	43.3	44.5	37.8	27.8	26.9	25.2	2.9
Waste tonnes	Mt	369.0	2.8	31.4	36.2	37.9	36.7	37.8	38.6	40.3	34.7	24.0	25.7	20.4	2.4
Strip ratio	Wt:ot	6.3	24.1	3.4	4.2	5.4	5.8	7.2	8.2	9.7	11.3	6.2	22.3	4.2	4.2
Ore tonnes	Mt	58.9	0.1	9.2	8.6	7.0	6.4	5.2	4.7	4.1	3.1	3.8	1.2	4.8	0.6
Au grade	g/t	0.97	0.46	0.97	1.02	0.97	1.05	0.98	0.71	1.02	1.08	1.12	0.72	0.88	0.82
In situ metal	koz	1 833	2	287	282	219	215	165	107	136	107	138	27	135	15

Table 10 - Mine processing summary (Source: WiaGold, 2025)

Source	Unit	Total	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12
Direct feed	Mt	45.0	4.8	5.2	5.3	4.8	3.8	3.6	4.1	3.0	3.8	1.2	4.8	0.6
	g/t	1.09	1.31	1.30	1.12	1.23	1.16	0.77	1.02	1.09	1.12	0.7	0.9	0.8
Stockpile reclaim	Mt	13.9	0.01	0.1	-	0.5	1.5	1.7	1.1	2.2	1.4	4.1	0.4	1.0
	g/t	0.56	0.54	0.80	-	0.70	0.69	0.69	0.52	0.52	0.52	0.52	0.51	0.51
Mill feed	Mt	58.9	4.8	5.2	5.3	5.3	5.3	5.3	5.2	5.2	5.2	5.3	5.3	1.5
	g/t	0.97	1.31	1.29	1.12	1.18	1.03	0.74	0.91	0.85	0.96	0.56	0.85	0.62
Au processed	koz	1 833	202	218	189	199	173	125	154	143	161	94	143	31
Au recovered	koz	1 653	182	197	171	179	156	113	139	129	145	85	129	28
Weathered	Mt	8.9	2.5	0.2	0.4	0.6	1.2	0.9	0.2	0.5	0.3	1.4	0.3	0.4
	g/t	0.84	1.27	0.92	0.97	0.89	0.75	0.72	0.49	0.51	0.49	0.53	0.6	0.5
Fresh	Mt	50.0	2.	5.1	4.8	4.7	4.1	4.4	5.0	4.8	4.9	3.8	5.0	1.2
	g/t	0.99	1.34	1.30	1.13	1.21	1.10	0.75	0.93	0.88	0.99	0.57	0	0
Weathered	%	15	53	3	9	11	22	17	4	9	6	27	6	23
Inferred	%	18	5	0	4	9	9	7	9	38	55	33	79	99

The mining and production schedule estimates a total recovery of approximately 1 367 500 oz Au and processing of approximately 1 486 413 oz Au, at an average head grade of 0.92 g/t Au. Operational mining is scheduled to cease in year 11. Over the life of mine, a total of 50 003 kt of ore and 222 635 kt of waste will be extracted. Low-grade (LG) ore will be stockpiled onto the LG stockpiles, while high-grade (HG) ore will be fed directly into the mill for processing.

4.10.4 MINING METHOD AND EQUIPMENT

Mining will be conducted using conventional open pit mining techniques. Selective drilling of ore and waste zones will be performed using ammonium nitrate fuel oil (ANFO), which will be mixed on-site. Standard open pit drilling equipment will be used for blasting activities. Once fragmented, ore and waste materials will be selectively loaded using hydraulic backhoe excavators onto off-highway diesel-powered haul trucks. The haul truck fleet will transport ore and waste materials to the primary crusher, run of mine (ROM) pad stockpile, LG stockpiles or WRDs. Topsoil will be separately handled and transported to designated stockpiles for future rehabilitation purposes.

The operational aspects of mining will be outsourced to an experienced and reputable mining contractor. However, the Proponent will retain full responsibility for all mine technical services, planning, grade control and overall mine management. The ore and waste dump extraction and recovery processes are discussed in the sections below.

4.10.5 DRILLING

Drilling is the initial stage of material extraction in most open-pit mining operations. During this phase, blast holes are drilled into the rock to prepare for blasting, which fragments the ore and waste material for easier handling. Rotary drills are predominantly used for large holes, while down-the-hole (DTH) hammer drills are commonly employed for smaller diameter holes (typically less than 200 mm) down, making them suitable for smaller scale surface operations.

4.10.6 BLAST OPERATIONS

Rock fragmentation will be undertaken by drilling and blasting, whereby lower powder factors will be applied in weathered zones. Blasting is the core component of the mining operation as it directly influences all downstream mining activities such as loading and hauling, comminution (crushing) processes, ore recovery and dilution within the processing plant. Effective blast design is therefore a critical factor in ensuring and improving operational efficiency and overall plant performance.

Blasting can substantially modify and control material flow within the mining operation, including the feed size to the primary crusher. Blast performance will be assessed in terms of the following outcomes:

- Fragmentation, relating to the feed size supplied to the primary crusher, as well as oversized material and the requirement for rehandling of material, and secondary breakage;
- Shovel productivity, including wear and maintenance costs;
- Use of track dozers to condition the bench floor and rip high bottoms;
- Grade control;
- Primary crusher power consumption, throughput and maintenance costs; and
- Disruption to material flow during loading and crushing that affects truck efficiency.

The material type at the Project site is suitable for a drill rig capable of drilling holes with a diameter of up to 165 mm, stemming length of 3 m and bench height of 10 m. The average drilling per day is anticipated to average ~160 holes, ranging between 133 to 178 holes when mining at 33 million tonnes per annum (Mtpa). This is based on the following drill patterns:

- Weathered at 5.4 m (burden) x 6.2 m (spacing); and
- Fresh at 4.1 m (burden) x 4.7 m (spacing).

The blast design and technical information are summarised in Table 11 below.

Table 11 - Blast design and technical information (Source: BMC, 2025)

Blast description	Weathered	Fresh
B/H diameter (mm):	165	165
Bench height (m)	10	10
Burden (m):	4.6	4
Spacing (m):	5.3	4.6
Average depth (m):	11	11
Explosive type:	emulsion	emulsion
Explosive charge / BH (kg)	145.4	145.4
P/F blasthole (kg/m^3):	0.6	0.8
Stemming length (m):	3	3
Accessories type: shock tube / electronic	nonel	nonel
Downhole delay (ms):	25 - 50	25 - 50
Surface timing - inter hole (ms):	8 - 25	8 - 25
Surface timing - inter row (ms):	50 - 100	50 - 100
Booster / primer (gr.):	400	400

Blasting activities will be conducted by a well-established and reputable contractor. Blasting energy is tailored according to material type. Waste rock is assigned a lower relative energy factor to optimise blasting costs while ensuring efficient excavation, haulage and deposition on the WRD. In contrast, ore material is assigned a higher relative energy factor to achieve finer fragmentation, which can reduce downstream crushing and milling costs and improve overall processing efficiency.

In areas where mining slopes remain intact for extended periods, it is good practice to minimise the fracturing of the high walls during blasting. If such areas are identified, pre-splitting will be considered to ensure safe working conditions in the lower areas.

Generally, 500 m are typically applied for a safe blasting/ clearance distance. However, the calculated unsafe zone based on the maximum charge per blast delay (689 kg) is 519 m (Blast Management and Consulting, 2025). Specific actions will be required and structures within this buffer zone will need to be relocated to ensure compliance with safety standards.

4.10.7 LOAD AND HAUL OPERATIONS

Load and haul activities will be conducted on 2.5 m of flitch heights using a fleet of 200 t backhoe excavators (e.g. Hitachi EX1900) to load 90 t class trucks (e.g. Caterpillar 777G) as this provides a good balance between physical number of mining equipment units, mining selectively and productivity. The excavator bucket width is approximately 3.5 m will permit adequate selectivity when digging to the ore contact from the hanging wall, whilst also enabling production of up to 13 Mtpa in weathered material and 10 Mtpa in fresh rock from each unit.

Ore will be hauled to the ROM pad for processing or long-term stockpiles for later reclaim. Waste will be hauled to the designated WRDs.

4.10.8 ROM PAD

Ore classified as high grade will be hauled to the ROM and processed in the same period in which it was mined. Mining trucks (approximately 140 t payload) will deliver material to the ROM pad where it will be either directly tipped into the dump pocket or dumped in blending ‘finger’ stockpiles arranged by material gold grade and lithology. A FEL (approximately 26 t payload) will be used to reclaim and load the material from the various stockpiles to the dump pocket.

The dump pocket will be provided with a dust suppression system comprising a water tank, pump and manifold to deliver raw water to the dump pocket during ore tipping.

4.10.9 METALLURGY AND ORE PROCESSING

The process plant is designed for a throughput of 5.25 Mtpa (5 250 ktpa) at the target grind P_{80} of 63 µm. A conventional gold treatment plant flowsheet, comprised of an SABC circuit with gravity gold recovery, carbon-in-pulp (CIL) and split Anglo-American Research Laboratories (AARL) carbon elution is shown is Figure 16. The gold ore recovery process is discussed in detail in section 4.10.9.1 through 4.10.9.11.

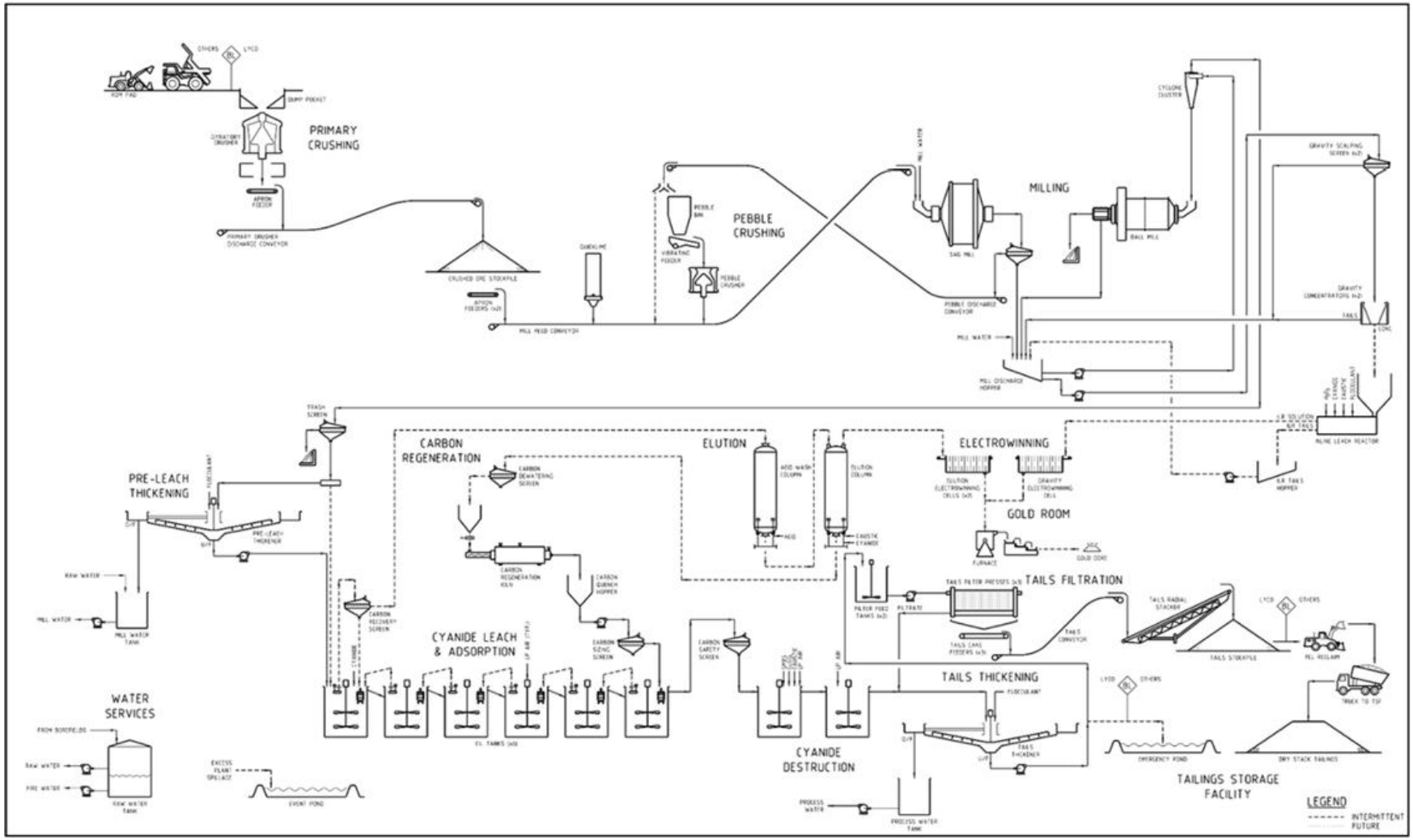


Figure 16 - Metallurgical process flow (Source: WiaGold, 2025)

4.10.9.1 Crushing circuit

Ore will be fed from the dump pocket to a gyratory crusher, and the crushed product will be withdrawn from the vault by an apron feeder onto the primary crusher discharge conveyor.

The primary crusher unit selected, Metso Superior MKlll 42-65 with a 450-kW motor has the capability to handle much higher feed rates at the nominal 80% circuit availability. Considering that the apron feeder and conveyor will be sized based on the maximum throughput of the primary crusher, the crusher throughput will be limited by using a variable speed drive to avoid oversizing the downstream equipment. A weightometer beneath the primary crusher discharge conveyor will indicate the instantaneous and totalised primary crushing tonnage.

Crushed ore from the crusher discharge conveyor will be transferred onto the crusher ore stockpile.

A dust extraction system will be installed on the discharge conveyor to extract dust from beneath the primary crusher and the conveyor discharge points. The dust will be captured by a wet scrubber using raw water with a bleed to control the solid contents of the scrubber solution.

The crushing circuit will be monitored and controlled from the crusher control room. Two-way radio communication between the crusher control room operator and the ROM pad front end loader (FEL) driver will ensure that a minimum inventory is maintained within the dump pocket.

4.10.9.2 Plant feed storage and reclaim

Crushed ore will be withdrawn from a tunnel underneath the live stockpile at a controlled rate by variable speed apron feeders and delivered to the milling circuit via the mill feed conveyor. A weightometer on the mill feed conveyor will indicate the instantaneous and totalised mill feed tonnage and will be used to control the speed of the belt feeder.

An FEL will be used to load semi autogenous grinding (SAG) mill grinding media from the SAG media storage bunker directly into a media feeding system for subsequent discharge onto the mill feed conveyor.

Quicklime, used for pH control in the leach circuit will be delivered to site in bulk tankers and pneumatically offloaded into a lime silo. The silo will be fitted with a dust collector and bin activator to prevent compaction and blockage. Quicklime will be metered from the silo directly onto the mill feed conveyor using a variable speed rotary valve feeder. The speed of the valve will be varied according to the mill feed tonnage.

A pulsed jet baghouse dust collector will reduce airborne dust generation in the stockpile tunnel, at the discharge of the emergency belt feeder and quicklime addition point. The reclaim circuit will be controlled from the main control room.

4.10.9.3 Grinding and classification unit

Crushed ore will be milled to achieve the required grind size for effective gold recovery. The grinding circuit will comprise a SAG-ball mill-crush (SABC) circuit configuration operating in closed circuit with a cluster of hydro-cyclones.

Primary crushed ore will be directly fed to the SAG mill, together with recycled crushed pebbled and mill water to achieve the correct milling density. The SAG mill will be equipped with a variable speed drive to enable operation at between 60% and 80% of critical speed.

The SAG mill product will discharge to a horizontal vibrating pebble dewatering screen, which will be equipped with spray bars fed with mill water to both remove adhering fine materials from the oversize and to partially dilute the undersize slurry. The screen undersize (<15 mm particle size) will flow to a mill discharge hopper, while washed oversize will be conveyed to a pebble crushing circuit.

The mill discharge slurry will be further diluted in the mill discharge hopper using mill water before pumping to a cluster of hydro-cyclones, using duty/standby variable speed cyclone feed pumps for effective classification. Dedicated duty/standby variable speed gravity feed pumps will also pump from the mill discharge hopper and feed a pair of gravity scalping screens for subsequent feed to the feed gravity concentrator. Cyclones underflow will be recycled to the ball mill feed hopper via transmission box.

Oversize materials from the pebble dewatering screen, consisting of pebbles, worn steel grinding media and trash (usually wood) will discharge onto the pebble discharge conveyor. Screen oversize may also be diverted to the milling area drive in sump, if required.

A self-cleaning belt magnet mounted above the pebble discharge conveyor will be used to remove mill balls and any other magnetic debris discharged from the SAG mill. Tramp metal that is not removed by the magnet will be detected by a metal detector located above the pebble transfer conveyor prior to the pebble crusher. If any tramp metal is detected, an automated flop-gate will be activated to temporarily divert tramp steel and pebbles away from the crusher and back onto the mill feed conveyor. This diverter gate will also allow maintenance to be carried out on the pebble crusher without having to shut down the milling circuit.

A weightometer on the pebble transfer conveyor will indicate the mass of pebbles being recycled. Pebbles will report to the pebble bin and will be fed to the pebble crusher at a

controlled rate from the vibration feeder. The pebbles will be crushed and will discharge directly onto the SAG mill feed conveyor.

The ball mill will typically operate at approximately 25% volumetric ball loading and at a fixed 75% of critical speed. The ball mill will discharge via a trommel, with the trommel oversize (scats) reporting to the scats bunker and trommel undersize gravitating to the mill discharge hopper where it will combine with the SAG mill product and be pumped to the hydro-cyclone cluster for subsequent classification.

Steel grinding media will be added to the ball mill feed hopper using a hoist and kibble arrangement. The kibble will be charged with grinding media, hoisted to the ball charging level and discharged into the ball mill.

The cyclone overflow (grinding circuit product) will gravitate to a single vibrating trash screen via a feed box, where it will be screened to remove any misreporting coarse ore particles, wood fragments, organic material and plastics that may adversely affect the performance of the carbon circuit and 'peg' the intertank screens. Screen oversize material will report to a trash bunker while the screen undersize will gravitate to the pre-leach thickener via separate boil and pre-leach thickener feed boxes.

4.10.9.4 Gravity circuit and gravity concentration

The gravity circuit will comprise a pair of gravity scalping screens each assigned to a 48" Knelson centrifugal concentrator (2 off). The scalping screens will be fed with slurry from the mill discharge hopper and will be equipped with 2 mm slotted aperture polyurethane panels to prevent coarse material from reporting to the gravity concentrators. Screen oversize from both screens will combine with gravity concentrator tails slurry and will return to the mill discharge hopper.

Scalping screen undersize slurry will report to the centrifugal concentrator to remove coarse gold from the milling circuit recirculating stream. The concentrators will be operated on a semi-batch basis with periodic discharge of the gravity concentrators to the concentrate storage hopper and thereafter to the inline leach reactor (ILR). During the collection cycle, coarse and dense particles will fill the grooves of the rotating concentrate cone, while the finer less dense particles will flow from the feed point to the top of the cone and into a peripheral launder. Fluidising water will be applied to the ports of the cone to fluidise the bed and elutriate the fine light particles, allowing the denser particles to be captured and retained under the influence of centrifugal force.

After a set period, the concentrate will be discharged from the bowl by opening the concentrator feed bypass valve, reducing the speed of the cone and flushing the concentrate from the collection grooves. Thereafter, the cone will be re-accelerated to operating speed, the fluidising water flow re-established, and the bypass valve closed to allow feed slurry to

again flow to the concentrator to commence the subsequent collection cycle. The intention will be to stagger the operation of the gravity concentrator to enable discharge of gravity concentrate from one unit to be at the midpoint of the concentration cycle of the other.

Recovered high specific gravity metal (gravity concentrate) will be periodically discharged to the concentrate storage hopper, while the concentrator tailings will combine in the gravity concentrator tailings before gravitating to the mill discharge hopper for further processing.

4.10.9.5 Gravity concentrate treatment

Gravity concentrate will be processed in batches through an ILR circuit located with a secure meshed enclosure under security closed circuit television (CCTV) surveillance in the milling area.

The ILR will process the gravity concentrate once per day in a rotating drum leach vessel. A strong solution of sodium cyanide and caustic will be introduced into the slurry, and the drum will be rotated for up to 20 hours to leach the coarse gold while dosing a solution of hydrogen peroxide to aid in the leaching process. The resulting leach solution (pregnant liquor) will be separated from the barren solids and pumped to the dedicated pregnant liquor tank adjacent to the gold room. Flocculant may be added to assist solids settling, enhancing the solid-liquid separation process. ILR tails will be pumped to the mill discharge hopper for additional milling and recovery of any remaining entrained gold.

4.10.9.6 Pre-leach thickening

The high-rate pre-leach thickener (31 m diameter) will be installed to reduce the size of carbon-in-leach (CIL) tanks required to provide the required residence time (24 h), improve slurry mixing characteristics and reduce overall reagent consumption.

The thickener feed slurry will be mixed with flocculant to facilitate effective settling. The thickened slurry (thickener underflow) will be pumped to the CIL circuit, and the thickener overflow will gravitate to the adjacent mill water tank for re-use in the milling circuit.

4.10.9.7 CIL circuit

Gold will be leached from the milled ore using sodium cyanide and air. The dissolved gold will be recovered from the leach solution by adsorption onto activated carbon. The carbon will be periodically removed from the slurry and further processed to recover the gold.

The leach and adsorption circuit will consist of six (6) identical CIL adsorption tanks (nominally 3 600 m3 each), sized to provide the required leaching residence time. The tanks will be interconnected with launders and slurry will flow by gravity through the tank train. Each tank will be equipped with a mechanically swept intertank screen to retain carbon within the tank and redress impeller carbon transfer pump to facilitate carbon transfer between adjacent tanks.

Quicklime (added to the mill feed conveyor) will ensure that the slurry pH is sufficiently elevated for cyanidation. Sodium cyanide solution will be metered into the CIL circuit from the cyanide ring main, while low pressure air from dedicated blowers will be sparged down the shaft of the individual tank agitators to maintain the required dissolved oxygen concentration within the slurry.

Regenerated barren carbon will be added to the final tank (CIL Tank 6) of the CIL circuit and will be advanced counter-current to the slurry flow, allowing leached gold to adsorb onto the carbon and be recovered from the CIL slurry. The carbon will be advanced by pumping slurry and carbon from the downstream to the adjacent upstream tank. Any carbon will be retained in the upstream tank by the intertank screen, while the slurry will pass through the screen panels and flow by gravity back to the downstream tank. This counter-current process will be repeated until the carbon eventually reaches the first CIL tank (CIL Tank 1).

Carbon loaded with gold and silver will be removed from the circuit by pumping slurry and carbon from CIL Tank 1 to the loaded carbon recovery screen. The loaded carbon will be washed on the screen to remove fine ore particles and will report as screen oversize to the elution circuit. The screen undersize will gravitate back to CIL Tank 1.

Barren slurry from CIL Tank 6 (CIL tailings) will gravitate to the cyanide destruction circuit via the carbon safety screen that will be provided to ensure that any fugitive carbon passing through a holed or worn intertank screen is captured.

Barren carbon from the carbon regeneration kiln will be screened on the carbon sizing screen to remove fine carbon and quench /transfer water. The regenerated and screened carbon will discharge from the sizing screen directly to CIL Tank 6.

A portal crane, mounted on rails on top of the CIL tanks will provide easy access for intertank screen and carbon transfer pump maintenance. Removal of tank agitators, however, will be by mobile crane.

4.10.9.8 Elution and gold room operations

The following operations will be carried out in the elution and gold room areas:

- Acid washing of carbon;
- Stripping of gold from loaded carbon back into solution using a split AARL elution circuit;
- Electrowinning of gold from solution;
- Filtration, drying and smelting of electrowinning sludge; and
- Regeneration of barren carbon.

The split AARL elution circuit will be automated and will contain separate acid wash and elution columns. The total daily carbon movement around the elution circuit, assuming one elution per day, will be 14 tonnes.

4.10.9.9 Acid wash

Loaded carbon will be received into the acid wash column from the loaded carbon screen. During acid washing, a dilute solution of hydrochloric acid will be pumped into the bottom of the column to remove containment and predominantly carbonates from the carbon. After a soak period of 30 minutes, the loaded carbon will be rinsed with water to remove residual acid before pressure transferring the washed loaded carbon to the adjacent elution column. Dilute acid and rinse water from the acid wash column will report directly to the tailings tanks.

4.10.9.10 Pre-heat and elution

Acid washed carbon will be hydraulically transferred into the elution column and the excess transfer water will be drained from the column through the strainer manifold.

The split AARL elution process will be used to recover gold adsorbed onto carbon in the CIL circuit. sodium hydroxide (NaOH) and sodium cyanide (NaCN) will be pumped from their respective storage tanks to the strip solution tank and diluted with filtered water to achieve a strip solution containing 2% w/v sodium cyanide and 2% w/v sodium hydroxide.

Initially, the elution circuit (equipment and pipework) will be fitted with reverse osmosis (RO) permeate water which will be recirculated at 2 bed volumes (BV) per hour (BV/h) through a diesel fired oil heater and heat input heat exchanger to achieve an elution column outlet temperature of approximately 95 °C (pre-heat stage).

The presoak stage follows the pre-heat stage, where the elution column will be filled with strip solution heated to 140 °C to soak the loaded carbon for 30 minutes. After this time, 5 BVs of lean eluate collected from the previous elution cycle is pumped through the elution column, stripping gold from the carbon. The resultant solution is directed to the pregnant eluate tank in preparation for electrowinning.

Once all the lean eluate has been pumped through the column, the same volume of RO permeate is pumped through the tank to strip the remaining gold and silver from the carbon. After the first 3 BVs of strip water, the elution heater is turned off to cool the carbon using the remaining 2 BVs of strip water. The solution produced during this stage is directed into the lean eluate tank ready for use in the next elution cycle.

4.10.9.11 Electrowinning and gold room

Pregnant eluate from the spilt AARL elution circuit will be pumped from the pregnant eluate tank to an electrowinning cell distributor, which will distribute flow evenly between two (2)

electrowinning cells operating in parallel, with the overflow from the cell directed back to the pregnant eluate tank. Direct current will be passed through stainless steel anodes and stainless-steel mesh cathodes within the electrowinning cells and electrolytic action will cause the gold and other metals in solution to plate on the cathodes. Electrowinning will continue until the target barren eluate gold concentration of less than 5 mg/l is achieved, which will typically be between six (6) and twelve (12) hours.

Pregnant liquor from the gravity circuit will be pumped from the ILR pregnant liquor tank through a dedicated electrowinning cell in the gold room. Gold will be recovered onto the stainless-steel cathodes and the solution recycled to the ILR pregnant liquor tank. Solution recirculation through the electrowinning cell will continue until the precious metal tenor is sufficiently depleted. The barren liquor from the ILR liquor tank will then be returned to the CIL circuit. Once electrowinning is complete, the cathodes from the gravity electrowinning cell will be processed separately from the CIL electrowinning cathodes to determine the gravity gold recovery, and to assist with metallurgical accounting.

An overhead crane within the gold room will be provided for cathode and anode handling. The cathodes will be washed with high pressure spray water, and the gold/silver sludge will be recovered in a vacuum pan filter. The filtered sludge will be placed in trays and dried in an oven before being mixed with fluxes and smelted in a diesel-fired furnace to produce doré bars.

The gold room will be a secure building with the electrowinning cells on a mezzanine level and the other equipment installed at ground level. The gold room will also have a vault containing a safe in which the doré bars will be securely kept until they are transported offsite for refining. Fume hoods, ducting, and extraction systems will be provided to remove fume and off-gas from the electrowinning cells, drying oven and barring furnace. In addition, several air fans will be installed to provide adequate gold room ventilation.

4.10.10CARBON REGENERATION

After completion of the elution process, eluted (barren) carbon will be hydraulically transferred from the elution column to the dewatering screen in the carbon regeneration circuit. The screen will remove most of the contained water prior to carbon discharging into the feed hopper of the diesel-fired carbon regeneration kiln. In the feed hopper, most of the remaining residual and interstitial water will be drained from the carbon before it enters the kiln.

During the regeneration process, the carbon will be heated to between 650 °C and 750 °C and maintained within this temperature range for approximately 20 minutes to allow effective carbon regeneration to occur. Regenerated carbon from the kiln will discharge to the quench tank where it will be quenched with raw water before being pumped on a batch basis to the carbon sizing screen located above the final CIL tank.

Carbon screen undersize (raw water and fine carbon) will gravitate back to the quench tank for recycle as quench water with provision to periodically divert this stream to the CIL tailings launder to prevent accumulation of carbon fines within the quenching circuit.

4.10.11 TAILINGS TREATMENT

4.10.11.1 Cyanide destruction

A sulphur dioxide (SO2)/air cyanide destruction circuit will be utilised to meet the ICMC tailings discharge requirements of less than 50 ppm of CNWAD. Tailings slurry from the carbon safety screen undersize will gravitate to the cyanide destruction circuit feed box which will discharge into a two mechanically agitated cyanide destruction tanks in series.

Copper sulphate and sodium meta-bisulphite (SMBS) solutions will be added to provide the required copper and SO2 for the cyanide destruction process. Low pressure air will be sparged into the tanks through externally mounted SlamJet® spargers to achieve the target dissolved oxygen concentration. The ability to add caustic solution to the cyanide destruction circuit to maintain slurry pH between 8.0 and 9.0 will also be provided. Cyanide destruction discharge will gravitate to the tailings thickener.

4.10.11.2 Tailings thickening

The tailings filtration plant will be located adjacent to the filtered stack TSF to reduce filtered tailings handling costs. The thickened tails slurry will be pumped to the tailings filter feed tanks via an overland pipeline.

Three (3) filter press units will be installed to dewater the tailings slurry to enable the tailings to be stored in a filtered stack TSF. The filtration circuit will operate at a lower availability of 80% compared to the milling and leaching plant to allow for the additional service requirements associated with the filter plates and cloths.

The tailings thickener underflow slurry will be discharged into two filter feed tanks that provide surge between the filtration and leach circuits to manage the difference in availability. Each filter press unit will have its own dedicated feed pump drawing from the feed tanks. The filter presses will operate in a batch mode with each cycle comprising several stages including filling, membrane pressing, air drying, discharging and cloth washing.

Filter cake will discharge from the filter presses onto belt feeders beneath the filtration units. The belt feeders will transfer filter cake to a stockpile via a tailings conveyor and radial stacker. The filter cake stockpile will have enough storage capacity to facilitate transportation of the tailings cake to the dry stack TSF using trucks loaded by FELs.

Process water, which will be pumped from the main plant and then distributed from a small tank for general use in the filter plant, will be used for cloth washing, which will be part of

each filtration cycle. The washate from this step will be recycled to the filter feed tanks, giving a minor dilution. Filtrate from the filters will be collected in a transfer tank and pumped back to the tailings filter at the main plant.

High pressure air compressors within the filtration system will produce dry compressed air for both the cake drying and membrane squeeze steps.

There will be provision to divert thickener underflow to an emergency tailings storage pond, incorporated as part of the filtered stack TSF, via a pipeline in the event of filtration difficulties or lack of filtration capacity.

The filters will be installed in a building with the top level enclosed to provide some protection from the wind, rain and sun during the routine service activities required to maintain the filter plates and cloths. The building will be furnished with a gantry crane for lifting and lowering filter plates. Plant tailings filter cake will be deposited into the filtered stack TSF.

4.10.12 REAGENTS

Table 12 presents the major processing reagents and consumables, including estimated consumption rates. The process design criteria developed for the ore recovery process is summarised in Table 13.

Table 12 - Processing reagents and consumables (Source: WiaGold, 2025)

Description	Delivery method	Delivery size	Storage	Minimum inventory	Average consumption
Mill media (125 mm)	Drum	850 kg	Laydown	30 days	2 378 t/a
Mill media (50 mm)	Drum	850 kg	Laydown	30 days	4 468 t/a
Sodium cyanide	Briquette box	1 tonne	Reagent shed	30 days	3 596 t/a
Quicklime	Bulk tanker	36 tonnes	Silo (360 t)	30 days	4 200 t/a
Sodium hydroxide	Bulk bag	1 tonne	Reagent shed	30 days	1 353 t/a
Activated carbon	Bulk bag	550 kg	Laydown	30 days	158 t/a
Flocculant	Bulk bag	750 kg	Reagent shed	30 days	158 t/a

Description	Delivery method	Delivery size	Storage	Minimum inventory	Average consumption
Hydrochloric acid	IBC	1000 L	Reagent shed	30 days	573 t/a
SMBS	Bulk bag	1000 kg	Reagent shed	30 days	2 396 t/a
Copper sulphate	Bulk bag	1000 kg	Reagent shed	30 days	785 t/a
Hydrogen peroxide	IBC	1000 L	Reagent shed	30 days	38 t/a
Diesel (ex. mining)	Bulk tanker	5000 L	Tank	8 m^3	2 819 kL/a

Table 13 - Process design criteria (Source: WiaGold, 2025)

Parameter	Unit	Value
RoM ore throughput	dry t/a	5 250 000
Plant utilisation		
Crushing	%	80
Milling and leaching	%	91.3
Pressure filtration	%	82.7
Comminution parameters - design		
Crushing work index	kWh/t	20
Bond rod mill work index	kWh/t	14.4
Bond ball mill work index	kWh/t	19.8
SMC test Axb	-	27
Abrasion index	G	0.19
Ore gold grade – design	g/t	1.2
Overall gold recovery – design	%	91.4
Primary crushing		
Crusher type	-	Gyratory
Crusher open side setting	mm	140
Crushed ore stockpile capacity	h	12
SAG mill		
Diameter (inside shell)	m	10.4
Effective grinding length	m	5.24
Mill motor installed power	kW	13 000
Grinding media load - duty	% v/v	11
Total mill load - nominal	% v/v	25
Pebble crushing		

Parameter	Unit	Value
Crusher type	-	Cone
Pebble production – nominal /design	% of new feed	10.6/28
Closed side setting	mm	12
Ball mill		
Diameter (inside shell)	m	7.6
Effective grinding length	M	11.68
Mill motor installed power	kW	13 000
Grinding media load - duty	% v/v	28
Classification		
Target product size – P_{80}	µm	63
Overflow solids content	% w/w	26.9
Gravity		
Gravity gold recovery	%	40
Gravity concentrators	#	2
Gravity concentrator feed – each/total	dry t/h	400/800
Gravity concentrator	dry t/day	5.12
Gravity concentrator treatment	-	Intensive cyanidation inline leach reactor
Pre-leach thickening		
Underflow solids content	% w/w	50
Settling flux	$t/m^2.h$	1.005
Leach and adsorption		
Residence time	h	24
Number of CIL stages	#	6
Carbon gold loading	g/t	1 500
Carbon concentration	g/L	10
NaCN consumption – nominal	kg/t	0.9
Residual NaCN concentration	mg/l	150
Lime consumption - nominal	Kg CaO/t	0.8
Elution		
Circuit size - carbon	dry t/strip	15
Elution frequency	strips/week	6
Solution flow rate	BV/h	2
Elution temperature	°C	140
Electrowinning cell linear velocity	m/min	0.4
Barren electrolyte gold concentration	mg/l	<5
Smelting frequency	smelts/week	3
Carbon reactivation kiln type	-	Horizontal rotary diesel-fired
Cyanide destruction		

Parameter	Unit	Value
CN_{WAD} concentration – feed/discharge	mg/l	100/20
Residence time	minutes	60
SMBS.CN_{WAD} dose ratio	Kg/kg	3
Copper concentration	mg/l	30
Operating pH	-	9
Air injection oxygen utilisation	%	3
Tailings thickening		
Underflow solids content	% w/w	62
Settling flux	$t/m^2.h$	1.005
Tailings filtration		
Feed storage capacity – total	hours	8
Cake moisture	% w/w	14.3
Filtration rate – design	$kg/m^2.h$	216.8
Number of filter units	#	3
Plate size	m x m	2.5 x 3.5
Tails stockpile capacity	h	16

4.10.13 GOLD PRODUCT TRANSPORTATION

The main road that will be used during the construction phase will be the C36 secondary road and the D3714 district road. During operations, the D3714 will be diverted around the Project infrastructure and access/haul roads will be built onto this (Figure 13).

During operations, the main type of material that will be transported will be reagents, consumables and diesel along the route from the Walvis Bay port, via Swakopmund, Karibib, Omaruru and enter the Project site via a purpose-built site access road connected to the C36 road, as shown in Figure 17. Reagents will be typically received on-site in either bulk bags or intermediate bulk containers (IBC) packed into shipping containers, typically with a minimum of 30 days capacity stored on-site to ensure that supply interruptions due to port, transport or weather delays do not restrict production. Reagent containers will be offloaded from the delivery truck by the site crane and stacked in a lay-down area until required.

The B2 trunk road is the preferred route as it is specifically designed for commercial and industrial traffic between inland towns and the Port of Walvis Bay. Although accessing the Project site via Swakopmund, Henties Bay and then Uis offers the shortest distance, this route involves more travel on gravel roads (approximately 120 km more). This makes it less suitable for heavy and frequent traffic.

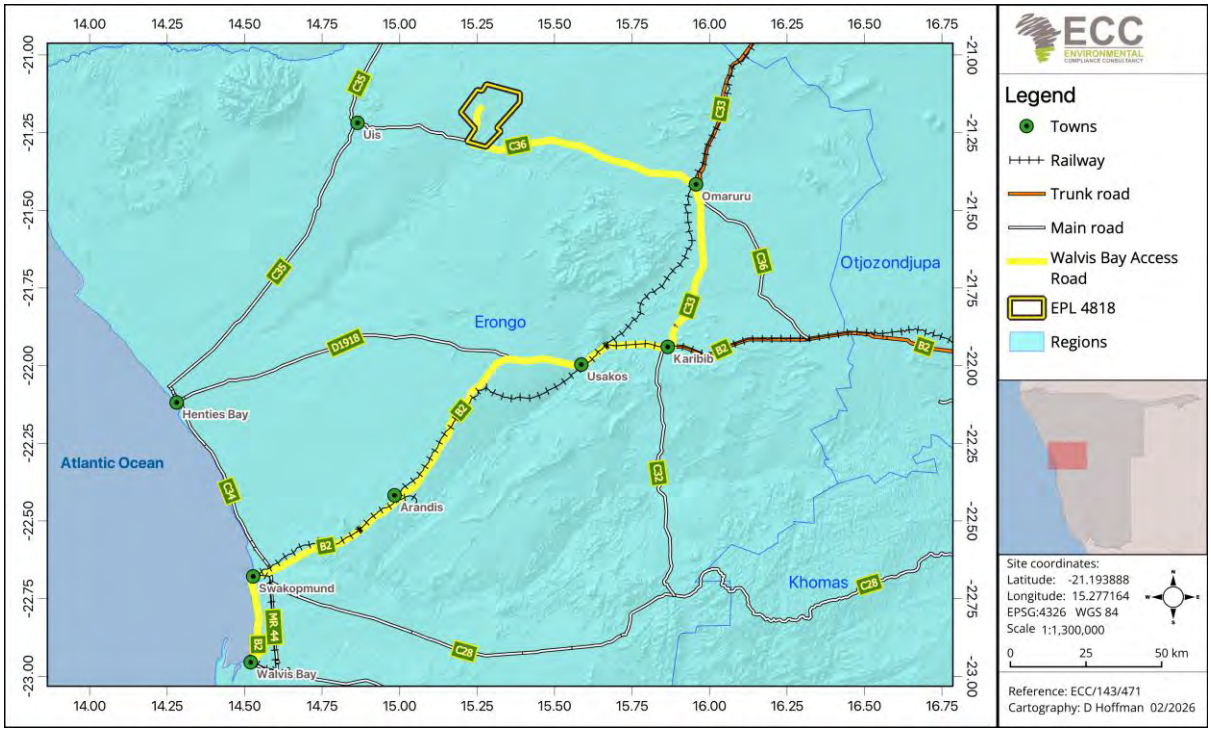


Figure 17 - Expected operational logistics route from Walvis Bay to the Project site

Gold doré bars produced in the gold room will be transported offsite via helicopter every second week for further refining at an external facility. To facilitate this, a helipad with an approximate footprint of 3 300 m^2 will be established in close proximity to the gold room.

4.10.14 ANCILLARY EQUIPMENT

The following ancillary equipment will be required:

- Dozers for floor control and waste dump tip-head management (Caterpillar (CAT) D10);
- Grader for road maintenance (CAT G16);
- Front end loader for ongoing ROM re-handle (CAT 990K); and
- Water truck for dust suppression (CAT 777WT).
- The support equipment fleet consists of units that assist with tasks aimed at improving the safety and efficiency of both primary and secondary fleet operations. These units are not directly involved in production and do not impact output metrics. However, they are important functions that enable smooth and continuous mining activities. The support fleet typically includes:
- Small trucks used for maintenance activities (heavy delivery vehicles such as lube truck(s) and cable rollers);
- Light vehicles (LV) used to transport management, operational staff, admin and support staff personnel around the mine;
- Buses used to transport mine staff (operators) from the change houses to the equipment in the field and back;
- Lighting plant areas to increase visibility during night operations; and

- Pumping equipment for pit dewatering.

4.10.15 OTHER MINING ACTIVITIES AND INFRASTRUCTURE

Most surface haul roads, stockpiles, TSF and WRDs required for the LoM will be constructed during the first year of mining. Waste material will be deposited by haul trucks and spread with dozers to allow the waste material to expand outward over time. Rehabilitation will be prioritised and undertaken progressively, in line with sustainable mining practices (e.g. when deemed practical, progressive rehabilitation will include the use of topsoil and subsoil on outer slopes of WRDs to reduce dust and improve visual integration). Ore stockpiles will be strategically positioned near the primary crusher to reduce haul distances, streamline ore reclaim processes and reduce handling costs. A truck scanner will be positioned at the ROM.

In-pit water management will mainly consist of run-off control around the pit perimeter and temporary sumps at the lowest elevation in the pit. Pit dewatering pumps will pump excess water to a suitable holding dam ready for use in the processing plant or dust suppression.

Haul road dust suppression is considered for the Project and will be handled through a comprehensive dust management system. A bitumen-based product may be applied during haul road construction and maintained on a customised maintenance programme. Stormwater drainage will also be required to separate clean and dirty water systems and prevent flooding to reduce operational downtime experienced during these events.

4.10.15.1 Surface water management/stormwater management infrastructure

Surface water management infrastructure will consist of diversion channels and diversion bunds to divert rainfall runoff from key Project infrastructure.

Key surface management infrastructure will include:

- Diversion bunds: required to divert water from the early stages of open pit mining. This proposed bund will be constructed from mine waste and will require some form of rock armouring to the upstream toe to prevent erosion;
- Pit diversion drain (west): required to divert water to the west of the WRD. This diversion drain has a length of approximately 1.9 km and is unlined. This drain will be required during the 2nd year of operation, when stage 4 of open pit mining commences;
- Pit diversion drain (east): required to divert water from the eastern area of stage 5 and 6 open pits. This diversion drain has a length of approximately 1.5 km and is unlined; and
- TSF diversion drain: required to divert water from the northern boundary of the proposed TSF location, discharges to the east and into existing natural drainage paths. This drain will be unlined and will cover an approximate length of 2.5 km.

4.10.15.2 Pit dewatering

Pit dewatering will be undertaken prior to mining. As water for operations is scarce, all water extracted from the open pits will be re-used in the processing plant or for dust suppression. The Proponent will manage the bore field operations with the mining contractor to ensure incidental water encountered in the open pits is promptly managed.

4.10.16 SERVICES

4.10.16.1 Mining infrastructure

The bulk of the mining support infrastructure will be provided as part of the mining contract by the open pit mining contractors.

The mining infrastructure required for the Project includes:

- Earthworks, including hardstand, drainage, fencing and surface water management, installed by the Proponent;
- Facilities provided by the mining contractor, including:
    - Contractors' offices;
    - Contractors' ablution and change houses;
    - Contractors crib building;
    - Heavy and light vehicle workshops;
    - Warehouses; and
    - Construction of any go lines and maintenance bays in the area prepared by the Proponent.
- Heavy and light vehicle washdown bay and systems, including water cannons, hose reels, silt trap and oily water separator, installed by the Proponent for use by the mining contractor;
- High-flow and low-flow fuel dispensing bowsers installed by the Proponent for use of the mining contractors;
- Services provided and installed by the Proponent will include:
    - Power supply;
    - Potable water supply;
    - Wastewater collection and treatment in the main process plant wastewater treatment plant; and
    - Communication via optical fibre.

4.10.16.2 Diesel delivery, storage, handling and dispensing

Diesel will be delivered to site by road tanker and transferred into a bulk storage facility for subsequent use by the mine, emergency generators and to refuel site vehicles.

A separate self-bunded diesel storage facility will be provided for the process plant consumers (elution heater, regeneration kiln and smelting furnace). The storage tank will be filled from a

bulk tanker and transferred to a head tank located on the upper level of the elution circuit structure to enable subsequent gravity flow to the various consumers.

The diesel fuel storage facility will include up to 24 of 71 720 L capacity self-bunded tanks connected in a master-slave arrangement for a total storage of up to approximately 1.7 megalitres (ML), representing more than 30 days consumption. Since the diesel fuel storage facility is modular, the number tanks will be increased and decreased to match the long-term fuel consumption trends over the life of mine.

Fuel from the storage will be pumped to the process plant, back-up diesel generators and dispensed to the mining area heavy and light vehicle refuelling bowsers. The fuel storage will be filled from road tanker trucks at a dedicated diesel fuel unloading area which also incorporates a low flow refuelling bowser for non-mining light vehicle use. Waste water from the diesel unloading area will report to the mining washdown bay oily-water separator.

Diesel reservoirs for the fire water, emergency diesel generator and generators in the bore fields will be filled from a site service tanker.

A site-based service provider will erect infrastructure and facilities for the storage and handling of fuel. The service provider will also be responsible for the supply, delivery and management of stock for the LoM. The service provider is required to have the relevant MIME permits in place to transport, sell and dispense fuel on site that are specific to the Kokoseb Project.

4.10.16.3 Delivery of consumables

The majority of reagents (other than lime), consumables and spare parts for the Project will be sourced internationally and will therefore be imported via the port of Walvis Bay. A single logistics contractor for general freight to site will be engaged to provide port handling management, customs clearance and inspection management, consolidation in Walvis Bay and transport to site.

The exception to this main logistic contractor will be:

- Fuel deliveries to site will be handled by the fuel supply contractor; and
- Explosive delivery, which will be handled by the explosive supplier or their contracted transport contractor.

4.10.16.4 Geological core shed

The geological core shed building will be constructed as a sheeted steel portal structure. The facility will be utilised by the geology department for the inspection, logging and secure storage of drill core and geological samples. The facility will be equipped with ablution facilities and lighting to support round-the-clock operations (including night shifts).

4.10.16.5 Explosive magazine and bulk emulsion storage facility

An explosives magazine will be established on site for the secure storage and management of emulsion explosives, initiators, detonators and other blasting consumables. The magazine will be located at a safe distance from general working areas, positioned to the southwest of the WRD and east of the processing plant (Figure 13), in accordance with regulatory safety and separation distance requirements.

The explosives facilities will comprise purpose-built structures for storing components of bulk explosives as well as an emulsion plant for onsite production. This approach ensures that bulk explosives are only manufactured when required.

A modular portable emulsion plant will be installed on site which typically consists of the following modules (shown in Figure 18):

- Emulsion/ammonium nitrate solution (ANS) (ammonium nitrate 80% solution) / fuel phase production module (No. 1 in Figure 18);
- Gas generating additives (GGA) and hot water production module (No. 2 in Figure 18);
- Ammonium nitrate bin with auto feed system (No. 3 in Figure 18);
- Emulsion storage tank (No. 4 in Figure 18);
- Administrative module with control panel (No. 5 in Figure 18); and
- Laboratory module (No. 6 in Figure 18)

The Proponent will appoint a reputable contractor to construct the facility and provide blasting services to the mine. The Proponent will also obtain the required permit from the Ministry of Industries, Mines and Energy (MIME) and secure approval from the Namibian Police Force (NAMPOL) for the storage and production of explosives onsite.

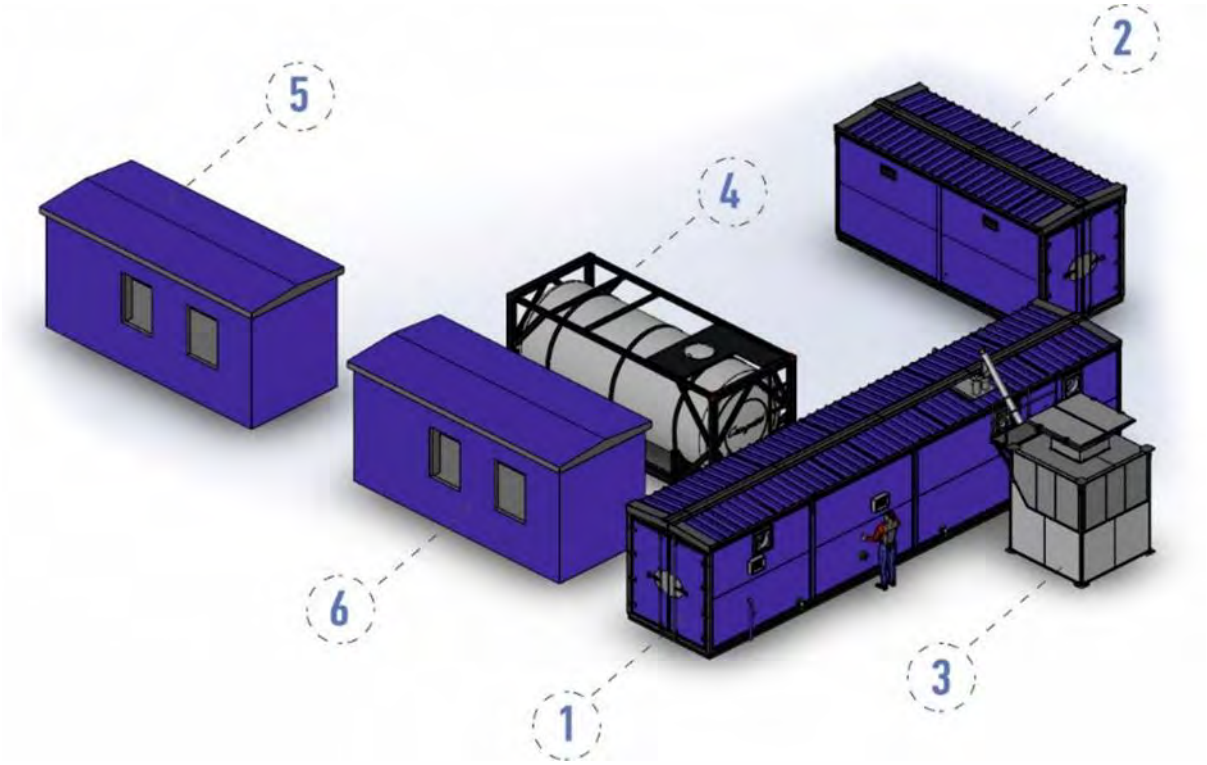


Figure 18 - Typical modular portable emulsion plant configuration (Source: WiaGold, 2025)

4.10.16.6 Security and fencing

The facility features two (2) levels of security: high security and low security. The high security area will be enclosed by a double fence arrangement, using 2.4 m high wire mesh 'cyclone' fences with coiled razor wire above the mesh. A minimum six (6) m wide gap between the fences will be cleared and grubbed.

Areas confined with in the high security area include:

- Milling;
- Recycle crushing;
- Gravity concentration;
- CIL;
- Elution;
- Gold room;
- Helipad;
- Switchyard;
- Laboratory;
- Plant office and control room;
- Plant workshop;
- Sewage treatment plant (STP);
- Tailings storage facility; and
- Plant mess (on-site dining and meal facility).

The low security area will be enclosed by a 2.4 m high wire mesh 'cyclone' fence with 3-strand barbed wire above the mesh.

Areas confined within the low security area include:

- Admin main office;
- Light vehicle workshops, wash bays and office;
- Low security area workshop;
- Warehouse and storage yard;
- Critical spares shed;
- Clinic/HSE/ERT; and
- Project /visitors security office and training room.

Several areas such the ROM pad, coarse ore stockpile, tailings thickening and detox, tailings filtration, water services, air services and reagents will not require to be fenced.

In addition to this security fencing around the facilities, personnel safety fencing will be installed around the site to prevent inadvertent public access, including:

- A single 0.9 m high fence around the perimeter of the entire facilities, mine fly rock areas and inner and critical explosive magazine exclusion zones. The fencing will also include a patrol track around the perimeter; and
- A single 1.8 m high fence around the explosive magazine, accommodation village and other remote infrastructure.

Security fencing will also be determined for the tailings storage facility and advanced wastewater treatment facilities, in line with licence requirements issued by the Department of Water Affairs.

A dedicated and specialist security contractor will be engaged to provide security services for site during the construction and operational phases. The security will be split across the following areas:

- Management of security operations;
- Access control staff at key entry points including the main site gatehouse, process plant, administration area gatehouse, mining infrastructure area and gold room entry;
- CCTV supervisor and operators;
- Gold room supervisor and security personnel; and
- Patrol officers to patrol the process plant perimeter, process plant, administration, mining infrastructure perimeter and site perimeter.

Access to the gold room within the plant will be restricted and strictly controlled as is typical in gold mining operations worldwide. Extensive camera surveillance will be installed, and entry points will be monitored and alarmed. All personnel allowed into the area will be accompanied and monitored by members of the security team. Persons leaving the area will

be subject to a comprehensive search of themselves and any tools or equipment leaving the building.

4.10.17 COMMUNICATION

The on-site communications network is designed around a site-wide fibre optic backbone which will be shared by all services. This will minimise cabling and related communications equipment and will be installed in underground conduits, cable tray and via the overhead powerline. The services that will use the common fibre optic backbone include:

- Corporate local area network including telephony (voice over internet protocol (VolP));
- Plant control system; and
- CCTV/security services.

A microwave internet link will provide external network connectivity to the site. Camp entertainment services will be provided via satellite TV with dishes located on each senior accommodation building.

Radion communications will be supplied by a site-wide private radio network system typically supported across all surface operations by a 30 m high communications tower. All heavy and light vehicles will be equipped with radios.

4.10.18 UTILITIES

4.10.18.1 Power supply

The Project will be connected to the national utility power grid (NamPower grid). Power will be supplied from a 66/22 kV transformer located outside the plant boundary with the electrical system based on a 22 kV distribution and 400 kV working voltages at a frequency of 50 Hz. From the 66/22 kV switchyard, the 22 kV supply will be reticulated from a tariff metered plant feeder to the process plant 22 kV switchboard. Remote loads such as the tailings filtration plant will be fed via a 22 kV overhead transmission line. Connection approval will be required from NamPower and will include approval of the powerline servitude and other NamPower's specifications and requirements. The development of the powerline infrastructure will require environmental authorisation from the Department of Environmental Affairs and Forestry (DEAF) in terms of the Environmental Management Act, No. 7 of 2007 (EMA). The grid connection and powerline infrastructure fall outside the scope of this ESIA and will be subject to a separate ESIA and authorisation process.

Diesel powered back-up generators for plant emergency power will be installed at the process plant and accommodation village. These back-up generators will also provide power prior to the connection of the main overhead power line.

Bore field pumps, both bore pumps and transfer pumps will be supplied with power from local diesel generating sets.

4.10.18.2 Water supply

The operational water demand for the Kokoseb Gold Mine Project is estimated at approximately 1.1 Mm^3/a (WiaGold, 2025). The results of the field reconnaissance investigation conducted by SLR Consulting (Pty) Ltd (SLR) in February 2025 indicate that bulk water supply for the Project will be sourced from two (2) existing water supply schemes, the Okombahe water supply scheme (WSS) and the Ozondati WSS. Both schemes are managed by the local authorities in collaboration with the Directorate of Water Affair (DWA), Namibia Water Corporation (NamWater) and the Erongo Regional Council (ERC). The supply will be supplemented by an undeveloped bore field located on the Omaruru alluvial plain (OmAP), which is planned for development to enhance water supply and security for the Project. In addition, water recovered from pit dewatering activities (through sump pumping) will be stored for operational use.

The following volume estimates and conclusions are based on the reconnaissance water supply investigation conducted by SLR in February 2025:

- Okombahe WSS: the total recommended abstraction is 459 360 m^3/a. The average annual abstraction for the past 20 years is 167 190 m^3/a, suggesting that the scheme operates at about 40% capacity. According to NamWater's data, the scheme has a surplus of about 292 170 m^3/a or 60%;
- Ozondati WSS: the aquifer at Ozondati has the estimated potential to yield surplus water of approximately 220 000 m^3/a; and
- OmAP: abstraction volume was estimated at 52.5 Mm^3.

Potable water used within the plant will be filtered prior to distribution to various end-use points. The water filtration facility will include micro filtration, ultra-violet sterilisation and chlorination. The water treatment plant will supply potable water to the plant, mine services area, paste plant and administration facilities.

As the accommodation village is approximately 10 km south of the plant, a separate modular water treatment plant will be installed. The potable water demand for the Project has been estimated on a per capita usage basis by village residents, day labourers and mining activities and amounts to approximately 150 m^3/d.

The location of the bore fields and pipeline routes is shown Figure 19. Figure 20 presents the conceptual water network for the Project.

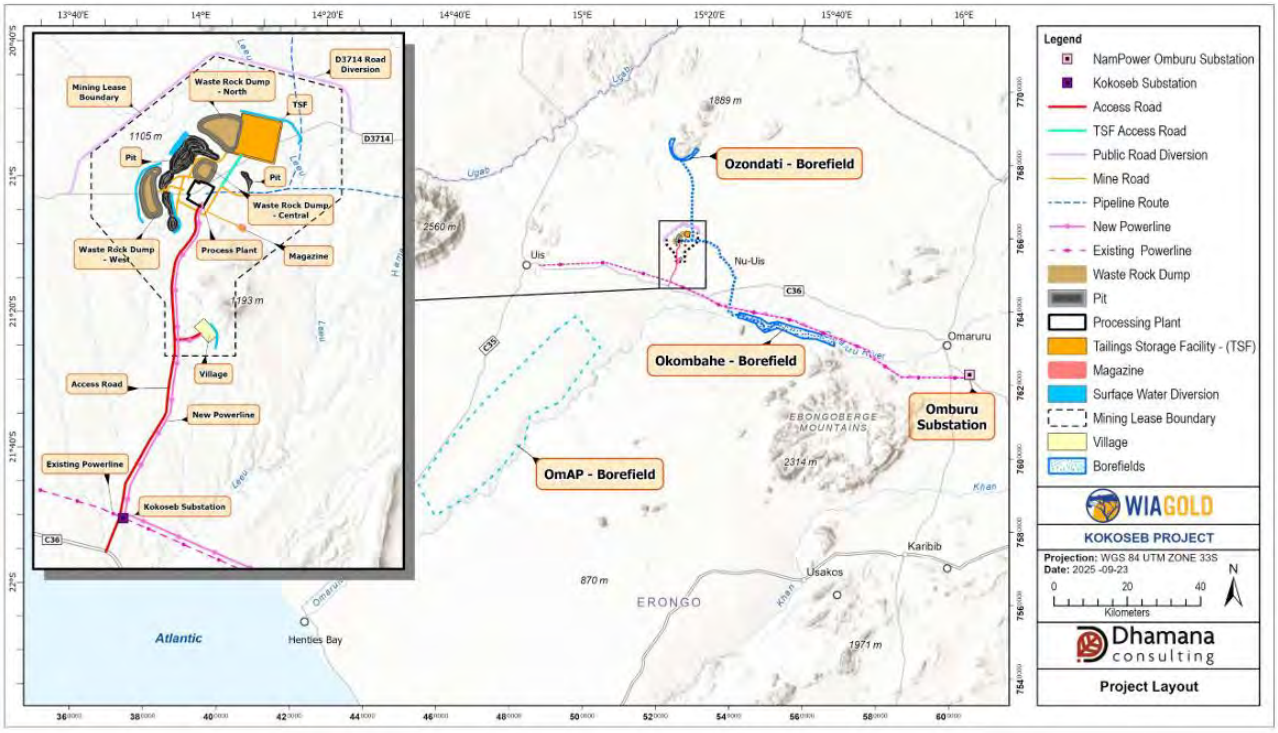


Figure 19 - Location of the bore fields and pipeline routes (Source: WiaGold, 2025)

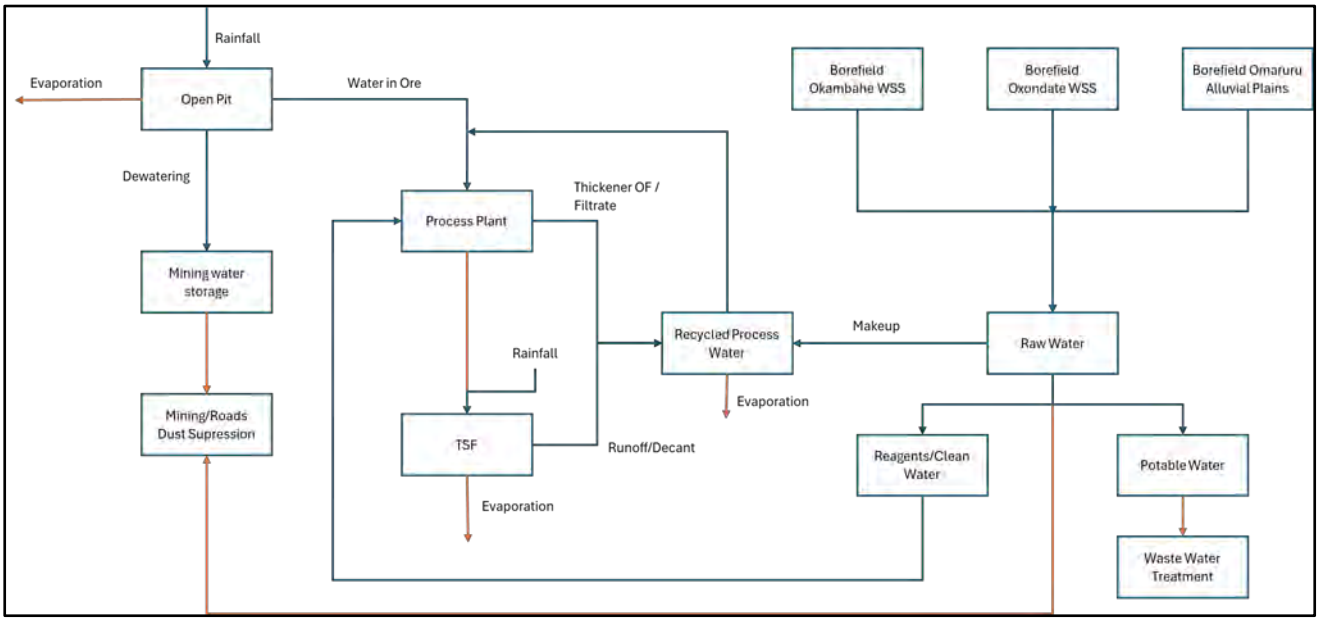


Figure 20 - Conceptual water network for the Kokoseb Gold Mine Project (Source: WiaGold, 2025)

The Proponent will acquire all the necessary water abstraction and water use licences from the DWA to ensure regulatory compliance and sustainable bulk water abstraction from all identified/planned sources. Approval for the proposed water supply pipelines, including the associated pipeline corridors will also be required from DWA in collaboration with NamWater.

This work falls outside the scope of this ESIA and will be handled with a separate ESIA and authorisation process.

4.11 MINERAL AND NON-MINERALISED WASTE

4.11.1 WASTE ROCK DUMPS

Three (3) WRDs have been proposed surrounding the main pit to the north (WRD_N), west (WRD_W) and centrally located between the pit and the processing plant (WRD_C) (Figure 21).

The WRD_C is situated immediately to the east of stage 1 and north of the proposed processing plant location. Excess waste not used for construction will be stored in this dump and any additional space will be utilised for waste from stage 2.

The WRD_N is a large WRD situated to the north of the open pit and merges with the TSF embankment (Figure 21), which will be constructed using mine waste. WRD_N will initially store excess waste from stage 2 before being used to store all waste from stage 3 and stage 7.

The WRD_W is located to the west of stage 4 and stage 5. All waste from stage 4, stage 5 and stage 6 will be stored in this WRD.

The WRDs are strategically placed to reduce the haulage distance from each pit to its respective WRD shown in Figure 21. The targeted gold deposit likely includes sulphide minerals such as pyrrhotite, löllingite and arsenopyrite, which have the potential to cause acid and metalliferous drainage (AMD) from potentially acid forming (PAF) waste rock. This has been considered in the WRD designs and is being investigated through comprehensive geochemical analysis, which also informs this final ESIA and is discussed in further detail within sections 5.12.6 and 7.12.

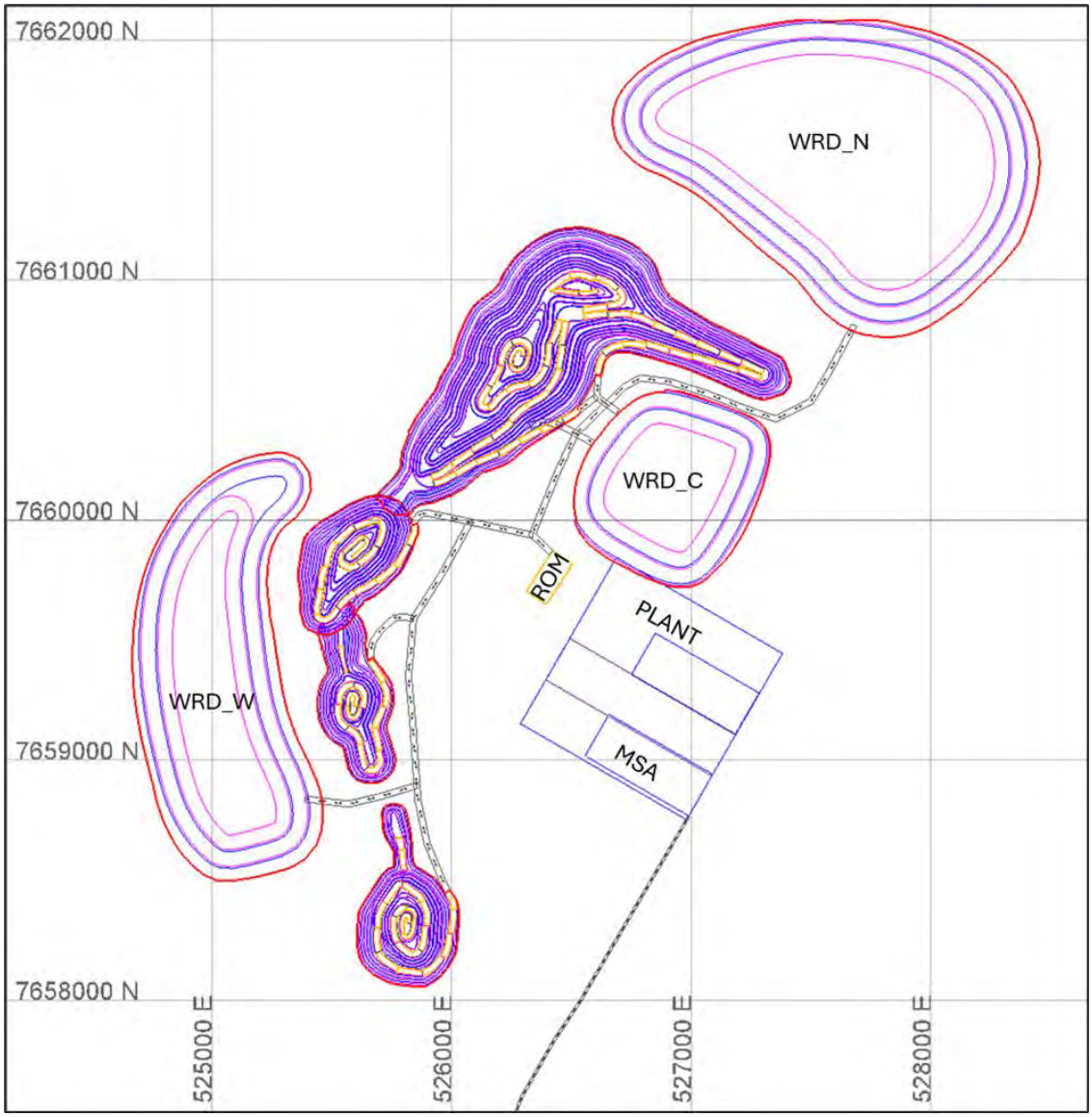


Figure 21 - Location of the WRDs (Source: WiaGold, 2025)

The storage capacities of the three (3) WRDs are summarised in Table 14.

Table 14 - Capacities of the WRDs (Source: WiaGold, 2025)

WRD	Capacity (Mm^3)
WRD_C	13.9
WRD_N	88.0
WRD_W	57.1
Filtered TSF	14.4
Total	**137.4**

4.11.2 LOW-GRADE (LG) STOCKPILE

A low-grade stockpile, with a planned capacity of three (3) megatons (Mt), will be positioned adjacent to the central waste rock dump and closest to the ROM pad and processing facility. This strategic location provides flexibility to cost-effectively rehandle the low-grade ore for processing, should it become economically viable at the end of the mine life. Alternatively, the material can be integrated into the final rehabilitation of the WRD.

4.11.3 TOPSOIL STOCKPILE

The Project site has sparse vegetation. Therefore, it is expected that minimal vegetation clearing and grubbing will be required prior to development. As the area is arid, conservation of the topsoil will be important for mine closure and rehabilitation. Topsoil stockpiles will be developed around the periphery of the WRDs.

4.11.4 TAILINGS STORAGE FACILITY

The tailings storage facility will be a paddock style facility located to the northeast (NE) of the processing plant.

The facility is a single-cell configuration and covers a total footprint area of approximately 190 ha. Considering the climate, the facility will be water negative over the life of operation. The facility will contain a decant structure which will collect any tailings stack runoff water and seepage.

The external wall of the facility will consist of a two (2) zoned, downstream profile embarkment with the upstream slope lined with a high-density polyethylene (HDPE) textured liner. The embarkment will utilise basin borrow (fine-grained soil) and mine waste (mixture of fine-grained soil and waste rock) for the outer zone and will be placed as a part of the mining waste haulage operations. The basin will be lined with smooth HDPE liner.

The starter embarkment will have an initial storage period of approximately two (2) years with an approximate embarkment height of 5 m. The design is based on four (4) raises, providing approximately two (2) to two and a half (2.5) years storage, with the 4^{th} raise to the final

elevation of 1 105.5 maximum residue limit (mRL), representing between 40 m and 50 m above grade.

Closure of the facility will consist of reprofiling the outer embarkment as part of the mine waste rock rehabilitation and hauling a capping material to a reprofiled tailings surface. The capped surface will be covered with topsoil originally stockpiled from the Project development.

Figure 22 shows the location of the TSF.

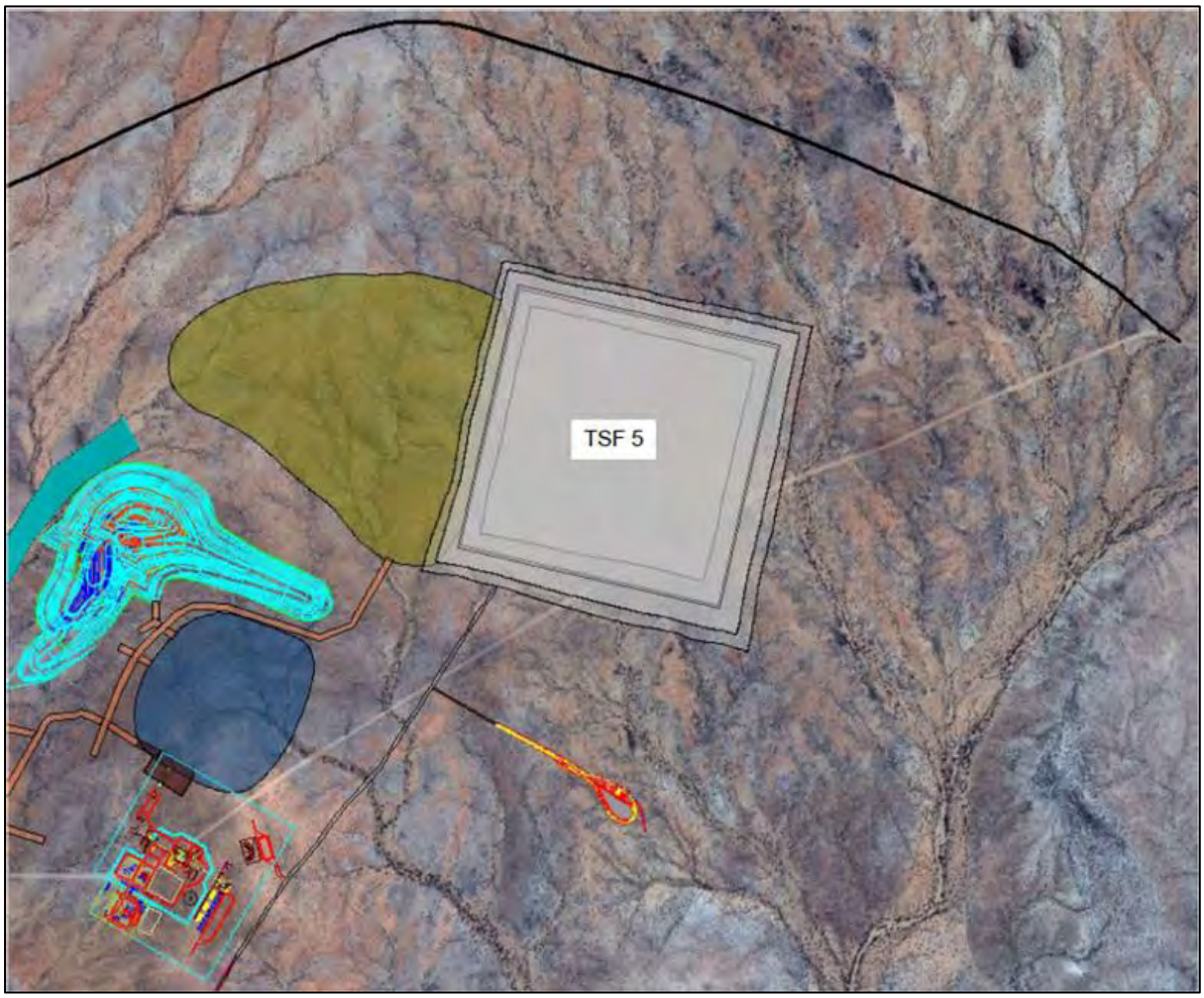


Figure 22 - Location of the TSF (Source: WiaGold, 2025)

4.12 WASTE MANAGEMENT

The Project will produce non-mineralised general/industrial waste and hazardous waste. Examples of waste likely to be generated includes:

- General waste: food waste, disposable PPE, used paper towels and cleaning cloths;
- Recyclable waste: wooden crates, metal scraps, plastic packaging, pallets, cable drums, drink bottles and cans;

- Industrial waste: building rubble and concrete waste;
- Laboratory chemical waste: mineral samples, mineral assay samples, chemical fluids, glass, gloves and general laboratory sample waste;
- Hazardous waste (non-hydrocarbon hazardous materials): solvent packaging, paint and paint residues, batteries and sewage;
- Hydrocarbon waste: oil or grease rags, fluorescent bulbs, lubricant oils, solvent packaging; and
- Medical waste: used bandages and dressings, gloves, masks, syringes, needles, used medical instruments or swabs, expired or unused medications, and biological or specimen containers.

A waste management plan (WMP) will be developed and implemented for the Project to ensure that all waste streams are reused and recycled, wherever possible and that hazardous and hydrocarbon materials are disposed of appropriately.

4.12.1 GENERAL WASTE (NON-MINERALISED)

No landfill will be established on site. However, a dedicated temporary waste storage facility will be established to store general, recyclable, hazardous and hydrocarbon waste until a registered contractor can collect it and transfer it to an off-site disposal facility. Potential off-site disposal locations under consideration include facilities in Uis, Omaruru and Karbib for general waste and recyclable waste and Walvis Bay for hazardous and hydrocarbon waste.

Each work area on site will be equipped with clearly labelled waste bins, designated for specific waste types to ensure the waste streams are not mixed.

4.12.2 HAZARDOUS AND HYDROCARON WASTE

Hazardous and hydrocarbon waste will be collected in dedicated, secure bins placed within bunded areas to prevent environmental leakages. Hazardous waste (except for medical waste) will be incinerated on-site.

4.12.3 LABORATORY WASTE AND MEDICAL WASTE

Laboratory waste and medical waste will be transported off-site by a registered waste management contractor to a permitted medical waste treatment facility.

4.12.4 EFFLUENT AND WASTEWATER TREATMENT

Wastewater generated by the Project will be managed through two (2) advanced biological sewage treatment plants, located within the accommodation village and plant area, respectively. The accommodation village is expected to generate a maximum of approximately 150 m^3/day of wastewater, and the wastewater treatment plant will be designed with a capacity of 200 m^3/day to accommodate peak flows and operational flexibility. The plant wastewater treatment unit will have a smaller capacity designed to accommodate approximately 80 m^3/day of wastewater.

Effluent and greywater from both areas will be conveyed via gravity-fed sewer systems, and pumping systems will be installed where gravity flow is not feasible either due to site topography or infrastructure layout.

The sewage treatment plant will be strategically located at the accommodation village for treated effluent to be discharged into leach drains. Treated plant sludge, following chlorination will be disposed of in lined landfill pits following site-specific waste management protocols.

The Proponent will be required to acquire wastewater treatment and effluent disposal licences from the DWA in accordance with the Water Resources Management Act No. 11 of 2013 and its 2023 Regulations.

4.13 ALTERNATIVES CONSIDERED

A range of alternative options were systematically assessed during the pre-feasibility and feasibility phases of the Project. These alternatives include various mine designs, processing plant technologies, layouts and tailings management strategies.

The evaluation and suitability of these alternatives were considered based on a range of technical risk and environmental impact factors, including water resource availability, geochemical risks such as AMD and metal leaching, geotechnical stability, operational safety and resilience to climate change impacts (e.g. extreme weather events and water scarcity). For each technically viable option, trade-off analyses and multi-criteria decision-making tools were employed to assess relative performance in terms of capital and operating costs, technical risks, environmental impacts and regulatory compliance. These trade-off studies formed an integral part of the decision-making process and have guided the overall Project design.

4.13.1 MINE LAYOUT

Several site layout alternatives were evaluated during the assessment. The selection of layout options is currently constrained by the EPL boundaries, the D3714 district road, ephemeral drainage systems, archaeological sites within the Project area and ecologically sensitive features such as mountainous terrains and ridge habitats.

4.13.2 ENERGY SUPPLY

The alternative energy source identified is predominantly a PV solar power system, integrated with a BESS. This renewable energy option improves energy reliability, particularly during peak demand periods and grid interruptions.

4.13.3 WATER SUPPLY

The Omaruru River, located approximately 20 km from the Project mine site, was investigated as a potential source of water for mining operations. Geophysical investigations were conducted to assess the availability and capacity of underlying groundwater resources to support the Project water requirements. Water supply optimisation strategies are being developed and are continuously being refined to ensure efficient, sustainable and reliable water availability throughout the Project lifecycle.

4.13.4 OFF-SITE LANDFIL SITE

An alternative considered for managing general waste (non-mineralised) is the use of an off-site landfill facility. Waste generated would be securely collected and transported to a permitted off-site landfill site.

4.14 REHABILITATION

The Proponent will develop a detailed mine rehabilitation and restoration plan as part of the mine closure plan that is consistent with the Namibian Mine Closure Framework and the International Council on Mining and Metals' (ICMM) Integrated Mine Closure Good Practice Guide. These plans will include estimated costs and are consistent with Namibian legislation as well as the draft Namibia Mine Closure Framework. This commitment has been included in the final ESMP (Appendix A), and the first draft of this plan must be developed by year three (3) of operations.

A conceptual mine closure plan will be prepared and submitted to MIME within the next twelve (12) months as part of the ongoing mining licence application process.

5 ENVIRONMENTAL AND SOCIAL BASELINE

5.1 BASELINE DATA COLLECTION

Initial desktop baseline studies relevant to the Project were compiled during the scoping phase of the environmental and social impact assessment (ESIA). As part of this assessment, the baseline is studied in detail, with inputs from specialists' studies commissioned as part of the environmental and social impact assessment process.

5.2 DESKTOP STUDIES AND FIELD SURVEYS

Field-based studies were undertaken and completed mid 2025 as part of the ESIA to supplement and validate the initial desktop studies. The hydrogeological field work was completed in December 2025. Site-specific baseline environmental monitoring activities are ongoing to establish a robust environmental baseline dataset for the Project.

The baseline chapter defines the biophysical and socioeconomic environments in which the Project is situated. It is an important part of the impact assessment process as it determines if there are any knowledge gaps that require further investigations prior to finalising the assessment. The established baseline is then used as a reference against which potential Project-related impacts are assessed to determine their significance.

5.3 SPECIALIST STUDIES

Study area	Purpose	Specialists
Social and economic	- Assess the social and economic status quo of communities in the immediate Project area and other regional centres (Uis, Okombahe and Omaruru).	- ECC (2025)
Traffic impact study	- Review the potential traffic impacts and loading on routes associated with mining activities; - Estimate traffic volumes on district and mine routes during the construction and operational phase; - Assess the capacity of infrastructure and safety at the mine entrance; - Assess the need for an intersection upgrade at the mine entrance and provide a concept layout if necessary; and - Assess the design of the D3714 road and provide recommendations to ensure uninterrupted traffic flows throughout the life of mine (LoM).	- Innovative Transport Solutions (2025) (Appendix D)

Study area	Purpose	Specialists
Heritage and culture	- To identify, assess and protect cultural, historical and archaeological resources that may be affected by the Project; and - To comply with Namibian legislation and gain approval (consent) from the National Heritage Council (NHC).	- Dr Alma Nankela (2025) Appendix E)
Noise	- Identify possible noise sensitive receptors (NSRs); - Model noise simulation levels to understand the extent to NSRs; and - Recommend mitigation measures for noise impacts.	- Airshed Professional planning (Pty) Ltd (2025) (Appendix F)
Blast and vibration study	- To assess the impact of blasting (air blast, fly rock and vibration) on receptors in the immediate Project area; and - To determine the safe blast zone.	- Blast Management and Consulting (2025) (Appendix G)
Visual and sense of place	- Assess the Project's visual impacts on the aesthetic character and quality of the receiving environment; and - To determine how changes to the landscape may affect visual receptors (e.g. local communities and tourists).	- ECC (2025)
Air quality	- Provide emission standards and dust suppression requirements; - Assess prevailing wind directions and possible impacts of emissions on receptors (on-site and off-site); and - Recommend mitigation measures for air quality impacts.	- Airshed Professional Planning (Pty) Ltd (2025) (Appendix H)
Climate change	- To assess and understand the requirements to adhere to the implementation of the Equator Principles and climate-related risks, guided by the Task Force on Climate-related Financial Disclosures; and - To model the Project's greenhouse gas emissions throughout the LoM; and - Provide a basis for understanding the Project's contribution to climate change and identify opportunities for emission reduction.	- RDJ Consulting (2025) (Appendix I)
Soil and land use	- Assess existing land use patterns and potential impacts on surrounding land users; and	- ECC (2025) (Appendix J)

Study area	Purpose	Specialists
	- Assess the quality and quantity of material available and suitable for rehabilitation.	
Geochemical impact study	- The geochemical analysis of waste rock, tailings and overburden material to assess the mineralogical composition and acid forming potential.	- RGS & ECC (2025) (Appendix K)
Hydrology	- An assessment of possible flooding, design storm protection measures and diversion of natural drainage channels; and - Recommend management systems for clean and dirty water.	- Umvoto Africa (Pty) Ltd and Hydrologic Consulting (Pty) Ltd (2026) (Appendix L)
Hydrogeology	- Investigate and assess feasible off-site bulk water sources for integration into the Project's water supply strategy; - Investigate and assess feasible on-site bulk water supply sources for the Project; - Assess the potential for contamination of aquifers from TSF and WRDs; - Provide a model to determine impacts of drawdown and plume mobility; and - Assess the sustainability of groundwater supply for bulk water supply and alternative water supply schemes.	- SLR (2025) - ECC and Umvoto Africa (Pty) Ltd (2025 and 2026) (Appendix M)
Terrestrial ecology	- Biodiversity, habitat and ecosystem services; - Identify species of concern and ecological sensitive areas; - Assess impacts of mine construction and operational activities on habitats and biodiversity; and - Recommend applicable, practicable mitigation and management measures for implementation.	- Peter Cunningham (2025) (Appendix N)

5.4 LOCATION

Mining licence (ML) 274 within exclusive prospecting licence (EPL) 4818 is located approximately 15 km northeast (NE) of Okombahe and approximately 30 km east northeast (ENE) of Uis, within the Erongo Region, coordinates: (-21.193888, 15.277164). The ML is bordered by the C36 gravel road to the southwest (SW) and falls within the Okombahe Reserve. A SW portion falls within the Tsiseb Conservancy, and a northwest (NW) corner borders the Ohungu Conservancy.

5.5 SOCIOECONOMIC BASELINE ENVIRONMENT

The socioeconomic baseline chapter provides a comprehensive overview of the social and economic environment of the Project area and the broader regional spectrum. The key aspects discussed include demographic profile and characteristics, employment, income levels, education, health, cultural heritage, land use patterns and access to basic services. Furthermore, the chapter provide insights into the local governance structures, societal structures and core economic functions within the Project area and broader Erongo region.

These elements present an understanding of the socioeconomic landscape and form a baseline against which potential Project impacts can be assessed and future Project development interventions can be planned.

5.5.1 NATIONAL ECONOMIC ENVIRONMENT

Namibia displays significant economic disparities. Despite having endured an economic recession since 2016, Namibia has long been regarded as an upper-middle-income country. However, in July 2025 the World Bank reclassified Namibia as a lower-middle-income country, following a decline in its gross national income (GNI) per capita and a population revision that diluted per-capita income. Namibia holds the second-highest level of inequality in the world, with a Gini coefficient of 59.1, just behind South Africa. In terms of human development, Namibia was ranked at 139 in the 2021/22 Human Development Report (Bertelsmann, 2024).

Namibia continues to strive towards achieving Vision 2030, Harambee Prosperity Plan (HPP), Global Sustainable Development Goals and the African Union Agenda 2063. Namibia's overall development is guided by Vision 2030, supported by short-term five (5)-year development plans, sectoral policies, plans and strategies. Namibia's Sixth National Development Plan (NDP6), covering 2025/26 – 2029/30, is the final step toward Vision 2030 under the theme "Fostering Economic Growth, Inclusiveness and Resilience". It targets an average annual GDP growth rate of 7% and an increase in employment from 63% to 75% (National Planning Commission, 2025).

Mining plays an important role in the economy of Namibia and has consistently been one of the largest contributors to national revenue since independence. In 2022, the sector accounted for 29.6% of government revenue and contributed 12.2% of the country's GDP (Chambers of Mines, 2022). Over the years, mining has remained the cornerstone of the Namibian economy, increasing its contribution to 13.3% to the GDP (Chambers of Mines, 2025). The sector is particularly significant in Erongo Region, where the main commodities mined include uranium (U), gold (Au), lithium (Li), tin (Sn) various precious and dimension stones (granite and marble).

The agricultural sector remains an important contributor and employs a significant portion of the population, particularly in rural areas. Livestock farming (cattle, sheep, and goats) dominates in the central and southern regions, while crop farming, including millet, maize, and sorghum is practiced mainly in the northern and northeastern communal areas, where rainfall and soil conditions are more favourable. The fishing industry is also a key sector along the coast as Namibia is one of Africa's largest exporters of fish products (hake, horse mackerel and pilchard).

The tourism sector is increasingly significant and contributes to the GDP of the country. Etosha National Park, the Namib Desert and the Skeleton Coast are some of the tourist attraction sites in Namibia.

5.5.2 GOVERNANCE

Namibia was established in 1990 and is led by a democratic elected and stable government. Since gaining independence in 1990, the country has maintained political stability and has upheld regular and peaceful transitions of power in accordance with its well-established constitutional framework. As a result of sound governance and stable macroeconomic management, Namibia has experienced rapid socioeconomic development and ranked 136th on the 2025 Global Human Development Index (HDI) out of the 193 countries assessed (World Bank, 2025). Namibia also ranked sixth (6th) out of fifty-four (54) African countries in the 2024 Ibrahim Index of African Governance (IIAG) (Mo Ibrahim Foundation, 2024). This signifies the quality of governance and the government's ability to support human development, enhance economic development and social transformation.

Namibia marked its 35th independence anniversary by inaugurating the fifth (5th) and the country's first female president, following the November 2024 elections (James, 2025). This event reflects Namibia's stable democratic processes and represents a notable advancement in gender representation in political leadership.

Namibia is administratively divided into fourteen (14) regions, which are further subdivided into 121 constituencies. The Erongo Region is divided into seven (7) constituencies, namely: Arandis, Dâures, Karibib, Omaruru, Swakopmund, Walvis Urban and Walvis Bay Rural. The Kokoseb Gold Project is within the Daures Constituency. The Erongo Regional Council (ERC) serves as the primary authority responsible for the coordination of all regional developmental projects through the Ministry of Urban and Rural Development (MURD).

Local governments and authorities (e.g. municipalities, local authorities, village councils, and traditional authorities) at regional and constituency level actively contribute to planning and implementation of community development initiatives and ensure such development initiatives align with local priorities and needs. In addition, these authorities facilitate social progression by addressing local social challenges through promoting access to essential services, education, sanitation and healthcare.

5.5.3 REGIONAL ECONOMY (PROJECT CONTEXT)

In addition to the mining sector, the economy of the Erongo Region is predominated by the local economies of Swakopmund and Walvis Bay. Approximately 80% of households in the region rely on salaries and wages as their main source of income (Namibian Statistics Agency, 2024). This high dependence reflects the dominance of the mining, fishing, manufacturing and processing sectors, together with the prominence of state departments and the administrative sectors within the region. Approximately 7.5% of the households derive their income from non-farming business activities (Namibian Statistics Agency, 2024). In the rural areas of the region, small-scaled communal livestock farming is widespread, and some communities are concentrated to the ephemeral Swakop and Omaruru Rivers, as access to reliable water is critical to sustain livestock in an otherwise arid environment.

The economy of Dâures Constituency is primarily rural and subsistence-oriented, reflecting the constituency's arid environment and dispersed population. Majority of the residents depend on communal livestock farming and small-scale crop cultivation for their livelihoods. Cattle, goats, sheep and donkeys are the most common livestock. Low and erratic rainfall, frequent droughts, and poor soils severely constrain agricultural productivity. These conditions lead to high livelihood vulnerability and seasonal food insecurity (Boell Foundation, 2021).

Mining is a main pillar of the local economy. The historic Uis Tin Mine (UTM), once one of the largest open-cast tin mines in the world, remains an important economic and cultural reference point. Today, small-scale and artisanal mining provides informal employment and household incomes, although with challenges such as limited regulations, fluctuating commodity prices and environmental impacts.

An emerging service sector around Uis and Okombahe encompasses small retail outlets, repair services and hospitality establishments for passing tourists and mine workers. Tourism is potentially linked to the Brandberg Mountain, the desert landscape and wildlife (including desert-adapted elephants).

5.5.4 DEMOGRAPHIC PROFILE

5.5.4.1 Population size and growth rate

Namibia is one of the world's most sparsely inhabited countries, with a population of 3 022 401 recorded in the 2023 population and housing census. In 1991, Namibia's population was approximately 1.4 million, with the Erongo Region accounting for 55 470 people. Between 2011 and 2023, Namibia's population grew by around 3% annually, with urban areas expanding by 65.5% compared to a 26.3% increase in rural populations (Namibia Statistic Agency, 2024).

A significant population increase in 1994 followed the reintegration of Walvis Bay from South Africa. Growth between 2001 and 2011 was driven largely by industrialisation in coastal towns and expansion in mining activities. By 2011, the national population stood at 2 113 077 (Namibia Statistics Agency, 2011). The population and housing census conducted in 2023 reported that the Erongo Region has a population of 240 206 (Namibia Statistics Agency, 2024). Currently, the region is the fifth most populated region in the country, with a population density of 3.8 persons per km2 (Namibia Statistic Agency, 2024). Additionally, the 2023 population and housing census reported that the Daures Constituency has an estimated population of 14 601 and 4 820 households. The wider Erongo Region recorded 74 475 households in total. Within the constituency, the settlement of Okombahe has an estimated population of 1 295 while Uis has an estimated population of 1 771 people (Namibia Statistics Agency, 2024).

5.5.4.2 Regional age structure

Namibia has a youthful demographic profile, as 66% of people are below the age of 35 and 37% are children under 15 years (Namibia Statistics Agency, 2024).

The Erongo Region has a distinctly urban profile, with approximately 216 215 or 90% of the total population) living in urban areas. Nearly two-third of the region's population are of working-age groups (15 – 59 years). Children and young people (0 – 14) account for just under 30%, while the elderly (60 years and above) account for only 5.8% (Namibia Statistics Agency, 2024). This demographic pattern reflects the region as an economic hub that attracts young adults for employment in the mining, fishing, and tourism sectors. As a result of this, there is a strong drive and demand for jobs, housing, and urban infrastructure development to accommodate the growing working-age population.

The age distribution in Erongo Region shows notable differences between rural and urban areas. Children under 15 years are more prevalent in rural areas (42%) than in urban areas (32.1%). In contrast, the youth population (15 – 34 years) is predominantly in urban areas (38.4%) compared to rural areas (29.8%). The elderly poplulation (60 years and above) is higher in rural areas (9%) than in urban areas (4.7%). Among the working-age group (15 - 59 years), 63.2% reside in urban areas, compared to 49.1% in rural areas (Namibia Statistics Agency, 2024).

5.5.4.3 Sex composition

Women and girls make up just over half of Namibia's population (51.2%), while men and boys account for 48.8%, resulting in a national sex ratio of 95 males for every 100 females.

Labour-driven demographic patterns have had a pronounced impact on the region's overall sex composition. According to the 2023 population and housing census, the Erongo Region recorded 122 322 men/boys (50.9%) and 117 884 women/girls (49.1%), resulting in a sex ratio

of approximately 104 males to every 100 females. This represents a shift from the 2011 Census, which reported 93.6 males to every 100 females (Namibia Statistics Agency, 2024). The reversal of the sex balance over time and the divergence from the national sex ratio reflect demographic and economic dynamics. The predominance of male labour drives migration into Walvis Bay, Swakopmund and other urban centres and settlements linked to mining, fishing and port industries.

In the 2023 population & housing census, Dâures Constituency had 14 601 people. Of those, 8 061 were male and 6 540 were female. That is approximately 55.2% male and 44.8% female. This represents a noticeably higher proportion of males compared to the region's average (about 51% male and 49% female) (Namibia Statistics Agency, 2024). The sex imbalance in Dâures Constituency likely reflects the constituency's migration patterns within the region.

5.5.4.4 Household characteristics

Average household size in Namibia has been on the decline since 1991 and currently stands at 3.8 persons per household. In Erongo Region, the average household size is 3.1, the lowest among the country's regions and a distinct share with //Kharas Region (Namibia Statistic Agency, 2024).

Majority of households in the region are male-headed, accounting for 65.6%. Most households (80%) rely on salaries or wages as their primary source of income. This is followed by income from business activities (5.5%), pensions (5.2%), and remittances or grants (5%). Subsistence farming contributes as the main source of income for only 0.4% of the households (Namibia Statistics Agency, 2024).

Erongo Region has approximately 74 795 households. Of these, 4 820 are located in Dâures Constituency. This reflects that the constituency is rural and is sparsely populated.

5.5.4.5 Unemployment

Namibia has a persistently high and increasing unemployment rate despite its upper-middle-income classification. The general unemployment rate stood at 33.4% in 2018, which increased to 36.9% in 2023. According to the 2023 Labour Force Report, Namibia's working-age population stood at 1 876 122, whereby approximately 320 442 (17.1%) individuals were recorded as unemployed (Namibia Statistics Agency, 2024).

The region has an unemployment rate of 32%, which, while although lower than the national average of 33.4%, still reflects significant labour market challenges. The unemployment rate for men in Erongo Region is 29.7% and 34.8% for women (Namibia Statistic Agency, 2024). This gender disparity is largely attributed to the region's male-dominated sectors such as port operations, fishing and mining.

5.5.4.6 Youth unemployment

Youth unemployment nationally is higher than the national average (i.e. than overall unemployment). The 2023 Labour Force Study Report highlights that youth unemployment remains critically high, estimated at 44.4% (Namibia Statistics Agency, 2024).

Youth unemployment in Namibia remains a significant concern. Data[1] from the Afrobarometer survey (April 2024, round 10) indicate that 58% of young adults aged 26 - 35 years are without work and are actively seeking employment. This highlights the challenges facing young people in accessing the labour market.

5.5.4.7 Education

The available education statistics for the Erongo Region provide critical and useful insight regarding literacy, enrolment and school progression in the region.

The adult literacy rate in the Erongo Region is high, with 96.7% of individuals aged 15 and older reported as literate. Literacy rates are even higher in Walvis Bay urban, where 99.3% of youth aged 15 - 24 years are literate (Namibia Statistics Agency, 2014a). Although specific data for rural areas within the region is limited, it is generally acknowledged that literacy rates in rural communities are lower compared to urban counterparts, primarily due to restricted access to educational resources.

Early childhood development (ECD) enrolment in the region is low at 24.2%, with rates of 27.8% in Walvis Bay urban and 25.6% in Walvis Bay rural. There is minimal gender disparity, and a greater proportion of children attend edu-care centres than pre-primary programmes (Namibia Statistics Agency, 2014a).

School survival rates in the region show strong retention at lower levels but significant drop-off at higher grades. In 2018, 88.2% of learners progressed from primary to secondary while 78.3% advanced from grade 9 to grade 10. Only 44.2% advanced from grade 11 to grade 12 (MEAC, 2020).

The 2021 National Planning Commission's (NPC) Targeted Review Report on youth unemployment identified the challenges within the Namibian education system. According to the National Planning Commissions' Targeted Review Report (2021) on youth unemployment, 35% of respondents had no formal education. The key challenges include issues related to access, equity and efficiency that also contribute to the high unemployment rate. The re-admission and age-limit policy for junior secondary education in Namibia also contributes to skills shortages. Majority of young people drop out of school at this level to join the ranks of the unemployed with minimal qualifications.

[1] Representative sample size of 1 200 individuals, Namibian citizens of voting age (18 years and older).

By their late 20s or early 30s, majority remain unable to access vocational training institutions and are therefore excluded from opportunities for formal employment.

5.5.4.8 Health

According to the Ministry of Health and Social Services (MoHSS), there are eighteen (18) primary healthcare facilities in Erongo Region, including two (2) health centres, and four (4) district hospitals. These are complemented by private hospitals in both Swakopmund and Walvis Bay, which ensure a good mix of public and private healthcare services.

According to the Namibia Population-Based HIV Impact Assessment (NAMPHIA, 2017), Erongo Region had an adult (15 – 64 years) HIV prevalence of 10.6%, with a marked gender disparity of 15.1% among women and 7.5% among men (MoHSS, CDC & ICAP, 2019). These figures place Erongo close to the national average at the time and highlight the higher vulnerability of women to HIV infection. The President's Emergency Plan for AIDS Relief (PEPFAR) of 2022 estimates indicate a national HIV prevalence of 8.3% (19.3% in women and 12.3% in men aged 25 years and older).

Tuberculosis (TB) is the fifth highest cause of death in Namibia. Those infected with HIV are about twenty-five (25) times more likely to develop active TB. Erongo Region has a history of high numbers of TB cases with about 5% of deaths in the Erongo Region caused by TB (Namibia Statistics Agency, 2020). This history is linked to Walvis Bay, which was among the first towns in Namibia to experience cluster infections during the Coronavirus Disease of 2019 (COVID-19) pandemic. As a town with an international harbour, multiple trucking companies and overcrowding in townships, Walvis Bay's conditions facilitate rapid spread of airborne diseases.

5.5.4.9 Sexual and reproductive health

Reproductive health is directly tied to population dynamics, gender equality, health outcomes, and social well-being. It frequently intersects with issues like gender-based violence (GBV), poverty, youth development and social cohesion.

The national adolescent pregnancy rate is at 19%. This implies that one (1) in five (5) adolescent girls aged 15 to 19 years have been pregnant (UNFPA, 2020). Erongo Region has been reported to have one of the lowest teenage pregnancy rates (8.8%) among all fourteen (14) regions. Other regions with similarly low rates include Khomas Region (7.8%) and Oshana (9.6%). Unintended pregnancies among adolescent girls reflect the high levels of risk they face regarding sexually transmitted infections (STIs). Adolescent girls are among the most vulnerable groups for HIV infection in Namibia, with young women aged 15 - 24 accounting for approximately 30% of all new infections (UNAIDS,2022). Teenage pregnancy is also an indicator of compromised safety for girls, reflecting their heightened exposure to GBV, sexual coercion and exploitation.

Sexual and reproductive health services in the Erongo Region are compromised, as is the case in all the regions (especially in light of recent USAID health cuts).

5.5.4.10 Gender-based violence (GBV)

Sexual and gender-based violence (SGBV) remains a persistent challenge in Namibia. One (1) in four (4) young women in Namibia are survivors of intimate partner violence (Ministry of Health and Social Services and ICF International, 2014), while 86% of sexual and domestic violence survivors are women and 93% of perpetrators are men (Legal Assistance Centre, 2012). Among young men (age 15-19) who participated in the health survey conducted by the MoHSS in 2013, 29.5% consider it justifiable for a husband to beat his wife, while 28.3% of young women in the same age group expressed the same belief.

The 2019 Namibia Violence against Children and Youth Survey conducted by the Centres for Disease Control and Prevention assessed the experiences of females and males aged between 13-24 through a nationally representative sample of households. Among 18 - 24 years old, more than one (1) in four (4) females (28.7%) and three (3) in ten (10) males (30.4%) reported experiencing some form of sexual, physical or emotional violence in the past twelve (12) months (Centres for Disease Control and Prevention, 2021). Among 13 - 17-year-olds, over one (1) in three (3) females (34.2%) and males (35.5%) reported the same form of violence during the same period. Regarding the sexual violence in childhood among 18 - 24 years old, approximately one (1) in ten (10) females (11.8%) and one (1) in thirteen (13) males (7.3%) reported experiencing sexual violence before the age of eighteen (18). Additionally, nearly one (1) in four (4) females (23.8%) and males (22.6%) experienced physical violence in childhood at the hands of a parent, caregiver or other adult relative.

According to local news sources, the Erongo Region recorded 493 GBV cases, ranking it the second highest among Namibia's fourteen (14) regions in the 2023/2024 financial year (Namibian Press Agency, 2024). These figures highlight the urgent need for targeted interventions to address GBV in Erongo Region. In response to the rising GBV cases, the Erongo Regional Council established the Erongo Regional Gender Permanent Task Force in September 2024. This initiative seeks to coordinate cross-sectoral efforts to combat GBV, strengthen support for survivors and ensure accountability for perpetrators (Terblanché, 2024).

Namibia has a comprehensive legal and policy framework to protect women from GBV and intimate partner violence. However, access to prevention and response services remains limited and uneven across the country. There are no social workers or counsellors based in the Dâures Constituency to respond to GBV cases[2]. There is, however, a social worker

[2] Uis has an operational police station under the Namibian Police Force (NamPol). It serves as the primary law enforcement authority in the area, including handling cases of GBV.

stationed in Omaruru from the MoHSS and another in Usakos from the Ministry of Gender Equality, Poverty Eradication and Social Welfare (MGEPESW).
Both are tasked with supporting GBV victims in the area. In addition, Lifeline Childline operates a national GBV helpline that provides counselling and referral services to anyone in need.

5.5.4.11 Crime

Crime remains a significant concern in Namibia. During the 2023/2024 financial year, the Namibian Police recorded a total of 110 551 criminal cases nationwide. The Khomas, Oshana, Otjozondjupa and Erongo regions accounted for majority. Specifically, the Erongo Region recorded a total of 8 709 (8%). The most common reported offences included theft, stock theft, housebreaking, common assault, GBV and fraud.

5.5.4.12 Alcohol and drug (substance) abuse

The Namibia Demographic and Health Survey (MoHSS & ICF International, 2014) provide valuable insights into alcohol consumption patterns among Namibians. Approximately 50% of women and 60% of men aged between 15 – 49 years reported having consumed alcohol at some point in their lives. Among those who drink, 45% of women and 34% of men reported consuming one (1) to two (2) alcoholic drinks per day.

According to World Health Organization (WHO) (2025), the country snapshot on alcohol and health indicate that 26.9% of adults (15+ years) consumed alcohol, with 36.3% of males and 18.4% of females reporting alcohol use. Heavy episodic drinking, defined as consuming six (6) or more drinks on a single occasion in the past thirty (30) days was reported by 12.7% of adults. This was more prevalent among males (20%) than females (6.5%).

These statistics highlight the substantial prevalence of alcohol use in Namibia, with marked gender disparities. Research indicates that migrant workers, who live far from their families and communities and work irregular shifts in industrial towns with limited recreational opportunities, are particularly vulnerable to alcohol and drug abuse (Maree, Ananias, Lightfoot, Katondoka, & Ashton, 2008).

5.6 SOCIOECONOMIC BASELINE ENVIRONMENT: SOCIAL

5.6.1 LAND USE

The Project site is predominantly situated within the Okombahe Reserve. Okombahe Village was officially established as a Rhenish mission in 1870 and is situated in an area historically inhabited by the ǂNūkhoen (Damara) people. Today, Okombahe is recognised as a cultural centre for the ǂNūkhoen and hosts the annual Damara King's Festival.

The general Project area is predominantly rural and is characterised by communal agricultural activities, with land use mainly focused on small and subsistence livestock farming.

The SW portion of the EPL falls within the Tsiseb Communal Conservancy. The conservancy was registered in January 2001 and covers an area of approximately 7 914 km^2. The conservancy is characterised by a variety of free-ranging game such as elephants, leopards, cheetahs and mountain zebras. Additionally, the area has significant cultural and natural tourism attraction sites such as ancient rock paintings and the Brandberg Mountain (Namibia's highest mountain).

Farming activities within the boundaries of ML 274 will be discontinued as these areas will be cleared and repurposed for mining operations. The affected farmers will be relocated. However, farming activities on adjacent communities and village houses to the south of the Project site (>3 km) are expected to continue with minimal to moderate disruption. These impacts are discussed in detail in section 7.3.1.1.

On a regional scale, the Project site is situated within a broader, active mining landscape. The nearest operational mine is the Uis Tin Mine (UTM), located to the west (W) of the Project site. Small-scale and artisanal mining activities are prevalent throughout the broader region.

5.6.2 BUILT ENVIRONMENT AND INFRASTRUCTURE

5.6.2.1 Infrastructure and bulk services

The C36 gravel road, located to the south (S) of the Project site is primarily used by tourists and local communities commuting between Omaruru, Okombahe and Uis. This route will serve as the primary access route to the mine site. An access road will be developed during the construction phase to connect the mine site directly to the C36 road. The C36 connect the Project site to the B2 trunk road (also referred to as the Trans Kalahari Highway). The B2 trunk road is engineered to carry heavy duty vehicles and serves as the primary transportation corridor and connect the Project and other industrial operations within the country with the port in Walvis Bay. Maintenance and management of the B2 road falls under the jurisdiction of the Road Authority (RA).

The D3714 gravel road transverse the proposed Project infrastructure. This road will be diverted to the north/northwest of the Project site during the construction phase.

Bulk water to Okombahe and Uis is pumped by Namibia Water Corporation (NamWater) from the Von Bach Dam, Swakoppoort reservoir and Omatako Dam. In the broader region, water supply is sourced from underground aquifers. Water points have been established within rural areas and villages through NamWater's rural water supply programs. These efforts have been made to ensure surrounding communities have equitable access to clean water for domestic use and small-scale farming activities.

The TransNamib Railway line from Kranzenberg through Omaruru and Otjiwarongo to Tsumeb parallels the C33 road to the east of the Project site. Okombahe and Uis are presently supplied with electricity by Erongo Regional Electricity Distributor (ErongoRed) via a 66 kilovolts (kV) overhead grid. A new 95 km 66 kV overhead transmission line from NamPower's Omburu substation, situated near Omaruru is proposed as the primary power supply for the Project. This new line will run parallel to the existing line.

The greater Project area is under-developed, charaterised by expansive open landscapes and minimal infrastructure. Rural homesteads are sparsely distributed across the region, with homesteads and settlements scattered at considerable distances from one another.

Major regional roadways surrounding the Project area and within the broader Erongo Region are shown in Figure 23.

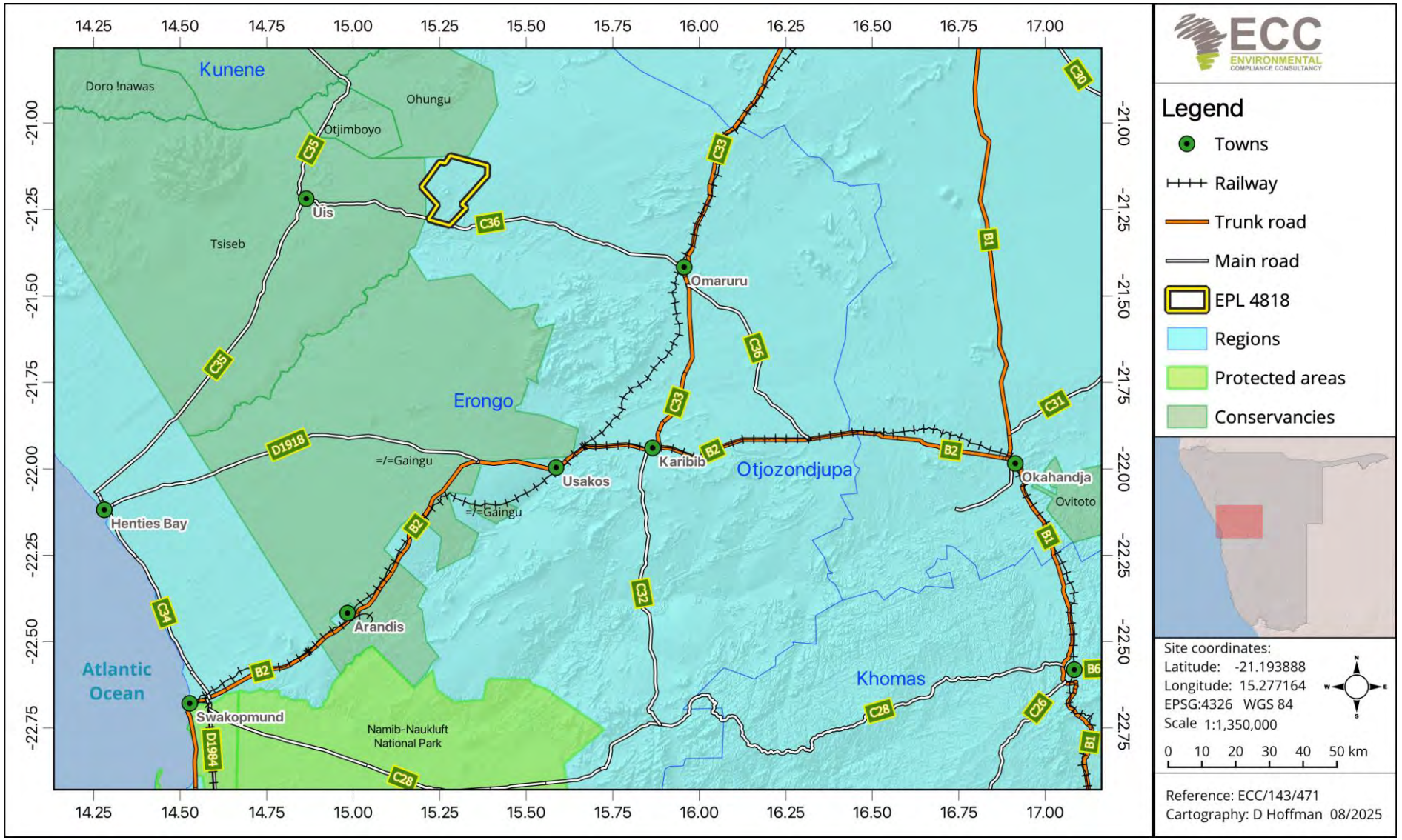


Figure 23 - Major regional roadways within Erongo Region

5.6.3 TRAFFIC AND TRANSPORT

Innovative Transport Solutions (ITS Global) was commissioned by ECC to assess the road traffic baseline conditions within the immediate Project site. The traffic study was completed in August 2025 and is provided in Appendix D . This assessment documents the current baseline traffic volumes and conditions of major road networks in the immediate Project area. The assessed traffic scenarios and associated impacts are discussed further in detail in chapter 7.4.

5.6.3.1 Conditions of major existing roads

This section describes the baseline conditions of major existing roads within and surrounding the Project area that may be utilised during the construction, operation and decommissioning phases. The roads are described in terms of their classification, signage, surface type, speed limits and maintenance status.

The major existing roads within and surrounding the Project area are as follows:

- **C36 road:** A gravel road between 2 km west of the C33/C36 intersection and at the C36/D3714 intersection. The speed limit along the road is 100 km/h. There is signage along the road which indicates the alignment of the road. Advance warning signage for bridges and hazard plates is erected at the beginning of the gravel road.
- **D3712 road:** A gravel road with a speed limit of 100 km/h and signage present along the roadway.
- **D3714 road**: A gravel road with a speed limit of 80 km/h and signage present along the roadway.
- **B2 road:** The roadway is typically a dual carriageway with a median and shoulders in Walvis Bay, Usakos and Swakopmund and a single lane per direction with on-street parking in Karibib. The speed limit lowers to 60 km/h when approaching the towns. This trunk road connects all Projects to the logistic port (NamPort) in Walvis Bay.
- **C33 road:** A single lane per direction with no shoulders on both sides of the road. There is signage present along the roadway, and the road is in good condition.
- **C34 road:** The roadway is a paved single lane per direction with no shoulders on both sides. The speed limit is 120 km/h.
- **C35 road**: The roadway is a paved single lane per direction with no shoulders on both sides of the road for approximately 35 km north of the C34/C35 intersection. The posted speed limit at this paved section is 120 km/h and there is signage present along the roadway. Thereafter, the C35 is a gravel road with a speed limit of 80 km/h until Uis. The paved section of the road is in good condition. However, the gravel section of the road is in fair condition, as some portions of the road show signs of corrugation.

5.6.3.2 Baseline traffic volumes

The 2025 baseline traffic volumes were estimated based on a 12-hour (06:00 – 19:00) traffic count conducted during a typical weekday survey at the following intersections:

- C36 road / D2306 road / 3712 road (stop priority control);
- D3712 road / D3714 (stop priority control); and
- C36 / Wia Gold Mine access road (future access road).

Based on the capacity analysis, the traffic engineers at ITS determined that all intersections operate at an acceptable level of service and have adequate spare capacity. Therefore, no intersections upgrades will be required. This demonstrates that the introduction of more traffic associated with the Project would be possible.

Figure 24 shows the 2025 baseline traffic conditions in the immediate Project area.

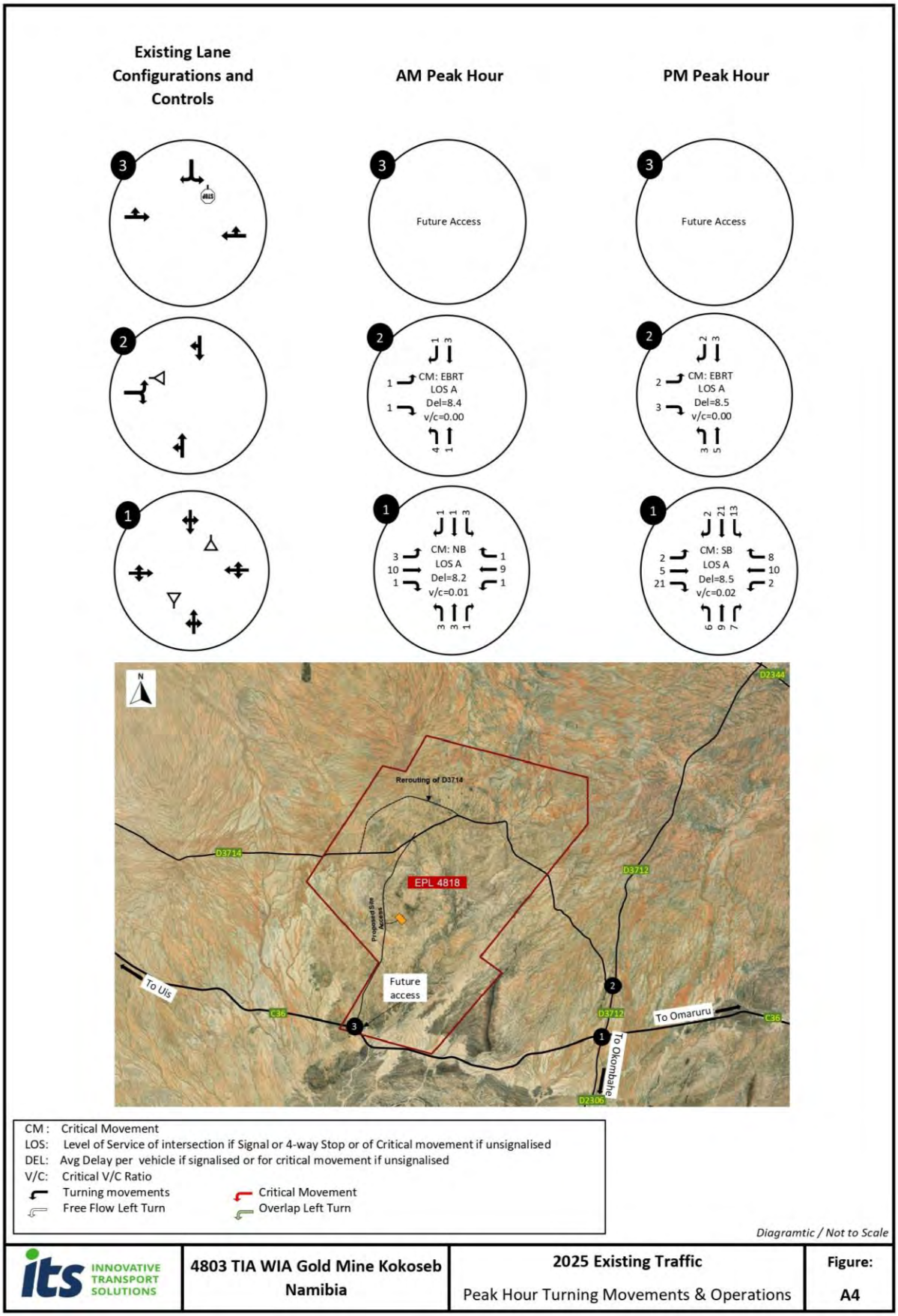


Figure 24 - 2025 baseline conditions for intersection hourly traffic volumes (Source: ITS, 2025)

The major existing roadways in proximity to the Project area includes:

- C36 (M0064) road – main road with gravel lanes and a speed limit of 100 km/h;
- D3714 road – a district road with gravel lanes and a speed limit of 80 km/h. The district road currently runs through the Project site. It is planned to realign this roadway north/northwest of the Project site;
- D3712 road – a district road with gravel lanes and speed limit of 100 km/h; and
- D2306 road – a district road with gravel lanes and speed limit of 60 km/h.

5.7 HERITAGE AND CULTURE

The baseline archaeological field survey and assessment for the Kokoseb Gold Project was conducted by Dr Alma Nankela in September 2025 (refer to the heritage specialist report provided in Appendix E). The field survey identified twelve (12) archaeological sites and features that warrant protection under the National Heritage Act, No. 27 of 2004. Of these, eight (8) of the sites are located within EPL 4818 while four (4) are located in adjacent areas, outside the boundary of EPL 4818.

The heritage features represent a cross section of the region's cultural landscape and may be sensitive to the proposed mining and associated development activities. This section provides a detailed description and condition of each heritage feature/site. The locations of the identified heritage sites in relation to the planned mine operational areas are shown in Figure 25. The potential vulnerability and susceptibility of these features and sites to mining-related disturbance are discussed in section 7.5.

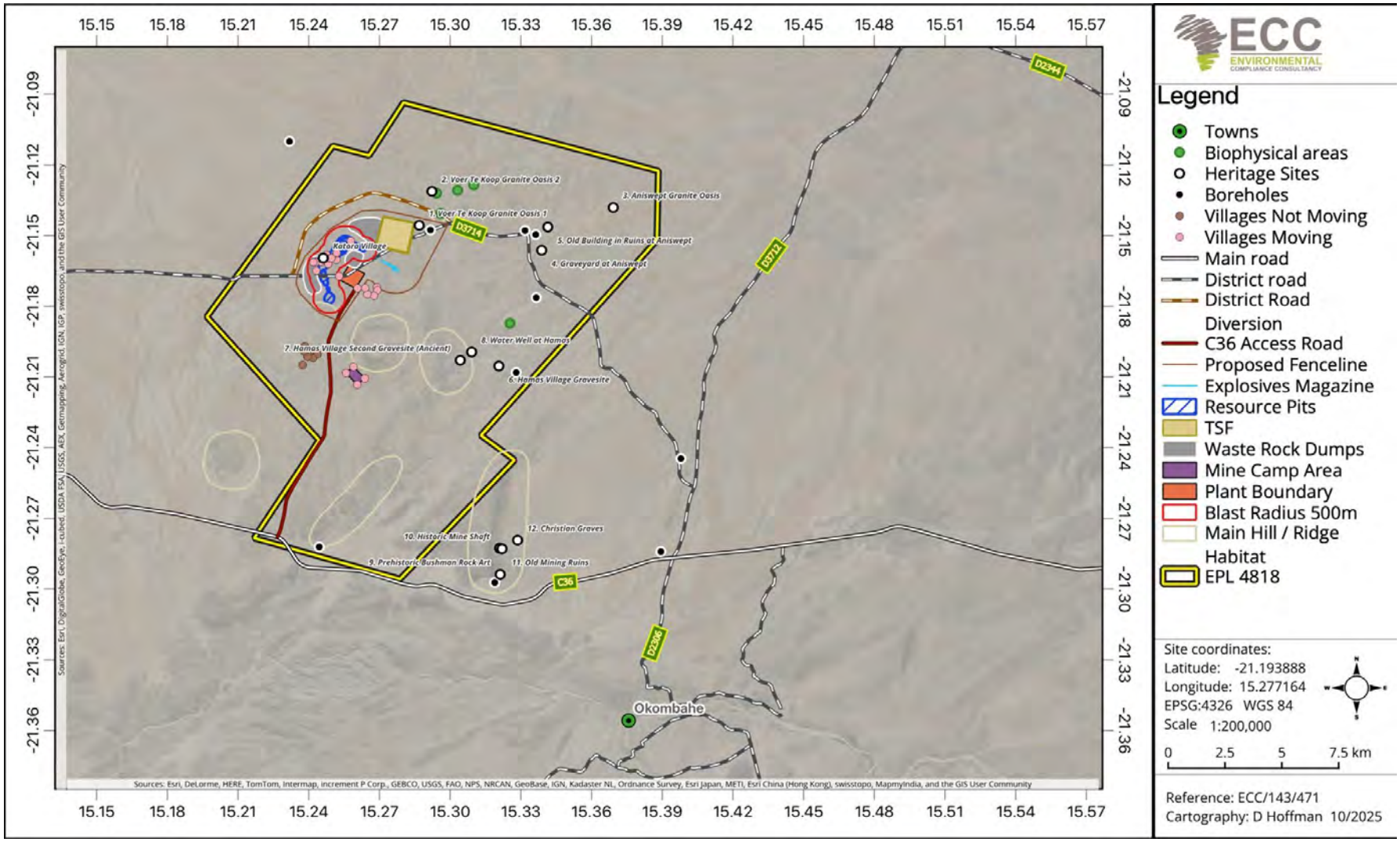


Figure 25 - Spatial distribution of the identified heritage sites/features in relation to the mine infrastructure layout and biodiversity hotspot areas

5.7.1 HERITAGE FEATURES RECORDED WITHIN EPL 4818

Eight (8) heritage features that fall directly fall within EPL 4818 include three (3) historic water sources (pools), one (1) cemetery containing approximately twenty (20) unmarked graves, one (1) historic ruined structure, one (1) Christian grave site with four (4) un-marked graves, one (1) historic gravesite with approximately thirty (30) marked graves and one (1) historic well (water point) (Nankela, 2025). These heritage features are discussed in detail in the sections below.

5.7.1.1 Historic water sources (Pools)

The three (3) historic water sources are locally known as Voer Te Koop Granite Oasis 01 (No. 01), Voer Te Koop Granite Oasis 02 (No. 02) and Aniswept Granite Oasis 03 (No. 03) (Figure 26). These ephemeral historic water sources have multiple depressions that retain water for extended periods after the rainfall season. The water pools are regarded as sacred by the local communities for sustaining both human and animals, and historically they are linked to the 19th century pastoral activities when hunters and gatherer groups increasingly migrated into the area in search for reliable water sources and suitable grazing land (Nankela, 2025). As tension and competition over water sources increased, such places were guarded and kept under surveillance at various vantage points. Therefore, these sites may have functioned as resource bases, strategic locales for hunting and gathering where animals were likely ambushed at water points during the dry periods (Nankela, 2025).

Figure 26 - Voer Te Koop Granite Oasis 01 (a), Voer Te Koop Granite Oasis 02 (b) and Aniswept Granite Oasis 03 (c) (Source: Nankela, 2025)

The historic water sources are considered relatively vulnerable to disturbance due to their considerate distances from the designated mine infrastructure areas. The degree of vulnerability to disturbance varies as these features are located approximately 500 m from the TSF (Voer Te Koop Granite Oasis 01) while Voer Te Koop Granite Oasis 02 and Aniswept Granite Oasis 03 are located approximately 880 m and 7 km, respectively, from the planned reroute section of the D3714 road (Nankela, 2025).

5.7.1.2 Ancient cemetery site with twenty (20) un-marked graves

The field survey located a potential ancient cemetery site, comprising of at least twenty (20) un-marked graves or burial cairns on farm Aniswept (No. 04) (Figure 27). The graves are circular to oval shaped and are constructed from loose limestone and diabase rocks stacked to form low mounds (Nankela, 2025). Although the cairns lack headstones or steles, they appear to remain in their primary context. According to local accounts, the burial site has been in use for over 100 years. However, the site has since been abandoned as community members migrated to Uis, Okombahe and other areas due to prolonged drought periods. Over time, the site had partly been neglected as a result of modernisation and the community's shift away from traditional practices.

By virtue, age and historic use, the site meets the criteria for significance in terms of the National Heritage Council Act, No. 27 of 2004, the Burial Places Ordinance No. 27 of 1966, the Local Authority Act, No. 23 of 1992 and the Cemetery Regulations No. 4291 of 2009

Figure 27 - Images of ancient burial cairns on farm Aniswept (Source: Nankela, 2025)

The ancient cemetery site is well preserved. However, it may likely be vulnerable to disturbance as the site is located approximately 720 m east (E) of the D3714 road (Nankela, 2025).

5.7.1.3 Historic ruined structure

The abandoned ruined stone-built structure (No. 05) is located at farm Aniswept. The ruined structure is made from locally sourced stone bound held together by a mixture of local sand mortar (Figure 28) (Nankela, 2025). According to Nankela (2025), the ruined structure holds low heritage significance in terms of the National Heritage Act, No. 27 of 2004 as it merely reflects past occupation of the area and its abandonment serves as a testimony to the stone architecture of the area. The ruined structure is located approximately 915 m northeast (NE) of the D3714 road.

Figure 28 - The ruined stone-built structure on farm Aniswept (Source: Nankela, 2025)

5.7.1.4 Christian gravesite with four (4) unmarked graves

The site is locally recognised as a Christian gravesite by the community within farm Hamas (No. 06). The gravesite bears four (4) un-marked graves, buried on a flat gravel plain (Figure 29).

Figure 29 - An image of the Christian gravesite with four (4) buried individuals at farm Hamas (Source: Nankela, 2025)

According to local community accounts, the last grave at the site was dug in 1983; however, the identity of the deceased as well as those of the remaining three (3) graves remain unknown (Nankela, 2025). The graves are all circular in shape, made from loose calcrete rocks and surrounded by small thorn bushes. No physical disturbance was observed; therefore, it was concluded that graves are currently within their primary context. These graves fall under the jurisdiction of the Burial Place Ordinance No. 27 of 1966, as read with the Local Authorities Act No. 23 of 1992. This provides for their protection and management.

The gravesite lies approximately 800 m west (W) of the D3714 road, and no planned mine infrastructure directly overlap or encroach upon its immediate vicinity.

5.7.1.5 Historic graveyard with thirty (30) graves

The graveyard at Aniswept Village comprises at least thirty (30) graves (marked and unmarked) and is well enclosed by a well-maintained fence (No. 07) (Figure 30). This demonstrate that the site is presently used by the local community. Community members, as interviewed by Nankela (2025), reported that the site has been used for at least the past fifty (50) years.

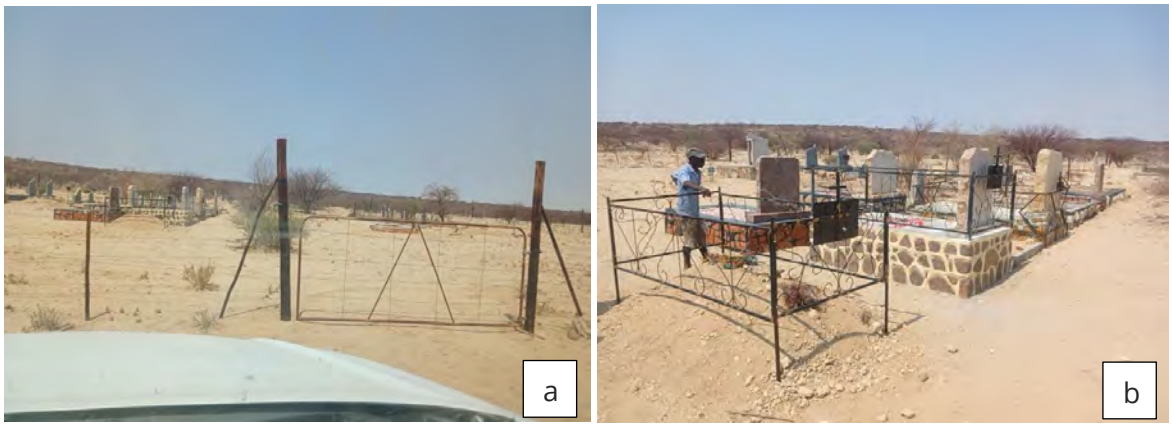


Figure 30 - The fenced graveyard at Aniswept Village (a) and (b) (Source: Nankela, 2025)

Considering that the site has been operational for at least the past fifty (50) years, the graves are significant in terms of the National Heritage Act, No. 27 of 2004 and the Burial Place Ordinance No. 27 of 1996, as read in terms of the Local Authorities Act, No. 23 of 1992 and the Cemetery Regulations No. 4291 of 2009.

The graveyard is situated approximately 6 km west (W) of the D3714 road and no planned mine infrastructure directly overlap or encroach upon its immediate vicinity.

5.7.1.6 Historic well (water point)

The historic well at Hamas Village (No. 08) is considered a sacred waterpoint that was dug in 1957 in response to severe drought periods experienced at the time (Nankela, 2025) (Figure 31). The historic well is in a riverbed underlain by limestone and currently supplies water for household use and domestic livestock. Considering its continued functional use and cultural significance, the water source is regarded as a significant heritage feature within the local context. The water source is approximately 4 km from the proposed explosives magazine area.

Figure 31 - Historic well at Hamas Village (Source: Nankela, 2025)

5.7.2 HERITAGE FEATURES RECORDED OUTSIDE EPL 4818

The field survey documented four (4) heritage features located outside EPL 4818, yet in close to planned Project development areas. These include: (i) a prehistoric rock art site (No. 09), (ii) a historic era mine shaft (No. 10), (iii) remnants of a historic settlement (No. 11) and (iv) a Christian burial site with two (2) graves (No. 12). According to Nankela (2025), these heritage features are considered significant under the provision of the National Heritage Act, No. 27 of 2004 and are discussed in the following sections.

5.7.2.1 Prehistoric rock art site

The rock art site is located approximately 3.25 km from the EPL boundary, on the edge of the basalt ridge, with an elevation of 980 metres above sea level (masl), in the vicinity of the C36 road to Uis. The site hosting the artworks is a large yellowish rock shelter resting at the foot of the hill overlooking the valley. The site hosts about ten (10) slightly visible painted anthropomorphic and zoomorphic figures in red pigment (Nankela, 2025). The painting has been executed in various fine-line techniques, typical of hunter-gatherer traditions. Some have been fully painted with their interiors fully infilled, while others are partially infilled. Among the recognisable animal figures are antelopes, such as springboks and giraffes (see Figure 32). Human figures depict mainly hunters, bearing hunting equipment (bows and arrows) in various scenes. Associated archaeology includes surface scatter of flakes, fragments of pottery and ashy sedimentations beneath the site to attest to its use and function. The artworks are relatively small in morphology, measuring between 11 cm x 9 cm, 12 cm x 4 cm, 13 cm x 8 cm and 10 cm x 6 cm in length and width. However, most of the artworks have immensely faded possibly as a result of long-sun exposure, exfoliation, erosion, wind and rainwater runoff caused by the site's orientation to the east (E) as well as dust accumulation.

Figure 32 - Prehistoric painting site on a granite outcrop outside EPL 4818 (Source: Nankela, 2025)

5.7.2.2 Historic mine shaft

The abandoned historic mine shaft is located approximately 1.11 km from the EPL boundary. According to Nankela (2025), the mine shaft is attributed to the 19th century settlements during the German colonial administration. In the post-independence era, the site and its environs were repurposed as pastoral trade hub and later functioned as a communal labour reserve in the early 20th century. Figure 33 shows a visual overview of both the exterior surrounding and interior entrance of the abandoned mine shaft. The images capture the

structural conditions of the shaft opening, visible features such as rock face, entrance dimension, geological context, surrounding vegetation and shaft orientation.

Figure 33 - Exterior surrounding of the abandoned mine shaft (top) and interior entrance of the Mine shaft (bottom) (Source: Nankela, 2025)

5.7.2.3 Abandoned historic settlement

The abandoned historic settlement is located approximately 1.43 km from the EPL boundary and comprises of at least four (4) structural ruined structures, constructed from local stones and cement (Figure 34). The settlement is historically associated with mining activities at the nearby abandoned mine shaft. According to Nankela (2025), the settlement was once occupied by local inhabitants who vacated the area during periods of severe droughts during the 1980's and early 1990's. Today, the remaining features include isolated structural remnants, surface scatters of colonial era glass bottles and refuse deposits and debris which indicate domestic activities.

Figure 34 - Abandoned historic settlement associated with the early mining activities in the area (Source: Nankela, 2025)

5.7.2.4 Christian graveyard

The fenced graveyard enclosure comprises at least two (2) Christian graves belonging to community members who were employed by German farmers who inhabited the adjacent settlement during the 1980's and early 1990's. The graves are each marked with headstone and are well preserved by the local community (see Figure 35). The graveyard is located approximately 1.68 km from the EPL boundary and 135 m from the abandoned historic settlement.

Figure 35 - Two Christian graves belonging to the local community members buried at an old mine (Source: Nankela, 2025)

5.8 NOISE

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 an ear can detect. Human response to noise is complex and highly variable as it is subjective rather than objective. The International Finance Corporation (IFC) General Environmental Health and Safety (EHS) guidelines on noise addresses the impacts of noise beyond the property boundary of the facility under consideration and provide noise level guidelines.

A noise baseline survey was conducted by Environmental Compliance Consultancy (Pty) Ltd (ECC) on 01 and 02 August 2024 to determine the current baseline noise levels at designated points site for the Kokoseb Gold Project. Airshed Planning Professionals (Pty) Ltd. (hereto referred to as "Airshed"), a firm that specialises in all aspects of air quality and noise pollution impacts was appointed to conduct the noise modelling and assessment process. Airshed identified sites to be monitored for day and night-time noise level measurements for the noise baseline report. The noise baseline report can be viewed in Appendix G.

In the absence of local noise guidelines and standards, the international guidelines and standards were referenced in the study (i.e. IFC and the General Environmental, Health and Safety (EHS) Guidelines).

The IFC Performance Standard 3 stipulates that noise emissions should not exceed the guideline levels presented in Table 15 for industrial residential, institutional and educational receptors, or should not results in a maximum increase above the levels of 3 A-weighted decibels (dBA) at the nearest off-site receptor (IFC, 2007). For a person with average hearing acuity, an increase of < 3 dBA in the general ambient noise level is not detectable, therefore 3 dBA is therefore a useful significance indicator of a noise impact.

Table 15 - IFC noise level guidelines (IFC, 2007)

Area	One-hour L_{Aeq} (dBA) 07:00 to 22:00	One-hour L_{Aeq} (dBA) 22:00 to 07:00
Industrial receptors	70	70
Residential, institutional and educational receptors	55	45

The Project area is classified as within a rural setting, therefore, the residential day and nighttime IFC noise guideline of 55 dBA and 45 dBA were applied in the assessment.

5.8.1 NOISE SENSITIVE RECEPTORS

The noise survey sites were selected after careful consideration of future activities, accessibility, potential noise sensitive receptors (NSRs) and safety restrictions. A total six (6) survey sites were selected and measured for day and nighttime noise levels, as shown in Figure 36. The chosen NSRs include residential houses, small communities and the accommodation village. The general Project area is predominantly composed of sparsely scattered communal homesteads, where livestock farming is practiced (mainly sheep, goats and cattle). No crop cultivation is practised in the area due to arid conditions and highly erratic rainfall patterns.

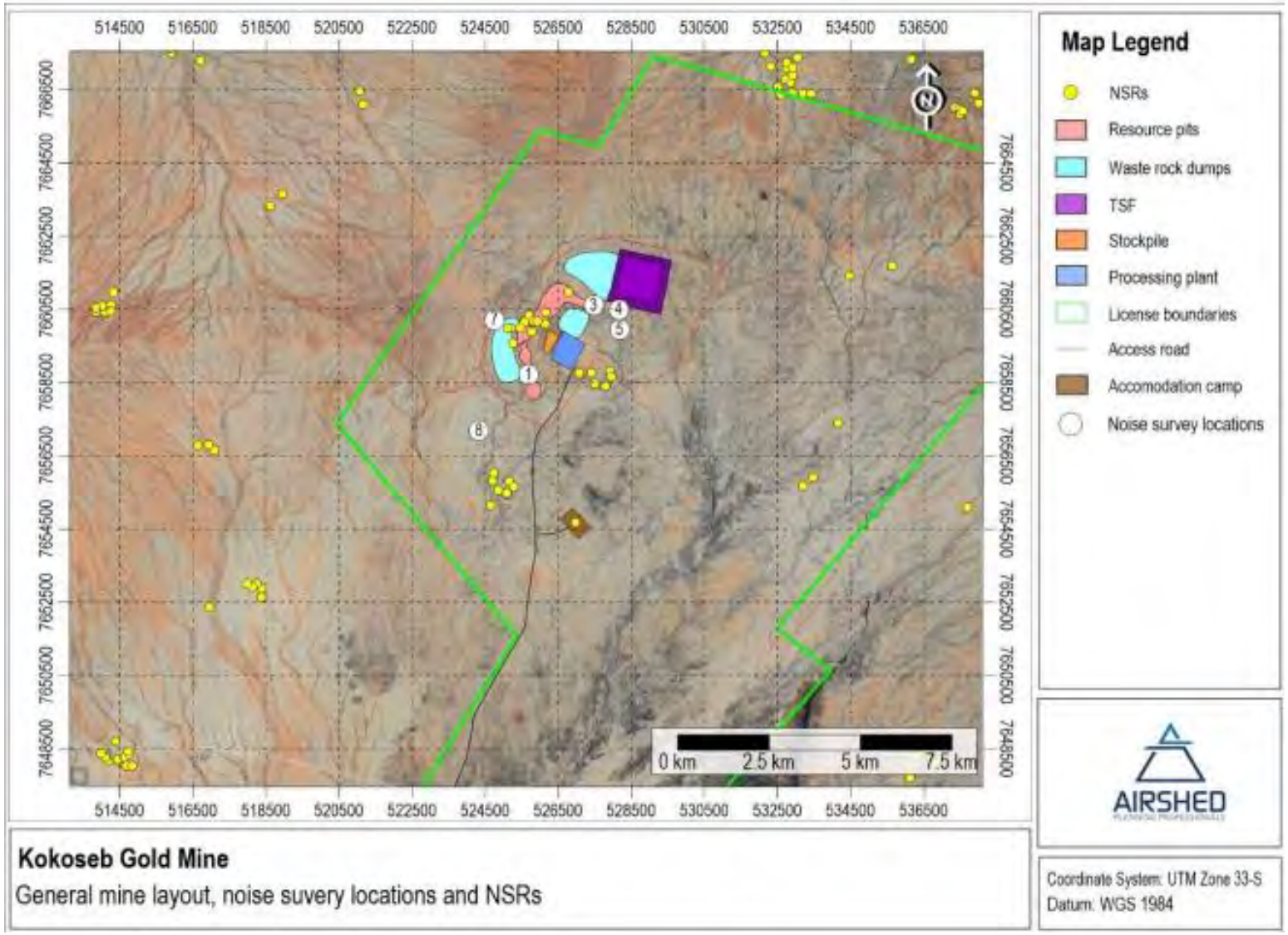


Figure 36 - Baseline noise survey locations and NSRs (Source: Airshed, 2025)

Noise emissions from mobile and non-mobile equipment were estimated using sound power level in decibel (L_w) predictions for industrial machinery, where L_w estimates are a function of the power rating of the equipment engine. Crushing and conveyor noise source Lw's for the Project was obtained from a database of similar operations, whereby the values are based on sources measurements carried out in accordance with the procedures specified in the South African National Standards (SANS) 10103. Moreover, source inventory, meteorological conditions and information on land use were used to populate noise propagation models.

5.8.2 NOISE SOURCES

The noise sources of the proposed Project are typical of opencast gold mining and ore processing facilities. Sources of noise at the Project site will include the following (Airshed, 2025):

- Drilling (high-pitched whine from the drill head and bits as it penetrates hard rock formation);
- Blasting can cause noise and vibration, which can have an impact upon neighbouring noise receptors. Blasting usually results in both ground and airborne vibrations;
- Ore and waste handling (loading, unloading, dozing) in open pits, on waste rock dumps (WRDs), crusher/plant area and tailings storage facility (TSF);
- Crushing and screening of ore and milling;
- Haul truck traffic; and
- Diesel mobile equipment uses (including reverse warnings).

5.8.3 BASELINE AMBIENT NOISE SURVEY RESULTS

The main findings from the 2025 noise baseline study are as follows:

- The IFC noise guidelines for residential areas (55 dBA for daytime and 45 dBA for night-time) were not exceeded at any of the noise survey sites;
- The measured day-time noise levels ranged between 26 dBA and 38 dBA (Figure 37) and nigh-time noise levels ranged between 28 dBA and 38 dBA (Figure 38); and
- The sensitive receptors in the study area consist of homesteads and small communities located within the main open pit area (i.e. Katora community). The impacts on these noise sensitive receptors are assessed in section 7.6 with mitigation to relocate the significantly impacted households.

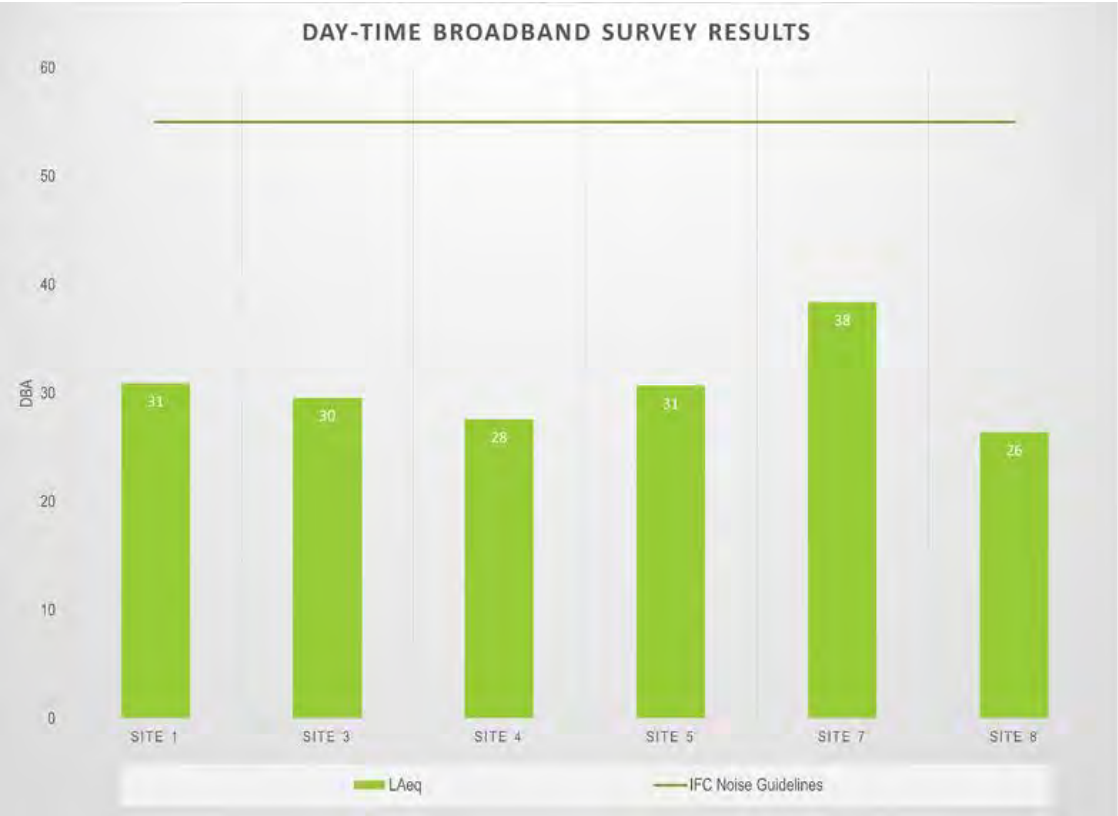


Figure 37 - Day-time broadband survey results (Source: Airshed, 2025)

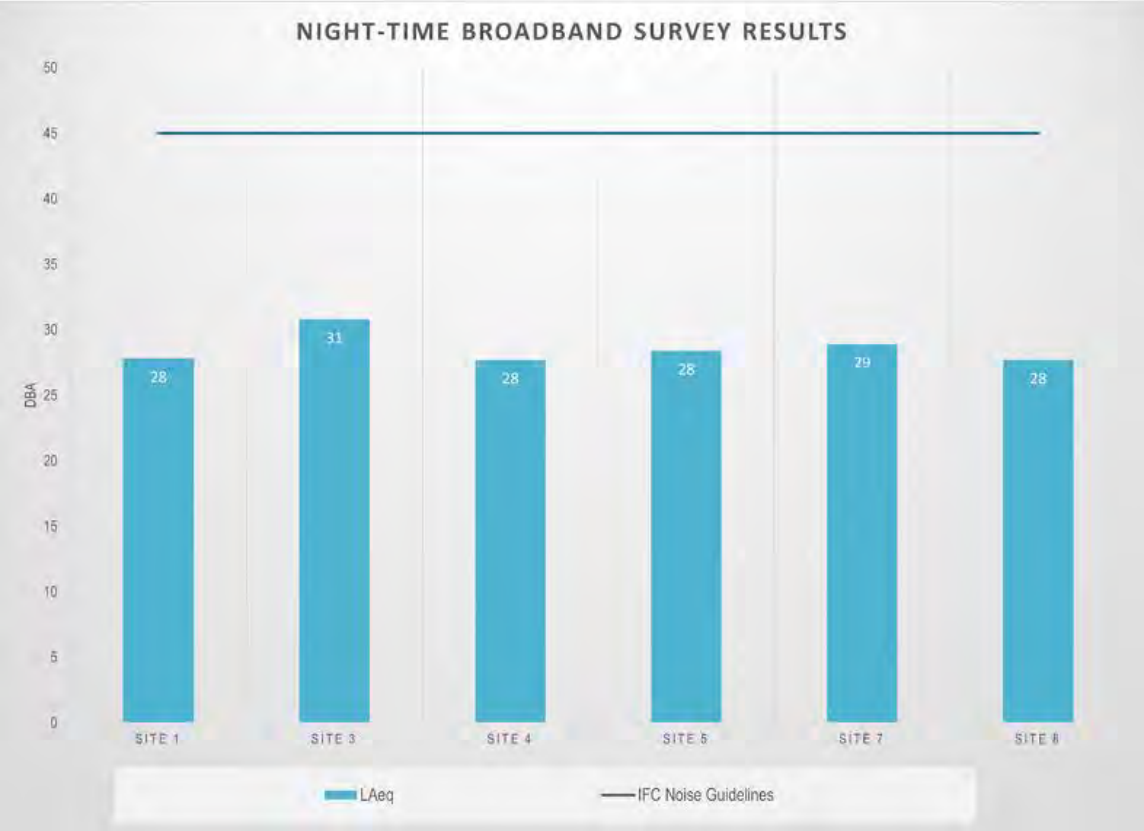


Figure 38 - Night-time broadbands survey results (Source: Airshed, 2025)

5.8.4 NOISE PROPAGATION AND ATTENUATIOB POTENTIAL

5.8.4.1 Atmospheric absorption and meteorology

The main meteorological parameters affecting the propagation of noise include wind speed, wind direction and temperature. These, along with other parameters such as relative humidity, air pressure, solar radiation and cloud cover affect the stability of the atmosphere and the ability of the atmosphere to absorb sound energy.

Regional weather data retrieved from the Weather Research and Forecasting (WRF) Model for the period 2022 to 2024 was used for the assessment. The modelled data set indicates wind flow primarily from southwest (SW) during the day and from the east (E) during the night. On average, noise impacts are expected to be slightly more notable to the northeast (NE) during the day and to the west (W) during the night (Airshed, 2025).

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.

5.8.4.2 Terrain, ground absorption and reflection

Noise reduction caused by a barrier (i.e., natural terrain, installed acoustic barrier, building) feature depends on two (2) factors namely the path difference of a sound wave as it travels over the barrier compared with direct transmission to the receiver and the frequency content of the noise (Airshed, 2025).

Sound reflected by the ground interferes with the directly propagated sound. The effect of the ground is different for acoustically hard (e.g., concrete or water), soft (e.g., grass, trees or vegetation) and mixed surfaces. Ground attenuation is often calculated in frequency bands to take into account the frequency content of the noise source and the type of ground between the source and the receiver (Airshed, 2025). Based on observations, ground cover was found to be acoustically mixed.

The noise baseline study provides the basis for the environmental noise impact assessment plan for the Project, as discussed in chapter 7. The following has been included in the environmental noise impact assessment study (Airshed, 2025);

- Compilation of Project source term;
- Attenuation modelling of all potential noise sources due to Project operations;
- Evaluation of potential noise impacts on human receptors due to Project activities; and
- Recommendation of mitigation and management measures, including the relocation of identified sensitive receptors.

5.9 GROUND VIBRATION, AIR BLAST AND FLY ROCK

Blast Management and Consulting (BMC) conducted a baseline blast impact assessment of the Kokoseb Gold Project site in 2025 to assess the potential ground vibration, air blast and fly rock impacts from blasting activities on the surrounding receptors and infrastructure. The potential blasting impacts were assessed over an area of 3 500 m from the pit edge and specified minimum and maximum charge output. The range of structures observed include roads, low-cost houses, mining infrastructure, wildlife activity points, boreholes/cement dam and heritage sites. The specialist report can be viewed in Appendix L .

The impact assessment of the ground vibration, air blast, fly rock per pit design (and resultant noxious fumes) are discussed in detail in section 7.7.4 of this report. The recommended mitigation measures are included in the final ESMP (Appendix A).

5.9.1 PROJECT SENSITIVITY

A 3 500 m radius sensitivity map (Figure 39) was developed by BMC (2025) based on distances normally where potential blast impacts are expected to be very high to none in relation of identified receptors or points of interest from the pit edge. Three (3) different areas were identified and are discussed below:

- A highly sensitive area of 500 m around the pit area. Normally, this 500 m area is considered an area that should be cleared of all people, animals and infrastructure 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 1 500 m around the pit area can be considered as a medium-sensitive area. In this area, the possibility of impact is still expected, however, it is lower. The expected level of influence may be low, although there may still be reasons for concern as levels could be low enough to cause structural damage and upset people; and
- An area > 1 500 m is considered a low-sensitive area. In this area, it is relatively certain that influences will be low, with a low possibility of damage and a limited possibility of upsetting people/public.

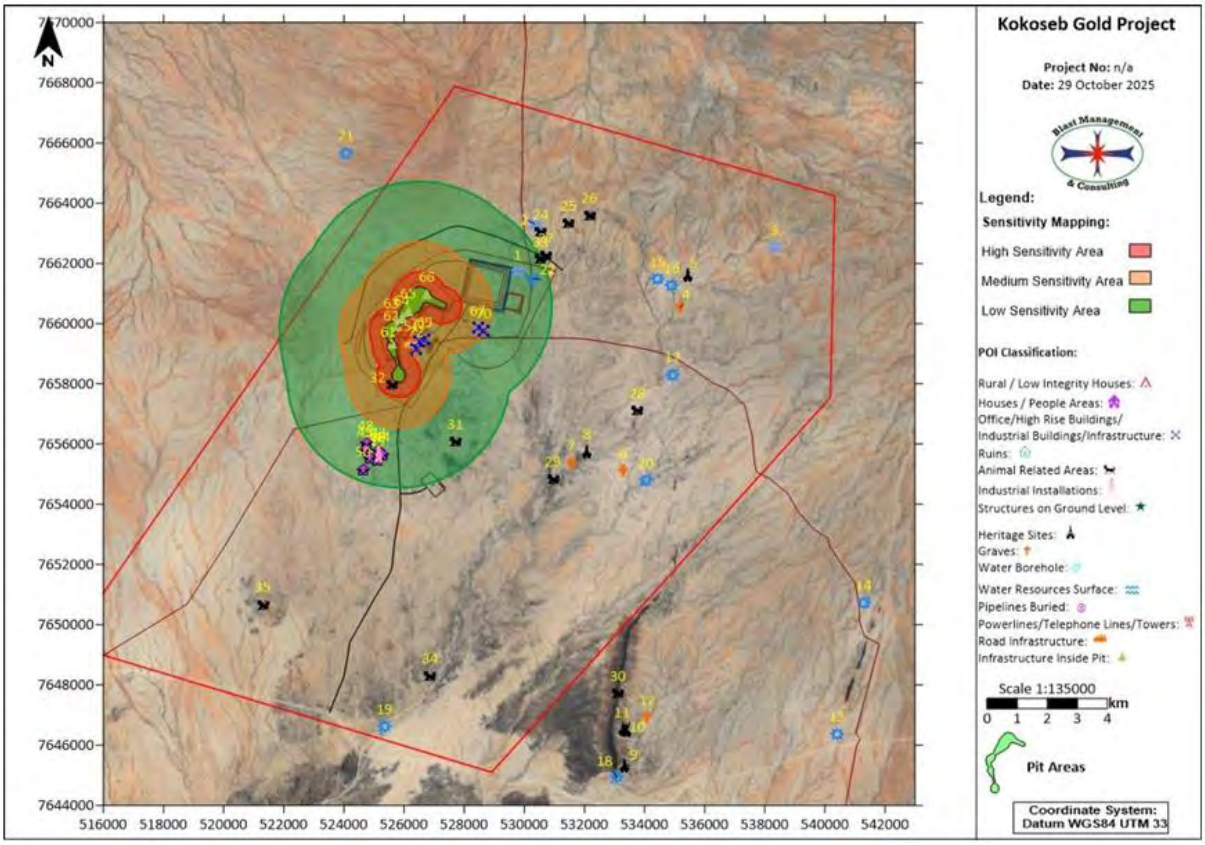


Figure 39 - The identified sensitive areas and receptor's distances from the pit edge (Source: BMC, 2025)

A list was prepared of all structures in the vicinity of the open pit area. This included the receptors and points of interest (POI) in the 3 500 m radius and classified per type according to BMC classification system. Table 16 and Table 17 below presents the POI classification used and the list of POIs linked to their respective classification and their respective GPS co-ordinates.

Table 16 - POI classification used (Source: BMC, 2025)

Class	Description
1	Rural building and structures of poor construction
2	Private houses and people sensitive areas
3	Office, high-rise building and industrial buildings/infrastructure
4	Ruins
5	Animal related installations and animal sensitive areas
6	Industrial installations
7	Earth-like structures – no surface structure
8	Heritage site (building, infrastructure, activity)
9	Graves
10	Water borehole
11	Water resources surface

Class	Description
12	Pipelines buried
13	Powerline/telephone lines/towers
14	Road infrastructure
15	Infrastructure inside the pit

Table 17 - List of the identified POI (Source: BMC, 2025)

Tag	Description	Classification	Y	X
1	Heritage site (site 01 - historic water pool)	11	7661708.27	529786.52
2	Heritage site (site 02 - historic water pool)	11	7663302.24	530348.69
3	Heritage site (site 03 - historic water pool)	11	7662529.63	538336.77
4	Heritage site (site 04 - Graveyard at Aniswept)	9	7660529.73	535179.67
5	Heritage site (site 05 - built ruin)	8	7661619.62	535450.79
6	Heritage site (site 06 - Christian graves with 4 unmarked graves)	9	7655096.64	533295.84
7	Heritage site (Site 07 - Hamas Village second gravesite - ancient)	9	7655371.80	531582.41
8	Heritage site (site 08 - historic well)	8	7655759.73	532083.11
9	Heritage site (site 09 - prehistoric rock art)	8	7645310.83	533320.35
10	Heritage site (site 10 - historic mine shaft)	8	7646539.77	533297.45
11	Heritage site (site 11 - old mining ruins)	8	7646510.55	533402.89
12	Heritage site (site 12 - Christian graves)	9	7646914.11	534088.68
13	Borehole	10	7646361.61	540395.72
14	Borehole	10	7650730.80	541288.39
15	Borehole	10	7661458.00	534446.00
16	Borehole	10	7661259.01	534919.79
17	Borehole	10	7658304.17	534934.27
18	Borehole	10	7644928.30	533080.42
19	Borehole	10	7646613.20	525356.48
20	Borehole	10	7654786.83	534044.70
21	Borehole	10	7665660.80	524077.52
22	Borehole	10	7661489.53	530279.65
23	Village houses (Katora)	2	7660154.19	525570.82
24	Granite dome 1	5	7663031.38	530557.96
25	Granite dome 2	5	7663329.11	531484.26
26	Granite dome 3	5	7663593.40	532170.67
27	Wildlife animal activity (Black Rhino rubbing post)	5	7662265.23	530735.12
28	Wildlife animal activity (Raptor Nest)	5	7657101.16	533773.30

Tag	Description	Classification	Y	X
29	Wildlife Animal Activity (main hill/ridge habitat 1)	5	7654833.17	530956.56
30	Wildlife animal activity (main hill/ridge habitat 2)	5	7647713.06	533120.14
31	Wildlife animal activity (main hill/ridge habitat 3)	5	7656072.55	527710.15
32	Wildlife animal activity (main hill/ridge habitat 4)	5	7657968.37	525622.14
33	Wildlife animal activity (main hill/ridge habitat 5)	5	7662137.01	530546.62
34	Wildlife animal activity (main hill/ridge habitat 6)	5	7648302.97	526875.14
35	Wildlife animal activity (main hill/ridge habitat 7)	5	7650663.20	521316.11
36	Village houses	2	7658807.26	527916.78
37	Village houses	2	7658673.30	527940.92
38	Village houses	2	7658409.27	527789.75
39	Village	2	7655071.10	526880.52
40	Village	2	7654781.53	526551.06
41	Village	2	7654523.07	527377.90
42	Village	2	7654238.01	527043.98
43	Village houses	2	7655803.85	525151.89
44	Village houses	2	7655662.42	525286.48
45	Village houses	2	7655487.22	525093.00
46	Cement dam	6	7655654.38	525128.63
47	Village houses	2	7655552.35	524854.54
48	Village houses	2	7656034.99	524739.25
49	Village houses	2	7655816.24	524704.60
50	Village houses	2	7655157.39	524640.53
51	D3714 road	14	7659333.18	526255.22
52	Village houses	2	7658477.83	527495.06
53	Village houses	2	7658770.06	527401.64
54	Village houses	2	7658761.62	527063.97
55	Village houses	2	7660101.32	526140.01
56	Village houses	2	7660338.20	525703.78
57	Village houses	2	7659997.61	525455.43
58	Village houses	2	7659989.13	525213.56
59	Village houses	2	7659987.57	525124.17
60	Village houses	2	7659582.24	525252.86

Tag	Description	Classification	Y	X
61	D3714 road (inside pit area)	15	7659334.12	525601.32
62	Village houses (inside pit area)	15	7659899.26	525774.30
63	Village houses (inside pit area)	15	7660168.92	525820.76
64	Village houses (inside pit area)	15	7660183.16	525926.38
65	Village houses (inside pit area)	15	7660415.94	526150.65
66	Village houses (inside pit area)	15	7660974.55	526769.50

5.9.2 BLASTING OPERATIONS

Planned blast design technical information was provided and used to define the expected outcomes by utilising the JKSimblast software to simulate the blast. Table 18 below provides an overview of the technical blasting information for the Project.

Table 18 - Blast design technical information (Source: BMC, 2025)

Blast description	Weathered	Fresh
B/H diameter (mm):	165	165
Bench height (m)	10	10
Burden (m)	4.6	4
Spacing (m)	5.3	4.6
Average depth (m)	11	11
Explosive type	Emulsion	Emulsion
Explosive charge / BH (kg)	145.4	145.4
P/F blasthole (kg/m^3)	0.6	0.8
Stemming length (m)	3	3
Accessories type: shock tube/electronic	Nonel	Nonel
Downhole delay (ms)	25 - 50	25 - 50
Surface timing – inter hole (ms)	8 - 25	8 - 25
Surface timing – inter row (ms)	50 - 100	50 - 100
Booster/primer (gr)	400	400

5.10 VISUAL AND SENSE OF PLACE

ECC conducted a visual modelling assessment for the proposed Kokoseb Gold Mine Project to assess the potential extent of visual intrusion on the surrounding landscape. The assessment considered key determinants of visual impact, including the scale and height of proposed Project infrastructure, prospect of light pollution, the existing topography, land cover, viewing distances, and the location and sensitivity of visual receptors (including tourists and communities). This modelling provides a basis for understanding how the Project may alter the current visual character of the area.

The proposed Kokoseb Gold Project is situated approximately 15 km north (N) of Okombahe and 30 km east (E) of Uis. The immediate Project site is sparsely populated, characterised by

isolated farmsteads and small, clustered rural communities. The nearest settlement in the immediate Project site is the Katora community, which lies within the area designated for development of the main open pit. The affected communities will be relocated prior to the commencement of Project activities.

There are no known tourism or recreational sites within the immediate vicinity of the Project area. The local landscape is primarily defined by undulating plains and low-lying vegetation, with limited anthropogenic structures. However, significant geological and scenic landmarks are present at a greater distance from the Project site. This include the Brandberg Mountain to the west (W), Spitzkoppe Mountain to the south (S) and the Erongo Mountains to the southeast (SE). These sites are located over 40 km from the Project site. Their considerable distance from the site reduces the potential for direct visual intrusion or adverse impact on their sense of place.

Furthermore, the Project site is bordered by the C36, D3712, D2344 and D3714 district roads. The D3714 road transverse the Project footprint and will require realignment to accommodate mining infrastructure and operations. The Project's mining landforms such as waste rock dumps (WRDs) (~59 m in height), the tailings storage facility (TSF) and processing plant will be visible from these surrounding roads. This will potentially alter the visual experience for road users and other receptors in the vicinity (permanent transformation of the local viewshed of the landscape throughout the LoM). Construction and operational activities are expected to generate dust, which may further contribute to visual disturbance.

A visual assessment was undertaken to evaluate the potential impacts on key receptors (refer to chapter 7). This includes a viewshed analysis for various distances (5 km, 10 km and 20 km) from the Project site. Figure 40 to Figure 42 illustrate the expected viewshed models for the WRDs, TSF and processing plant, identifying areas from which these features are likely to be visible.

The viewshed models indicate the proposed mine infrastructure will be visible to several receptors within the immediate surrounding of the Project. This includes residents of nearby villages, employees housed at the mine accommodation village and motorists travelling within a 5 km radius (mostly receptors within the EPL boundary) (Figure 40). At greater distances, visibility decreases significantly. However, a limited number of receptors located approximately 10 km from the site will still have sight of certain mine infrastructure. These receptors mainly include motorists travelling along the D3714 road, as well as residents within the Ohungu and Tsiseb Conservancies (Figure 41). At a 20 km radius, the likelihood of visual intrusion is significantly reduced due to the increased distance and topography (Figure 42). Only a small number of receptors are expected, such as those located at Otjumuse Dued farm and motorists travelling along segments of the C36 and D3714 roads. Overall, the extent and significance of visual intrusion diminish considerably with distance from the Project site. The visual impacts are discussed in detail in section 7.8.

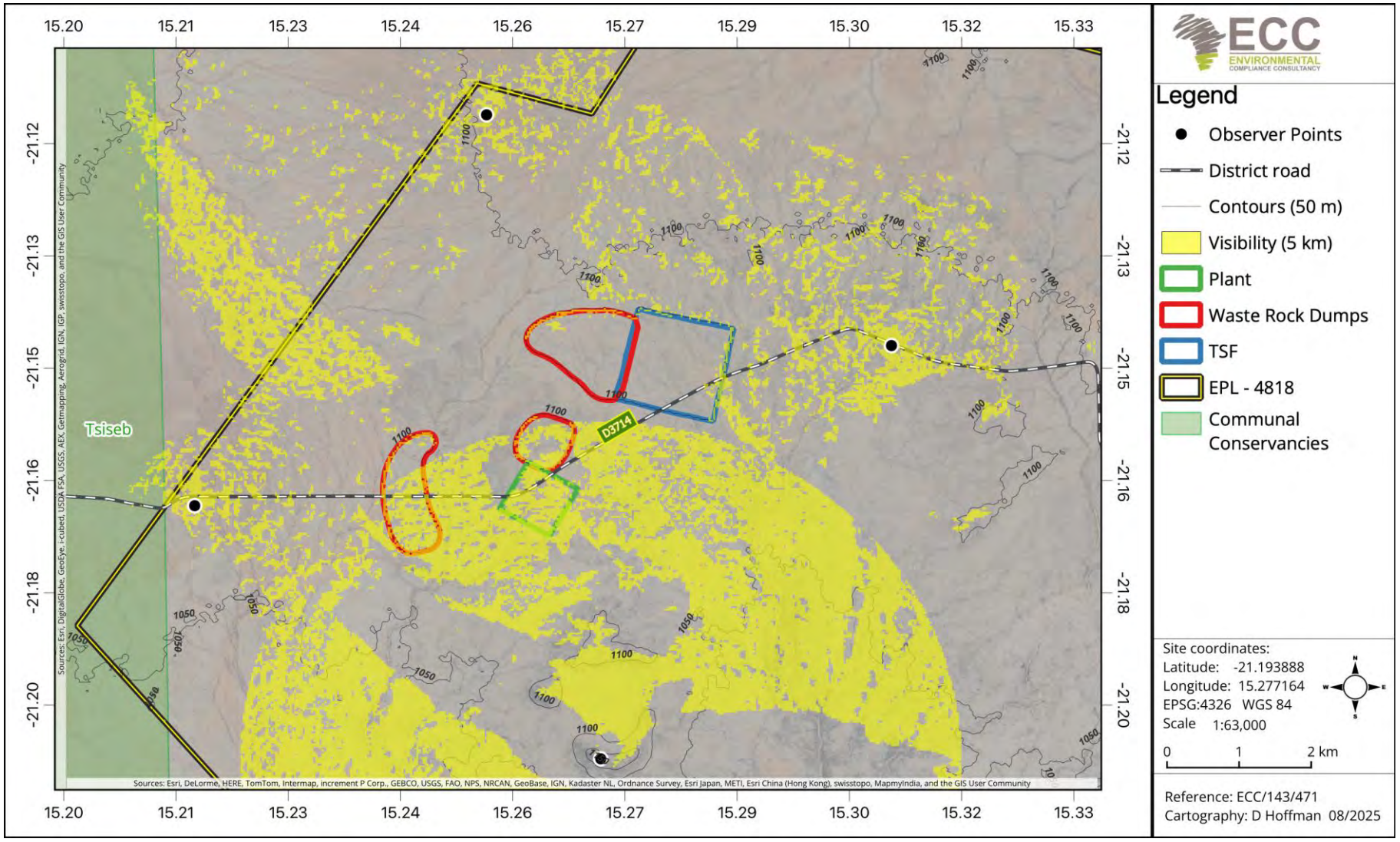


Figure 40 - Viewshed models for TSF, WRDs and processing plant within a 5 km radius (ECC, 2025)

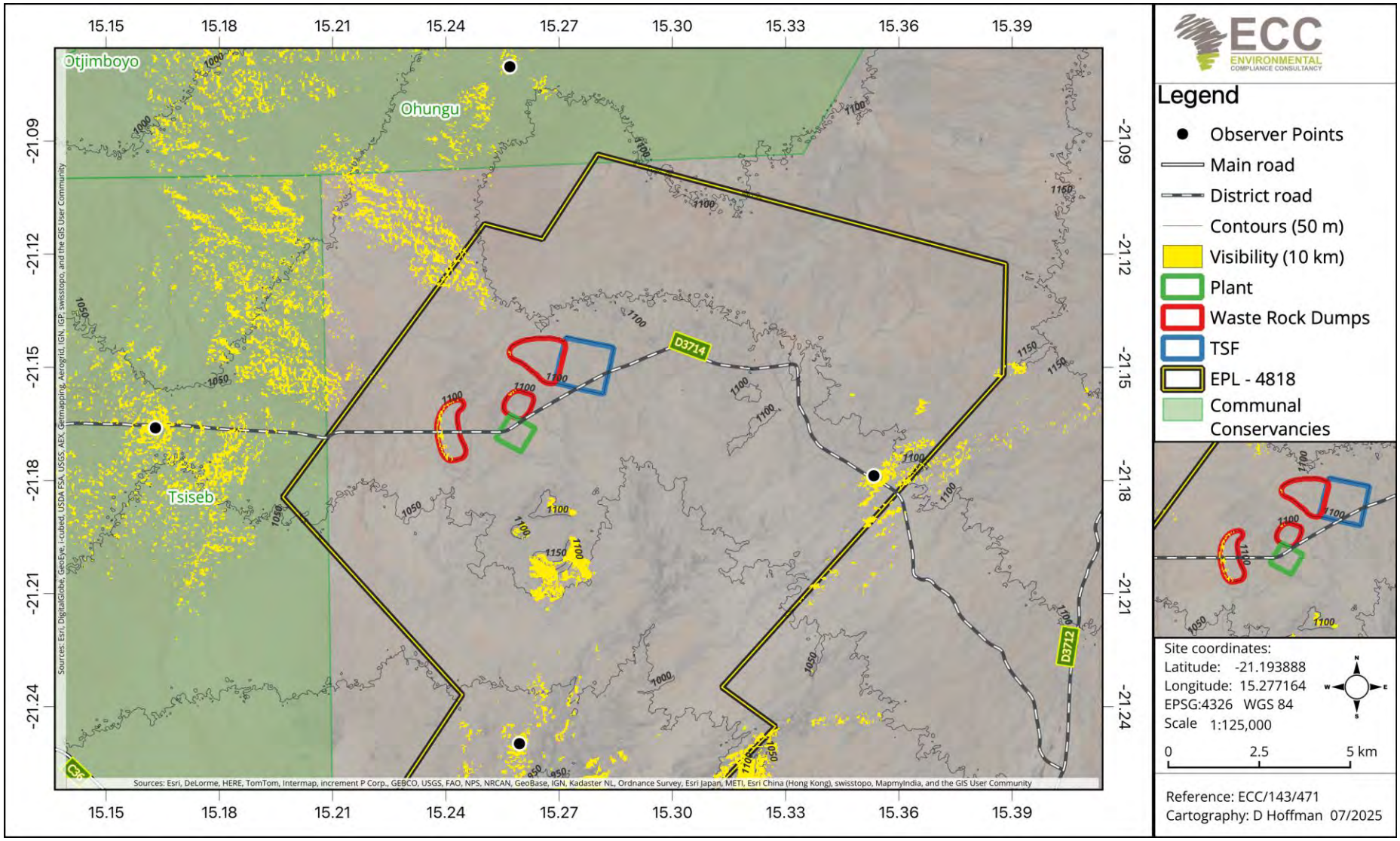


Figure 41 - Viewshed models for TSF, WRDs and processing plant within a 10 km radius (ECC, 2025)

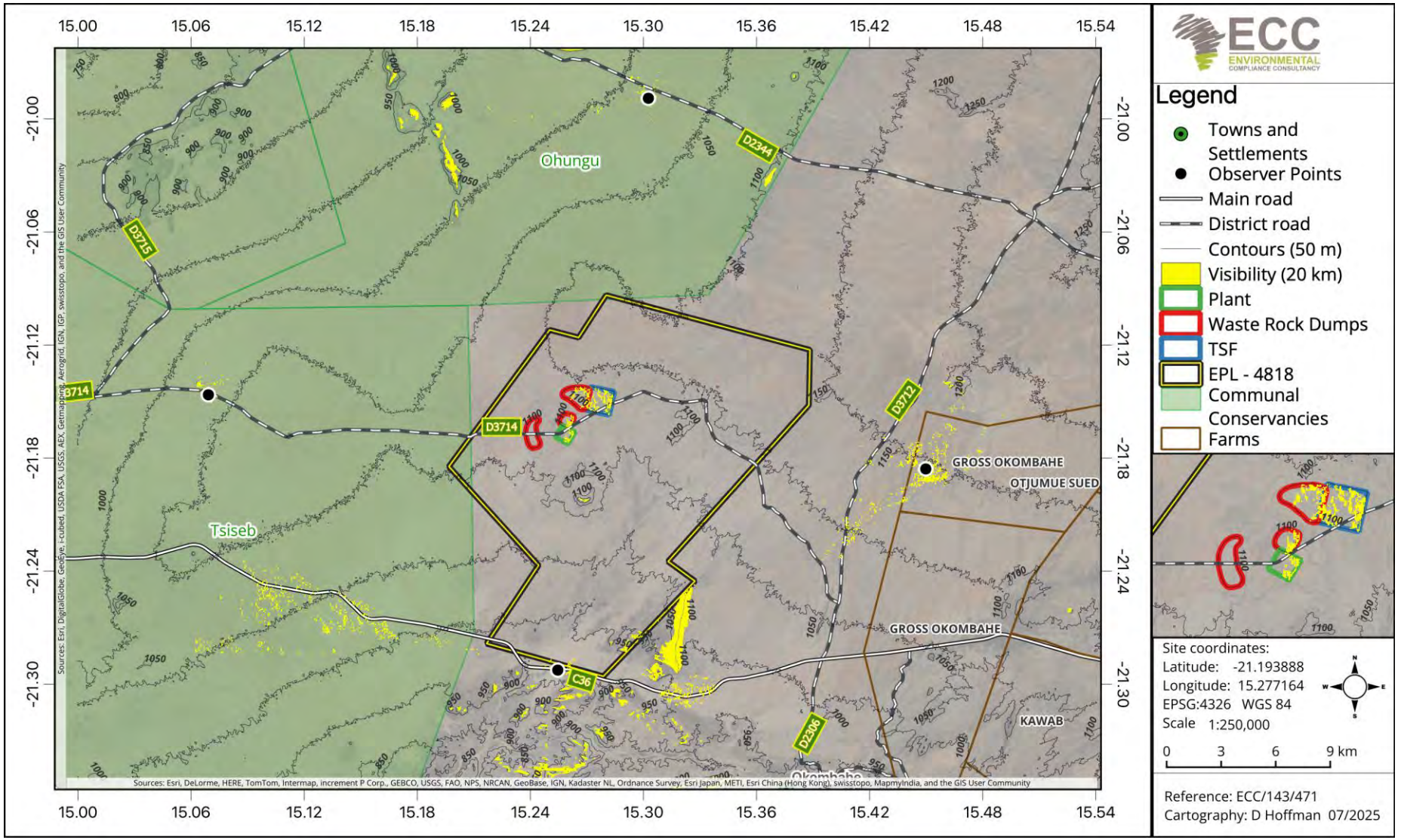


Figure 42 - Viewshed models for TSF, WRDs and processing plant within a 20 km radius (ECC, 2025)

5.11 AIR QUALITY

5.11.1 DEPOSITIONAL DUST FALLOUT MONITORING

ECC has been conducting depositional dust fallout monitoring at the Project since November 2023. The purpose is to report on depositional dust fallout across a network of eight (8) depositional dust monitoring stations that are strategically located on the Project site.

The air quality monitoring program aims to fulfil the following objectives:

- To develop a robust air quality baseline dataset for the Project;
- To analyse trends, identify early indications or markers of potential contamination;
- To guide management to ensure potential impacts to the environment and community are mitigated at the earliest phase of the Project; and
- To provide historical points of reference where Project induced changes will be measured against.

The potential expected sources of dust particulate matter resulting from the operational activities include, but are not limited to, construction activities (e.g. mineral material handling and processing) and mining activities (e.g. drilling, blasting and hauling). Therefore, depositional dust monitoring station locations were based on the proposed infrastructure locations likely to generate dust, taking into account meteorological conditions such as prevailing wind directions.

The monitoring program is set up in line with the requirements of the Standard Test Method for Collection and Measurement of dust fall (ASTM D1739-98) and South African National Standards (SANS) standards and target actions (SANS 1929:2011). Baseline ambient particulate matter (PM) 10/2.5 measurements are also measured on quarterly schedule, for 30-minute periods at selected dust gauge locations. This monitoring is conducted in terms of the World Health Organisation (WHO) interim targets (IT3) for particulate matter.

Natural environments are complex systems that can be affected by anthropogenic interference such as mining activities, including mineral exploration. To understand the compounding factors and interpret the findings based on the baseline of the receiving environment, deductive and inductive approaches can be used. The wind vectors, topography (e.g. hills, mountains and valleys), seasonal rainfall and drought are identified as potential factors that are likely to influence air quality. Wind direction and speed are the primary factors determining the distance of travel of a dust particle and the distribution of particles falling out. An on-site weather station was erected in July 2024 to provide atmospheric meteorological data, specific for the site and further guide the analysis and interpretation of the fall out dust results.

Figure 43 shows the locations of the eight (8) depositional dust monitoring gauges. To date, dust fallout rates are generally low for the sampling period and within the dust fallout limit of 600 mg/m²/day (adopted limit for residential areas) and 1 200 mg/m²/day (adopted limit for non-residential areas). The residential dust fallout limit of 600 mg/m²/day was only exceeded at dust gauge AQ-03 during February 2024 (Figure 44). This result, however, is considered anomalous.

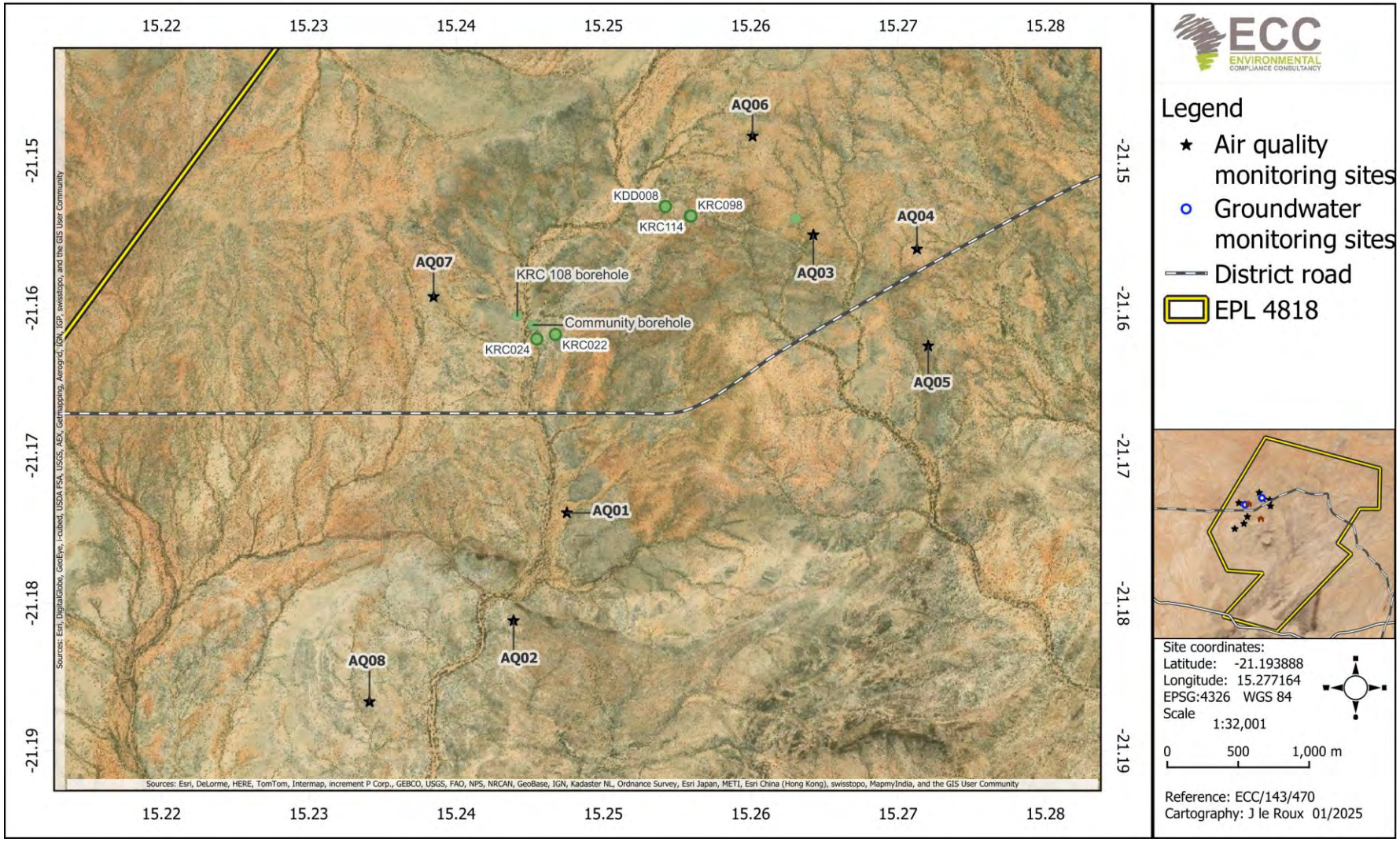


Figure 43 - Location of the depositional dust monitoring gauges on EPL 4818

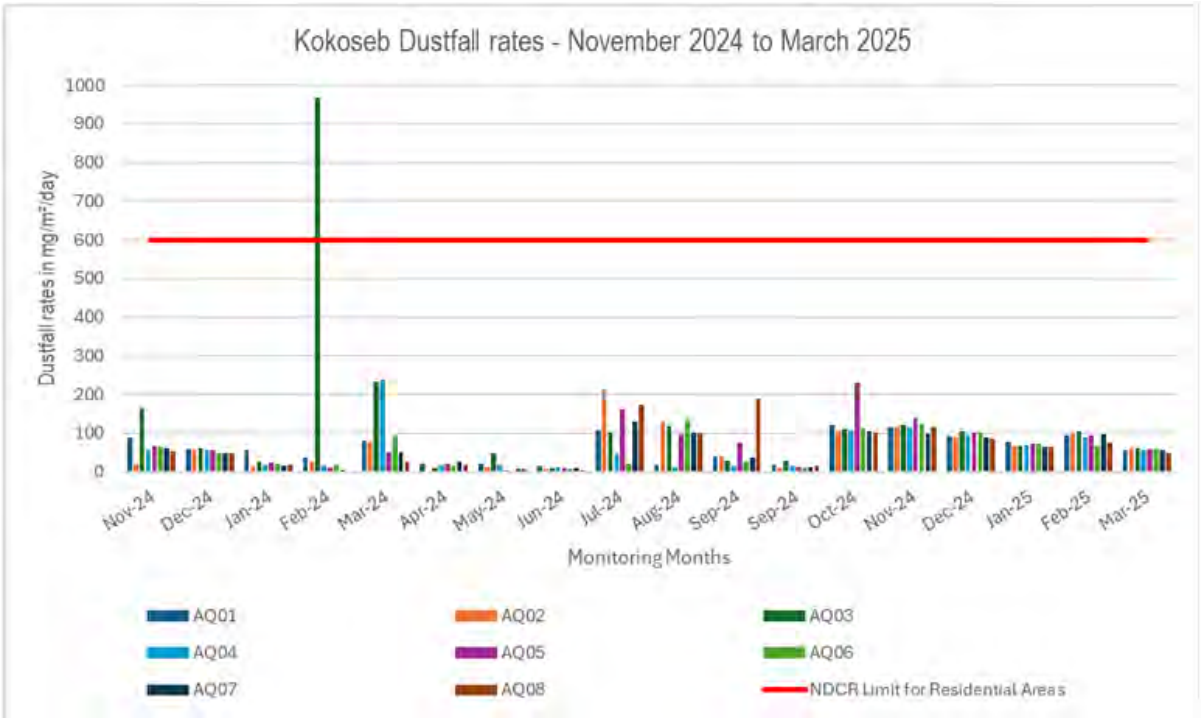


Figure 44 - Dust fallout results from November 2024 to March 2025 (Source: Airshed, 2025)

5.11.2 AIR QUALITY IMPACT ASSESSMENT

During the scoping phase of the ESIA, an air quality specialist study was deemed necessary to determine the potential impacts of atmospheric pollution for this Project. Airshed Planning Professionals (Pty) Ltd (Airshed) was engaged by ECC to conduct an air quality impact assessment study for the ESIA. The ambient air quality guidelines, as contained within the IFC and EHS guidelines of 2007 were applied in the assessment. The report is provided in Appendix H .

The main findings from the baseline air quality assessment study are summarised below (Airshed, 2025):

- The terrain is hilly, with a ridge running through the centre from east to west and northwest, with a small hill right in the centre of the modelling domain;
- There are homesteads close to the Project. The closest settlements are directly next to the Kokoseb pit area (Figure 45). The proposed accommodation village is located approximately 6 km to the south (S) of the main site. Other settlements in the vicinity include scattered homesteads to the north (N), east (E) and west (W) of the EPL. It is planned that some of these homesteads will be relocated due to their proximity to the main mining areas;
- The main pollutant of concern in the region is particulate matter (total suspended particles (TSP), PM_{10} and $PM_{2.5}$) resulting from vehicle entrainment on the roads (paved, unpaved and treated surfaces), windblown dust, and mining and exploration activities; and

- Gaseous pollutants such as sulphur dioxide (SO_2), nitrogen oxide (NOx), carbon monoxide (CO) and carbon dioxide (CO_2) would result from vehicles and combustion sources; however, these are expected to be at low concentrations due to the few sources in the region.

The main sources of atmospheric emissions in the vicinity of the Project site include (Airshed, 2025):

- Vehicle entrainment from the C36 road located to the south (S) of the Project and D3714 road that will be diverted to pass north/northwest of the mine;
- Windblown dust - windblown particulates from natural exposed surfaces, mine waste facilities, and ROM and product stockpiles can result in significant dust emissions with high particulate concentrations near the source locations, potentially affecting both the environment and human health. Windblown dust from natural exposed surfaces in and at the Project site is only likely to result in particulate matter emissions under high wind speed conditions (>10 m/s), and since recorded wind speeds did exceed 10 m/s, this source is likely to be of an important source of background particulate;
- Mines and exploration operations - pollutants typically emitted from mining and quarrying activities are particulates, with smaller quantities associated with vehicle exhaust emissions. Mining and quarrying activities, especially open-cast mining methods, emit pollutants near ground-level over (potentially) large areas. Mines in proximity to the proposed Project are the Uis Tin Mine (UTM), located at Uis, approximately 40 km southwest (SW) from Kokoseb Gold Project, and the Xinfeng Lithium Mine, located approximately 36 km southeast (SE) of the Project; and
- Regional transport of pollutants - regional-scale transport of mineral dust and ozone (due to vegetation burning) from the north of Namibia is a significant contributing source to background PM concentrations.

Air quality assessment impacts are further discussed in the assessment section 7.9 of this report. The mitigation measures are included in the final ESMP (Appendix A). Section 7.9 also discusses in detail the modelling outcomes for dust fallout, $PM_{10}/_{2.5}$ and gaseous emissions impacts in response to the pre-determined air quality sensitive receptors (AQSRs). Figure 45 below shows an overview of the AQSRs.

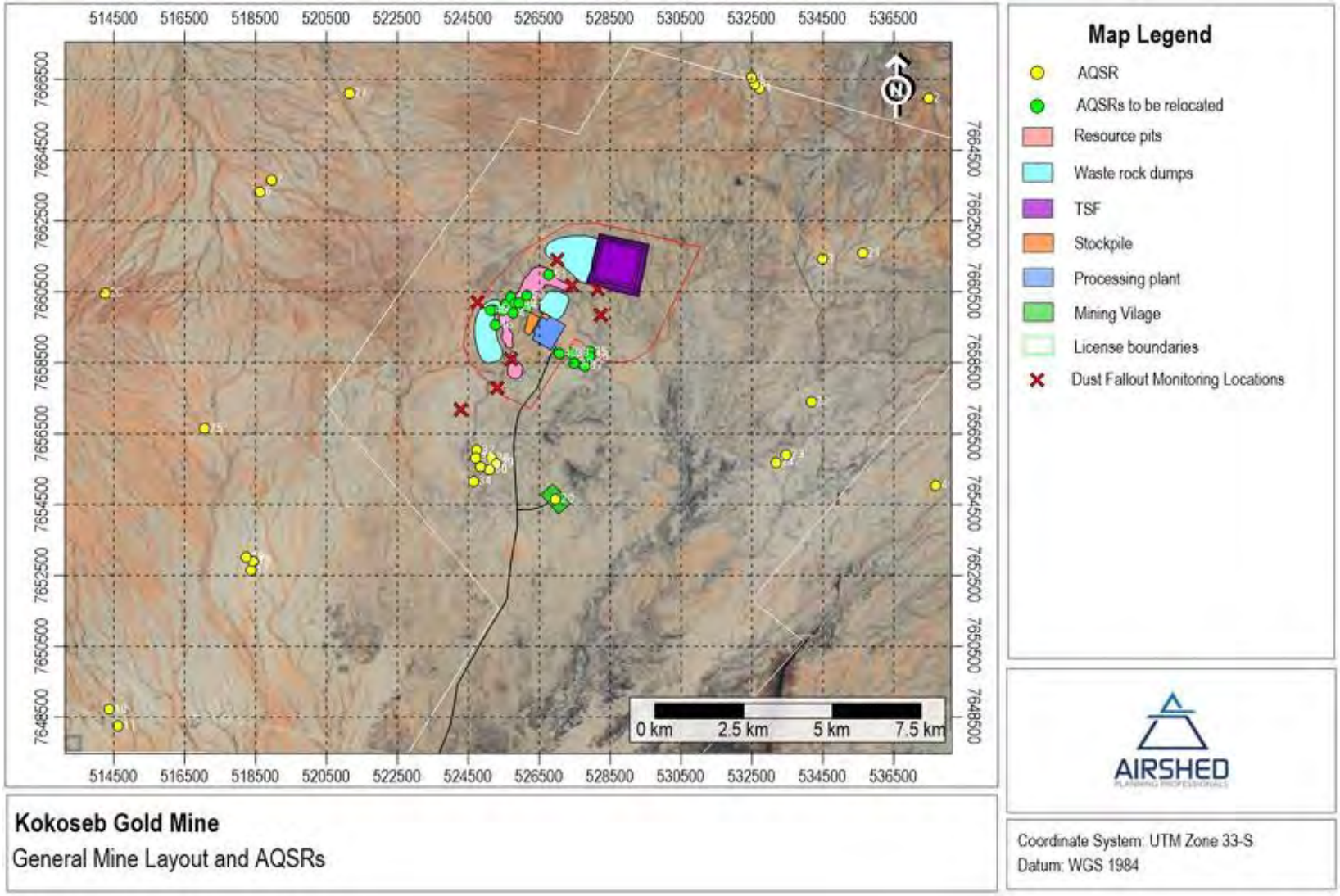


Figure 45 - Identified air quality sensitive receptors (AQSRs) (Source: Airshed, 2025)

5.12 BIOPHYSICAL BASELINE ENVIRONMENT

5.12.1 GEOLOGICAL SETTING

The regional geological and tectonic history of the Project site is influenced by the northeast-southwest trending Damara Orogenic Belt, formed during the Pan-African orogeny (~650-550 Ma). The Damara Belt consists of five tectono-metamorphic orogen strike-parallel zones that trend NE-SW. From north to south, these five zones are the Northern Zone (NZ), Northern Central Zone (NCZ), Southern Central Zone (SCZ), Southern Zone (SZ) and the Southern Marginal Zone (SMZ). The Damara Belt evolved during successive stages of the breakup of the supercontinent Rodinia (~800-600 Ma) through spreading, drifting, subduction, and convergence. The evolution ended in continental amalgamation and collision that led to the formation of the supercontinent known as Gondwanaland (~550-530 Ma).

The Project site occurs within the NCZ Damara Orogenic Belt, underlain by rocks of the Swakop Group and both late syn-tectonic and post-tectonic granites. The Swakop Group rocks in the area consist of metasediments of the Navachab and Usakos sub-groups.

The local geology is summarised from a collection of reports compiled by the Proponent during exploration activities and is provided in detail in the Project description chapter of this report (chapter 4).

Stratigraphically the Project site is predominantly underlain by metasediments of the Navachab sub-group, namely the Karibib Formation (Fm) and the overlying Kuiseb Fm.

Locally the Karibib Formation is marble-dominated with lesser schist and calc-silicates. The Kuiseb Formation is the youngest stratigraphic unit of the Damara Supergroup in the area. The formation is dominated by schist and consist of poorly foliated, dark grey, quartz/plagioclase/K-feldspar rich, biotite bearing units and black well foliated biotite units. Gold mineralisation is found within the Kuiseb Formation. The Kuiseb Formation metasediments are extensively intruded by the late syn-tectonic and post-tectonic granites, and minor N-S to NNE-SSW trending mafic dykes.

The granites consist of medium grained quartz, K-feldspar and plagioclase, with accessory biotite, muscovite, magnetite, garnet and tourmaline and form a dome structure, flanked by the Kuiseb schist. Granite dykes, granitic veinlets and pegmatites crosscutting the Kuiseb schist represent the same granite phase or later granitic phases. Gold mineralisation wraps around this pluton in a roughly arcuate form of 3 km diameter. Surrounding the Kuiseb Formation are coarse grained, pre-syn tectonic, porphyritic-feldspar granites.

The geological setting for the Project site is shown in Figure 46.

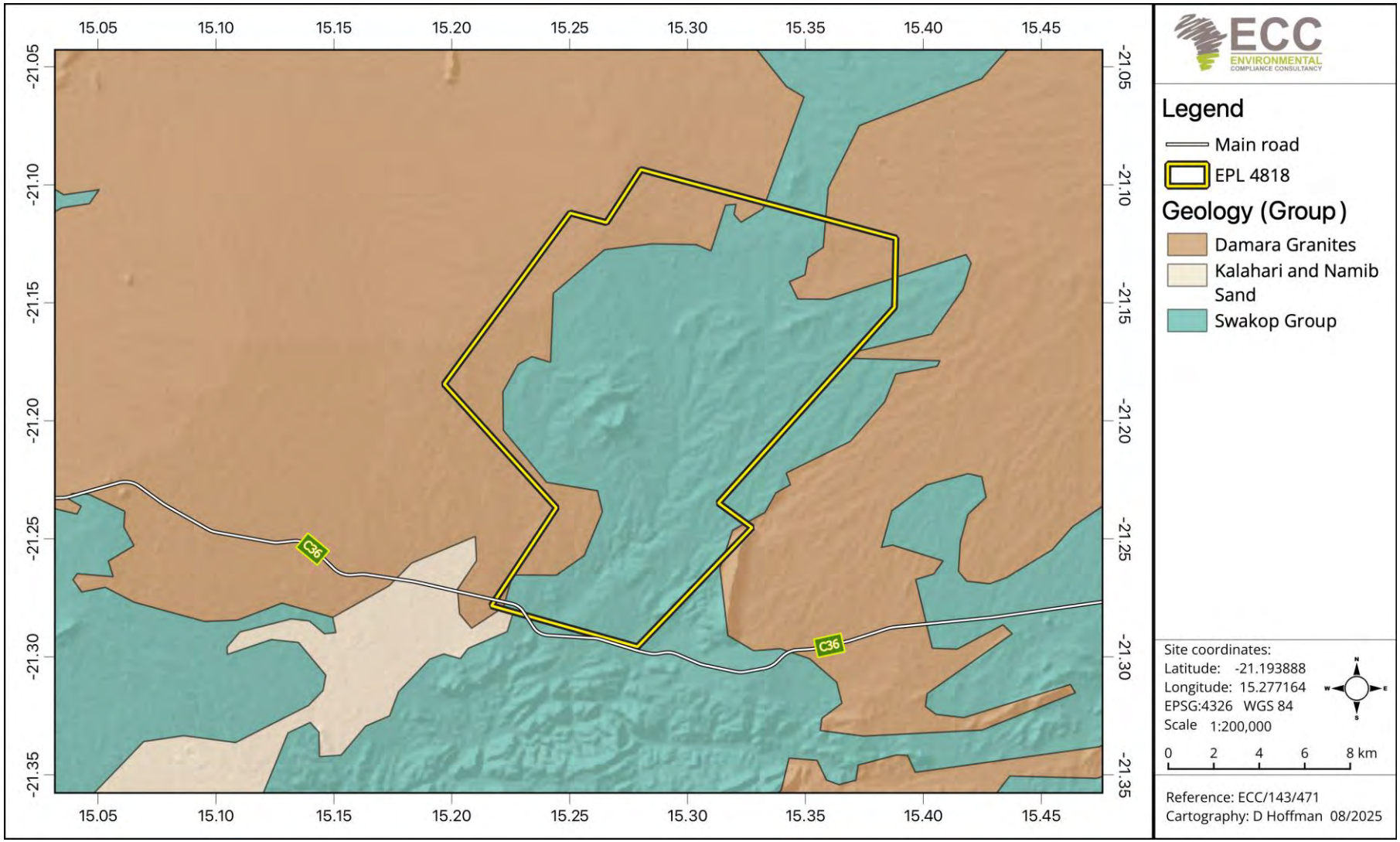


Figure 46 - Regional geological setting of the Project site

5.12.2 TOPOGRAPHY

The elevation generally decreases from the north (N) to south (S) and from east (E) to west (W) within the ML. Although rocky outcrops are present in the southeastern (SE) portion of the ML, the overall topography is varied and features a combination of gently undulating hills and more rugged areas. The SE portion is the lowest within the ML, at approximately 900 metres above mean sea level (mamsl), while the highest elevations reach over 1 200 mamsl in the north and northeastern portions of the ML, where more prominent hills and ridgelines are located.

The terrain can be described as moderately mountainous, influenced by a mix of geological features such as isolated hills, ridges and a range of minor outcrop formations scattered throughout the area. Some of these features are small and partially vegetated while others are more exposed and form distinct landmarks within the landscape.

EPL 4818 is intersected by several drainage lines and ephemeral rivers that follow the natural slope of the land. These watercourses are typically dry for most of the year and only become active during seasonal rainfall events.

The topography map for the Project site is shown Figure 47.

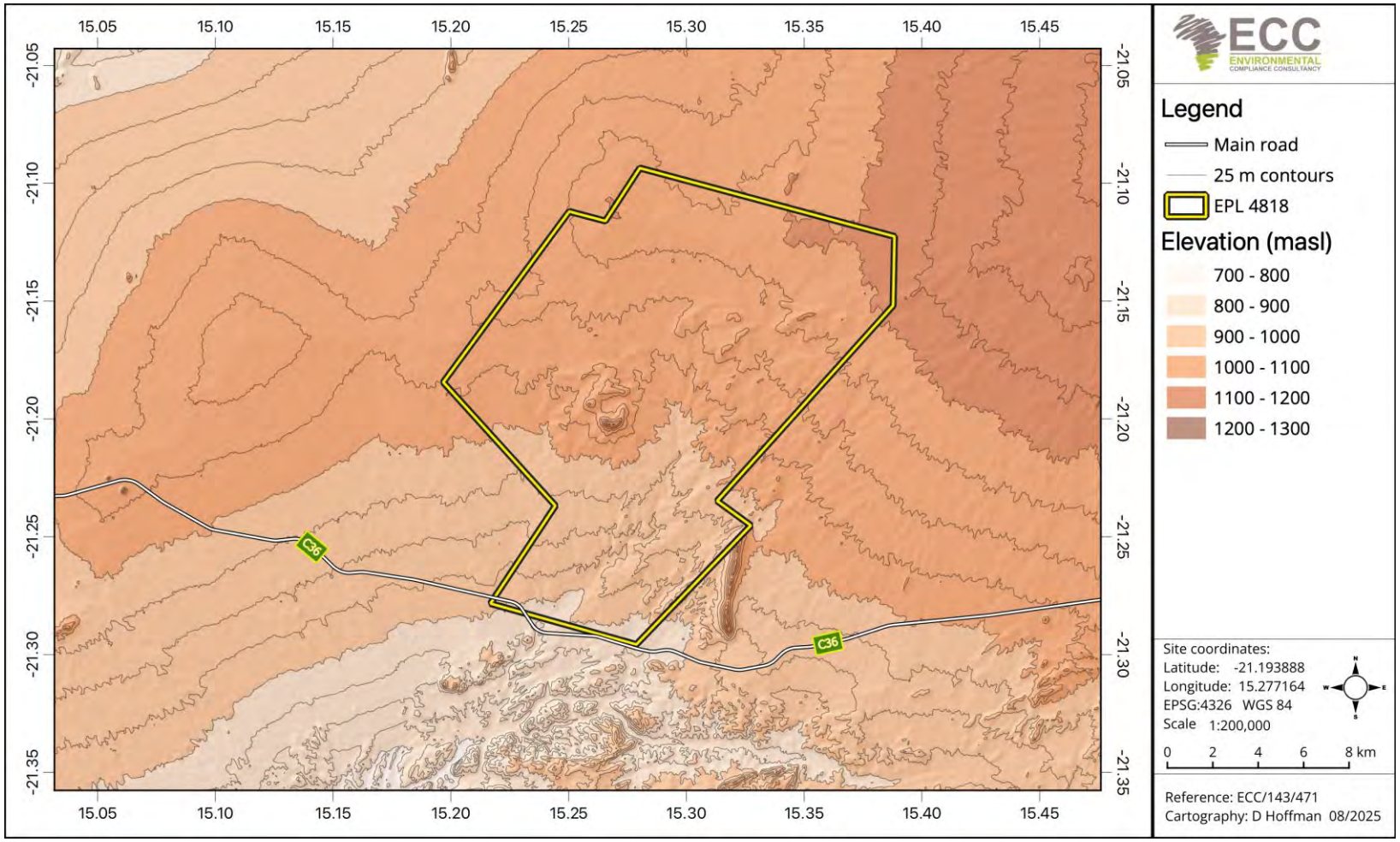


Figure 47 - Topography map for the Project area

5.12.3 CLIMATE AMD METEROLOGY

Namibia is characterised as a hyper arid country, and on a regional scale, water demand continues due to combined factors such as population, domestic consumption and small-scale livestock farming. These pressures collectively intensify the strain on already limited water resources. The prevailing atmospheric conditions (i.e. wind field, precipitation patterns, temperature regimes and other relevant meteorological variables) of the greater Project area are discussed in detail in the sections below.

5.12.3.1 Wind direction and speed

The wind direction and the variability in wind direction determines the general path that air pollutants will follow and the extent of crosswind spreading.

Daytime and nighttime wind roses for the Project area, derived from modelled WRF meteorological data over a thirty-six (36) month period (01 January 2022 to 31 December 2024) are presented in Figure 48. The corresponding seasonal wind roses for the same period are shown in Figure 49, while Figure 50 illustrates the wind roses derived from six (6) months of on-site meteorological data (30 August 2024 to 06 March 2025).

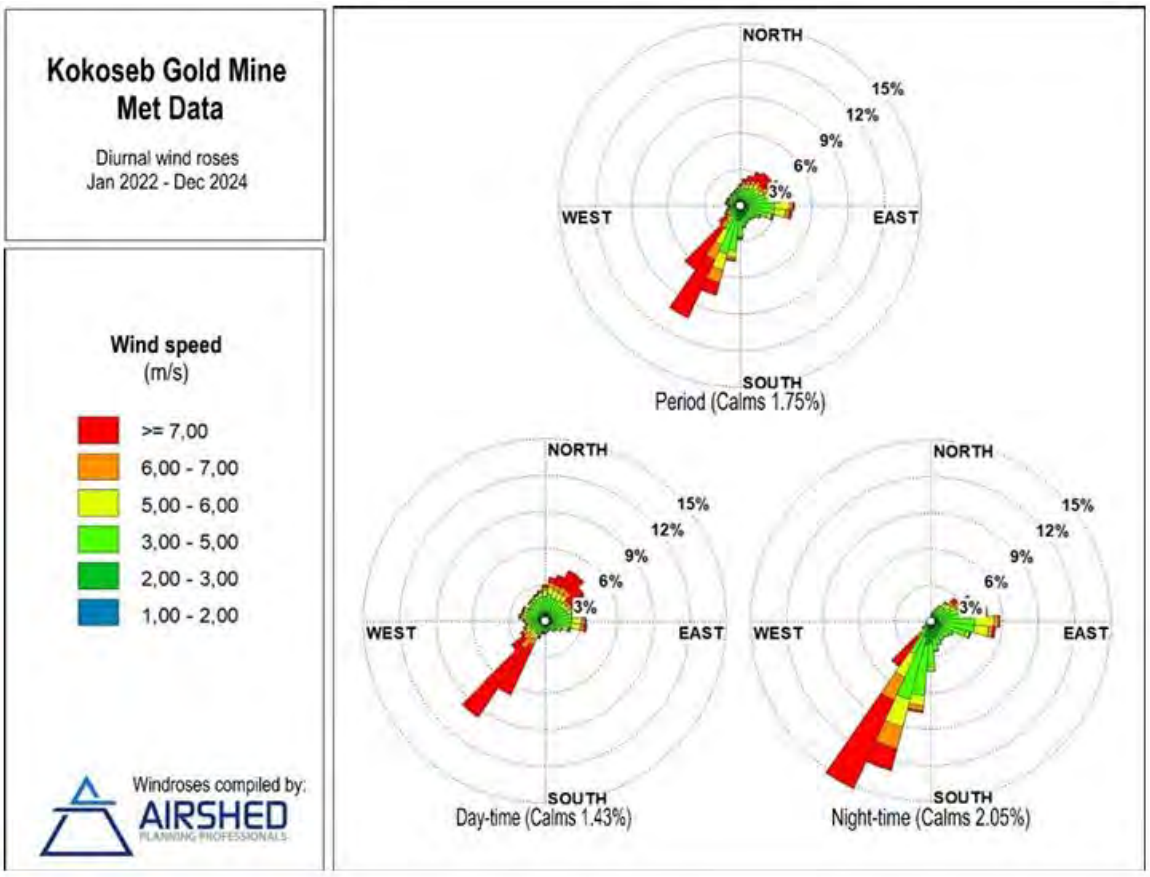


Figure 48 - Daytime and nighttime wind roses for the broader region, derived from WRF modelled data (01 January 2022 to 31 December 2024) (Source: Airshed, 2025)

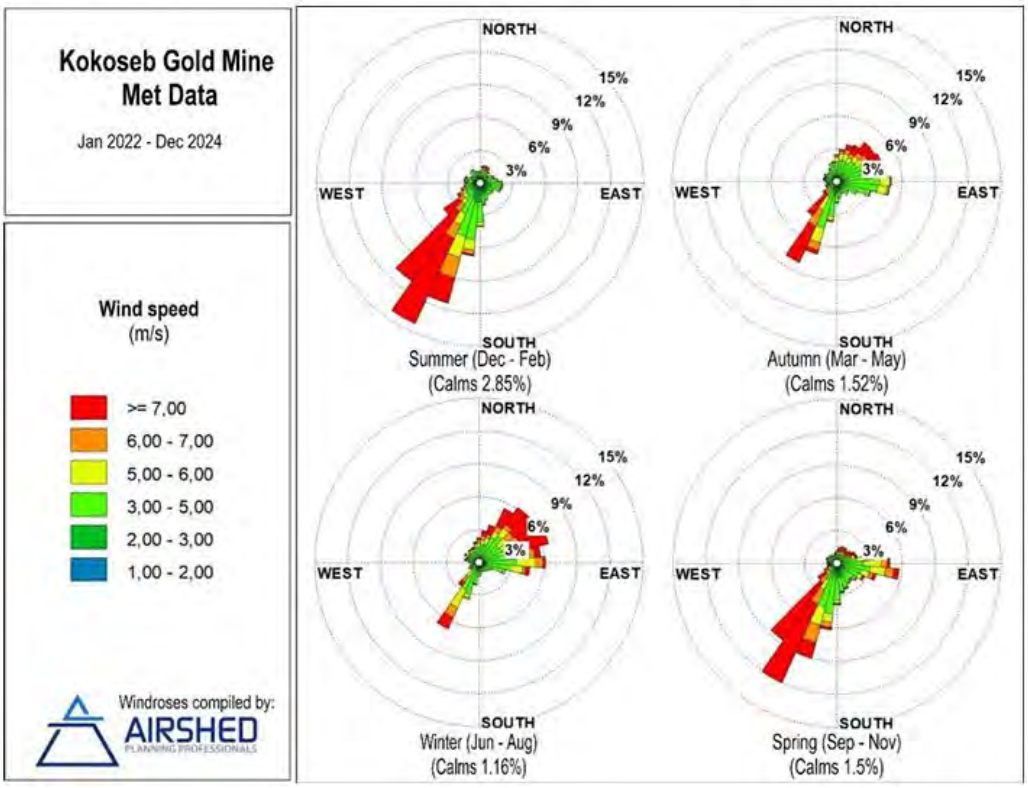


Figure 49 - Seasonal wind roses for the broader region, derived from WRF modelled data (01 January 2022 to 31 December 2024) (Source: Airshed, 2025)

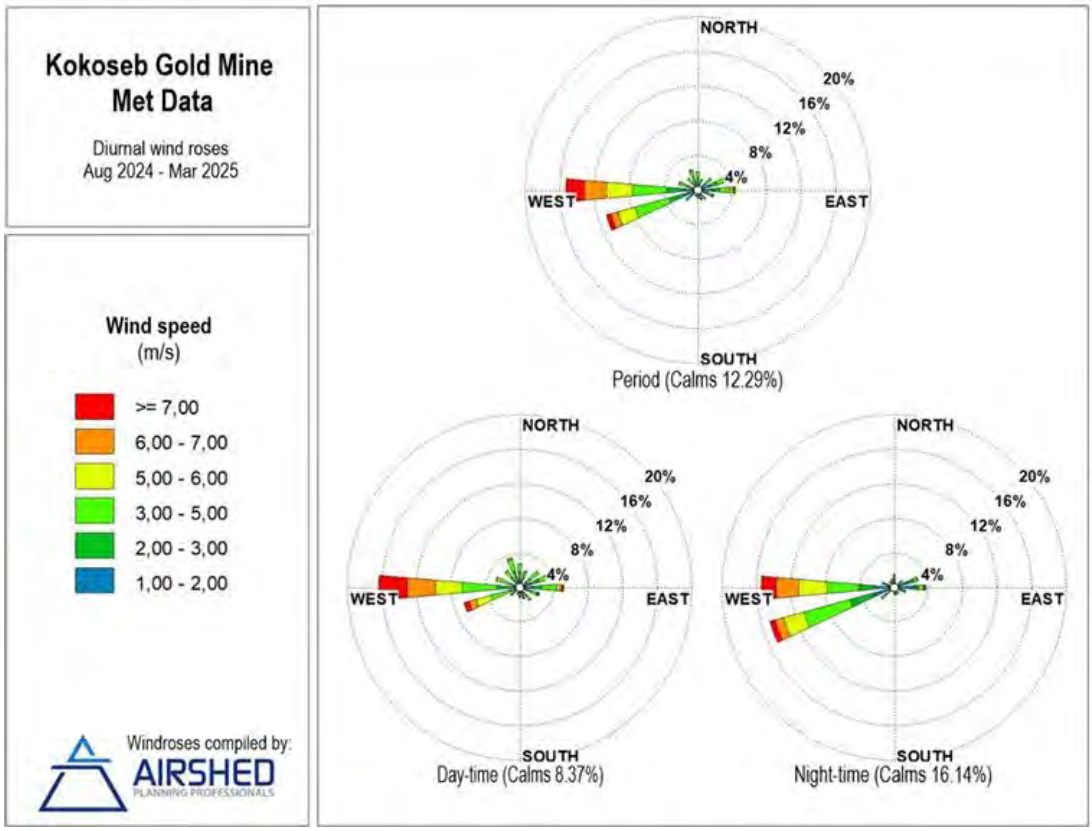


Figure 50 - Daytime and nighttime wind roses for the Project site, derived from on-site meteorological data (30 August 2024 to 06 March 2025) (Source: Airshed, 2025)

As illustrated in Figure 48 and Figure 49, the wind field in the broader region is predominantly influenced by winds from the southwest (SW), which are also associated with the strongest wind speeds. Calm conditions are observed at an average of 4.7 m/s. During the day, winds from the northeast (NE) and east (E) occur less frequently and are generally associated with calmer conditions and reflects clear variation in wind patterns. Notably, the maximum wind speed recorded over the period from 01 January 2022 to 31 December 2024 reached 15.3 m/s. In contrast, the recorded on-site meteorological data for the immediate Project site is predominated by west (W) winds (Figure 50).

As shown in Figure 49, during the summer months (November to February), SW winds are dominant. In autumn (March to May), the wind field is dominated by NE and E winds and less frequent SW winds. During winter (June to August), the wind field shifts to the NE, while during spring (September to November), SW winds are dominant, with less frequent E winds.

5.12.3.2 Temperature

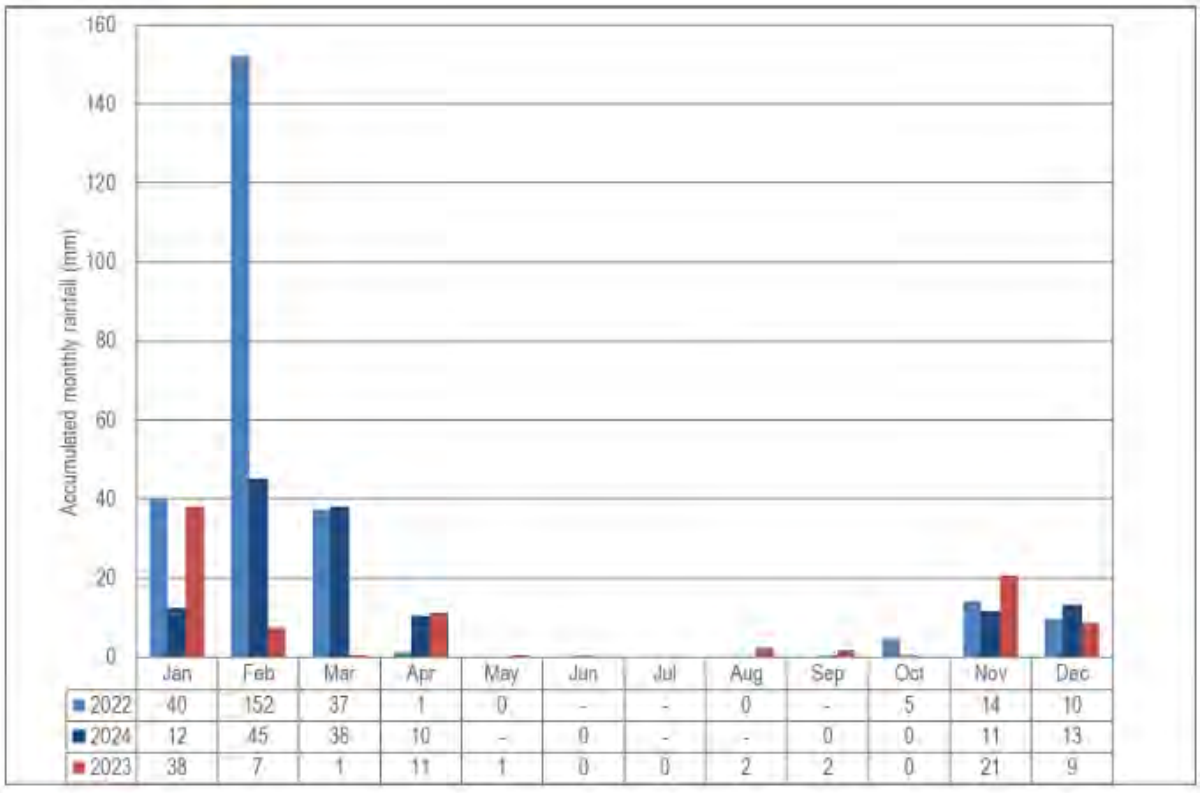
The diurnal temperature profile for the broader region is summarised in terms of the monthly mean and hourly maximum and minimum temperatures (Table 19). Based on the WRF modelled weather data for the period January 2022 to December 2024, the minimum, average and maximum temperatures for the broader region are observed as -1^{o}C, 22^{o}C and 39^{o}C, respectively.

Table 19 - Minimum, maximum and average hourly temperatures based on WRF modelled data (January 2022 - December 2024) (Source: Airshed, 2025)

Hourly minimum, hourly maximum and monthly average temperatures (^{0}C)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	10	10	9	9	3	-1	3	-1	4	4	9	8
Maximum	37	39	38	36	34	30	31	34	37	39	38	39
Average	24	25	25	24	21	17	17	20	22	24	24	24

5.12.3.3 Precipitation

The rainfall patterns in the broader region are generally low and highly variable. This reflects the hyper-arid climatic conditions of the region and the influence on land use patterns. Monthly average rainfall records derived from WRF modelled data (January 2022 to December 2024) are illustrated in Figure 51. Annual rainfall was highest in 2022 at 260 mm, followed by 130 mm in 2024 and 92 mm in 2023. The highest rainfall recorded during the period was 152 mm in February 2022.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	40	152	37	1	0	-	-	0	-	5	14	10
2024	12	45	38	10	-	0	-	-	0	0	11	13
2023	38	7	1	11	1	0	0	2	2	0	21	9

Figure 51 - Average monthly rainfall in the broader region based on WRF modelled data (Jan 2022 to Dec 2024) (Source: Airshed, 2025)

5.12.4 CLIMATE CHANGE

RDJ Consulting Services CC (RDJ Consulting) was contracted by ECC in August 2025 to conduct a predictive carbon footprint analysis for the Project. The specialist report can be viewed in Appendix I .

This section summarises the climate-related scenarios analysis, estimate future operational emissions, assess Project impacts on society and environment and the risks of climate and related impacts on the Project.

5.12.4.1 Climate vulnerability and renewable energy opportunities in Namibia

Namibia's climate vulnerability, proneness to prolonged drought periods, desertification, land and water resources degradation and loss of biodiversity pose a risk to the regional and national economy. Namibia is the driest country in Sub-Saharan Africa and severe droughts are a persistent threat to agricultural outputs.

Available data indicates that Namibia is experiencing rising temperatures over time (Figure 52), being close to the 1.5°C global average temperature rise above pre-industrial levels set by the Paris Agreement.

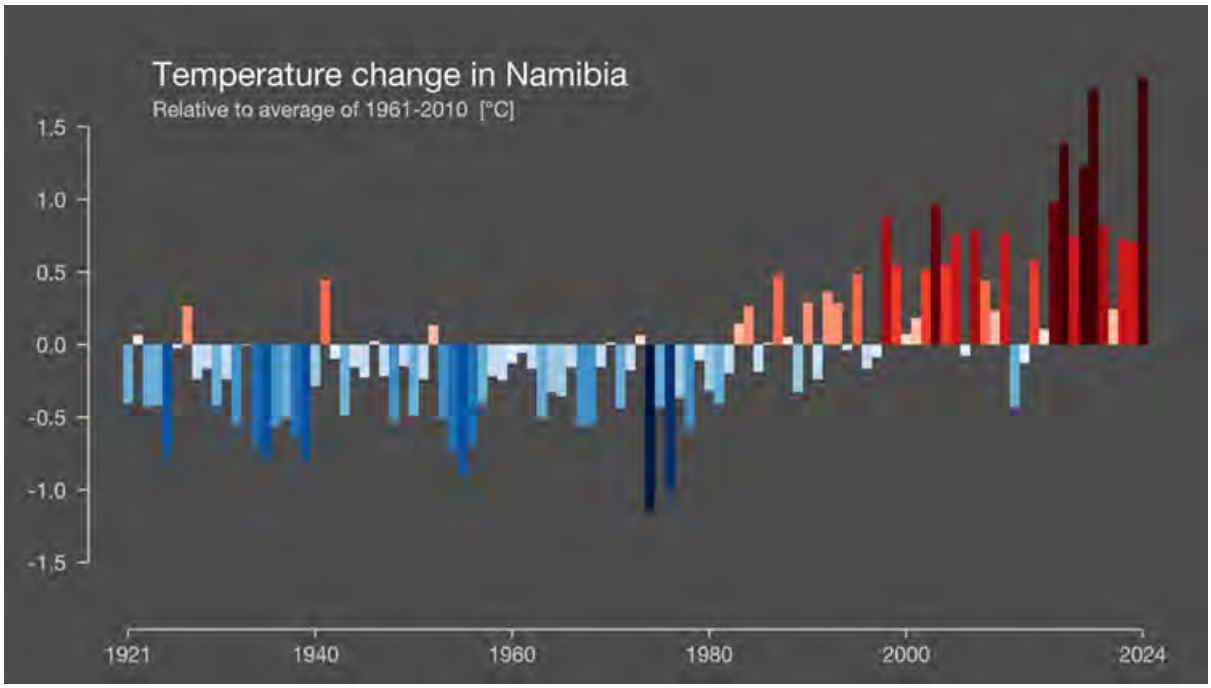


Figure 52 - Changes in Namibia's average mean temperature (°C) from 1921 to 2024 (Source: RDJ Consulting, 2025)

The mining industry is highly dependent on Namibia's dynamic climate and rainfall patterns, which directly influence water availability for critical operational processes such as ore extraction and processing, dust suppression and other industrial activities. Prolonged drought conditions can constraint water resources and as a result force mines to reduce production or halt operations. On the opposite spectrum, floods pose different set of challenges, such as damage to mine infrastructure, roads, bridges and processing facilities. Flooding also causes soil erosion and sedimentation, disrupt transportation and logistics and increase operational costs for infrastructure repairs. The overview of Namibia's rainfall spatial rainfall distribution is shown in Figure 53.

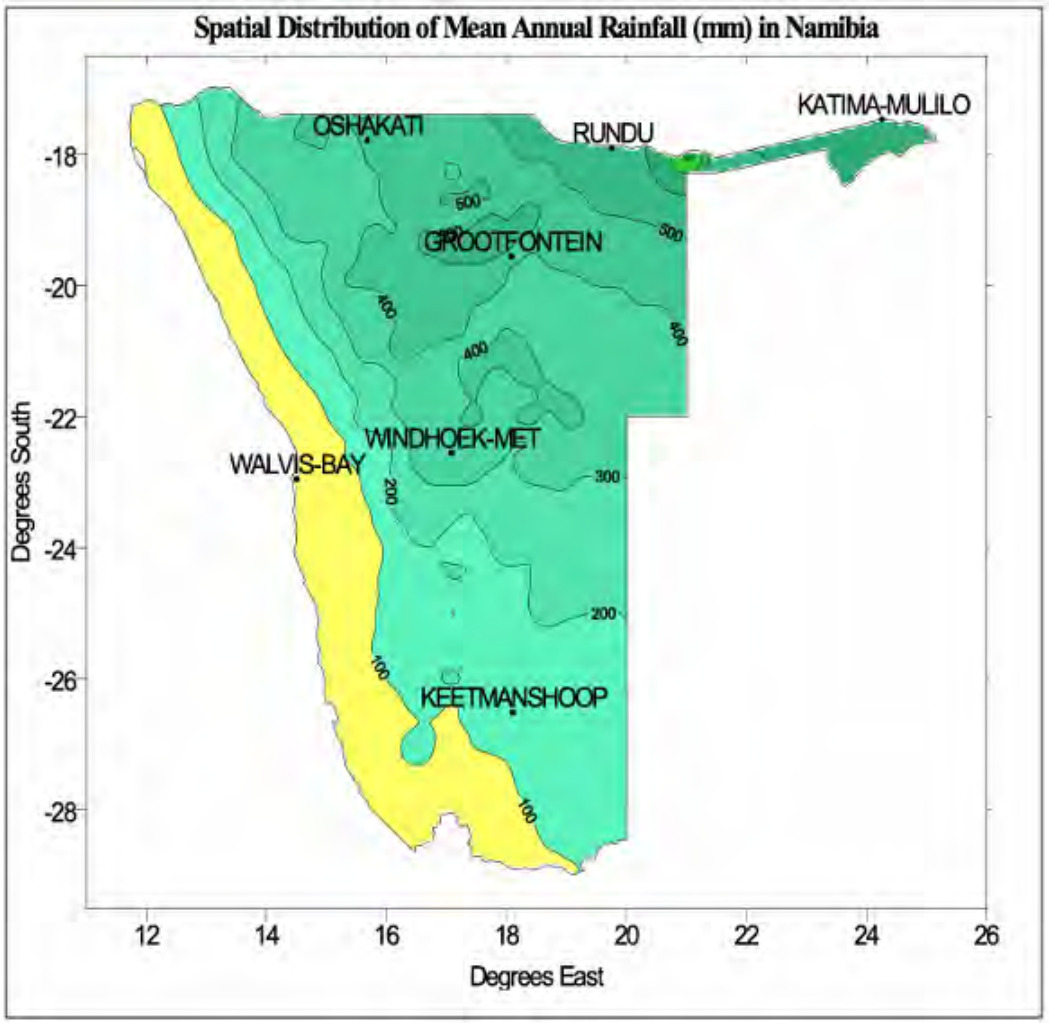


Figure 53 - Namibia mean annual rainfall (mm) (Source: RDJ Consulting, 2025)

Climate change-related extreme weather events, specifically droughts and flooding events (e.g. prolonged droughts and erratic heavy rainfall), severe winds accompanied by extreme temperature fluctuations are expected to affect mining and plant operations. The associated impacts of rising temperatures will not only affect Project operations, but also the health and well-being of the occupational workforce, contractors and surrounding communities. The growth in the number and ambitiousness of policies aimed at stemming greenhouse gas (GHG) emissions and managing climate impacts are likely to further impact businesses. These could take the form of increased carbon taxes, stringent water regulations, the impact of new technologies, and changing investor perceptions.

Namibia is a net carbon sink when compared to major global carbon and greenhouse gas (GHG) emitters. The Project's projected Scope 1 and Scope 2 emissions are presented in section 7.10, where the potential climate change–related impacts associated with these emissions are also discussed in detail.

5.12.5 SOIL

ECC conducted a soil sampling, profiling and analysis investigation to characterise existing soil conditions and provide a baseline dataset for the Project site. The findings are summarised in the sections below. The soil baseline report is presented in Appendix J.

5.12.5.1 Current soil use and patterns

The Dâures Constituency is categorised into centres and villages that comprise clustered small communities and sparsely spaced individual farms. The small villages within the Uis - Okombahe area are located within a semi-arid farming region characterised by relatively homogeneous agricultural systems, predominantly based on customary livestock farming. In the communal areas of Okombahe, farming practices are predominantly based on maintenance and management of livestock herds (ECC, 2025).

Communal farmers in Okombahe primarily raise goats, while Damara sheep are commonly kept in the broader Erongo Region. Small numbers of cattle, domestic poultry and pigs are also kept. Livestock production in the area is supported by an abundance of shrub vegetation, which serves as the primary forage for small stock. Unlike grasses, these shrubs are perennial and are a reliable source of nutrition, particularly during the drought periods (ECC, 2025). The land use potential is limited to subsistence livestock farming. Due to erratic and unpredictable rainfall patterns and the lack of irrigation water, large scale crop production has not been explored as a viable land use option.

5.12.5.2 Soil characterisation and analysis

Six (6) soil sampling locations were strategically selected using satellite imagery in areas surrounding the main open pit, mine waste disposal sites, and where significant earthworks are anticipated (Figure 54). At each sampling location, both topsoil and subsoil samples were collected to characterise surface and subsurface soil conditions. The soil samples were analysed by an independent, accredited laboratory (NviroTek Laboratories), based in South Africa. The soil analysis baseline report summarises the soil composition, fertility, erodibility (K-factor) and land use potential. Additionally, the soil samples were analysed in terms of their general characteristics, physical properties, chemical properties and hydrological properties. This information is valuable for environmental monitoring and will contribute to rehabilitation and mine closure designs.

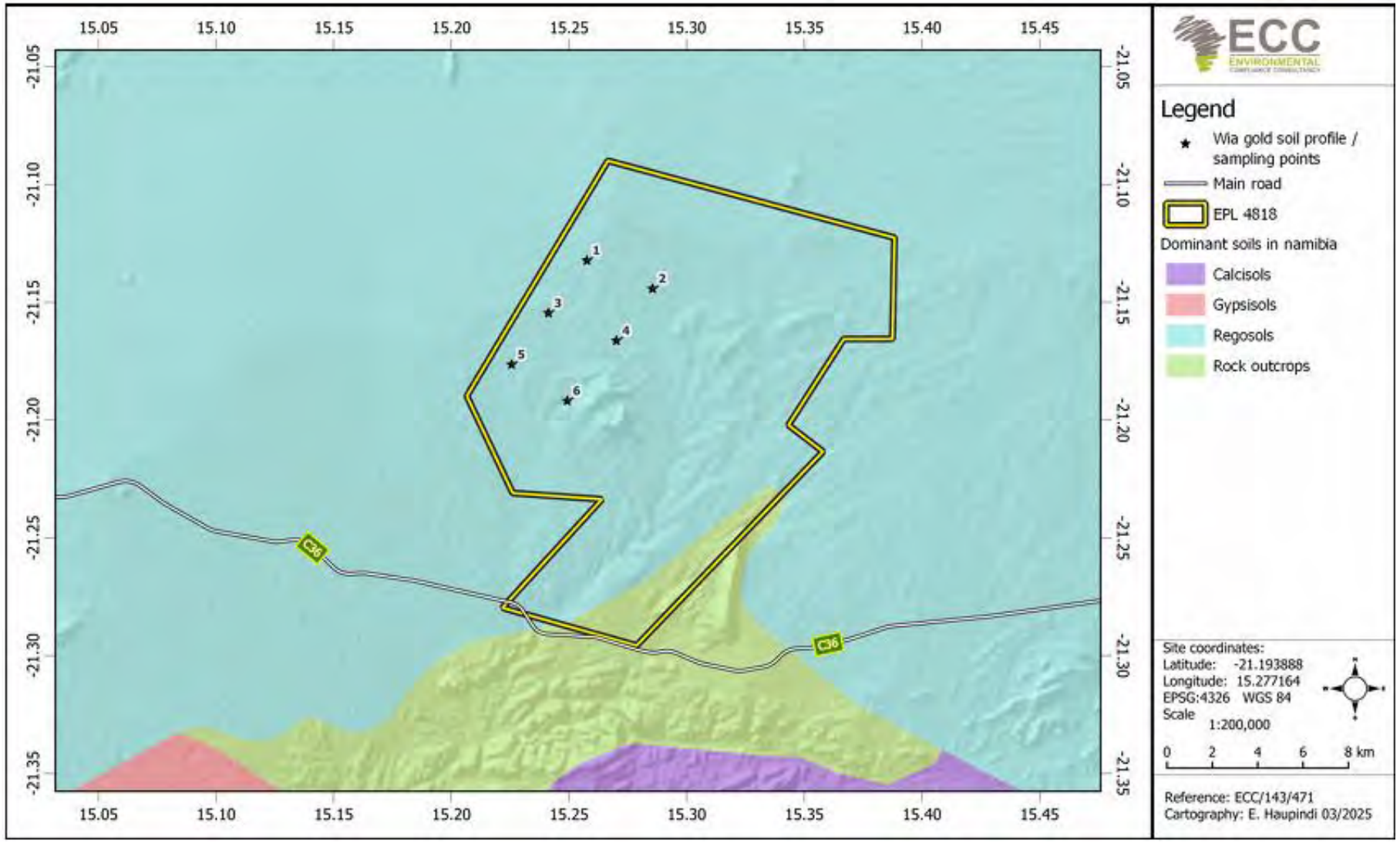


Figure 54 - Soil sampling locations and soil types in the immediate Project area (ECC, 2025)

According to Coetzee (2022), the soils in the Project area are predominantly classified as Eutric Skeletic Regosols (typically exhibiting a light brownish colour). This classification is also supported by observable geomorphological features and sample photographs captured during the soil sampling campaign. The physical properties of soils sampled in the Project area are summarised in Table 20.

Table 20 - Physical properties of six (6) soil sampling locations

Sample photo	Structure and texture	Boundary characteristics
Photo – site 1	Granular and blocky structured. Sandy and loamy textured.	Gradual transition
Photo – site 2	Granular structure and sandy textured.	Gradual transition

Sample photo	Structure and texture	Boundary characteristics
Photo – site 3	Granular structured and sandy textured.	Abrupt transition
Photo – site 4	Granular and blocky structured. Sandy and loamy textured.	Gradual transition
Photo – site 5	Granular and blocky structured. Sandy textured.	Gradual transition

Sample photo	Structure and texture	Boundary characteristics
Photo – site 6	Granular structured and sandy textured.	Abrupt transition

5.12.5.3 Soil erodibility (K-factor)

The soil erodibility factor (K-factor) is a quantitative depiction of the characteristics of a particular soil particle to detach and get washed away by rainwater and runoff (ECC, 2025). The soil erodibility factor can in some cases be described as the rate of erosion per unit index from a specific area. The erodibility factor reflects the susceptibility between different soils when all other impacting factors (infiltration rate, permeability rate, dispersion and total water capacity, abrasion and rain splash) are all kept constant.

Soil erodibility factor was calculated using the Universal Soil Loss Equation (USLE). The calculation takes into account the soil particle sizes (Fp), percentage of organic matter content (Pom), the soil structure index (Sstruc) and profile permeability class factor (Fperm). The soil erodibility factor of the six (6) soil samples collected ranged between 0.11 and 0.17, which indicate all soils to predominantly classify as granular structured, soils with slow infiltration rates, low erodibility, some cohesion and moderate permeability. Sandy soils make rehabilitation efforts easier as compared to clay rich soils.

It was observed that sand content varies from 77% to 97%, with a mean value of 86%. Silt content varied from 1% to 15%, with a mean value of 7.5% and clay content varied from 2% to 10%, with a mean value of 6.5%. This indicate that the soils are predominantly sandy, with low silt and clay fractions. As a result, the soils are expected to have a higher Estimated Infiltration Rate (EIR) and therefore would be more effective in allowing water to infiltrate rather than being eroded by surface runoffs. However, the high sand content also makes the soils more susceptible to wind erosion, particularly during dry seasons when vegetation cover is limited.

The soil compositions and erodibility results of the six (6) sampled locations are summarised in Table 21 and Table 22, respectively.

Table 21 - Particle size proportion per sample (Source: NviroTek Laboratories, 2024)

Sample ID	Clay	Silt	Sand
	%	%	%
SS 01A	2	1	97
SS 01B[3]	2	1	97
SS 02A	8	10	82
SS 02B	10	9	81
SS 03A	8	15	77
SS 03B	8	13	79
SS 04A	6	10	84
SS 04B	6	10	84
SS 05A	6	5	89
SS 05B	10	8	82
SS 06A	6	3	91
SS 06B	6	5	89

Table 22 - Estimated Infiltration Rate (EIR) and K-factor (Source: NviroTek Laboratories, 2024)

Sample ID	Fp	EIR (cm/H)	Fperm	Sstruc	K-factor
SS 01A	98	18.38	6	3	0.14
SS 01B	98	18.38	6	3	0.14
SS 02A	920	10.37	6	2	0.13
SS 02B	810	9.10	6	2	0.12
SS 03A	1 380	8.62	6	2	0.14
SS 03B	1 196	9.32	6	2	0.14
SS 04A	940	11.99	6	3	0.17
SS 04B	940	11.99	6	3	0.17
SS 05A	470	13.74	6	2	0.11
SS 05B	720	9.45	6	2	0.12
SS 06A	282	14.44	6	2	0.11
SS 06B	470	13.74	6	2	0.11

5.12.5.4 Soil fertility and suitable soils for rehabilitation cover

Based on the laboratory results, soil samples 1, 2, 4 and 6 exhibit neutral to slightly alkaline pH levels ranging from 8.1 to 7.0 (ECC, 2025). Soil sample 3 and 5 are more acidic, with pH ranging from 5.9 to 6.6. These results are presented in Table 23.

[3] Sample label "A" and "B" correspond to the topsoil and subsoil horizons, respectively.

Soils with a neutral to slightly acidic pH, typically ranging from 6 to 7.0, provide favourable conditions for soil fertility and sustainable agricultural productivity. Within this pH range, the availability of nutrients such as phosphorus (P), potassium (K), sodium (Na), calcium (Ca) and magnesium (Mg) is optimised and are soluble for plant uptake (ECC, 2025). Additionally, microbial activity is more efficient in this pH range, and this enhance critical biological processes including nutrient cycling and organic matter decomposition (ECC, 2025). The soil structure is also positively influenced by aggregation and porosity that promote root development and effective water infiltration.

The high Ca content of most soil samples does not preclude the requirement for agricultural lime dosing as a third of the soil samples (i.e. soil sample 3 and 5) were more acidic. In conclusion, the soil analysis survey has determined that the soils are nutrient rich and are suitable for the site rehabilitation.

Table 23 - Laboratory results of major ion concentrations calculated based on bulk densities (NviroTek Laboratories, 2024)

Sample	pH	Density (g/ml)	K (mg/l)	Na (mg/l)	Ca (mg/l)	Mg (mg/l)
SS 01A	8.1	1.49	59.6	11.9	2690.9	52.2
SS 01B	7.6	1.52	60.8	16.7	2307.4	69.9
SS 02A	7.2	1.28	276.5	19.2	4835.8	144.6
SS 02B	7.0	1.23	227.56	20.9	5094.7	139.0
SS 03A	6.6	1.3	330.2	14.3	4404.4	188.5
SS 03B	7.2	1.28	353.3	14.1	4704	218.9
SS 04A	7.5	1.35	379.4	13.5	4591.4	140.4
SS 04B	7.6	1.33	325.9	13.3	4593.8	141.0
SS 05A	6.5	1.37	132.9	21.9	1038.5	89.1
SS 05B	5.9	1.29	172.9	18.1	1192.0	153.5
SS 06A	7.5	1.38	162.8	13,8	3088.4	82.8
SS 06B	7.1	1.42	156.2	14.2	2902.45	90.9

Mine rehabilitation, vegetation restoration and sustainable post mining land use are important steps in the process of ecosystem restoration on mined soils and are mandated under the Minerals Act, No. 33 of 1992, the Environmental Management Act, No. 7 of 2007 (EMA) and the Namibian Mine Closure Framework (NMCF). The high elemental composition, neutral pH and low erodibility of majority of soil samples indicate favourable conditions for the establishment of pastoral grassland as part of the rehabilitation process. However, in areas where soils exhibit increased acidity, targeted interventions such as the incorporation of organic matter and neutralising agents (agricultural lime) are required to enhance soil fertility and support successful vegetation growth. It is recommended that topsoil stockpiles, consisting of the upper 300 mm of soil must be established during the construction phase. To preserve soil structure, maintain biological integrity and minimise wind erosion, topsoil stockpiles should not exceed a height of 2 m.

A detailed soil map depicting stripping depths and available cover soil volumes must be created and should be used to start the stripping and topsoil stockpiling plan, as well as inform the active topsoil balance for LoM.

5.12.6 MINE MATERIAL GEOCHEMISTRY

RGS and ECC completed a Phase 1 and Phase 2 geochemistry assessment of mine materials (waste rock, potential tailings and ore) for the Kokoseb Gold Project (Appendix K). The geochemical analysis of the mine materials (waste rock, low-grade and high-grade ore) was conducted to assess the mineralogical composition and potential for the generation of acid and metalliferous drainage (AMD), neutral and metalliferous drainage (NMD), saline drainage (SD) or dispersive issues from these materials.

A total of seventy-five (75) representative samples were collected from eight (8) drill holes from the Project site for the geochemical analysis. The sample list included sixty-three (63) waste rock samples, eight (8) mineralised waste samples (to provide some indication of the geochemical characteristics of tailings materials) and four (4) ore samples (Figure 55 and Table 24). The samples were crushed (where required) and sub-samples were pulverised to pass 75 µm sieve size, bagged, labelled, sealed and then transferred to an accredited commercial laboratory (Aquatico Scientific Laboratories in South Africa) for static geochemical testing.

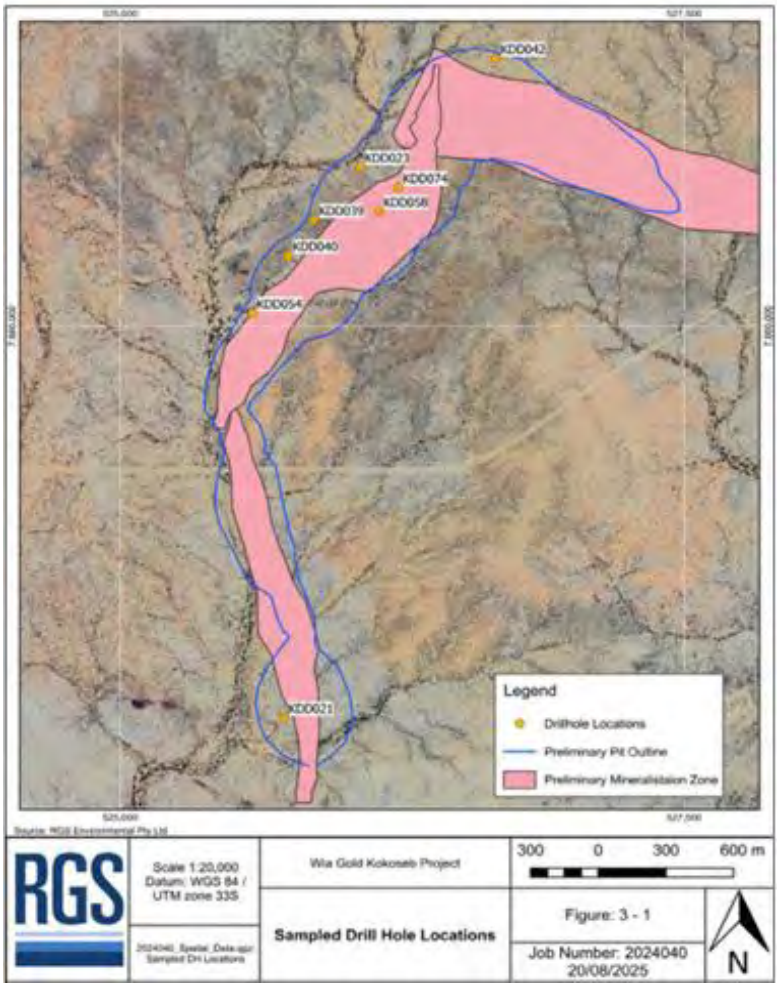


Figure 55 - Sampled drill hole locations (Source: RGS, 2025)

Table 24 - Sample materials per sampling location

Drill hole ID	No. of waste rock samples	No. of potential tailings samples	No. of ore samples
KDD021	8	3	1
KDD023	8	-	-
KDD039	6	-	-
KDD040	8	5	2
KDD042	11	-	-
KDD054	12	-	-
KDD058	9	-	-
KDD074	1	-	1
Total	63	8	4

The geochemical test program was designed to assess the degree of risk from the presence and potential oxidation of sulphides, acid generation and the presence/leaching of soluble

metals/metalloids and salts. The results from the acid base accounting (ABA) data trends are discussed below.

Potential for hydrogen (pH): The pH of the samples tested ranged from 8.3 to 10.2 (i.e. in the slight to moderate alkaline range) and has a median of 9.7 (Figure 56). Most samples had pH > the deionised water used in the tests, suggesting that, at least initially, addition of alkalinity to water in contact with these materials was likely. Only sever (7) waste rock samples had a pH < 9.0. The remaining waste rock samples as well as all potential tailings and ore materials had pH > 9.0.

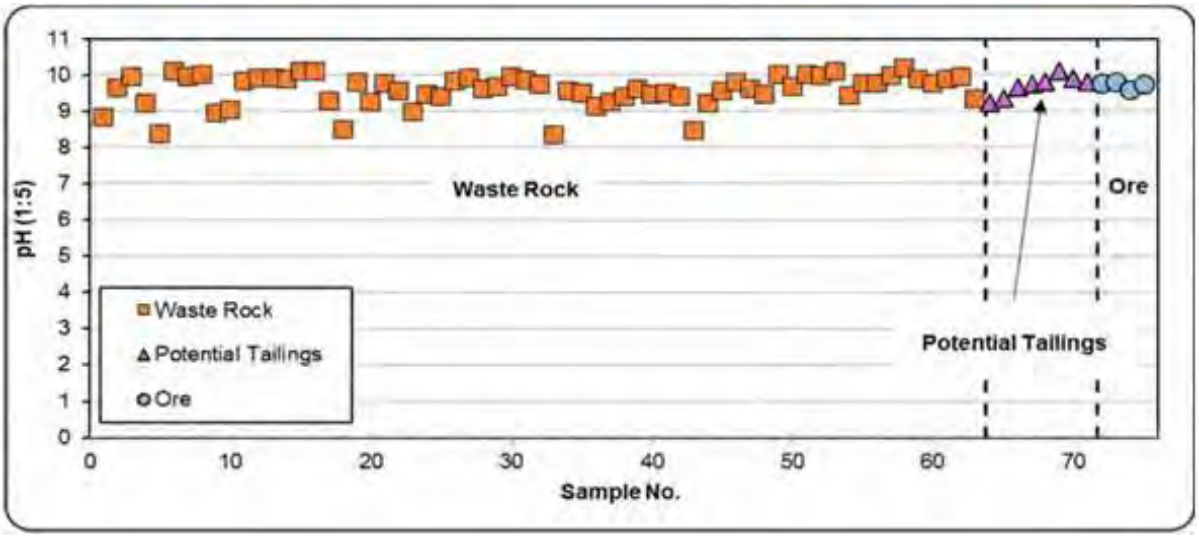


Figure 56 - pH values of tested mine materials (Source: RGS, 2025)

Electrical conductivity (EC): The EC values of the seventy-five (75) samples range from 98 to 603 µS/cm, with a median of 158 µS/cm (Figure 57). Waste rock samples exhibit a similar range (96-603 µS/cm) (fifty-nine (59) of the sampled had EC below 250 µS/cm). Generally, the waste rock samples are characterised to have low EC concentrations. Potential and ore material samples had EC values < 200 µS/cm.

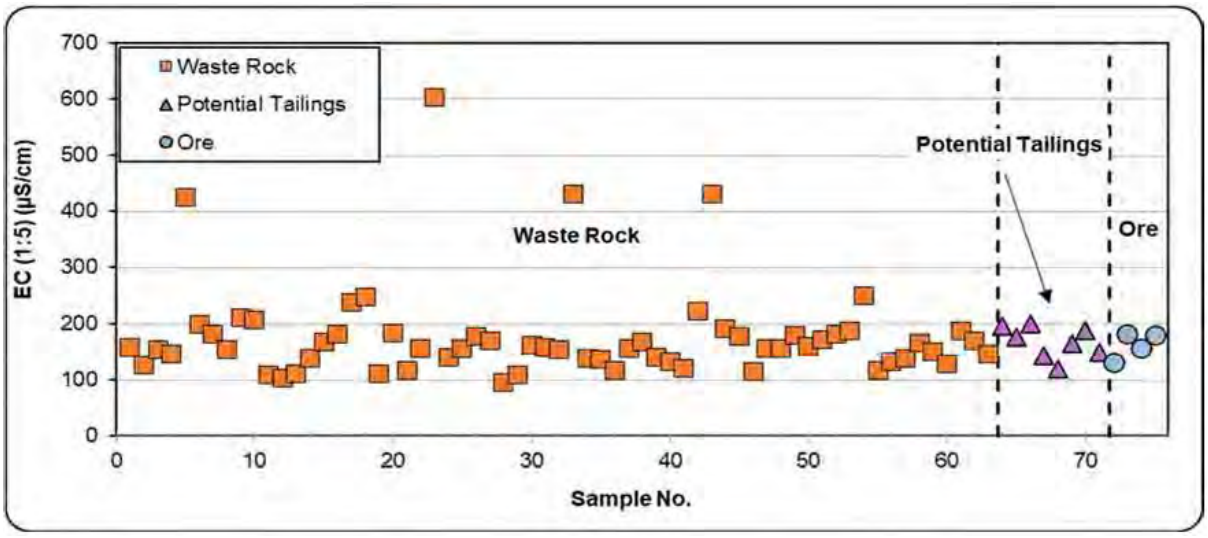


Figure 57 - EC values for the tested mine materials (Source: RGS, 2025)

Total and sulphide sulphur: The total sulphur of the seventy-five (75) samples of the mine materials range below the laboratory limit of reporting (LoR) of 0.01 to 1.78 %S and has a median value of 0.05 %S (Figure 58). Most of the waste rock and potential tailings samples had a very low total sulphur concentration relative to the median crustal abundance (0.1 %S) for this element in unmineralised soils. Materials with a total sulphur content less than or equal (≤) 0.1 % are essentially barren of sulphur, generally represent background concentrations and have negligible capacity to generate acidity (RGS, 2025).

The total sulphur content of nineteen (19) of the sixty-three (63) waste rock samples, two (2) of the eight (8) potential tailings samples and all the ore samples is > 0.1 %S. The higher total sulphur values (>1.0 %) are associated with one (1) biotite granite and two (2) biotite schist waste rock samples and one (1) ore sample.

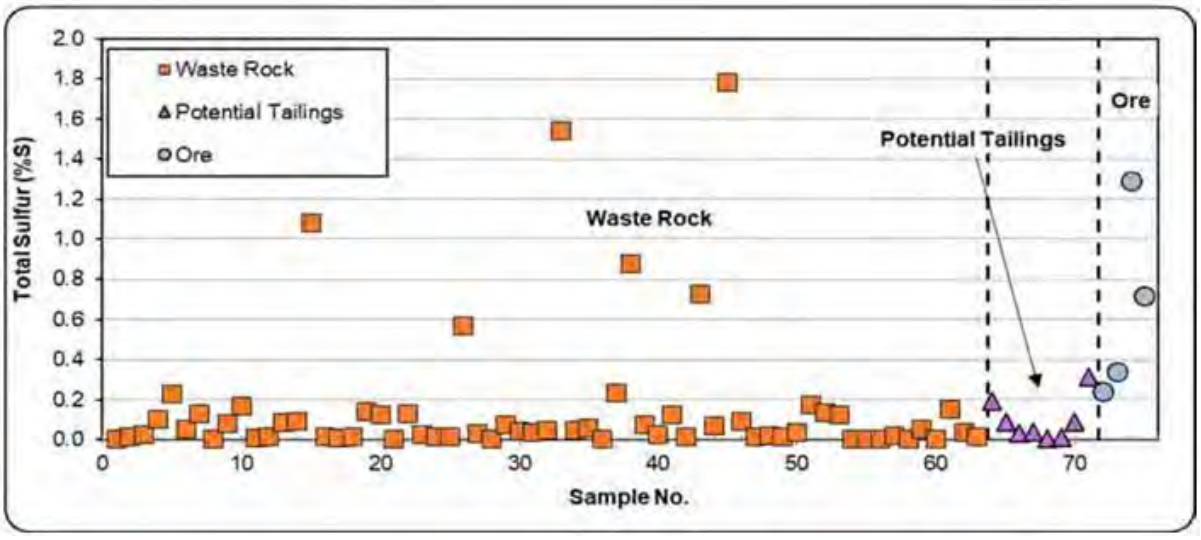


Figure 58 - Total sulphur concentrations of the tested mine materials (Source: RGS, 2025)

Only thirteen (13) samples out of the seventy-five (75) tested samples have a sulphide sulphur content > 0.1 %SCR (Figure 59). This sample group includes eight (8) waste rock samples and four (4) ore samples, where most of the total sulphur is in the form of sulphide sulphur. Additionally, one (1) potential tailings sample also had over 0.1 %SCR, where most of the sulphur is not in the sulphide form. The results indicate that for most samples with a total sulphur content > 0.1 %S, most of the total sulphur content is present in a sulphide form and therefore may potentially be a source of acidity.

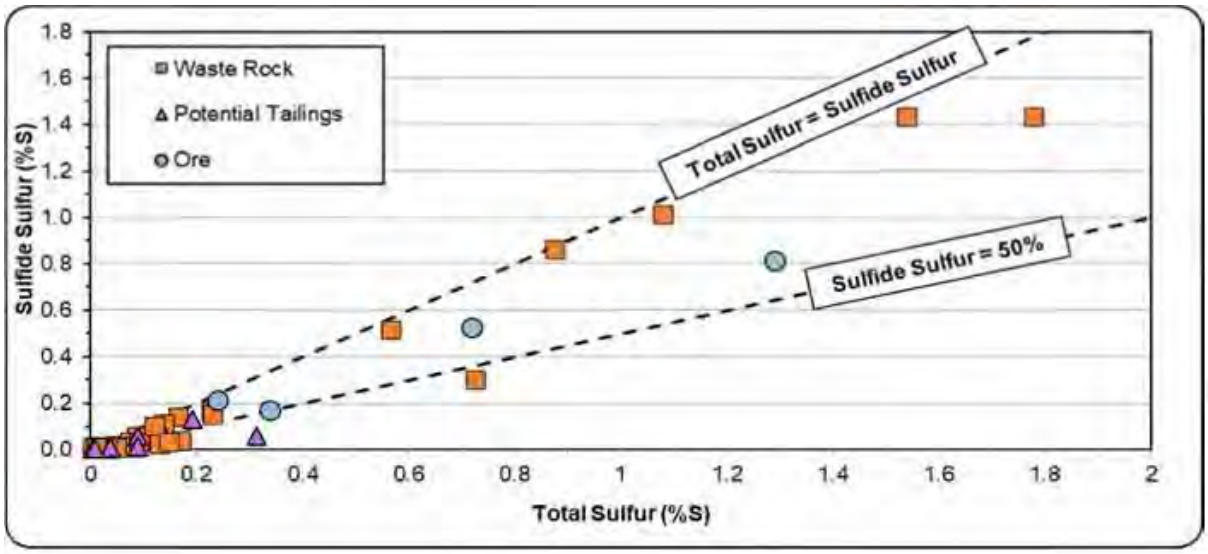


Figure 59 - Total sulphur vs sulphide sulphur for mine material samples (Source: RGS, 2025)

Maximum potential acidity (MPA): MPA values are expressed as the number of kilograms of sulfuric acid calculated to be generated by a tonne of the sample (kg H_2SO_4/t). Based on the sulphide content, the MPA that could be generated by the seventy-five (75) samples of the mine materials ranged from 0.2 to 43.8 kg H_2SO_4/t, with a low median of 0.2 kg H_2SO_4/t.

Acid neutralising capacity (ANC): The ANC value for the seventy-five (75) samples ranged from 41.4 to 238.0 kg H_2SO_4/t, with a median value of 86.1 kg H_2SO_4/t. The highest ANC values are recorded for the waste rock samples (median 100 kg H_2SO_4/t) and lowest ANC values are associated with potential tailings samples (< 60 kg H_2SO_4/t).

Figure 60 presents the ANC verses the MPA of the seventy-five (75) mine material samples.

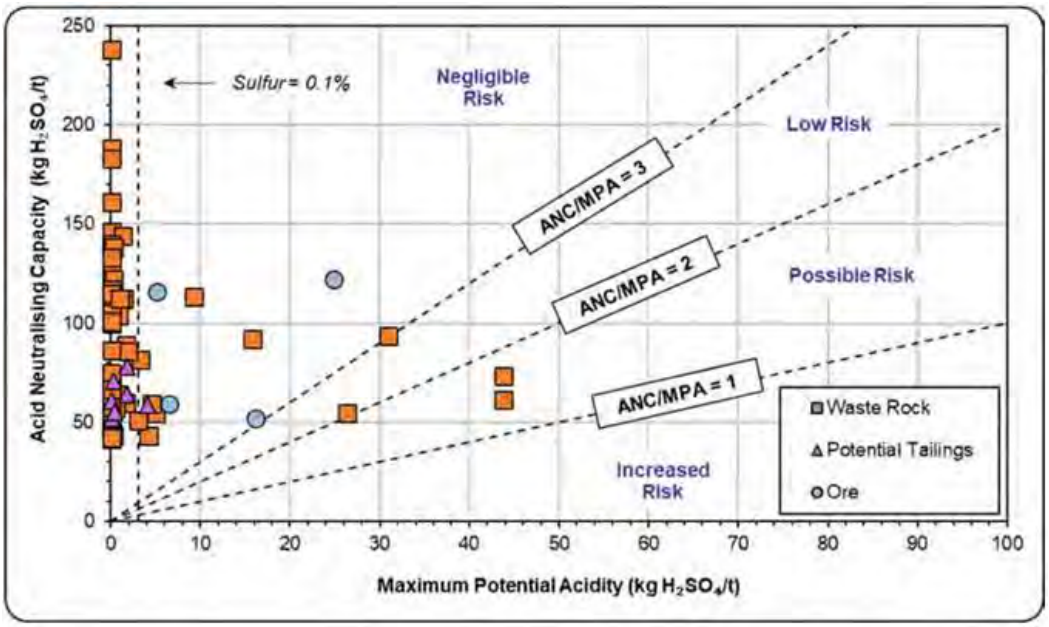


Figure 60 - ANC vs MPA for the tested mine material samples (Source: RGS, 2025)

Net acid producing potential (NAPP): NAPP is the balance between the capacity of a sample to generate acid (MPA) minus its capacity to neutralise acid (ANC). All seventy-five (75) samples of mine materials have negative calculated NAPP values which range from -237.8 to -17.5 kg H_2SO_4/t, with a median value of -78.4 kg H_2SO_4/t (Figure 61). This indicates that all samples are likely to have excess neutralising capacity relative to their MPA.

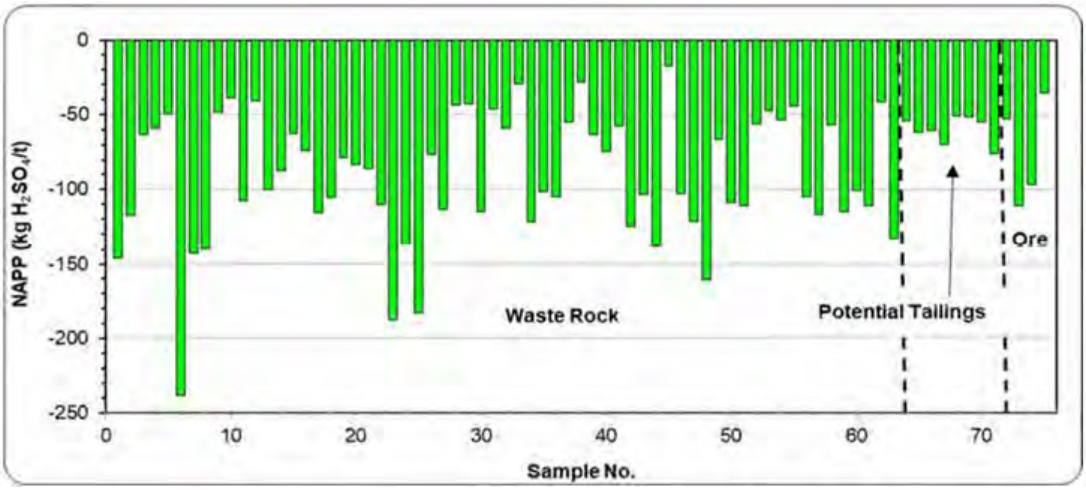


Figure 61 - NAPP values for the tested mine material samples (Source: RGS, 2025)

The results of the static geochemical test program have been used to provide some conclusions as to whether the exposed waste rock and ore materials at the Project site will present environmental impacts that will need to be managed.

The results presented in Table 25 and Figure 62 illustrate that all mine material samples have excess ANC and are classified as non-acid forming (NAF). Additionally, 71 % of the samples

have sufficiently low sulphide sulphur that they can be classified as NAF-barren due to essentially being barren of sulphide.

Table 25 - Geochemical classification criteria and classification of tested mine material samples (Source: RGS, 2025)

Classification	S (%)	NAPP[1] (kg H_2SO_4/t)	No. of samples (n=75)
Non-acid forming (barren)[2]	≤ 0.1	-	53
Non-acid forming	> 0.1	< - 5	22
Uncertain	> 0.1	> - 5 to ≤ + 5	0
Potentially acid forming – low capacity	> 0.1	> + 5 to ≤ + 10	0
Potentially acid forming	> 0.1	> 10	0

Notes:

1. If total sulphur/SCR is ≤ to 0.1 %S, the NAPP is not required for material classification as the sample is essentially barren of oxidisable sulphide sulphur.
2. A sample classified as NAF can be further described as 'barren' if the total sulphur and/or sulphide sulphur content is ≤ to 0.1 %S, as the sample essentially has negligible acid generating capacity.

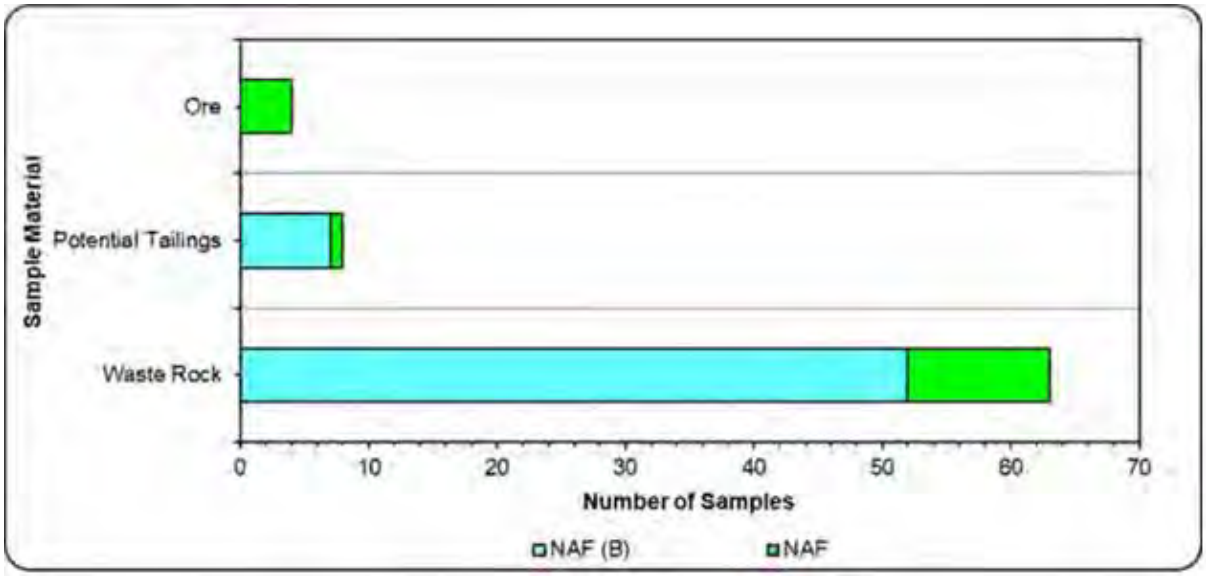


Figure 62 - Geochemical classification by material type (Source: RGS, 2025)

The geochemical assessment to date has made the following conclusions:

- The majority of the mine materials, as represented by the samples tested, have low sulphur content, and all samples have excess ANC relative to their MPA, and are classified as NAF;
- Waste rock, potential tailings and ore materials are not expected to be notably enriched in metals/metalloids compared to median crustal abundances in

unmineralised soils. Minor exceptions may include cadmium (Cd) in all mine materials and arsenic (As) in potential tailings and ore materials;
- Initial drainage from mine materials is generally expected to be alkaline and non-saline;
- The concentration of most dissolved metals/metalloids are expected to occur in low concentrations in initial contact water derived from mine materials; and
- Under a 'worst case' sample preparation and laboratory-controlled contact water situation, dissolved elements such as fluoride (F^-), aluminium (Al), and arsenic (As) from some mine materials may be present in pore water at a concentration > the applied water quality guideline values.

The potential generation of AMD and the associated plume dispersion are discussed in detail in section 7.12.

5.12.7 HYDROLOGY AND DRAINAGE

ECC appointed Umvoto Africa (Pty) Ltd and Hydrologic Consulting (Pty) Ltd to undertake a hydrological assessment for the Kokoseb Gold Project. The report is provided in Appendix L .

The Project site is located north (N) of the ephemeral Omaruru River, with its tributaries draining the majority of the EPL (Figure 63). The Omaruru River drains the Omaruru Catchment which has an area of approximately 11 500 m2 and receives an annual rainfall of between 300 and 500 mm from the mountainous region to the east (E). The greater Omaruru Catchment drains to the Atlantic Ocean.

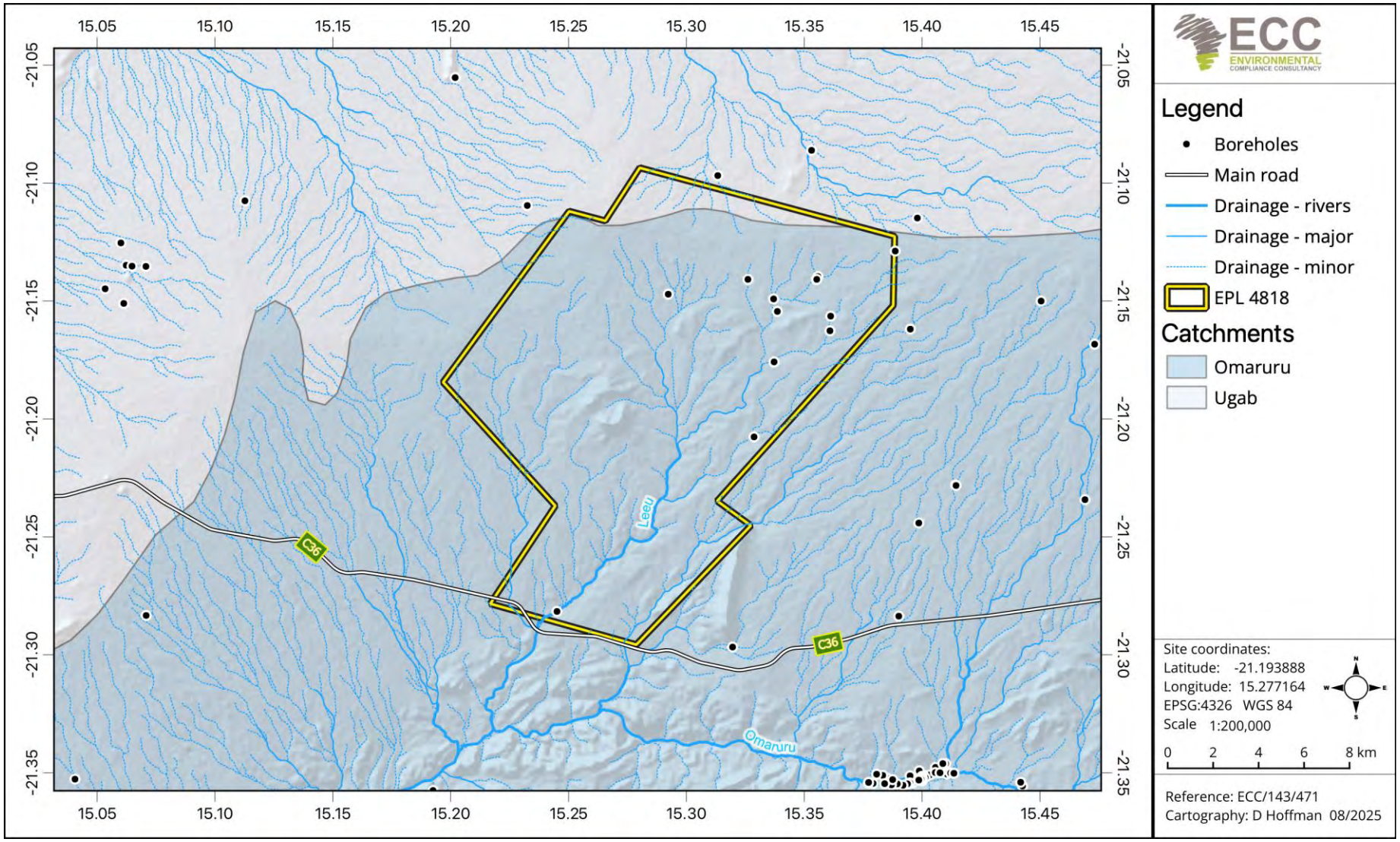


Figure 63 - Hydrology map for the Project

5.12.7.1 Riparian buffer

The Water Resources Management Act, No. 11 of 2013 (WRMA) provides legislation related to the management, protection, development, use and conservation of water resources. In terms of Section 141 (d) of the WRMA, a buffer zone of 100 m from the stream or riverbank must be maintained to protect streams and riverbanks from soil erosion and reduce floodings. The Proponent will require a licence to remove riparian species, fill or excavate a riparian zone or erect a structural development within a riparian zone.

5.12.8 HYDROGEOLOGY

Umvoto Africa (Pty) Ltd was commissioned to undertake a preliminary hydrogeological scoping study for the Kokoseb Gold Project followed by additional field work (geophysics, borehole drilling and test pumping) and numerical groundwater flow modelling. These reports are provided in Appendix L .

The Project site is located within the Brandberg – Waterberg hydrogeological region of Namibia, bordering within the Northern Namib and Kaokoveld hydrogeological region. The project area is situated within a low groundwater potential region dominated by fractured hard-rock aquifers associated with metamorphic and intrusive lithologies of the Damara Orogenic Belt. Groundwater occurrence is controlled almost entirely by secondary porosity developed along fractures, joints, faults, and weathered zones, with negligible primary porosity. Localised shallow alluvial sediments may host limited, discontinuous aquifers along ephemeral drainage features; however, these are expected to be transient and only temporarily saturated following significant rainfall events. Overall groundwater storage is limited, and aquifer properties are highly heterogeneous and structurally controlled.

Recharge to the groundwater system is expected to be low, episodic, and spatially variable due to the arid climate, low and irregular rainfall, high evaporation rates, and limited soil cover. Recharge is most likely to occur during infrequent high-intensity rainfall events via focused infiltration along fracture zones and drainage lines rather than through diffuse infiltration across the landscape. Groundwater flow broadly follows regional topographic gradients (towards the south), with flow inferred from elevated areas toward lower-lying zones and regional drainage systems. Depths to groundwater are generally moderate to deep, indicating limited interaction between surface water and groundwater under baseline conditions.

The hydrogeological map of Namibia indicates that the geology of the project area has very low and limited groundwater potential. The Kuiseb Formation schists are generally considered to have low groundwater potential, although localized areas may exhibit moderate potential in fractures, fault zones and weathered lithological contacts.

5.12.8.1 Groundwater quality

Groundwater quality is monitored quarterly by ECC as part of the environmental baseline monitoring program for the Project. Groundwater quality samples are collected at the community borehole and the exploration tank borehole (Figure 64). The groundwater parameters are then compared against the standards outlined in the Water Resources Management Act No. 11 of 2013 and the 2023 Regulations (Annexure 1). Application of these limits provides a useful benchmark against which changes in quality can be tracked and meets government reporting requirements. Additionally, monitoring facilitates the analysis of spatial and temporal trends, allowing the identification of early indications or markers of potential contamination. Monitoring results can be used to inform decision makers and guide environmental management practices toward the mitigation of potential impacts to the environment and community.

Baseline groundwater quality reflects geogenic control and long residence times typical of fractured hard-rock aquifers in arid environments. Water chemistry is generally characterised by moderate salinity and naturally elevated constituents such as fluoride, sodium, and magnesium, consistent with prolonged water–rock interaction and evaporative concentration. There is no evidence of significant anthropogenic influence on groundwater quality under pre-mining conditions.

The groundwater quality baseline monitoring program will be continued to improve understanding of temporal variability and the underlying hydrogeological conditions of the Project site.

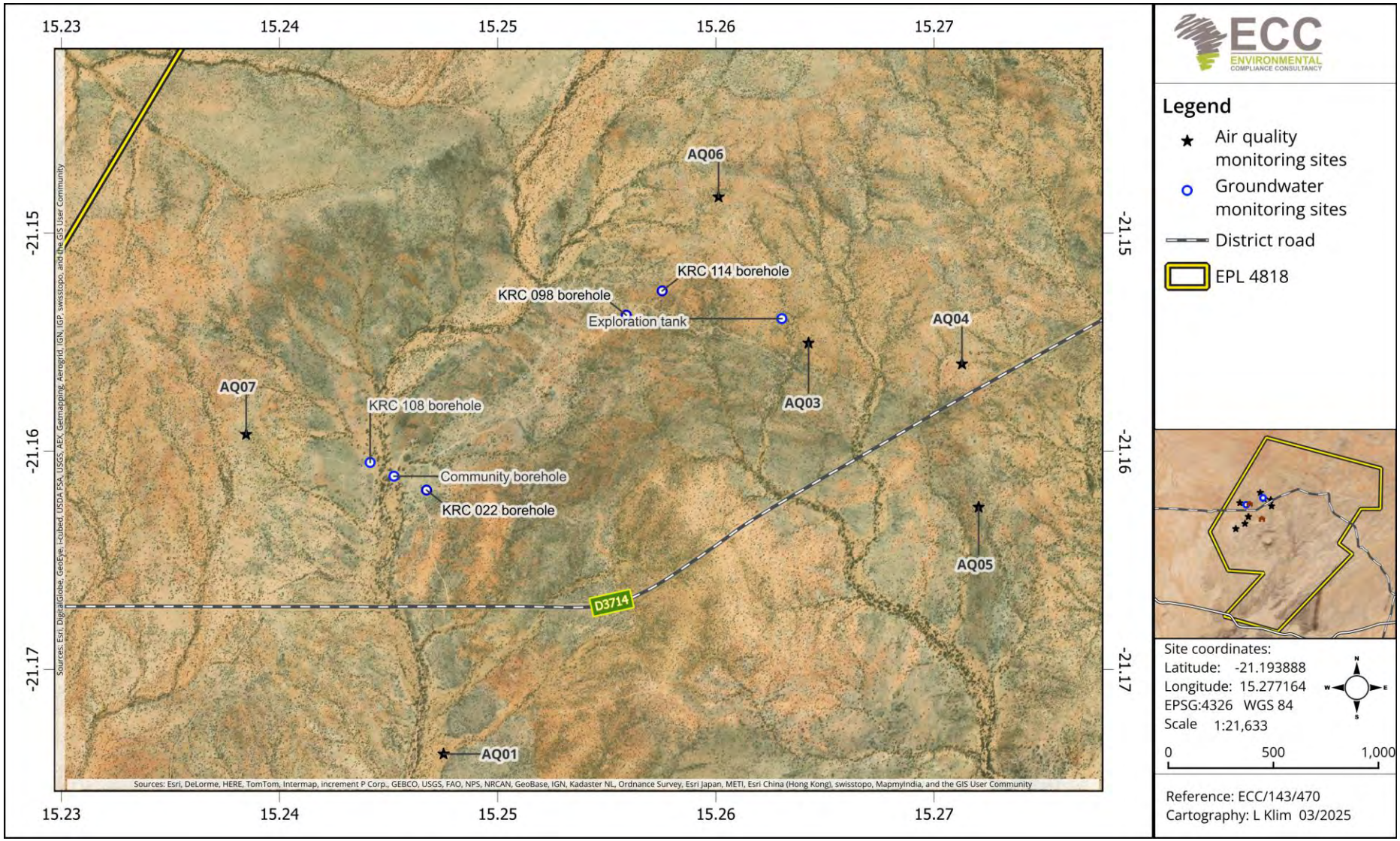


Figure 64 - Location of the groundwater monitoring sites on EPL 4818

5.12.9 BIODIVERSITY

Cummingham (2025) was commissioned to conduct a biodiversity baseline study focused on the vertebrate fauna (reptiles, amphibians, mammals and avifauna), flora (trees and shrubs > 1 m in height and grasses), unique species and key ecological habitats expected to occur within the broader Okombahe area (including are such as Uis and Omatjete) and the Kokoseb Gold Project's exploration license area (EPL 4818). The study was conducted over a two-year period, from June 2024 through to June 2025 to capture seasonal variation across both dry and wet seasons, complemented by a desktop literature review carried out from 19 to 22 November 2024. This extended timeframe was deemed required due to the arid climate and recurrent drought conditions. The field surveys included important biophysical sites and transects (Figure 65) and were guided by the proposed site layout showing these key biophysical sites (Figure 25).

The findings of the baseline study are summarised in the sections below and the report is provided in Appendix N. The potential impacts are assessed and discussed in the assessment chapter of this report (section 7.14) and the mitigation measures are included in the final ESMP (Appendix A).

5.12.9.1 Biodiversity hotspots/ecological sensitive areas

The biodiversity hotspots within the Project site represent areas of ecological sensitivity and conservation value. The areas are particularly important for maintaining ecological connectivity, providing breeding and foraging habitats and supporting ecosystem functions at a landscape level. As such, it is required to integrate them in the planning and implementation of all Project activities. The spatial distribution of these biodiversity hotpots within EPL 4818 is illustrated in Figure 65.

From an ecological perspective, the most important sites identified by the Project ecologist include the following (Cunningham, 2025):

- Granite domes: these are considered ecologically important due to being typically high in biotic richness and endemism. One such granite dome had a leopard latrine which is viewed as an important territorial site for this species (see Figure 70). Additionally, these domes are often habitat to a variety of unique species (e.g., endemic dwarf python (*Python anchietae*));
- Rocky outcrops (hills/ridges): are generally associated with high biodiversity and are therefore considered important habitat for both vertebrate fauna and flora within the broader area. The features support a range of significant tree species, many of which have well developed and structured canopies such as Commiphora species (e.g., *C. glauscens*, *C. virgata*), wild fig (e.g., *Ficus cordata*), phantom tree (*Moringa ovalifolia*) and African star chestnut (*Sterculia africana*);
- Ephemeral drainage lines: various larger, well vegetated ephemeral drainage lines (tributaries of the Omaruru River) are characterized by the presence of larger tree

species. These riparian zones provide habitats and food resources to a variety of the local vertebrate fauna (see Figure 71);

- Black rhino rubbing post: a black rhino (*Diceros bicornis*) rubbing post was observed at coordinates S21°08'28.0" & E 15°17'21.7 (see Figure 72), indicating the long standing presence of the species in the area. Such sites are typically reused by successive individuals and hold important social and territorial significance for rhinos. In addition to their ecological role, they possess historical value and should therefore be preserved and strictly avoided during all Project activities; and
- Raptor nest: a large raptor nest was observed in an umbrella thorn (*Acacia tortilis)* tree (S21°11'02.2" & E15°17;24.2) (see Figure 73). The nest is considered ecologically important, as raptors often reuse established nesting sites over multiple breeding seasons. The identified nest site, along with any additional nests that may be observed throughout the LoM should be protected and avoided, especially during the breeding season.

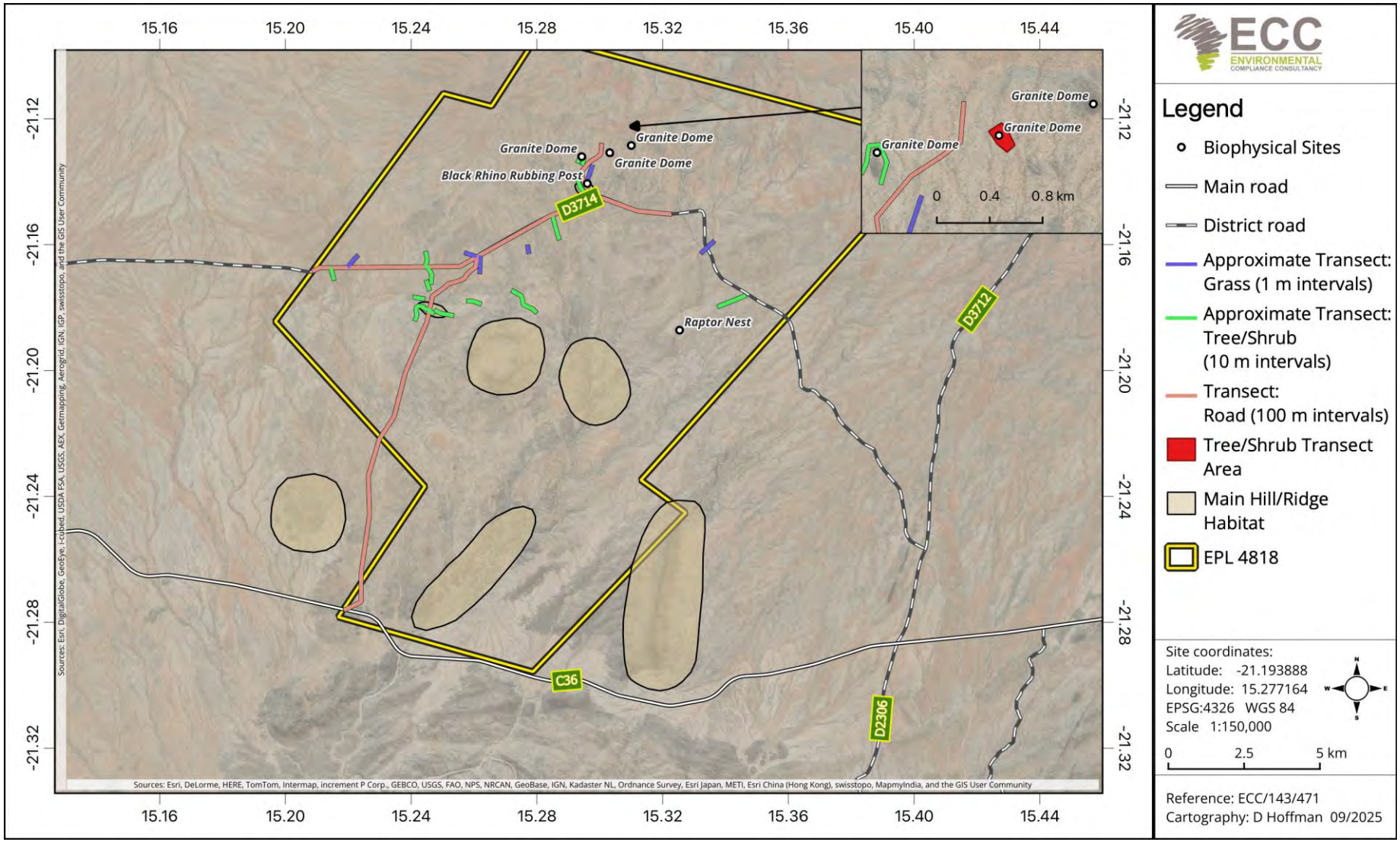


Figure 65 - Biodiversity hotspots within the Project site and transects used during field surveys (Source: Cunningham, 2025)

5.12.9.2 Trees, shrub and grass diversity

Vegetation cover is strongly influenced by rainfall variability. According to the literature review conducted by Cunningham (2025), it is estimated that 105 species of large trees and shrubs (> 1 m high) occur within the broader Okombahe region. Of these, twelve (12) species (11.4%) are classified as endemic while seven (7) species (6.7%) are considered near endemic. In terms of legal protections, twenty-five (25) species (23.8%) are protected under the Forest Act, No. 12 of 2001 and four (4) species (3.8%) are protected under the Nature Conservation Ordinance No. 4 of 1975. Additionally, six (6) species (5.7%) are listed under Appendix 2 of the Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora.

A total of thirty-nine (39) trees and shrubs species were recorded during the field study across EPL 4818, three (3) identified vegetation zones. Twelve (12) identified in rocky habitats (hills and ridges), thirteen (13) along the ephemeral drainage lines and (13) on undulating gravel plains (Cunningham, 2025). The vegetation within these zones comprises a mix of prominent and those of conservation significance. Key examples include Commiphora virgata (endemic and protected), *Commiphora glaucescens* and *Sesamothamnus guerichii* (both near-endemic), and *Ficus cordata*, *Maerua schinzii*, *Albizia anthelmintica*, *Ziziphus mucronata*, *Acacia erioloba*, and *Boscia albitrunca* (all of which are protected under the Forest Act). Other prominent but more widespread species recorded include *Adenolobus pechuelii*, *Cadaba schroeppelii*, *Acacia reficiens*, *Boscia foetida*, and *Acacia tortilis*. Cunningham (2025) noted that these species are widely distributed across various regions of Namibia and not only restricted to the Project area. However, these trees provide habitat and food resources for much of the local fauna, particularly those along the ephemeral drainage lines. Therefore, development should be carefully planned, limited within drainage lines and land clearing permits must be obtained from the Directorate of Forestry (DoF) prior to vegetation removal or land clearing activities (Cunningham, 2025).

Visual overviews of the identified vegetation zones are presented in the following figures:

- Rocky outcrop (s) (hill/ridge) (Figure 66);
- Undulating gravel plain (s) (Figure 67); and
- Ephemeral drainage line (s) (Figure 68).

No invasive alien species were observed throughout the EPL 4818 area, although Prosopis spp. (mesquite spp.) individuals were observed in adjacent areas.

Figure 66 - Vegetation cover on rocky outcrop (hill/ridge) (Source: Cunningham, 2025)

Figure 67 - The undulating gravel plain habitats (Source: Cunningham, 2025)

Figure 68 - Riparian vegetation within an ephemeral riverbed (Source: Cunningham, 2025)

Two (2) grass species endemic to the area; *Eragrotis omahekensis* and *Stipagrotis damarensis* are considered particularly important to the local ecosystem. The latter is restricted to dry river courses in the central and northern Namib (Cunningham, 2025). Grass diversity during the dry season is virtually bare, with only a few dry tufts in some hills and ephemeral drainage lines. Other contributing factors to low vegetation cover are prolonged droughts and continuous grazing. However, grass cover rapidly improves during the wet season as many species, including some perennials rejuvenate.

5.12.9.3 Reptile diversity

Approximately fifty-seven (57) reptile species are expected to occur in the broader region, with twenty-eight (28) species being endemic. Among the most notable are slow mobility reptiles such as leopard tortoise (*Stigmochelys pardalis)*, pythons (*Python anchietae* and *Python natalensis*), the Namibian wolf snake (*Lycophidion namibianum*), the white -throated monitor lizard (*Varanus albigularis*) and several endemic and little-known gecko species, such as those from the Pachydactylus genus (Cunningham, 2025).

During the fieldwork, a total of fifteen (15) species were recorded. These included one (1) terrapin, one (1) sand snake, four (4) skinks, one (1) dwarf plated lizard, two (2) Old World lizards, three (3) agamas and three (3) geckos. Photographs of selected species encountered during the field survey are shown in Figure 69.

The variety of geomorphological features such as rock outcrops, hills and ridges provide varied habitats for reptiles. This likely increases the prospect of an equally high level of reptile diversity in the area.

Figure 69 - Photograph of a Wedge-snouted skins (*Trachylepis acutilabris*) and Boulton's Namib day gecko (*Rhoptropus boultoni*) (Source: Cunningham, 2025)

5.12.9.4 Amphibian diversity

Amphibian diversity is understudied in Namibia as most amphibians require water for breeding and are therefore primarily associated with the permanent water bodies, particularly in the northeast of Namibia (Cunningham, 2025). In the broader study area, overall frog diversity is estimated to range between five (5) and eight (8), most of which are restricted to rain-fed habitats such as granite rock pools and artificial rock pools in the Project area (see Figure 70). Documented or expected species include species such as pygmy toads (*Poyntonophrynus damaranus* and *Poyntonophrynus hoeschi*) (endemic), sand frogs (*Tomopterna ahli (damarensis*) (endemic), toads (*Sclerophrys (Amietophrynus) poweri*), rubber (*Phrynomantis annectens*) (endemic), puddle (*Phrynobatrachus mababiensis*) and platanna *(Xenopus laevis*) (recorded during the wet season field survey) (Cunningham, 2025).

Figure 70 - Granite dome depression within EPL 4818 (Source: Cunningham, 2025)

5.12.9.5 Mammal diversity

EPL 4818 lies adjacent to the Tsiseb Conservancy and the Ohungu Conservancy. The broader landscape is interconnected by natural corridors of migratory wildlife populations. As a result, the presence of mammals within the EPL or its adjacent areas is likely as such species migrate seasonally across conservancy borders in search for food, water and breeding grounds. Notably, elephants (*Loxodonta africana*) and black rhino (*Dicers bicornis*) (protected game) may occur in the broader landscape, although their presence within the EPL is not anticipated (Cunningham, 2025).

The overall diversity of large herbivorous mammals (big game) in the Project area is considered moderate, with three (3) to four (4) species expected, including huntable game such as gemsbok, mountain zebra, giraffe and springbok (Cunningham, 2025). Similarly, the diversity of large carnivorous mammals (large predators) is also regarded moderate, with at least four (4) species expected. This includes species such as leopard, cheetah, brown and spotted hyena. Broader regional assessments indicate overall mammal diversity to range between sixty-one (61) and seventy-five (75) species, whereby eight (8) are endemic to the area (Cunningham, 2025).

According to the IUCN RED List, the cheetah is classified as an endangered species, while the leopard and spotted hyaena are vulnerable and the brown hyaena is near threatened (Cunningham, 2025).

A total of eleven (11) small mammal species were recorded from the EPL area during the dry and wet season surveys. These included bushveld elephant-shrew, aardvark, rock hyrax, porcupine, rats and mice (Cunningham, 2025).

Additionally, evidence of a leopard scent-marking site and a historic black rhino rubbing post (S21°08'28.0" & E 15°17'21.7") were identified within the Project areas (see Figure 71 and Figure 72). These findings indicate past presence of both species and suggest territorial behaviour as well as possible historical patterns of regular use. From an ecological perspective, these sites are considered sensitive and should be preserved or avoided to maintain their ecological integrity. These sites are further highlighted and discussed in section 5.12.9.1.

Figure 71 - Leopard (Panthera pardus) latrine (Source: Cunningham, 2025)

Figure 72 - A historic black rhino (Dicers bicornis) rubbing post (Source: Cunningham, 2025)

5.12.9.6 Avian diversity

The avifaunal diversity in the broader Project area is classified as moderate. According to Cunningham (2025), a minimum of 190 (mainly terrestrial "breeding residents") out of the 658 bird species recorded in Namibia are known or expected to occur within the immediate Project area. The avifaunal assemblage within the immediate Project area includes fourteen (14) endemic species, among which several are of notable conservation concern. Of these, seven (7) species are classified as endangered, namely: the violet wood-hoopoe (*Phoeniculus damarensis*), Ludwig's bustard (*Neotis ludwigii*), white-backed vulture (*Gyps africanus*), tawny eagle (*Aquila rapax*), booted eagle (*Hieraaetus pennatus*), martial eagle (Polemaetus bellicosus), and black stork (*Ciconia nigra*). In addition, two (2) species are listed as vulnerable: the lappet-faced vulture (*Torgos tracheliotos*) and the secretary bird (*Sagittarius serpentarius*) and a further five (5) species are considered near threatened, including Rüppell's parrot (*Poicephalus rueppellii*), kori bustard (*Ardeotis kori*), cape eagle-owl (*Bubo capensis*), Verreaux's eagle (*Aquila verreauxii*), and peregrine falcon (*Falco peregrinus*). These are also classified as pylon sensitive species and are at risk electrocution and collision with the planned Project overhead powerline grid.

The most important bird species from the Project area are those classified as endemic to Namibia include the Damara hornbill (*Tockus damarensis*), bare-cheeked babbler (*Turdoides gymnogenys*) and Herero chat (*Namibornis herero*) and Rüppel's korhaan (*Heterotetrax rueppellii*.).

Although regarded as important, Rüppel's korhaan is highly migratory throughout its range. Other species of concern are those classified as endangered (violet wood-hoopoe, Ludwig's bustard, tawny eagle, booted eagle, martial eagle, black stork) and near threatened (Rüppel's parrot, Cape eagle owl).

A large raptor nest was observed in an umbrella thorn (*Acacia tortilis*) tree in an ephemeral drainage line (S21°11'02.2" & E15°17'24.2") (see Figure 73). The nest must be protected and avoided, especially during the breeding season. This aspect is discussed in detail in section 5.12.9.1.

Figure 73 - Large raptor nest observed within the Project site (Source: Cunningham, 2025)

Considering the high avian diversity within the Project area, additional studies are required to identify additional sensitive bird species at risk of electrocution and collision with the proposed powerline grid. This assessment will be undertaken as part of a separate environmental and social impact assessment (ESIA) study once the servitude has been established and approved by the national utility supplier (NamPower).

6 IMPACT IDENTIFICATION AND EVALUATION METHODOLOGY

6.1 INTRODUCTION

Chapter 2 provided an overview of the approach used in this ESIA process and detailed each of the steps undertaken for the Project to date. However, predication and evaluation of impacts is a key step in the ESIA process. As such, chapter 6 outlines the ESIA methods followed to identify and evaluate the various impacts arising from the proposed Project. The findings of the assessment are then presented in chapter 0.

This chapter provides comprehensive details of the following:

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

The aim of this assessment is 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 apply the identified assessment methodology to the impacts deemed to be significant.

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

Impacts identified as non-significant are highlighted in Table 26 at the beginning of chapter 7 and are not assessed further in this final ESIA report.

6.2 ASSESSMENT GUIDANCE

The following principal documents were 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); and

- 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 were 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; and
- 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.

6.4 ASSESSMENT METHODOLOGY

The ESIA methodology applied to this assessment has been developed by ECC using the 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 74 and Figure 75, respectively.

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 change 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.

Cumulative impacts will also be assessed and can be classified as intraspecific or interspecific. Intraspecific cumulative impacts occur when multiple activities on the same project interact over time or space, leading to intensified effects (e.g., dust, noise, and traffic from one mine collectively affecting nearby communities). In contrast, interspecific cumulative impacts arise from the interaction of different types of projects or sectors, within the same area that have a combined effect, thus creating new or amplified impacts (e.g., the combined pressures of agriculture, mining, and urban development contributing to habitat loss and reduced biodiversity). This distinction ensures that this ESIA assessment captures both the internal and cross-sectoral nature of cumulative impacts.

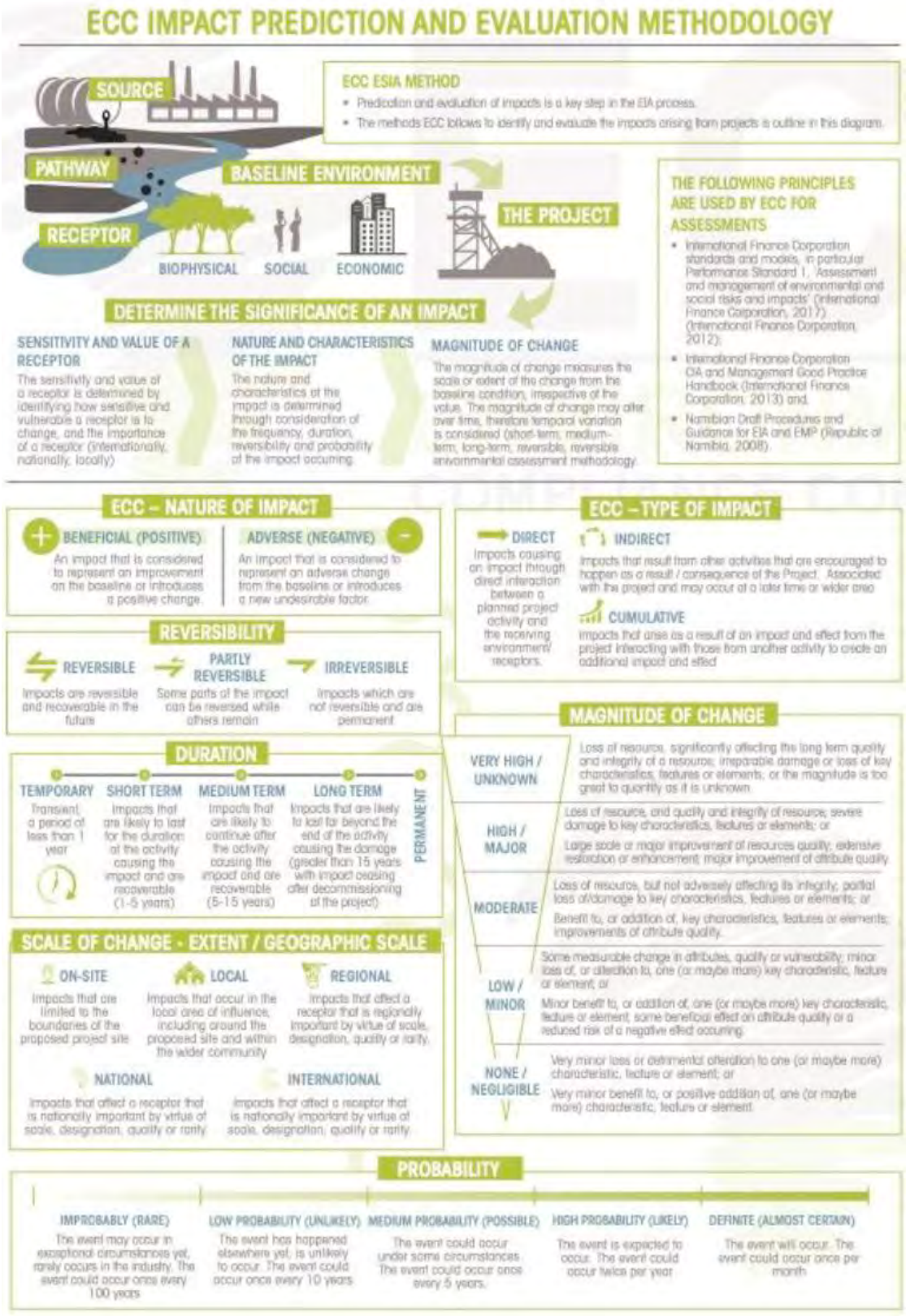


Figure 74 - ECC ESIA methodology based on IFC standards

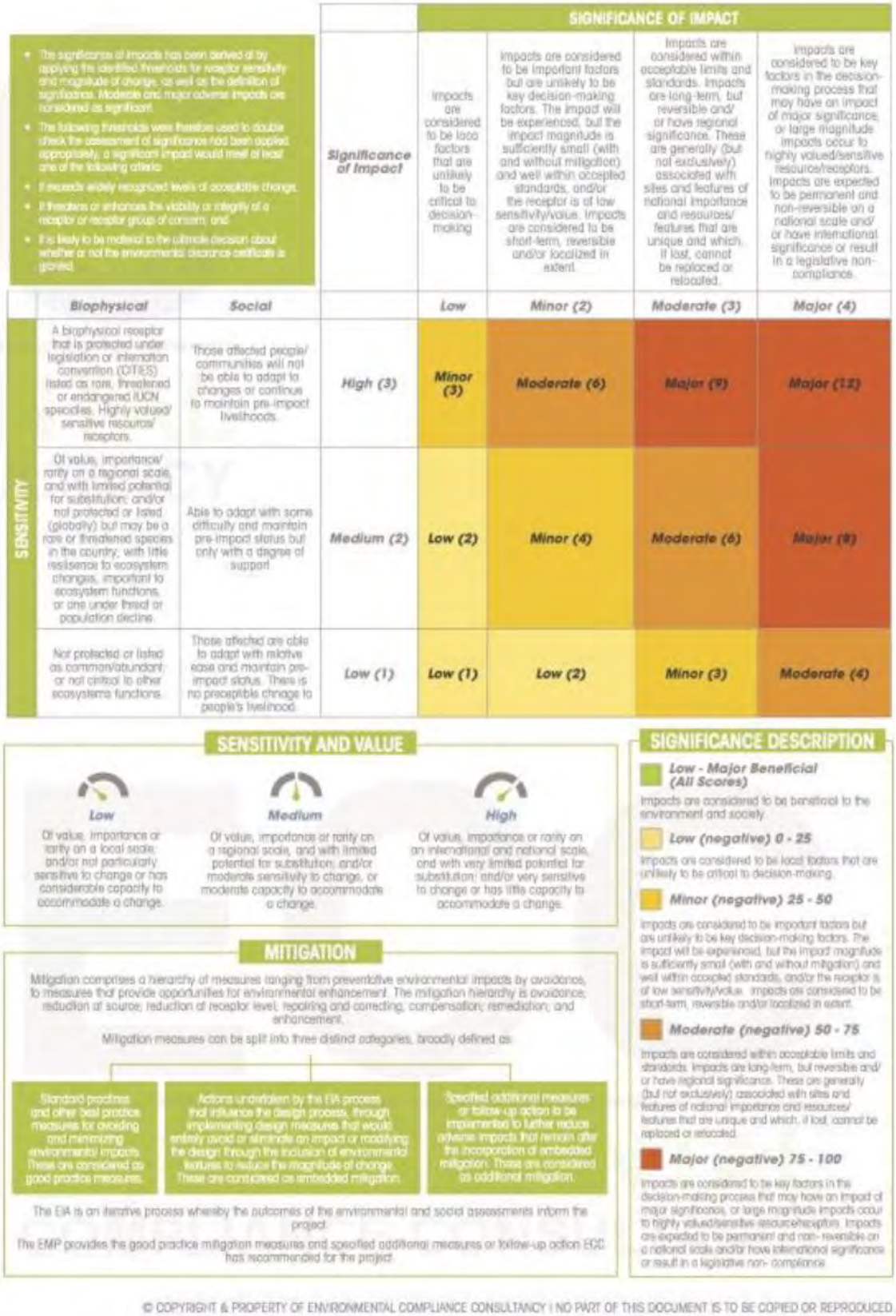


Figure 75 - ECC ESIA methodology based on IFC standards

6.5 CUMULATIVE IMPACTS

6.5.1 CUMULATIVE IMPACT ASSESSMENT METHOD

Cumulative impacts may arise as a result of other Project activities, or due to the combination of two or more projects in the Project area. A cumulative impact assessment (CIA) will be undertaken by applying the IFC CIA Good Practice Handbook (International Finance Corporation, 2013), which recommends that a rapid CIA is undertaken.

A rapid CIA takes into consideration the challenges associated with a good CIA process, which include a lack of basic baseline data, uncertainty associated with anticipated development, limited government capacity, and the absence of strategic regional, sectoral, or integrated resource planning schemes.

The following five-step rapid CIA process will be followed:
Step 1: Scoping – determine spatial and temporal boundaries
Step 2: Scoping – identify valued environmental and social receptors and identify reasonably foreseeable developments
Step 3: Determine the present condition of valued environmental and social receptors (The baseline)
Step 4: Evaluate the significance of the cumulative impacts
Step 5: Identify mitigation measures to avoid or reduce cumulative impacts

The following information will be applied to the assessment in line with the above steps and IFC guidance:

- The spatial and temporal boundaries of the CIA are the extent of the Project boundaries and the duration of the construction and operation phases of the proposed Project.
- Valued environmental and social receptors that may be affected.
- A review of existing and reasonable, anticipated and/or planned developments has been undertaken, which is based on the information presented in chapter 4.
- The predicted future conditions of sensitive and common environmental and social receptors have been taken into consideration in the assessment.
- The assessment findings will be presented in the assessment report and will have the CIA applied in combination with professional judgment and published environmental assessment reports.
- A review of mitigation and monitoring measures will be undertaken, with any additional ones identified.

6.6 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 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 mitigations.
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 actions to be implemented, to further reduce adverse impacts that remain after the incorporation of embedded mitigation. These are considered as additional mitigations.

The ESIA is an iterative process whereby the outcomes of the environmental assessments inform the Project.

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

Embedded mitigation and good practice mitigation were taken into account for this 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.

7 IMPACT ASSESSMENT FINDINGS AND MITIGATIONS

This impact assessment was completed taking into consideration the input received from stakeholders during the public participation phase. Specialist studies that had previously been conducted were reviewed and reassessed based on the input from the public participation phase. As part of the final impact assessment, a final environmental and social management plan (ESMP) was produced to manage residual impacts that cannot be mitigated through the Project evolution process.

This chapter presents the findings of the ESIA for the proposed Project as per the ESIA process, scope and methodology set out in chapters 2 and 6. The aim of this final ESIA report is to focus on the significant impacts that may arise because of the proposed Project. This chapter therefore only considers the significant impacts and or those that may have specific interest to the community and stakeholders. A summary of impacts that are not considered significant is discussed in section 7.1.

The list of high level and likely impacts that are considered significant or of interest to the community and stakeholders are as follows:

- Socio-economic environment: Employment and employee occupational health and safety;
- Social environment: Traffic;
- Social environment: Heritage;
- Social environment: Noise;
- Social environment: Blast and vibration;
- Social environment: Visual;
- Social environment: Air quality;
- Biophysical environment: Climate change;
- Biophysical environment: Soil and land use;
- Biophysical environment: Mine material geochemistry;
- Biophysical environment: Hydrology and drainage;
- Biophysical environment: Hydrogeology; and
- Biophysical environment: Biodiversity.

For each potential significant or sensitive impact, a summary is provided which includes the activity that would cause an impact; the potential impacts; embedded or best practice mitigation (stated where required / available); the sensitivity of receptor that would be impacted; the severity, duration, and probability of impacts; the significance of impacts before mitigation and after mitigation measures are applied.

7.1 IMPACTS NOT CONSIDERED SIGNIFICANT

Project related aspects are firstly screened to determine potential significance impacts, thereafter the impacts are scoped and the TOR's are determined and developed. 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 final ESMP (Appendix A) provides best practice measures, management and monitoring for identified impacts.

Impacts that have been assessed as not being significant are summarised in Table 26 and are not discussed further, unless otherwise indicated.

Table 26 - Non-significant impacts

Social environment topic	Potential impact	Summary of assessment findings
Noise	Temporary construction noise from machinery, experienced only within the site boundary and not affecting nearby communities due to distance to receptor (third party stakeholders located in neighbouring towns, adjacent farms and road users).	Intermittent construction noise from mobile equipment, remaining within acceptable thresholds and not propagating beyond the mine licence boundary area.
Vibration	Vibration from construction related activities on third parties, including adjacent towns, farms and road users.	Low in intensity, dissipates quickly with distance, and occurs far from any communities or sensitive receptors, who are located ~3 km away. It is short-term, intermittent and reversible, and therefore does not cause disturbance or structural risk to third parties. Routine construction practices further ensure that vibration levels remain negligible.
Visual	Artificial light from construction activities and operational infrastructure	The Project is located in a remote area with only a few sensitive receptors, the closest village houses are located ~3 km from the

Social environment topic	Potential impact	Summary of assessment findings
	(processing plant, workshops, mine infrastructure, offices, haul roads, accommodation village, and security lighting) on third parties, including towns, adjacent farms and road users.	Project site and light sources are confined, controlled and designed to minimise light trespass. Construction activities will mostly be confined to the day, whereby light sources will be minimal.
Traffic	Temporary road closure of the D3714 due to its diversion on commuters	The planned realignment avoids the complete loss of connectivity during mining; however, the construction of the new alignment will still introduce temporary, short-term disruptions that may affect local accessibility. During the realignment works, traffic may need to be shifted onto staged construction detours or partially completed sections of the new route. These temporary deviations, although necessary only for the duration of the roadworks, may result in reduced travel speeds, longer travel distances, and altered navigation patterns for unfamiliar users. However, the road has very minimal traffic, so the impact of the temporary diversion is negligible. Additionally, the C36 located south of the Project site is a more frequently used route and will be available throughout the road diversion process.
Infrastructure	Impact on nearby public infrastructure	The Project is located in a remote area with no surrounding public infrastructure positioned close enough to be affected by construction or operational activities. The nearest houses are

Social environment topic	Potential impact	Summary of assessment findings
		approximately 3 km to the south, outside the zone where Project (excluding noise, blast, vibration and dust, which have been assessed further on in this chapter) activities could interfere with buildings, services, transport routes, or utilities. There are no adjacent settlements, community facilities, roads, powerlines, pipelines, or service networks that could experience disruption, reduced functionality, or physical damage. Because no infrastructure lies within the Project's area of influence, and no interaction pathways exist, the potential impact is assessed as non-significant.
Force majeure (earthquakes, lightning strikes etc.)	Impact on the Project caused by natural disasters	These events are not caused by the Project, cannot be influenced by construction or operational activities, and there are no nearby receptors whose vulnerability would change as a result of the mine's presence. The Project does not increase the likelihood, severity, or consequences of such events for third parties, and any effects are limited entirely to the mine site. The Project operational procedures will account for any natural disasters through emergency response planning and area specific risk assessments.

7.2 SOCIOECONOMIC ENVIRONMENT: EMPLOYMENT AND EMPLOYEE OCCUPATIONAL HEALTH AND SAFETY IMPACTS

The likely economic impacts associated with the Kokoseb Gold Project includes aspects such as employment creation, skills development and transfer, stimulation of the local and regional economies and generation of revenue to the government (national economy). An overview of the likely economic impacts during the construction, operational and decommissioning phases is illustrated in Figure 76, before mitigation. The impacts are discussed in detail in the sections below.

The assessment of economic impacts has been undertaken through a human rights lens. In particular, employment creation, local procurement and revenue generation are closely linked to labour rights, the right to livelihood, non-discrimination and access to economic opportunities. Potential adverse impacts, including workforce downsizing during decommissioning and reductions in local and regional expenditure, may affect livelihood security and economic resilience, particularly for vulnerable groups. Accordingly, human rights considerations have been integrated into the identification, assessment and management of economic impacts across all Project phases, in line with national legislation and international good practice.

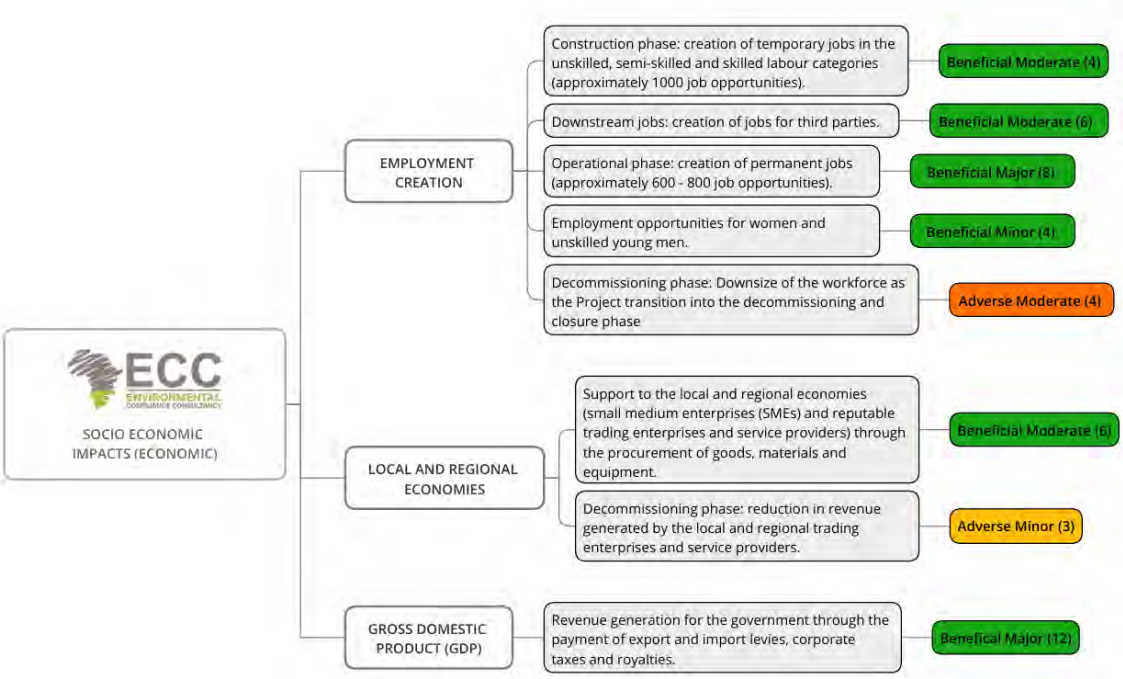


Figure 76 - Overview of the economic impacts

7.2.1 CONSTRUCTION PHASE: ECONOMIC IMPACTS

Both direct and indirect job opportunities will be created during the construction phase. These opportunities are expected to increase household incomes and stimulate both local and regional economic activities. As a result, this will lead to increased spending and circulation of money within the Dâures Constituency.

7.2.1.1 Creation of temporary jobs during the construction phase

The Project will employ approximately 1 000 workers during the construction phase. Semi-skilled and unskilled workers will be sourced locally and recruited, with priority given to Uis and Okombahe, followed by Omaruru and Usakos. Walvis Bay and Swakopmund provide additional pools of semi-skilled labour, including construction workers, plumbers, electricians, tilers, mechanics and drivers. The Proponent will employ reputable and specialised service providers and subcontractors for the development of the main open pit, processing plant and other ancillary Project infrastructure. These service providers will have their workforce in place.

Employment and recruitment processes will be guided by applicable national labour legislation and international good practice, including principles of non-discrimination, fair recruitment and safe working conditions.

Considering the limited local employment opportunities and the high youth unemployment rate in the Erongo Region (44.4%), these jobs will provide significant socioeconomic benefits to households and support the growth of local businesses for the duration of the construction phase. The creation of temporary employment will contribute to the realisation of the right to work and livelihood, particularly for unskilled and semi-skilled workers in nearby settlements.

The impact is assessed as beneficial and direct, as employment opportunities will provide workers with income that enhance household livelihoods and contributes to local economy activities in nearby settlements (Okombahe, Uis, Karibib, Omaruru and Usakos). In addition, workers will gain valuable skills and practical work experiences, which may improve their long-term employability beyond the life of the Project. The probability of the impact is assessed as definite as workers will be required to perform various construction activities to enable the Project's transition into the operational phase. Unskilled and semi-skilled workers will likely be sourced locally, however, other service providers with their specialised workforces (equipped with skills that are not readily available in the local labour pool) may be sourced from the broader Erongo Region. For example, service providers will be required for the development of the open pit, processing plant, road diversion works and other ancillary infrastructure. Therefore, the extent of the impact is expected to be regional. The impact is deemed reversible, as workers will have the opportunity to seek employment elsewhere (i.e. from projects within the broader region) once the construction phase concludes.

The duration of the impact is rated short-term as the construction phase is expected to last for approximately two (2) years. The magnitude of the impact is rated moderate as incomes earned by workers will allow them to improve their household livelihoods. However, the sensitivity of the receptor is rated low as a limited workforce will be required and the benefits are short-term. Overall, the significance of the impact is rated beneficial moderate (Table 27). The Proponent will develop corporate recruitment policies to maximise local employment from the host community. No mitigation measures are required.

7.2.2 OPERATIONAL PHASE: ECONOMIC IMPACTS

The likely economic impacts during the operational phase include the creation of permanent jobs, indirect employment opportunities for third party service providers, stimulation of the local and regional economies through ongoing household and business spendings and generation of revenue for the government through corporate taxes and royalties. These impacts are discussed in detail in the sections below.

7.2.2.1 Indirect employment: downstream jobs for third (3rd) parties

During the operational phase, the mine will create temporary employment opportunities for contractors and subcontractors to undertake various maintenance and other operational support services. These activities include plant maintenance, site services, drilling and blasting, security, catering and environmental monitoring services. Reputable service providers and trading enterprises from the surrounding settlements (Uis, Okombahe, Omaruru and Usakos) will be prioritised. Where specialised expertise is required and not available locally, contractors will be sourced from larger economic centres such as Walvis Bay, Swakopmund and Windhoek.

These employment opportunities are linked to the realisation of labour rights and the right to livelihood and will be governed by applicable national labour legislation and relevant international good practice, including principles of fair recruitment, non-discrimination and safe working conditions.

Additional economic benefits are expected through the procurement of goods and materials such as gravel, sand, cement, prefabricated parts and spare parts from local hardware and retail suppliers. These opportunities provide tangible benefits for employees of third-party service providers by generating incomes that improve their household livelihoods. This indirect employment and income generation supports livelihood security and access to economic opportunities for workers and small and medium enterprises within the local and regional economy.

The impact is considered reversible, as these opportunities are tied to the mine operational schedule and would likely persist for the duration of the Project (11 years). Accordingly, the duration of impact is considered medium term. The probability of the impact occurring is

deemed likely as the Proponent is expected to prioritise goods and services from local suppliers within the immediate region.

This approach will support local businesses, ensure efficient service delivery and reduce transport costs. The extent of the impact is considered regional as service providers are widespread across settlements such as Omaruru, Uis, Okombahe, Usakos, Walvis Bay, Swakopmund and potentially Windhoek, with a focus within the Erongo Region. The magnitude of the impact is assessed as moderate, as contractual commitments with the service providers throughout LoM will ensure continuous indirect economic benefits for the employed workforce. The sensitivity of the receptor is considered medium as employees will be assured regular incomes throughout the LoM. Overall, the impact is assessed as beneficial moderate (Table 27). The Proponent will apply labour management and procurement practices that promote fair working conditions and responsible contractor performance. No mitigation measures are required.

7.2.2.2 Creation of permanent jobs during the operational phase

Approximately 656 employees will be engaged on a permanent basis during the operational phase. A significant proportion of operational workforce will be recruited as part of the management team, mine technical service team, mine support team, production team, administration team, security team and mine maintenance team. The organisational labour structure for the Project's operational phase is illustrated in Figure 14.

The creation of permanent employment opportunities is considered a direct and beneficial impact as it provides long-term income security and socio-economic benefits for employees throughout the LoM (11 years). Permanent employment contributes to the realisation of the right to work and livelihood, supporting stable household incomes and improved living standards for employees and their dependants. The operational labour force for the Project will comprise of a mix of specialists, skilled, semi-skilled and unskilled employees. Although it is expected that many positions will be filled by employees from the local and regional labour markets, certain specialist positions will be filled likely by people from other regions across the country. Highly specialised positions may require the recruitment of international experts. Therefore, the extent of the impact is considered national.

The probability of the impact is considered definite as a suitable qualified workforce is required to ensure that the Project's objectives are progressively achieved. The duration of the impact is regarded as medium term, given that the economic benefits will be accrued over the LoM (11 years). The magnitude of the change is rated high (major) as incomes gained will positively contribute to household and community economic well-being, particularly since employees will be drawn from diverse geographical and socio-economic backgrounds. The sensitivity of the receptor is rated medium as the economic benefits will be experienced across the full spectrum of employees with varying skill levels. Overall, the significance of impact is rated beneficial major (Table 27). The Proponent will develop corporate recruitment policies to ensure that employees from the local and regional economies are prioritised as

feasibly possible and to support fair, safe, and equitable working conditions across the workforce. Employment practices will be guided by applicable national labour legislation and international good practice, including principles of non-discrimination, fair recruitment and equal opportunity. No mitigation measures are required.

7.2.2.3 Employment opportunities for women and unskilled young men

The Project is expected to create employment opportunities predominantly for men in operational roles such as plant operations, maintenance, haulage and various support services. These roles are culturally perceived as male-oriented occupations. Young men with vocational training are likely to benefit from these opportunities. Pools of semi-skilled and unskilled young men who are facing high unemployment will likely be engaged as general workers. The creation of these opportunities supports the realisation of the right to work and livelihood for young men, particularly those facing structural barriers to labour market entry. On-the-job training and targeted skills development programs are expected to enhance their competency, improve their long-term employability and increase prospects for career advancement. Such measures contribute to equal access to employment opportunities and skills development.

Historically, women have been less preferred for mining and construction roles due to cultural perceptions, limited opportunities and restricted access to specialised training for women. This has resulted in unequal access to employment opportunities and has implications for the rights to equality and non-discrimination in the workplace. However, with evolving social norms, policy developments, and increasing efforts by the industry to promote gender equality, prospects for women's inclusion and participation in these sectors have improved and continue to progress. The Proponent will make every reasonable effort to promote gender inclusion by employing women wherever feasible, particularly in roles and functions that align with their skills, qualifications and interests. These efforts are aligned with national labour legislation and international good practice, which promote gender equality, non-discrimination and equal opportunity in employment.

The employment of young men and women in mining, construction and support service roles is considered a positive, reversible and direct impact. This impact supports the realisation of the right to work, livelihood and equal access to employment opportunities for groups that have historically faced barriers to labour market participation. These roles will provide valuable practical experience to these pools of employees. In addition, the incomes earned through such employments is expected to improve their livelihoods (contributing to non-discrimination in employment and economic inclusion).

The direct benefit of earning incomes is tied to the Project's operational phase (11 years) and is therefore not permanent. However, some residual benefits such the development of skills and gained practical work experience will persist beyond the life of the Project. This cumulative impact enhances the prospect of their future employment within the mining

industry and related sectors. Skills development and work exposure are particularly relevant from a human rights perspective, as they strengthen long-term employability and reduce vulnerability to future livelihood insecurity.

The impact is localised, as pools of potential employees will likely be drawn from the broader community (where feasible). Therefore, the probability of the impact occurring is considered medium (possible). Although there is a commitment for inclusive hiring, operational requirements and the need for specific skills may limit the number of opportunities. In this context, fair recruitment processes and non-discriminatory selection criteria are therefore important to ensure equitable access to available opportunities.

The magnitude of the change is considered moderate as employees will earn incomes that would contribute to improving their livelihoods throughout the duration of their employment contracts. The sensitivity of the receptor is rated medium as employment of previously disadvantaged groups (specifically women and unskilled young men) would demonstrate the Proponent's commitment to inclusive employment, skills development and to the promotion of equality and non-discrimination in the workplace. Overall, the significance of impact is rated beneficial minor (Table 27). To promote inclusive employment, the Proponent will develop a recruitment plan that also prioritise women and unskilled young men.

7.2.2.4 Stimulation of the local and regional economies (small and medium enterprises (SMEs), trading enterprises and service providers) through the procurement of goods, materials and equipment

The economic base of Dâures Constituency is constrained by a small number of formal industries and large-scale enterprises. Economic activities are primarily sustained by informal businesses, small-scaled retail operations, accommodation establishments and service providers that serve transient populations and nearby settlements. As a result, opportunities for significant local business participation in the mine supply chain are limited. Most specialised materials, equipment, goods and technical services required during the construction and operational phases will therefore likely be procured from established commercial trading centres in Uis, Omaruru, Walvis Bay, Swakopmund and Windhoek, where adequate supply capacity and technical expertise are available.

Additionally, some indirect economic benefits are anticipated within the Daures constituency, primarily driven by increased demand for accommodation (particularly during the initial Project development phase), as well as small-scale catering and retail goods such as supplies and fuel. Where feasible, the Proponent will prioritise procurement from local and regional suppliers to maximise economic benefits and strengthen local value chains. Fair, transparent and non-discriminatory procurement practices will be applied to promote equitable access to opportunities. These procurement opportunities support the realisation of the right to livelihood and access to economic opportunities for local and regional businesses, including those operating within the informal and semi-formal economy.

The impact is assessed as beneficial, direct and reversible as financial inflows to both local and regional economies are anticipated over the LoM (>11 years).

Based on this, the duration of impact is rated as medium-term. Localised economic benefits are expected to arise from expenditure on goods, groceries, fuel and general services available within the broader Dâures Constituency and nearby settlements such as Omaruru, Usakos and Uis. Where local suppliers are unable to meet Project demands, procurement will shift to major regional centres with established supply capacity such as those based in Swakopmund, Walvis Bay and Windhoek. As a result, the spatial extent of the impact is considered regional. The likelihood of the impact occurring is assessed high as the Project's preference on local and regional suppliers is expected to reduce supply-chain risks, lower logistical costs and ensure timely delivery of goods and materials, which collectively ensures continuity of operations. Both the magnitude and sensitivity of receptor are rated moderate and medium, respectively. This is because expenditures by the Project are expected to support small-scale and micro economic activities within the Dâures Constituency and neighbouring towns. Overall, the significance of the impact is rated beneficial moderate (Table 27). The significance of the impact could be enhanced further through targeted local procurement and small business development initiatives. No mitigation measures are required.

7.2.2.5 Revenue generation for the government (GDP)

The mining sector makes significant contributions to the national economy. The sector contributed 13.3% to the GDP of Namibia IN 2024 (Chambers of Mines, 2025). The Project is expected to contribute to the country's GDP through the payment of corporate taxes, royalties, import and export levies.

The Project's contribution to the GDP is considered direct and beneficial impact as corporate tax payment play a critical role in supporting national economic growth. These contributions serve as tangible benchmarks for assessing progress towards national economic goals (e.g. Namibia's Sixth National Development Plan (NDP6) and Vision 2030).

From a human rights perspective, increased government revenue can support the progressive realisation of economic and social rights, including access to public services such as health, education and social protection, subject to government budg*et al*location and policy priorities. While the allocation and utilisation of public revenue falls outside the control of the Proponent, the Project's fiscal contributions may enhance the State's capacity to deliver public goods and services that benefit the wider population.

All revenue taxes are legally mandated for mining companies; therefore, the likelihood of the impact occurring is rated as definite. For example, the importation of reagents (except lime), consumables and spare parts through the port of Walvis Bay, will involve logistics services

(general freights, port handling management, customs clearance and inspection) which would generate taxable revenues. Corporate taxation obligations are rated as medium term as it aligns with the Project operational phase (11 years). Collected revenues are channelled into various national economic activities and social development projects. Therefore, the spatial extent of the impact is deemed national.

The magnitude of change is rated high/major due to the Project's significant contribution to the national GDP. The sensitivity of the receptor is also rated high as the revenue incomes will contribute to the national economic progression and social advancement of the country. The significance of the impact is rated beneficial major (Table 27). It is expected that this beneficial impact will cease at the decommissioning and closure phase of the Project.

7.2.3 DECOMMISSIONING PHASE: ECONOMIC IMPACTS

As the Project transitions into the decommissioning and closure phase, a smaller workforce and reduced levels of local and regional spending are anticipated. These impacts are discussed in detail in the sections below.

7.2.3.1 Job losses as the Project transition into the decommissioning and closure phase

The LoM is anticipated to span eleven (11) years. Thereafter, the Project will likely transition into the decommissioning and closure phase, unless further exploration results confirm additional ore reserves or identifies potential for underground mining. At the decommissioning phase, a gradual downsize of the workforce is expected as non-essential and production personnel become redundant. Only critical personnel will be retained on-site to oversee closure activities and ensure compliance with mine closure regulations. This core team will include the rehabilitation team, environmental control officers, site supervisors, maintenance and utility personnel and surveyors.

The decommissioning and closure phase of the mine will result in the loss of both skilled and semi-skilled jobs created during operation. This may have a negative socio-economic impact on local households and communities that have become dependent on Project-related employment. Local workers are likely to be most affected due to the limited alternative employment opportunities in the region.

From a human rights perspective, job losses at closure have implications for the right to work and livelihood, as well as the right to fair and just conditions of employment, including procedural fairness during retrenchment.

This anticipated loss of employment is assessed as an adverse impact as workers will be required to seek alternative employment opportunities elsewhere. Additionally, the impact is assessed as direct and irreversible as the ore reserve is finite and determines the LoM. The probability of the impact occurring is deemed definite under the current mine production

schedule (i.e. workforce downsize expected after year eleven (11) of mining). However, a potential LoM extension may arise, should the exploration program delineate additional economically viable ore reserves. The spatial extent of the impact is rated as regional, as the reduction in the workforce is likely to affect personnel drawn from diverse socio-economic settings across the broader region. The affected employees will be required to seek alternative employment.

However, their extensive work experience in the mining industry accumulated over the years is expected to enhance their prospect for securing re-employment within the broader region. On this basis, the duration of impact is assessed as short-term. The magnitude of the change is considered major, as the workforce redundancies will directly impact household livelihoods. However, the sensitivity of the receptor is rated as low, as the pool of experienced employees is expected to secure alternative employment opportunities within the local and regional labour markets. Overall, the significance of impact is rated adverse moderate, before mitigation (Table 27).

In accordance with national labour legislation and international good practice, the Proponent will apply fair, transparent and non-discriminatory retrenchment processes. These measures are intended to reduce the severity of livelihood impacts and support respect for affected workers' rights during the closure phase.

The following mitigation measures are also included in the final ESMP (Appendix A):

- Transition planning;
- Advance notice of job losses;
- Skills transfer programs; and
- Support for finding alternative employment and livelihood restoration initiatives.

With such measures in place, the overall significance of the impact is reduced to adverse minor.

7.2.3.2 Reduction in revenue generated by the local, regional trading enterprises and service providers as the Project transition into the decommissioning and closure phases

As the Project transitions into the decommissioning and closure phase, local and regional economic activities are expected to decline due to the reduction in employment, procurement and business opportunities that were initially associated with the mine's operations. The downsizing of the workforce will ultimately impact households that relied on mine-related incomes, while local businesses and service providers that depend on contracts, supply of goods and provision of services to the mine may experience significant drops in revenue.

From a human rights perspective, reduced commercial activity may have implications for the right to livelihood and an adequate standard of living for owners and employees of affected

enterprises, particularly small and medium enterprises (SMEs) and informal service providers that are economically dependent on mine-related procurement.

The nature of this impact is rated as an adverse impact as it is directly associated with the reduction of local and regional economic activities. It is considered a direct impact because revenue losses will result from workforce downsizing, the termination of mine-related contracts and decreased procurement of goods, equipment and consumables. The closure of the mine is expected to affect a range of businesses and service providers across the local and regional economy. The spatial extent of the impact is therefore considered regional.

The impact is deemed irreversible as it will result in the termination of any existing contracts with the mine and the discontinuation of procurement of goods from suppliers and trading entities. The likelihood of the impact occurring is assessed as definite as the Project will be decommissioned after approximately eleven (11) years of operation (as per the current mine production schedule). Although the spatial extent of the impact is regional, both the magnitude of change and the sensitivity of the receptor are rated low. Affected trading entities and service providers are expected to maintain resilience and derive incomes from alternative income sources and other microeconomic activities within the broader regional economy. Overall, the significance of the impact is rated adverse minor (Table 27). Mitigation measures are included in the final ESMP (Appendix A). In line with good international practice, the Proponent may support responsible closure by providing early communication on closure timelines and procurement phase-down, enabling service providers to plan, diversify and adjust their business models.

Table 27 - Economic impact assessment ratings

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Construction phase						
Construction activities	Regional labour pool (Uis, Okombahe, Omaruru, Usakos)	Creation of temporary job opportunities (~1000 jobs), contributing to income generation and improved livelihoods.	Beneficial Direct Reversible Regional Short-term Definite	Low	Moderate	Beneficial Moderate (4)
Operational phase						
Services from regional	Regional labour pool	Creation of indirect job	Beneficial Indirect	Low	Moderate	Beneficial Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
service providers and continuous procurement of goods from regional trading enterprises.		opportunities, contributing to enhanced livelihoods.	Reversible Medium-term Regional Likely			
Operational activities	Local, regional and national labour market	Creation of permanent jobs (>600 jobs), contributing to income generation and improved livelihoods.	Beneficial Reversible Direct National Medium-term Definite	Medium	Major	Beneficial Major (8)
Operational activities	Women and unskilled young men	Employment opportunities for women and unskilled young men.	Beneficial Direct Reversible Local Medium-term Possible	Medium	Moderate	Beneficial Minor (4)
Procurement of Project-related goods, equipment and materials from local and regional enterprises	Local and regional service providers, trading businesses and informal traders (SMEs).	Stimulation of the local and regional economies.	Beneficial Direct Reversible Regional Medium-term Likely	Medium	Moderate	Beneficial Moderate (6)
Payment of corporate taxes	National economy (GDP)	Revenue generation for the	Beneficial Reversible Direct	Major	Major	Beneficial Major (12)

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		government through the payment of export and import levies, corporate taxes and royalties.	National Medium-term Definite			
Decommissioning phase						
Decommissioning and closure activities	Operational workforce and household livelihoods	Downsize of the workforce	Adverse Direct Irreversible Regional Short-term Definite	Low	Major	Adverse Moderate (4)
	Local and regional economies	Reduction in revenue generated by the local and regional trading enterprises and service providers.	Adverse Direct Irreversible Regional Short-term Definite	Low	Low	Adverse Minor (3)

7.3 SOCIOECONOMIC ENVIRONMENT: SOCIAL ENVIRONMENT

Social impacts include effects on people's livelihoods, work, comfort, well-being, occupational health, safety and social interactions. Figure 77 provides an illustrative overview of the potentially significant social impacts of particular relevance to the affected communities and stakeholders, before mitigation. Each specific impact is discussed in detail in the sections below and the impact assessment ratings are summarised in Table 28.

The assessment of social impacts has been undertaken through a human rights lens, recognising that Project activities may influence the enjoyment of fundamental human rights by workers, host communities and other affected stakeholders. Social impacts related to labour and working conditions, community health and safety, land and resource use, stakeholder engagement, gender equality and access to services are closely linked to rights

such as the right to work and livelihood, equality and non-discrimination, the right to health and safety, participation in decision-making and access to remedy. Potential adverse impacts may disproportionately affect vulnerable or marginalised groups, including women, youth, low-income households and migrant workers, and may vary across Project phases, particularly during construction and closure phases. Accordingly, human rights considerations have been integrated into the identification, assessment and management of social impacts, in line with national legislation and international good practice, to support the Project's responsibility to respect human rights throughout its lifecycle.

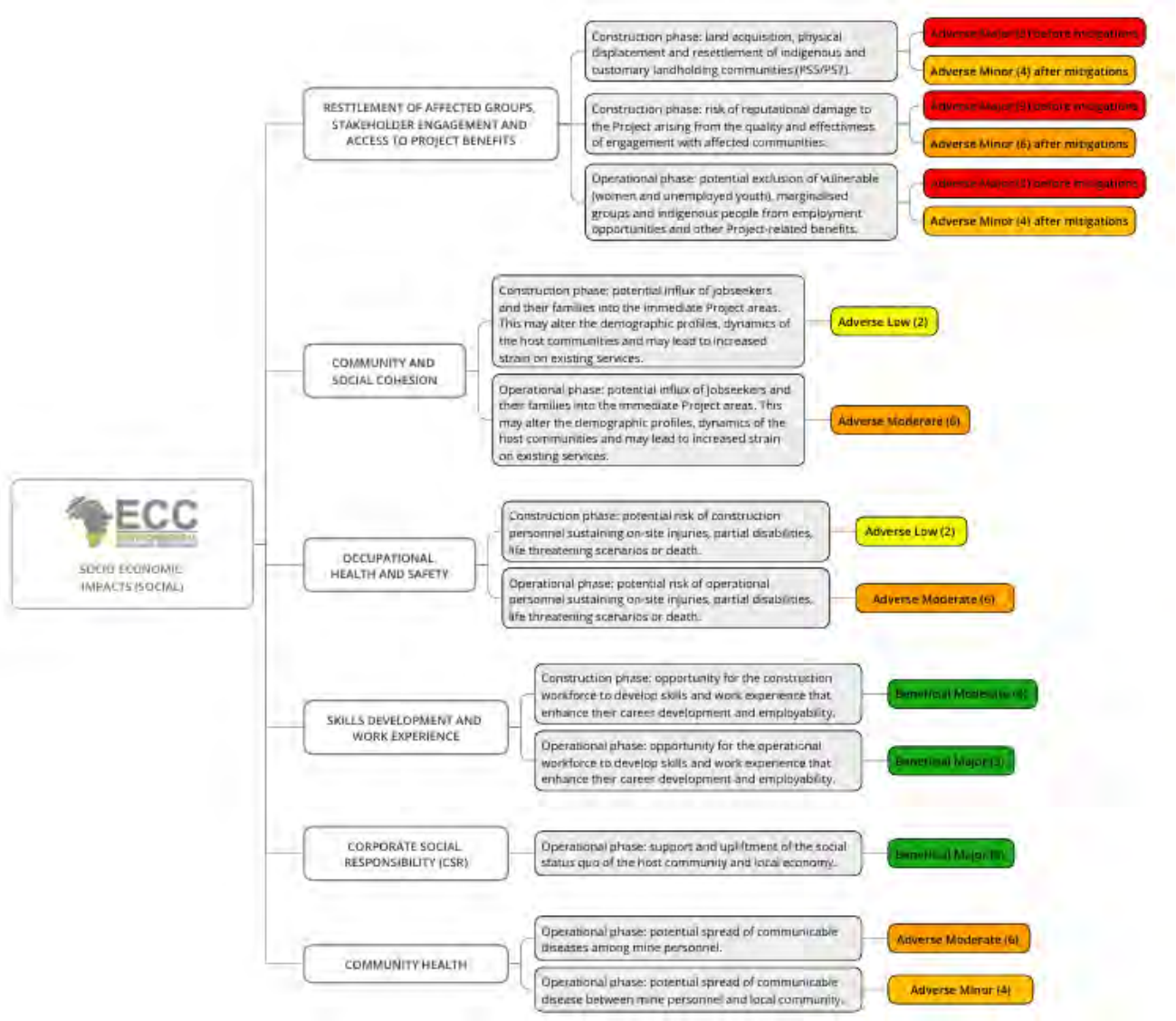


Figure 77 - An overview of the social impacts

IFC Performance Standards Screening: Land Acquisition, Resettlement and Indigenous Peoples

The Project will require the physical relocation of households from customary land to enable the development of mining infrastructure within defined safety and operational zones. As such, IFC Performance Standard 5 (Land Acquisition and Involuntary Resettlement) is

triggered. The Project will seek to avoid forced eviction and minimise displacement where feasible; however, where relocation is unavoidable for safety and operational reasons, resettlement will be undertaken in accordance with national legislation and the requirements of PS5, with the objective of avoiding or minimising adverse social impacts and restoring, and where possible improving, affected households' livelihoods and living conditions.

The affected communities include Damara and !Oe‡Gan groups with customary land tenure, traditional governance structures and cultural connections to land and resources.

In line with IFC Performance Standard 7 (Indigenous Peoples), a screening has been undertaken to assess the presence of Indigenous Peoples as defined under PS7. Given the collective attachment to land, reliance on customary land use systems and the presence of cultural heritage features, PS7 principles are considered applicable and have been integrated into Project planning, engagement and resettlement processes. Engagement with affected communities will be conducted in a culturally appropriate manner, respecting customary decision-making processes and the role of recognised traditional authorities.

To ensure compliance with PS5 and PS7, the Proponent will prepare and implement a Resettlement Action Plan (RAP), and where required, an Indigenous Peoples Plan (IPP) or an integrated resettlement and indigenous people's framework. These commitments have been included in the final ESMP (Appendix A). These instruments will define eligibility criteria, compensation at replacement cost, livelihood restoration measures, culturally appropriate relocation arrangements, consultation and participation processes and accessible grievance mechanisms, consistent with national legislation, international good practice and the Project's human rights commitments.

7.3.1 CONSTRUCTION PHASE: SOCIAL IMPACTS

The social impacts anticipated during the construction phase include, among other things, the resettlement of individuals from their customary lands to enable the development of Project infrastructure; potential disruptions to existing community structures and social cohesion; and occupational health and safety risks associated with construction activities. In addition, the construction will present opportunities for skills development and the acquisition of practical work experience, which contribute to the long-term employability and career prospects of the workforce. These impacts may affect the enjoyment of fundamental human rights, including the rights to adequate housing, livelihood, access to safe and sufficient water, safe and healthy working conditions and participation in decision-making.

7.3.1.1 Land acquisition, physical displacement and resettlement of indigenous and customary landholding communities (PS5 / PS7)

Several village houses, currently located in the vicinity of the main open pit footprint and the 519 m blast/unsafe zone, will need to be relocated prior to the commencement of mining activities (i.e., major earthworks, drilling and blasting, heavy machinery operation etc.). The

BMC (2025) blast assessment report (Appendix G) identifies that the village houses requiring relocation are those situated in Katora Village as they fall within the high sensitivity zone (500/519 m from the main open pit area) and those within the medium sensitivity zone (500 – 1 500 m from the main open pit area). An overview of homesteads proposed for relocation is shown in Figure 45 (green circles).

As the orebody is fixed and no alternative site configurations or design options are technically feasible, the relocation process is the most definite, practical and implementable solution. The resettlement of individuals and homesteads from their customary lands to accommodate Project infrastructure has the potential to disrupt established living arrangements, the continuity of education and access to essential community resources and utilities and may affect the realisation of human rights related to housing security, livelihoods, education and participation in decision-making processes**.** Additionally, there is a potential for perceived unfairness in access to Project benefits, particularly if certain community members feel excluded from employment or compensation opportunities which may raise concerns related to equality, non-discrimination and procedural fairness**.** This may indirectly contribute to social tensions and negative perceptions on the Project. Early consultation and coordination with the affected households will be critical to ensure a smooth resettlement process that is consistent with human rights principles of transparency, inclusion and informed consent**.**

The relocation/resettlement of communities from their customary lands is considered an adverse and direct impact. As the orebody location is fixed and no alternative site layouts are technically feasible, the relocation of communities within the sensitivity and medium zones is inevitable from a safety and operational standpoint. This measure will ensure that the affected households are not exposed to potential hazards associated with mining operations such as air blast, ground vibrations, dust and noise thereby supporting the right to life, safety and health. The extent of the impact is regarded regional as communities will be relocated from their customary lands to alternative grounds in the broader region. This process is planned to be facilitated by the Proponent in consultation with the land administration board and the traditional authorities (i.e. Erongo Regional Council (ERC), Dâures Constituency Office and the !OeGan Traditional Authority) in line with requirements for meaningful consultation and participation**.**

The impact is regarded as partly reversible, as it is anticipated that the affected communities will generally consent to the relocation, provided that the process is conducted transparently and accompanied by adequate support, compensation and resettlement assistance consistent with national legislation and international human rights standards**.** However, it is unlikely expected that these communities will return to the area after mine closure as the land will remain altered and disturbed by mining activities. The duration of impact is considered permanent as the affected communities will be relocated permanently to new grounds in the broader region. Successful adaptation to these new grounds will depend on several factors such as the availability of adequate and good quality water, suitable grazing land to support subsistence farming, access to major district roads, availability of

telecommunication and internet services, access to information, schools and access to sanitation and healthcare services which are closely linked to the rights to water, health, education and an adequate standard of living**.**

The magnitude of change is rated very high as communities will be resettled from their customary lands and will be required to adapt to new areas. Additionally, several well-preserved heritage gravesites are present within the broader area. These sites are currently accessible and in use; however, over time, continued mining activities may restrict/limit access to these sites potentially affecting cultural rights and the right to maintain cultural and spiritual practices**.** The sensitivity of the receptor is rated medium as affected communities are expected to gradually adapt to the new changes, maintain their pre-impact livelihoods and over time, establish new living arrangements. Overall, the significance of impact is rated adverse major, before mitigation (Table 28).

The relocation process is planned to be conducted in a consultative and transparent manner to ensure that no forced relocation occur and that basic human rights of affected communities are fully respected. Affected households will be thoroughly informed and supported throughout the resettlement process. Appropriate management measures such as compensation, resettlement assistance will be implemented to minimise social disruptions. With these precautionary measures in place, the significance of the impact is expected to be reduced to adverse minor. These measures are also included in the final ESMP (Appendix A).

To ensure compliance with PS5 and PS7, the Proponent will prepare and implement a Resettlement Action Plan (RAP), and where required, an Indigenous Peoples Plan (IPP) or integrated Resettlement and Indigenous Peoples Framework. These plans will detail eligibility, compensation at replacement cost, livelihood restoration measures, culturally appropriate relocation processes, consultation procedures and grievance mechanisms. These measures are also included in the final ESMP (Appendix A).

7.3.1.2 Risks of reputational damage to the Project arising from the quality and effectiveness of engagement with the affected communities

There is a potential risk on the Project, if consultation with affected communities is insufficient. Adequate and transparent engagement consistent with PS7 principles with the communities is essential to respect human rights and ensures that the communities understand the Project, its impacts and proposed mitigation measures. Additionally, effective consultation through culturally appropriate engagements that respect customary decision-making structures supports the Project's social licence to operate, contributes to the realisation of the right to participation in decision-making, strengthen the Project reputational image, ensures good working relations with the affected communities and eases access to investors and funding.

This impact is considered adverse as inadequate consultation has the potential to undermine human rights, including the rights to participation, access to information and effective remedy, strain community relations and possibly disrupt Project operations. The duration of this impact is considered long-term given that social tensions and reputational damage may persist throughout the Project lifecycle and extend into the post closure phase. The impact is deemed partially reversible through mitigation measures implemented by the Proponent in line with the UN Guiding Principles on Business and Human Rights. This includes routine engagements with community representatives through organised forums and consultation meetings throughout the LoM.

The impact is considered direct as it arises explicitly from Project activities that affect communities, land use and decision-making processes and the manner in which affected stakeholders are meaningfully consulted. The probability of the impact occurring is assessed as medium (possible) as there is a possibility of differing community views and expectations if consultation processes are not inclusive or adequately managed. The extent of the impact is assessed as regional as multiple communities may be affected and may influence other stakeholders and investors. The magnitude of change is rated very high as there is a potential for these scenarios to lead to significant operational delays. The sensitivity of the receptor is assessed high considering that effective engagement with affected communities and stakeholders is one of the key factors that contribute to both social acceptances, the respect of human rights and the Project's overall feasibility and long-term success. Overall, the significance of impact is rated adverse major, before mitigation (Table 28). With mitigation, the impact will be reduced to adverse minor.

The following mitigation measures are included in the final ESMP (Appendix A):

- Ensure ongoing engagement with affected communities and community representatives from the earliest Project planning phase (as initiated during the ESIA scoping phase) in line with human rights principles of participation, inclusion and transparency;
- Maintain continuous dialogue with community representatives throughout the Project lifecycle to address evolving concerns;
- Respect traditional decision-making processes and customary governance structures consistent with cultural rights and the right to self-determination of affected communities;
- Provide communities with clear, accurate and timely information about the scope of the Project, potential impacts and alternatives, to enable informed participation in decision-making;
- Use visual aids and written materials (infographics, posters etc.) to enhance understanding, where necessary, particularly to ensure accessibility for vulnerable or marginalised groups;
- Maintain records of community feedback, concerns and signed agreements;

- Establish accessible, transparent and independent grievance mechanisms to address community complaints and disputes;
- Adapt engagement strategies if community concerns evolve or new impacts emerge; and
- Maintain records of commitments made with communities as part of ongoing engagement and management of Project impacts.

7.3.1.3 Community and social cohesion: potential influx of jobseekers and their families into the immediate Project area. This may alter the demographic and dynamics of the host community and may place additional strain on existing services

Greenfield projects typically attract jobseekers and their families. Individuals, particularly those seeking to secure unskilled and semi-skilled employment opportunities may be drawn to the Project area. The influx of jobseekers is expected to affect the community's demographic, social dynamics, increase demand on existing services and may ultimately contribute to the emergence/development of informal settlements in the Project area.

The impact is considered adverse, direct, irreversible and regional as the Project is likely to attract a pool of jobseekers from the immediate vicinity as well as from the broader regional settlements, such as Uis and Okombahe. However, during the construction phase, the likelihood of a significant influx of jobseekers is expected to be low as reputable contractors and their subcontractors will be prioritised for construction activities and are likely to have their workforce already in place. In addition, considering the limited employment opportunities during this phase, most jobseekers are expected to defer seeking employment until the operational phase, which offers longer-term contracts and greater job stability. As a result of this, no significant alterations to community demographics or additional pressure on existing services are anticipated (at least during the construction phase). Therefore, the magnitude of change is rated low. The sensitivity of the receptor is rated low as the host communities are expected to likely maintain strong social cohesion, with limited to no disruptions to social networks or tensions with newcomers. Overall, the significance of the impact is expected to be adverse low, before mitigation (Table 28). The mitigation measures are included in the final ESMP (Appendix A).

7.3.1.4 Occupational health and safety: potential risk for construction personnel to sustain on-site injuries, partial disabilities, life threatening scenarios or death

Employee's health and safety are top priorities in the workplace. Injuries sustained on the job can result in partial disabilities and may have long-term consequences for an individual's well-being. Such incidents not only compromise employees' health and quality of life but can also limit their future employment opportunities.

Construction work often involves complex tasks that require the use of heavy machinery and power tools, which demand specific knowledge and experience for safe operation. The fast-paced and high- pressure environment significantly increase the risk of workplace injuries. Common injuries may result from slips, mishandling of power tools, contact with moving machinery or vehicles within active work zones, improper use of personal protective equipment (PPE), fall from heights and fatigue-related injuries due to extended work shifts.

Minor injuries include cuts, bruises and sprains while more severe injuries include fractures, dislocations or traumatic head injuries. In extreme cases, fatalities may result from machinery accidents or falls from heights.

The nature of the impact is adverse and will directly impact construction personnel. The duration of the impact is dependent on the severity of the injury, which may range from minor to major. Minor injuries are not life-threatening and generally heal within a short period, whereas major injuries may result in permanent disabilities and could limit prospect for securing future employment opportunities (worst-case scenario). However, the duration of the impact occurring is limited to the duration of the construction phase (expected to be two years – short term duration). For the construction phase, contractors and subcontractors are expected to employ a competent, experienced and highly skilled workforce, meaning injuries are more likely to occur as unforeseen accidents, rather than due to negligence, lack of awareness or incompetence. Additionally, construction activities will be supervised by construction supervisors and managers, and safety will be guided by the various health and safety and environmental (HSE) officers in work areas. The compliance with the health and safety management plan will be assessed by the HSE officers and provide guidance on compliance. This will reduce the likelihood of injuries. Nonetheless, as accidental injuries cannot be eliminated, the likelihood of the impact occurring is assessed as medium (possible). The extent of the impact is considered on-site as workers involved in construction activities are the primary group at risk. The magnitude of change is regarded as low while the sensitivity of the receptor is considered medium since minor injuries are expected and recovery is generally possible with appropriate medical treatment (partial reversible). It is recommended that all construction personnel strictly adhere to established safety protocols throughout the construction phase, particularly employees operating cranes and those working at heights. Overall, the significance of the impact is expected to be adverse low, before mitigation (Table 28). The mitigation measures are included in the final ESMP (Appendix A).

7.3.1.5 Skills development: opportunity for the construction workforce to gain skills and practical work experiences that advance their careers

During the two (2) – year construction phase of the mine, construction personnel are expected to gain valuable skills and practical work experiences. Exposure to a range of construction activities, modern equipment and industry standard practices will enhance their technical competencies and practical knowledge. A skilled and competent workforce will contribute to the timely completion of the construction phase. Moreover, the intangible skills and work

experience gained will help employees advance their careers and secure future employment within the mining industry.

The development of skills and acquisition of practical work experience is considered a beneficial and direct impact as the practical knowledge and technical competencies gained by the construction workforce will be retained permanently. The spatial extent of the impact is rated regional as the skills acquired by the workforce can be applied to future job opportunities within the Erongo Region or elsewhere in the mining industry.

The probability of the impact occurring is rated as definite, as skills will be gained through the completion of various construction activities. The duration of the impact is rated permanent as the skills and work experiences are lasting and transferable to future work. The magnitude of change is rated low, as the acquisition of skills and practical work experiences is limited to the construction phase. The impact is associated with major career uplifting benefits; therefore, the sensitivity of the receptor is rated low as the workforce will have the opportunity to apply these skills across multiple future projects. Overall, the significance of the impact is rated beneficial moderate (Table 28).

7.3.2 OPERATIONAL PHASE: SOCIAL IMPACTS

The social impacts anticipated during the operational phase include aspects such as the acquisition of skills and practical work experiences that enhance the long-term career development of the workforce, occupational health and safety risks and social benefits aligned with the Project social corporate social responsibility (CSR) programs. Additionally, the influx of jobseekers into the immediate Project area may place pressure on local communities, affect social cohesion and increase the risk of communicable disease transmission. These impacts are discussed in detail in the sections below.

7.3.2.1 Skills development: opportunity for the operational workforce to gain skills and work experience

Every organisation strives to develop skills and enhance capacity of its workforce to effectively meet job requirements. Where gaps in skills exist, targeted training is provided, in addition to the mandatory occupational health, safety and environmental training. It is anticipated that the operational workforce will possess the necessary skills and knowledge relevant to the mining industry, acquired through prior project experiences or formal vocational training. The Project will present an opportunity for skills development and career advancement for the operational workforce throughout the life of mine (expected to be > 11 years).

The development of skills and acquisition of practical work experience is considered a beneficial and direct impact as the practical knowledge and technical competencies gained by the operational workforce throughout the LoM (expected to be > 11 years) will be retained permanently. The spatial extent of the impact is considered regional as the skills acquired can be applied to future job opportunities within the Erongo Region or elsewhere in the mining

industry. The probability of the impact occurring is rated definite, as skills and work experience will be gained through the execution of a wide range of operational activities. In addition, targeted on-the-job training will be provided to unskilled and semi-skilled employees (i.e. general workers). This will progressively improve their competency over time. The duration of the impact is considered permanent as the knowledge, technical skills and work experiences are lasting and transferable to future work. In addition, the diverse and complex nature of the operational activities exposes employees to a wide range of technical tasks, modern equipment and best industry standard practices.

Therefore, the magnitude of the impact is rated high. The sensitivity of the receptor is rated medium as the workforce will have the opportunity to apply these skills across multiple projects in future, although certain specialised and technical skills may not be readily transferable, particularly to unskilled and semi-skilled workers. Overall, the significance of the impact is rated beneficial major (Table 28).

7.3.2.2 Occupational health and safety: potential risk for the operational workforce to sustain on-site injuries, partial disabilities, life threatening scenarios or death

The physically demanding nature of mining operations exposes workers to a range of occupational hazards that could result in injuries. High-risk activities that could cause injuries include the operation of heavy machinery, the handling of explosives and accidental contact with mobile equipment. Workers are also susceptible to slips and falls due to uneven or wet surfaces, as well injuries associated with the manual handling and lifting of heavy loads. In addition, fatigue and reduced alertness resulting from extended working shifts may further increase the likelihood of accidents and occupational injuries.

The nature of the impact is considered adverse and will directly impact operational personnel. The duration of the impact depends on the severity of injuries sustained, which may range from minor to major. Minor injuries are generally not life-threatening and typically heal within a short period, whereas major injuries may result in permanent disabilities and, in worst cases, limit future employment prospects. However, the duration of the impact occurring is limited to the life of mine that is expected to be > 11 years (medium term). During the operational phase, a diverse workforce comprising of unskilled, semi-skilled (general workers) and specialised personnel will be employed. As a result, there is high probability for occupational injuries. This risk will be managed through targeted on-the-job training, strict adherence to established safety standard operating procedures and close supervision by the managers and domain supervisors. Compliance will also be monitored by appointed HSE representatives. These measures, however, do not preclude the likely occurrence of accidental injuries. Under normal operational conditions, the likelihood of the impact is assessed as medium (possible). The spatial extent of the impact is considered on-site as workers involved in operational activities are the primary receptors. The magnitude of change is rated moderate while the sensitivity of the receptor is rated high as varying degree of

injuries may be sustained. This ranges from minor injuries, that fully heal with appropriate medical treatment (partially reversible), and more severe injuries that could result in permanent disabilities or even fatalities (irreversible). Overall, the significance of the impact is assessed as adverse moderate, before mitigation (Table 28).

The partial reversible rating is adopted in this assessment, considering that close supervision of the workforce will reduce the likely occurrence of major accidents and serious injuries. All operational personnel will strictly be required to adhere to established safety protocols, particularly when operating heavy machinery and handling hazardous materials and chemicals. In addition, a trained on-site first aid response team will be maintained, to render immediate first aid assistance in the event of accidents or injuries. With these mitigation measures, the impact will be reduced to adverse minor.

The Proponent shall comply with the following occupational health and safety measures, which are also included in the final ESMP (Appendix A):

- Ensure full compliance with the occupational health and safety requirements as stipulated in the Labour Act No. 6 of 1992 and ISO 45001 standards;
- Develop, implement and enforce standard operating procedures (SOPs) governing workplace health and safety across all operational domains of the mine;
- Provide mandatory on-site safety induction for all employees, contractors, subcontractors and visitors. Special emphasis must be on mobile equipment on-site traffic management and high-risk work areas;
- HSE personnel to conduct routine compliance inspections across all operational work areas. Manager and domain supervisor must ensure that semi-skilled workers are closely supervised;
- Ensure the availability and correct use of PPE gears (e.g., safety boots, high-visibility clothing, ear plugs, fall-arrest systems, gloves and hard hat);
- Maintain accurate records of occupational injuries, near-mises, corrective actions and lessons learned and use these records to continuously improve on-site safety practices;
- Enforce a zero-tolerance policy for alcohol and drug use on-site. Workers under the influence of alcohol or drugs must not be allowed to enter the mine premises. Daily alcohol testing should be conducted at mine entrances at the start of each shift and upon return from meal breaks. Random drug testing should be conducted periodically to promote a safe and productive work environment;
- Maintain first aid response teams on-site and ensure that emergency preparedness and response plans are in place;
- Implement adequate work-rest cycles, monitor shift durations and limit overtime to reduce fatigue-related accidents and incidents; and
- Promote a safety culture by encouraging workers to promptly report hazards, near misses, unsafe conditions.

7.3.2.3 Corporate social responsibility (CSR): support and upliftment of the social status quo of the host communities and local economy

The Proponent is committed to fulfilling its CSR obligations, with a focus on improving the social and local economy of host communities (communities within the area of influence of the Kokoseb Gold Mine Project). This concept was raised by I&APs during the public engagement phase of the ESIA.

The Proponent will consult various guiding tools such as local authority development plans, develop internal CSR policies, environmental, social and governance (ESG) principles, frameworks and corporate strategies to identify key areas and programs that its CSR objectives. These initiatives will be strategically planned and implemented in close collaboration with local authorities and community representatives to ensure that tangible benefits are delivered to majority of community members.

The CSR initiatives (benefits) are indirect and beneficial to the community as they provide opportunities for social upliftment, improved livelihoods and enhanced quality of life. Benefits, for example opportunities for skills development, education and vocational training sponsorships, the development of infrastructure through the Proponent's CSR initiatives and improvements to local services are considered as irreversible benefits. The spatial extent of the impact is considered regional as the initiatives will be designed, carefully planned and executed to reach a broader segment of the community. The duration of the impact is expected to be long-term as benefits potentially continue beyond mine closure (e.g. investments in community infrastructure and water supply improvements). The magnitude of change is assessed as high due to the substantial and positive contribution of CSR programs to the socio-economic development of the host communities. The sensitivity of the receptor is rated as medium as benefits through CSR initiatives can result in meaningful and positive changes to community well-being. However, the benefits may not be evenly distributed across all community members, which potentially could lead to some individuals or groups sensing some sort of exclusion. On another note, there is a risk that communities may develop expectation or reliance on continued support. Considering these factors, the significance of the impact is assessed as beneficial major (Table 28).

7.3.2.4 Community and social cohesion: potential influx of jobseekers and their families into the immediate Project area. This may alter the demographic and social dynamics of the host community and may lead to increased strain on existing services

The Project may attract jobseekers and their families into the immediate Project area during the operational phase. This influx is primarily driven by the perception of long-term employment opportunities, as the operational phase typically offer more stable and extended contracts compared to the construction phase. Individuals from surrounding communities and from more distant settlements may relocate or temporarily settle near the mine in pursuit of employment and related economic benefits. Such an influx has the potential to

alter the local demographic patterns, community and social dynamics and increase demand for social services within the host community.

The impact is considered adverse and direct, occurring over a medium-term duration (>11 years life of mine). The operational phase is likely expected to attract a pool of jobseekers from the broader region and may likely cause considerate influx of jobseekers in regional settlements, particularly in Okombahe. Therefore, the spatial extent of the impact is considered regional.

The probability of the impact occurring is assessed as medium (possible) as there is a potential for opportunistic jobseekers (particularly in the unskilled and semi-skilled labour categories) to migrate into Okombahe or adjacent villages over time in search for employment opportunities. The magnitude of change is assessed as moderate as there will be pressure on existing services (water, sanitation and other services), community and social dynamics. In cases of substantial influxes, local authorities may need to intervene and land allocation protocols and processes may require review and adjustment. The sensitivity of the receptor is rated medium as host communities have a moderate capacity to absorb additional population. However, the possibility of ethnic tensions, communal disputes or inter-ethnic conflicts cannot be entirely precluded. Overall, the significance of the impact is expected to be adverse moderate, before mitigation (Table 28). With mitigation, the impact will be reduced to adverse minor.

The Project will require a diverse workforce during the operational phase. To mitigate the potential influx of jobseekers and prevent the establishment of formal or informal settlements in the immediate Project area, the Proponent has established a set of mitigation measures, which are listed below and included in the final ESMP (Appendix A):

- Recruitment of personnel will be managed exclusively through the Human resources (HR) department (off-site). No on-site recruitment activities will be conducted;
- Strict access control will be maintained at all entry and exit points of the mine;
- All operational staff will be transported to and from the mine accommodation village by bus; and
- Family-style accommodation will not be permitted on-site or in the immediate Project area. All operational staff will be accommodated at the mine accommodation village.

7.3.2.5 Potential exclusion of vulnerable (women and unskilled youth), marginalised groups (previously disadvantaged groups) and indigenous people from employment opportunities and other Project-related benefits

The Project has the potential to adversely affect vulnerable and marginalised groups within the Dâures Constituency, particularly if employment opportunities are not properly managed and tailored to deserving candidates. These groups include women, youth and indigenous

people, notably the Damara and !Oe‡Gan[4] communities. Community involvement in Project opportunities may be constrained by skills mismatch between Project requirements and the current local skills base.

The mining sector is traditionally male dominated. Without proactive measures, women are likely to be excluded from employment opportunities, skills development and economic benefits due to limited prior experience in mining-related roles.

Cultural norms may further restrict women's participation in industrial work. Similarly, majority of the highly unemployed youth are unlikely to directly benefit from the Project as they lack the artisanal, technical skills or formal qualifications that are required for employment. However, some youth may secure employment in general labour or support roles.

The nature of this impact is considered adverse and direct as certain host community groups may not fully benefit from employment and other opportunities associated with the Project. The duration of the impact is considered medium (> 11 years life of mine) while the probability of the impact occurring is rated high as most positions require technical and specialised skills that are not readily available locally. It is expected that majority of the skilled positions will be filled by workers sourced from the broader region. The community groups at risk of exclusion are dispersed in the immediate Project area and broader community. Therefore, the spatial extent of the impact is considered local. The magnitude of change is rated high as exclusion from employment and other opportunities could create social tensions within the host communities as they may perceive that they are not being prioritised as first recipients of Project opportunities, despite them being the host communities. The sensitivity of the receptor is rated medium as the communities would likely have capacity to adapt through other alternative livelihoods and income streams. Overall, the significance of the impact is rated adverse major, before mitigation (Table 28). With mitigation, the impact is reduced to adverse minor.

The Proponent will develop and implement recruitment policies and procedures to ensure different community groups have equitable access to Project related opportunities and benefits.

The following mitigation measures are also included in the final ESMP (Appendix A):

- Maintain regular engagement with local community leaders and representatives to communicate upcoming employment opportunities and opportunities for previously disadvantaged groups;
- Set minimum inclusion targets for women and youth in both skilled and semi-skilled roles;

[4] The !Oe‡gan (also spelled !Oe-#Gan or Oe-#Gân) are a traditional community and a recognised traditional authority in Namibia, primarily located in the Okombahe area.

- Provide mentorship and on-the-job training to women in traditionally male-dominated roles;
- Establish support pathways that enable women to progress into technical positions over time;
- Collaborate with local vocational centres to prepare youth for future employment opportunities; and
- Monitor and track participation of women, youth and indigenous peoples in employment and skills programmes.

7.3.2.6 Community health: potential spread of communicable diseases (HIV, TB and STDs) among (i) mine personnel and between (ii) mine personnel and local community

Change in population density, increased workforce mobility and interactions between local communities and non-local employees have the potential to increase the risk of communicable transmission, particularly immunodeficiency virus (HIV), tuberculosis (TB) and other sexually transmitted illnesses/diseases (STI/Ds). Additionally, these dynamics may increase the risk of unintended pregnancies, unmet family planning needs, unsafe sexual practices and vulnerability among young women and adolescent girls. The presence of a predominantly male, migrant workforce may also contribute to an increase in sex work in nearby settlements, which can further increase the transmission of STIs, expose sex workers to exploitation and create additional health and protection risks. Collectively, these factors present direct health risks to mine personnel and indirect adverse impacts on surrounding communities.

The nature of this impact is adverse as communicable diseases pose health risks to both mine personnel and surrounding communities. Disease transmission is primarily indirect through interactions between the workforce and local communities. However, direct transmission may occur within mine accommodation facilities due to close or regular contact among personnel. The impact is considered partially reversible through the implementation of effective mitigation measures. Mitigation measures include the provision of comprehensive sexual and reproductive health education for employees and contractors, access to confidential contraception, family planning and health services, enforcement of workplace policies prohibiting sexual exploitation, abuse or coercive relationships and collaboration with local and regional health authorities. The duration of impact is rated medium (> 11 years life of mine) as opportunities for disease transmission may persist throughout operations. The spatial extent of the impact is considered regional as communicable diseases such as TB have the potential to spread beyond the Project area into the broader Erongo Region. The likelihood of this impact occurring is considered low as the operational workforce will be accommodated at the mine accommodation village and site access will be controlled. Therefore, contact with the surrounding communities will be minimal. However, the probability of disease transmissions among personnel residing within the accommodation village is considered high due to close living conditions and frequent interactions. On another

note, communicable diseases can result in both short-term and long-term illnesses, if not effectively managed. Therefore, the magnitude of change is rated major. The sensitivity of the receptor is rated medium as both mine personnel and local communities may require support to cope with potential health impacts. Overall, the significance of the impact, before mitigation, is assessed as adverse moderate (among the operational workforce) and adverse minor (between mine personnel and local communities) (Table 28). With the implementation of the mitigation measures, is expected to be reduced to adverse low.

The following mitigation measures are also included in the final ESMP (Appendix A):

- Implement an alcohol and drugs policy for the workforce residing in the accommodation village;
- Regular awareness and education sessions with all employees and contractors on HIV prevention, testing, stigma reduction and treatment adherence;
- Implement and enforce a workplace HIV and communicable diseases health policy aligned with national HIV/AIDS strategies;
- Conduct regular awareness and education sessions on the prevention of communicable diseases (TB and other STDs);
- Provide access to voluntary counselling and testing services for employees and contractors.
- Integrate TB screening into pre-employment medical examination and routine occupational health assessments;
- Maintain strong referral pathways to local and regional health facilities to support treatment and follow ups;
- Require contractors to comply with the same health standards and collaborate with local health authorities;
- Distribute free male and female condoms at accessible and confidential locations within the accommodation village; and
- Partner with the Ministry of Health and Social Services (MoHSS) or local health facilities to provide on-site voluntary HIV testing and counselling services for the workforce.

Table 28 - Social impact assessment ratings

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Construction phase						
Resettlement of communities within the main open pit footprint and the blast	Village houses at Katora Village	Land acquisition, physical displacement and resettlement of indigenous and	Adverse Direct Partly reversible Permanent Regional Definite	Medium	Very High	Adverse Major (8)

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
exclusion zone to new safe grounds		customary landholding communities (PS5/PS7).				
Construction activities	Community	Risks of reputational damage to the Project arising from the quality and effectiveness of engagement with the affected communities.	Adverse Direct Partly reversible Regional Medium probability Long-term	High	Very high	Adverse Major (9)
Construction activities	Community demographic and social dynamics	The Project may attract an influx of jobseekers into the Project surrounding areas, which alters the demographic profile and dynamics of the host communities. Increased strain on existing services.	Adverse Direct Irreversible Short-term Regional Low probability	Low	Minor	Adverse Low (2)
	Construction workforce	Construction personnel may potentially sustain on-site injuries, partial disabilities, life threatening scenarios or death.	Adverse Direct Partly reversible Short term On-site Medium probability	Low	Minor	Adverse Low (2)

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		Development of skills and work experiences that enhance their long-term career development and employability.	Beneficial Direct Reversible Permanent Definite Regional	Low	Minor	Beneficial Moderate (4)
Operational phase						
Operational activities	Operational workforce	Development of skills and work experiences that enhance their long-term career development and employability.	Beneficial Direct Reversible Permanent Definite Regional	Medium	Major	Beneficial Major (8)
		Operational workforce may potentially sustain on-site injuries, partial disabilities, life threatening scenarios or death.	Adverse Direct Partial reversible On-site Medium term Medium probability	High	Moderate	Adverse Moderate (6)
Corporate social responsibility (CSR)	Host communities	Upliftment of the social status quo and the local economy.	Beneficial Indirect Irreversible Regional High probability Long term	Medium	High	Beneficial Major (8)
Operational activities	Community demographic and dynamics	Potential influx of jobseekers into the Project surrounding area, which alter	Adverse Direct Irreversible Regional	Medium	Moderate	Adverse Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		the demographic profile and dynamics of the host communities. Increased strain on existing services.	Medium probability Medium term			
	Host community (youth, women and indigenous people (Damara and !Oe‡gan))	Potential exclusion of vulnerable, marginalised groups and indigenous people from employment opportunities and other Project-related benefits.	Adverse Direct Partly reversible Local Medium term High probability	Medium	Major	Adverse Major (8)
Workforce interaction	Mine personnel	Potential transmission of communicable diseases among mine personnel.	Adverse Direct Partly reversible On-site Medium term High probability	Medium	Major	Adverse Moderate (6)
Workforce - community interaction	Mine personnel and local community	Potential transmission of communicable diseases between mine personnel and local community.	Adverse Indirect Partly reversible Regional Medium term Low probability	Medium	Major	Adverse Minor (4)

7.4 SOCIAL ENVIRONMENT: TRAFFIC IMPACTS

This section presents the findings of the traffic impact assessment (TIA) conducted by Innovative Transport Solutions, (2025) for the proposed Project (Appendix D). The primary objective of this TIA section is to investigate the traffic-related impacts anticipated during both the construction and operational phases of the Project and other cumulative impacts from the interaction with the Project and other surrounding projects in the vicinity. This assessment identifies potential constraints within the local road network, specifically concerning the C34, C35, C36, D3712 and D3714 roadways (Figure 78) and recommends appropriate mitigation measures to ensure safe and acceptable traffic operations throughout the life of the Project. This analysis covers existing traffic conditions, projected trip generation (e.g., peak-hour trips of 52 total trips during construction and 27 - 37 total trips during operation), site access requirements and the necessity for realigning the D3714 district road.

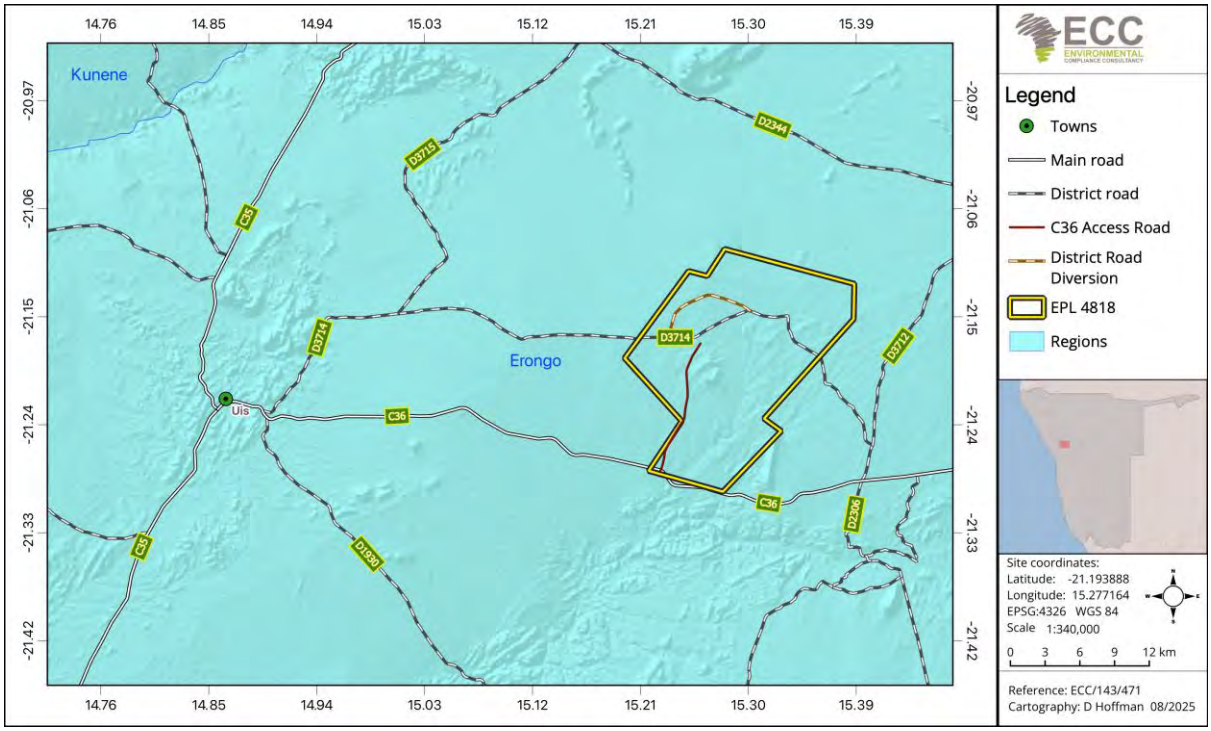


Figure 78 - Project site accessibility map

Construction is planned to commence in 2027 and is expected to be completed in ~two (2) years. The TIA specifically analysed the 2027 total traffic conditions for the construction phase. While the operational phase is planned to commence in 2029.

The potential traffic impacts during construction phase that were identified and assessed are illustrated in Figure 79, before mitigation and are expanded on in more detail in Table 29.

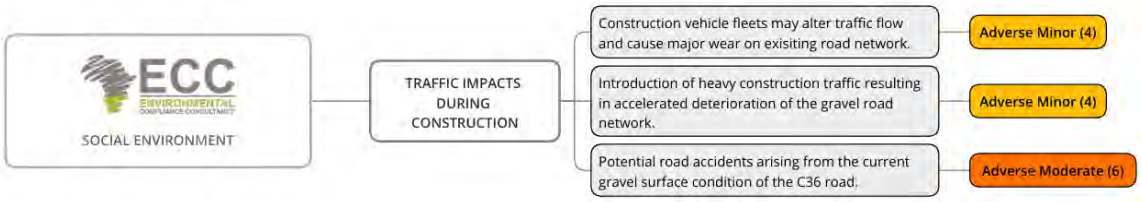


Figure 79 - An overview of the traffic impacts during the construction phase

7.4.1 CONSTRUCTION PHASE

7.4.1.1 Construction vehicle fleets may alter traffic flow and cause major wear on existing road networks

During the construction phase, the introduction of construction vehicles on the C36, D3712 and D3714 roads will increase the existing baseline traffic volumes on the local road network. Current traffic counts indicate that the C36, D3712 and D3714 roads accommodate very low volumes of traffic, with fewer than ~200 vehicles per day on the C36 and even lower volumes on the district roads (Innovative Transport Solutions, 2025). Hence, the network functions under free-flow conditions with negligible delays and extremely high reserve capacity. With the commencement of construction, the Project will generate 52 peak-hour trips, comprising light construction vehicles, contractor pick-ups trucks and up to four (4) heavy trucks per day transporting diesel, reagents and construction materials, increasing traffic congestion and wear on the existing road network. An overview of the estimated development trips during the construction phase is shown Figure 80.

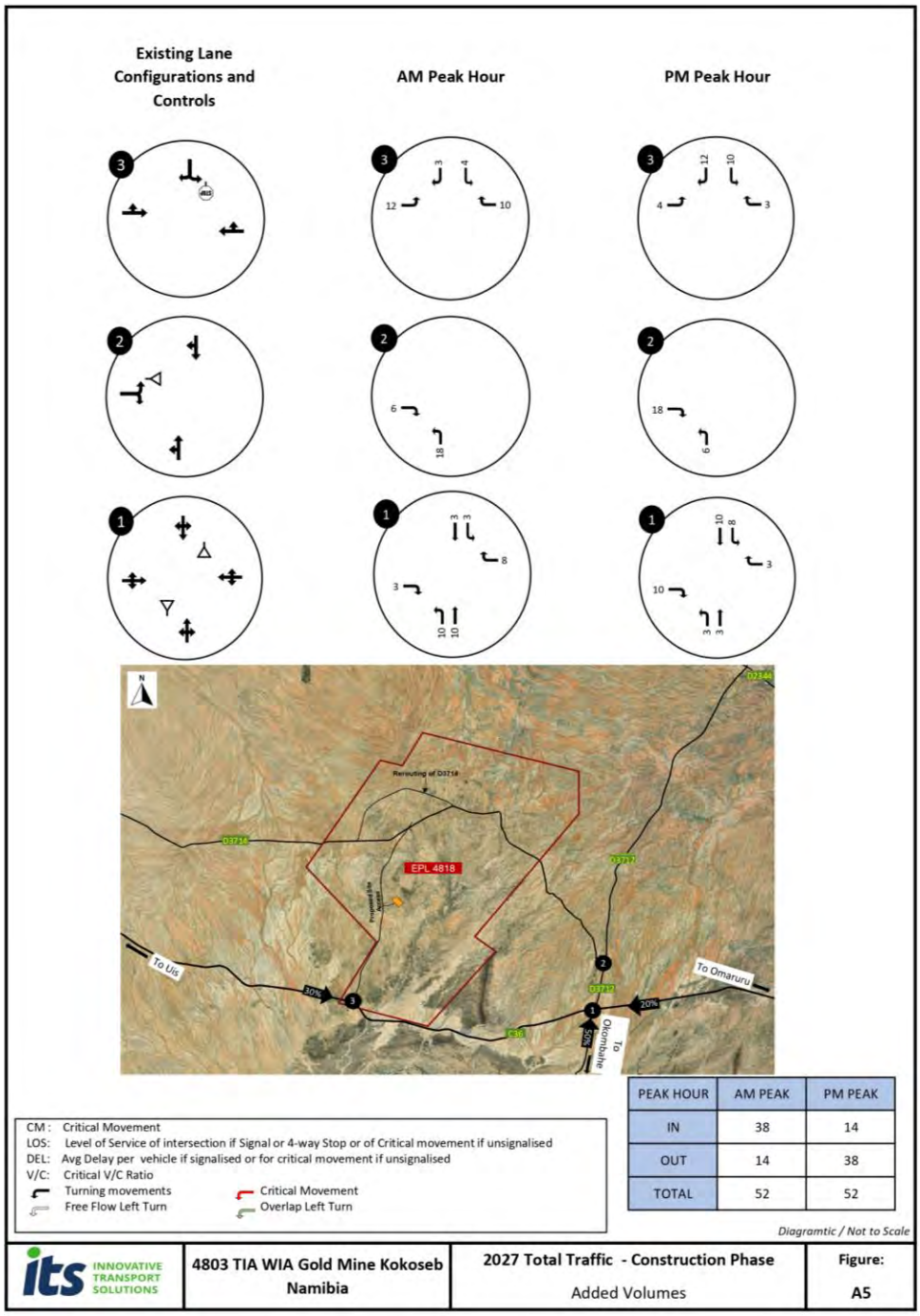


Figure 80 - The estimated traffic volumes during the construction phase (year 2027) (Source: ITS, 2025)

The nature of the impact is adverse as the construction traffic represents a slight increase compared to the very low existing baseline traffic volumes on the C36, D3712 and D3714 roads. The impact is considered reversible as traffic levels are expected to return to normal flow once construction cease and road wears can be repaired to restore safe and efficient traffic flow. The impact is short term (1–5 years) for the duration of the construction phase (<2 years).

The magnitude of change is low as the increased in traffic will likely only cause minor, short-lived alterations to road conditions and traffic flow. The extent is regional since the increased construction traffic affects several public roads that serve a wider area, thus the impact spreads across the broader regional road network rather than being limited to the Project site. The probability of the impact occurring is likely as construction vehicles will routinely use these roads, so increased traffic and road wear are expected to occur as part of normal Project activities. The sensitivity of the receptor is medium given that these roads are regionally important and there are few alternative routes. Therefore, the significance of this impact is rated adverse minor (before mitigation), as shown in Table 29. Mitigation measures are included in the final ESMP (Appendix A).

7.4.1.2 The introduction of heavy construction traffic will accelerate the degradation of the gravel road network

Gravel roads such as the C36, D3712 and D3714 are sensitive to repeated load cycles from heavy trucks. Therefore, the repetitive action of fully loaded supply trucks carrying diesel and construction materials will promote the rapid formation of corrugation (wash boarding), rutting and edge break. This may compromise the integrity of the surface, reduce traction, increase vehicle braking distances and ultimately degrade the level of service for all road users.

The nature of the impact is adverse as heavy, repeated truck movements accelerate the deterioration of gravel roads, causing rutting and corrugations. Additionally, the impact is considered direct as heavy truck volumes travelling to and from the Project site would degrade the gravel roads, causing deterioration of the road. The impact is reversible as the road damage can be repaired through routine maintenance such as grading, reshaping and re-gravelling. This will allow the roads to return to safe and functional conditions. The duration of the impact is rated short term (1 – 5 years), considering that the road damage occurs only during the period of heavy construction traffic (<2 years). Once the construction phase ceases and the roads are maintained, the impact ceased and the road conditions recover.

The magnitude of change is rated low as it is anticipated that road deterioration, including minor rutting, corrugation and surface wear will not result in significant road damages. The extent of the impact is deemed regional since these roads will also be used by other road users within the broader region.

The probability of the impact occurring is considered possible (medium), given that heavy truck traffic is expected on these gravel roads and such conditions often lead to road surface deterioration, although the exact severity depends on numerous factors such as maintenance frequency, moisture and traffic volumes. The sensitivity of the receptor is rated low as the affected gravel roads are of local importance and are not particularly sensitive to change, as the roads are routinely exposed to varying traffic loads. Overall, the significance of the impact

is rated adverse minor (before mitigation), as shown in Table 29. Mitigation measures are included the final ESMP (Appendix A).

7.4.1.3 Potential road accidents arising from the current gravel surface condition of the C36 road

The C36, which serves as the primary access route to the proposed Project, is currently an unsealed gravel road with a posted speed limit of 100 km/h and variable surface quality. Under baseline conditions, traffic volumes along this road are low, allowing safe travel despite the inherent limitations of gravel surfaces. However, the introduction of minimal construction traffic, including heavy goods vehicles transporting diesel, equipment and consumables may increase the safety risk profile of this route (Innovative Transport Solutions, 2025). Gravel roads possess inherent hazards such as loose stones, corrugation, loss of skid resistance, dust plumes and reduced braking efficiency. All of these become more acute under high-frequency heavy-vehicle movements. As construction trucks accelerate and decelerate along the C36 road, the gravel surface is likely to degrade rapidly, resulting in rutting, wash boarding and edge break that materially compromise vehicle stability and increase the likelihood of run-off-road incidents.

The nature of the impact is adverse as the influx of construction traffic onto the unsealed C36 gravel road amplifies existing road safety hazards, accelerates road surface deterioration and increases collision risks. The impact is considered direct as increased Project traffic on the C36 road will likely contribute to road surface degradation and associated road safety risks. The impact is considered reversible as structural wear, rutting and corrugation can be maintained to avoid road. The duration of the impact is deemed short term (1 - 5 years), for the duration of the construction phase (<2 years). Once construction activities cease, the additional heavy-vehicle movements and associated safety risks decline.

The magnitude of change is rated high as road collisions may result in injuries, assets or loss of life. The extent of impact is considered regional as the road is used by other road users from the broader region. The probability of the impact occurring is rated possible (medium), given that increased traffic on the gravel roads will create a risk of accidents. However, the actual occurrence of incidents depends on various factors such as the driver's behaviour, weather conditions, speed control and maintenance frequency. The sensitivity of the receptor is rated medium as the C36 gravel road is commonly used by the rural local community and tourists transitioning through the region. Overall, the significance of this impact is rated adverse moderate (before mitigation), as shown in Table 29. The mitigation measures are listed below and have been included in the final ESMP (Appendix A). The impact is rated adverse minor, post mitigation.

The following mitigation measures should be implemented:

- Enforce Project-specific reduced speed limits for all construction and commuter vehicles;
- Improve the mine access intersection through vegetation clearing, advance warning signs and temporary tapers to compensate for limited sight distance;
- Stagger heavy-vehicle movements to avoid peak periods;
- Restrict convoy driving;
- Schedule abnormal loads during off-peak daylight hours; and
- Ensure all Project vehicles meet gravel-road safety standards and undergo regular inspections.

Table 29 - Traffic impact assessment ratings during the construction phase

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Addition of construction vehicles to the existing road network	Traffic and road users	Increased traffic congestion and wear on local roads	Adverse Direct Reversible Short term Regional Likely	Low	Low	Adverse minor (4)
Increased presence of construction vehicles, particularly heavy trucks	Traffic and road users	Deterioration of gravel road	Adverse Direct Reversible Short term Regional Possible	Medium	High	Adverse minor (4)
Use of the gravel C36 for construction traffic	Traffic and road users	Potential road safety hazards	Adverse Direct Partly reversible Short term Regional Possible	Medium	High	Adverse moderate (6)

7.4.2 OPERATIONAL PHASE

An overview of the potential traffic impacts during the operational phase assessed are illustrated in Figure 81, before mitigation. Each specific impact is discussed in the sections below and the impact assessment ratings are summarised in Table 30.

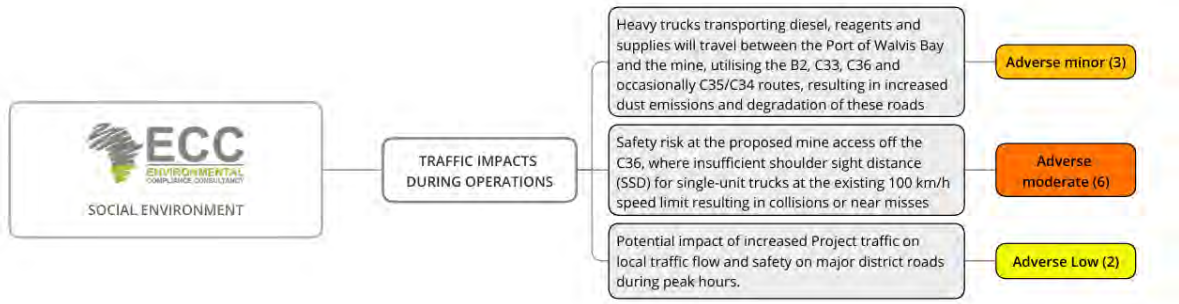


Figure 81 - An overview of the traffic impacts during the operational phase

7.4.2.1 Heavy trucks transporting diesel, reagents and supplies will travel between the Port of Walvis Bay and the mine, utilizing the B2, C33, C36 roads and occasionally the C35/C34 routes resulting in increased degradation of these roads

Heavy trucks transporting diesel, reagents and supplies between Walvis Bay and the Project site will travel along the B2, C33 and C36 roads. Although the B2 and parts of the C34/C33 roads are sealed and structurally designed for higher freight loads, the C36 and part of the C35 road is unsealed and are susceptible to accelerated deterioration under repeated heavy load traffic (Innovative Transport Solutions, 2025). Frequent truck movements may cause deterioration of the gravel surface layers, leading to rutting, corrugation, pothole formation and edge break as fines are displaced and the unbound layers deform under sustained wheel loads. Additionally, seasonal rainfall compounds cause deeper deformation, erosion channels and washouts where drainage is poor or disrupted by earlier surface failures. On sealed segments, degradation may result from repeated braking, acceleration and turning, especially at intersections and mine access points. Transition zones between sealed and gravel surfaces are likely to deteriorate faster due to dynamic loading and shoulder wear. Overall, the degradation will be most pronounced at high-stress points such as intersections, gradients, passing areas and the C36 mine access, where heavy trucks repeatedly accelerate or brake.

The nature of the impact is adverse as operational heavy-truck traffic may degrade public roads, causing rutting, corrugation, potholes, cracking and erosion, especially on unsealed sections like on the C35/36 gravel portions. However, these are not expected to significantly disrupt traffic flow as degradations are likely expected at intersections, gradients, passing areas where heavy truck repeatedly accelerate and brake. The impact is considered direct as heavy trucks contribute to the physically degradation of road surfaces. The impact is rated reversible as road damages sustained can be repaired through routine standard maintenance and rehabilitation, ensuring existing roads return to their normal conditions.

The duration of the impact is rated medium-term (5 – 15 years) as delivery trucks will use the Project access routes throughout the LoM (~12 years). The impact will cease once trucking reduces or stops and roadway conditions will be restored.

The magnitude of change is assessed as moderate as structural damages to these roads impact the road capacity to safely accommodate light vehicle traffic. The extent of the impact is considered regional as these roads form part of the regional road network and connect the Project site with other major towns and settlements. The probability of the impact occurring is rated possible (medium) as road damage may occur under expected traffic loads and operating conditions. Although heavy traffic volumes are a key contributing factor, the extent and severity of damage depend on factors such as the frequency of road maintenance frequency and prevailing weather conditions. The sensitivity of the receptor is rated low as road users from the broader region are expected to adapt to any temporary roads impacts with relative ease, particularly at intersections, passing areas and gradients. The B2 trunk road is designed as a major transport corridor and connects projects with the port in Walvis Bay. This road is maintained by the Roads Authority (RA) and it is expected that the road will remain in good condition throughout LoM. The C33, C36, C34 and C35 roads are also maintained regularly. Overall, the significance of the impact is rated adverse minor (before mitigation), as shown in Table 30. The mitigation measures are included in the final ESMP (Appendix A).

7.4.2.2 Safety risks at the proposed mine access off the c36 road, where insufficient should dight distance (SSD) for single-unit trucks at the existing 100km/h speed limit could result in collisions or near misses

The proposed access onto the C36 road has a shoulder sight distance (SSD) of ~250 meters which is sufficient for light vehicles which requires an SSD of 200m but is not sufficient for single unit trucks which requires 290 metres SSD travelling at the posted 100 km/h speed limit. This shortfall may pose a safety risk at the point of access to the mine as the current SSD reduces the time available for approaching drivers, react to and safely manoeuvre around slow-moving or stopped vehicles entering or exiting the mine (Innovative Transport Solutions, 2025). The safety risk is compounded by the gravel condition of the C36 road, which reduces brake efficiency and increases stopping distances compared to sealed roads.

The impact is adverse as the access road creates a possible safety hazard, as sight distance is shorter than required for single unit trucks, as drivers may not be able to see or react to heavy vehicles in time due to the shorter than required SSD for these vehicles. The impact is considered direct as road safety risks will likely occur as a result of the current design of the mine access road junction. The impact is considered irreversible as any collision that occurs, causing injury, loss of life or damage, cannot be reversed. The duration of the impact is considered medium term (5 - 15 years) given that the access-related safety risk will persist for the expected LoM mine operating period (~ 12 years).

The magnitude of change is rated high as the safety hazard could cause severe accidents, leading to major harm or loss of life. The extent is on-site since the safety risk is confined to the specific access point where the mine road intersects the C36 road. The probability of the impact occurring is possible (medium) given that the current access conditions present a potential for collisions or near-misses, even if they won't occur regularly. However, the sensitivity of the receptor is rated medium because collisions result in damage to vehicles, injuries to drivers or passengers. There is limited potential for substitution if vehicle or passenger experiences significant damage. Therefore, this impact is rated adverse moderate (before mitigation), as shown in Table 30. Post mitigation, the impact is rated adverse minor. Mitigation measures have been listed below and are included in the final ESMP (Appendix A).

The following measures are recommended:

- Reduce the speed limit along the C36 road, at least 1 km on either side of the proposed mine access to 80 km/h;
- Move mine access road intersection to comply with SSD requirements;
- Apply regular dust suppression to the site access turn off;
- Prohibit overtaking in the access zone; and
- Provide intersection ahead warning (W107/W108) in advance of the proposed access.

7.4.2.3 Potential impact of increased Project traffic on local traffic flow and safety on major district roads during peak hours (AM hours 07:15-08:15, PM hours 15;00-16:00)

It is planned that employees (~ 132 employees) will commute to and from the Project site via the surrounding road network (Innovative Transport Solutions, 2025). During peak hours and shift changes, there will be a notable rise in commuter transport, particularly on the C36, D3712 and D3714 roads. These roads currently operate under very low baseline traffic volumes. Peak-hour trips generated by the mine (26 – 37 trips during operations) (refer to Figure 82) will not exceed the available roadway capacity or reduce intersection performance below levels of service (LOS) (Innovative Transport Solutions, 2025).

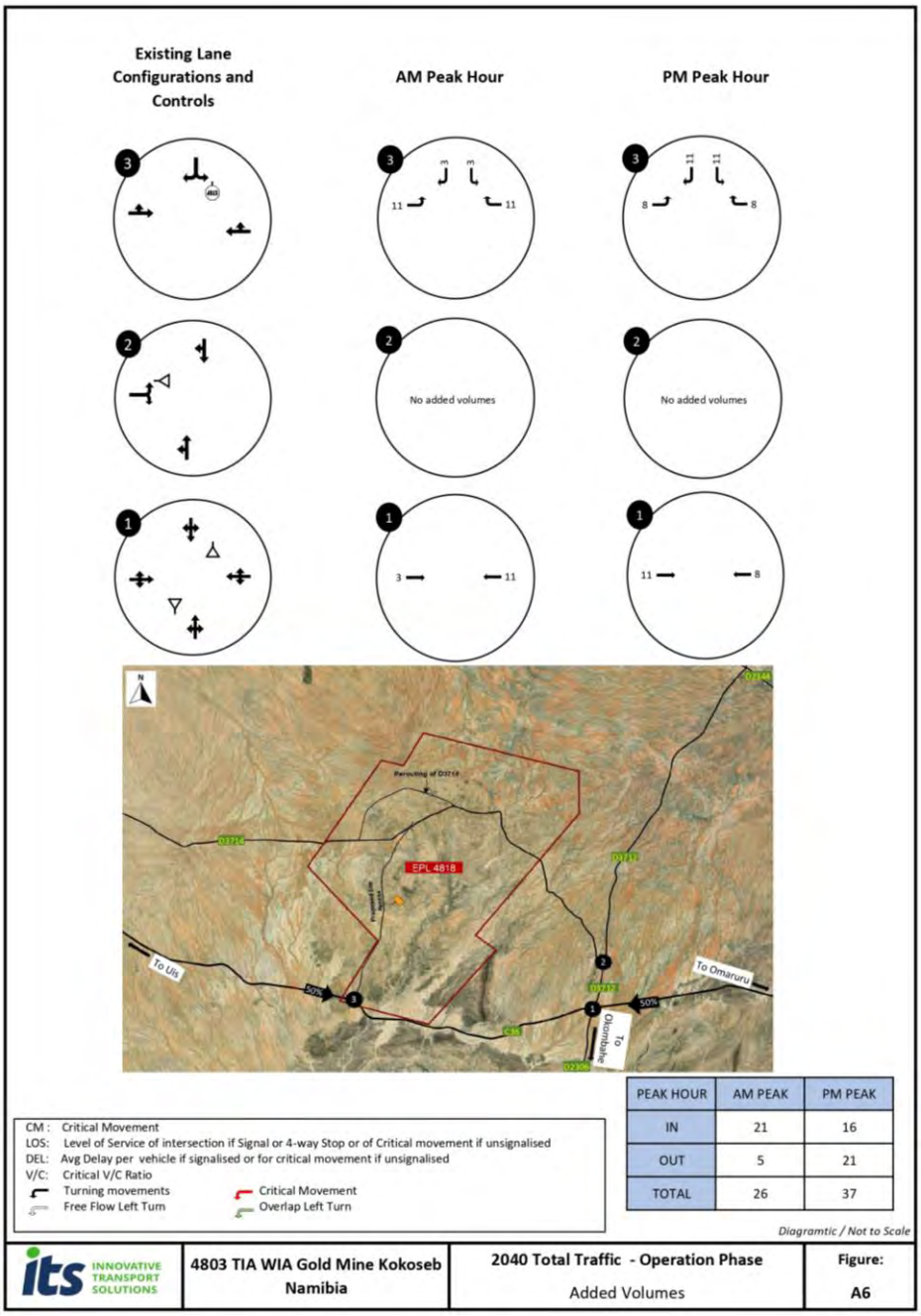


Figure 82 - Estimated traffic volumes during the operational phase (year 2040) (Source: ITS, 2025)

The nature of the impact is adverse as the increased traffic volumes introduce safety risks. The impact is direct as traffic associated with the mine operations may affect local traffic flow, although this is expected to be limited to peak hours. The impact is reversible as the disruption and associated safety risks are temporary and will cease once mine-related traffic decreases or return to normal levels. The operational traffic fleet will persist during the LoM (~12 years). Therefore, the duration of the impact is rated medium term.

The magnitude of change is rated negligible as only minor, measurable disruptions to traffic flow are expected. Road collisions, injuries or loss of life are considered unlikely under normal

operating conditions and are regarded as worst case scenarios. The extent of the impact deemed regional as communities, tourists and other regional roadways are the primary receptors. The probability of the impact occurring is rated low, considering the relatively low baseline traffic volumes along the regional roadways in the vicinity of the Project. The sensitivity of the receptor is rated low as the impact is limited to regional roads that can easily absorb the added traffic volume and other road users will unlikely affected. Therefore, the following impact has been rated adverse low (before mitigation), as shown in Table 30. Mitigation measures have been included in the final ESMP (Appendix A).

Table 30 - Traffic impact assessment ratings during the operational phase

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Heavy trucks transporting diesel, reagents and supplies will travel between the Port of Walvis Bay and the mine, utilising the B2, C33, C36 and occasionally C35/C34 routes.	Traffic and road users	Increased dust emissions and degradation of these roads	Adverse Direct Reversible Medium term Regional Possible	Low	Low	Adverse minor (3)
Safety risk at the proposed mine access off the C36, where insufficient shoulder sight distance (SSD) for single-unit trucks at the existing 100 km/h speed limit.		Collisions or near misses	Adverse Direct Irreversible Medium term On-site Possible	Medium	High	Adverse moderate (6)
Potential impact of increased	Traffic and road users	Affect to traffic flow and safety	Adverse Direct Reversible	Low	Negligible	Adverse Low (2)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Project traffic on local traffic flow and safety on major district roads during peak hours.		along access routes.	Unlikely Medium term Regional			

7.5 SOCIAL ENVIRONMENT: HERITAGE AND CULTURAL IMPACTS

7.5.1 INTRODUCTION

This section addresses the potential impacts of the Project on archaeological, heritage and cultural objects, sites and features that merit protection, preservation and management under the National Heritage Act, No. 27 of 2004. These may include, but are not limited to, archaeological sites, historic buildings and structures which symbolise past human occupation of the landscape, cultural landscapes, ancient burial sites, sacred sites, ritual or ceremonial places, historic routes or pathways, traditional settlements and other culturally significant locations or artefacts. The National Heritage Act, No. 27 of 2004 defines an archaeological feature as (i) any remain of human or occupation that is fifty (50) years or more years, found on or beneath the land surface or in the sea and (ii) any rock art, in a form of painting, engraving or other representation on a fixed rock surface or loose rock or stone that is fifty (50) years or more.

As discussed in chapter 5, the heritage baseline study for the Project was undertaken by Dr Alma Nankela in September 2024 (Appendix E). The field survey identified twelve (12) distinct heritage features, located both within and in the immediate vicinity of the Project site (see Figure 25). A number of these features lies in close proximity to planned operational areas and are therefore considered at risk of disturbance from various Project-related activities. These potential impacts may arise from activities such as driving (vehicle tracks), land clearing, excavation and earthworks and air-blast and ground vibrations associated with blasting activities, which will be undertaken at various stages of the Project lifecycle (construction, operations and decommissioning phases).

The twelve (12) heritage features identified within the immediate Project site and planned mine operational areas are categorised into five (5) distinct categories, namely: historic water pools (watercourses), ancient burial ground and cemeteries, a ruined historic building symbolising past human occupation, prehistoric rock art and a historic mine site. The impact assessment adopts this structure and categorisation and considers the features proximity to mine infrastructure and development areas. Figure 83 provides an overview of heritage impacts before mitigation, for illustrative purposes only. The impacts are discussed in detail in the section thereafter.

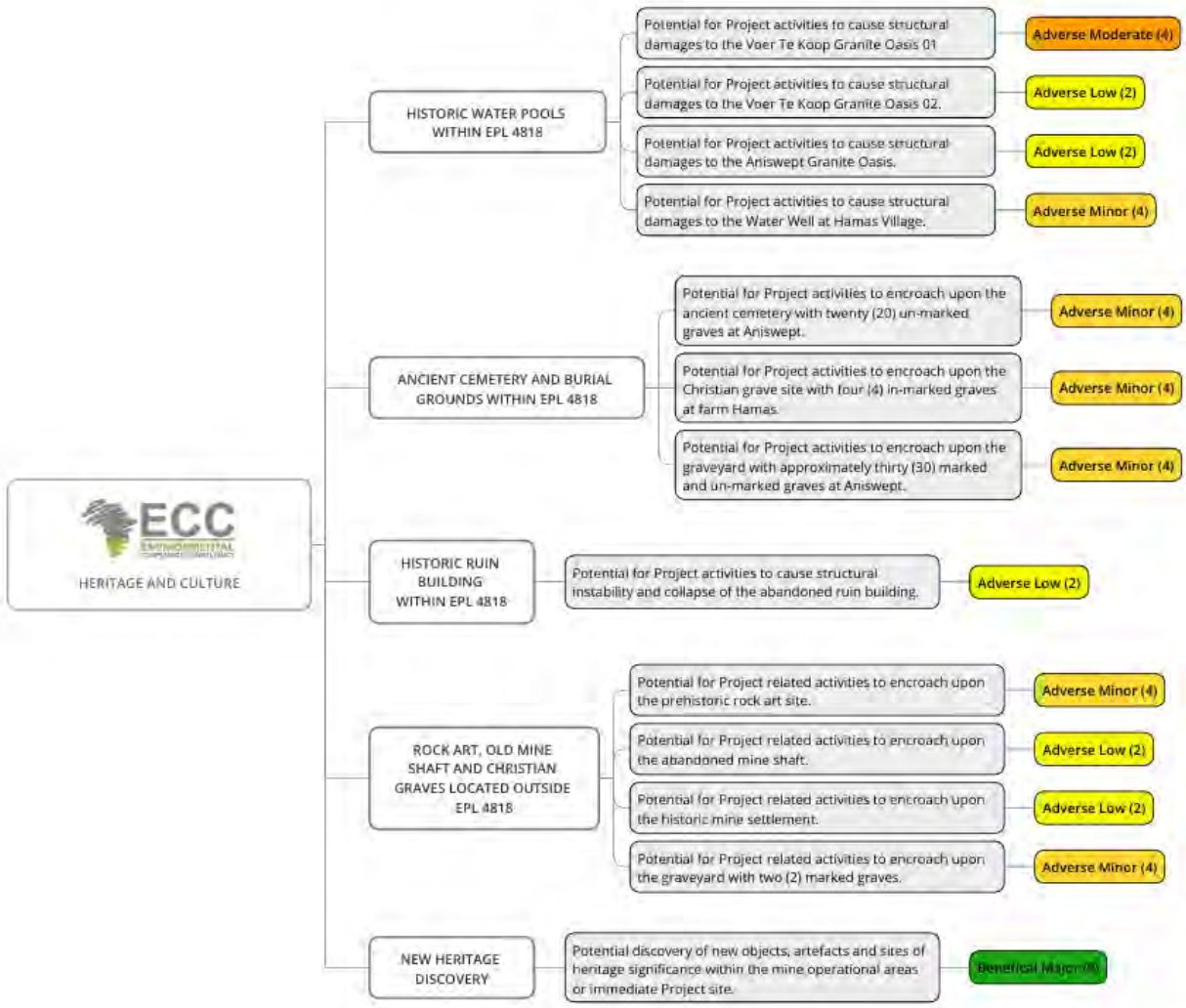


Figure 83 - Overview of the heritage impacts

7.5.2 POTENTIAL FOR PROJECT ACTIVITIES TO CAUSE STRUCTURAL DAMAGE TO HISTORIC WATER SOURCES 9POOL) LOCATED IN PROXIMITY TO MINE INFRASTRUCTURE AND PLANNED MINE OPERATIONAL AREAS

Four (4) historic water sources (pools) have been identified within the Project site, whereby three (3) are seasonal (ephemeral) and one (1) is a fully operational water well. These historic water pools are considered sacred by the local communities as they collect and retain water within their granite intrusions through multiple depressions and supplies water to the local communities, domestic animals and wildlife.

The water pools are briefly described below in the terms of their water-retaining characteristics and proximity to proposed developmental areas and mine infrastructure (refer to Figure 26):

- Voer Te Koop Granite Oasis 01 – an ephemeral water pool located approximately 500 m from the tailings storage facility (TSF) footprint;

- Voer Te Koop Granite Oasis 02 – an ephemeral water pool located approximately 880 m from the realigned D3714 road;
- Aniswept Granite Oasis – an ephemeral water pool located approximately 7 km from the realigned D3714 road; and
- Water Well at Hamas Village – a perennial and fully operational water pool located approximately 4 km from the explosives magazine area.

The four (4) identified water pools within the Project area lie beyond the 500 m blast radius of the main open pit and are spatially distant from mine core infrastructure (Figure 25). This minimises the likelihood of direct disturbances to these features. However, Voer Te Koop Oasis 01 is situated approximately 500 m from the tailings storage facility (TSF) footprint and may be susceptible to potential impacts arising from operations at the TSF. Such impacts could result in its structural degradation, potentially reducing its capacity to retain seasonal water and its heritage significance. The Proponent is unlikely expected to access the areas with the other historic water pools during any phase of the Project, unless material changes to the current mine layout are proposed. These historic water pools are expected to remain undisturbed under the current developmental plan.

Project activities, particularly at the TSF are likely to result in adverse, direct and irreversible impacts on the Voer Te Koop Granite Oasis 01 water pool. Considering the irreversible nature of the impact, the duration of the impact is deemed permanent as restoration of the feature is not feasible once damaged/altered. Although the feature lies marginally outside the current TSF footprint (~ 500 m), there is a risk that the site may be encroached as TSF personnel would be required to develop ancillary works areas and access routes in the immediate TSF footprint and future expansion of the TSF footprint could further increase this risk. The magnitude of change is rated moderate as the water pool will lose its primary ecological function as a seasonal water-retaining feature. The water resource, despite its cultural value (sacred) and functional role, is ephemeral and has a low heritage significance (Nankela, 2025). Therefore, the sensitivity of the impact is rated low. Taking these factors into consideration, the significance of the impact, before mitigation measures, is rated adverse moderate (Table 31).

In relation to Voer Te Koop Granite Oasis 02, Aniswept Granite Oasis and the Water Well at Hamas Village, the potential impacts are assessed as adverse, indirect and irreversible. These features are situated considerable distances from planned operational areas (i.e. TSF, waste rock dumps (WRDs), ancillary infrastructure and mine support service corridors). However, they may still be vulnerable to indirect disturbance resulting from other anthropogenic activities associated with core mining operations (e.g. track creation, air blasts and fly rock outside 519 m safe blast zone). The likelihood of disturbances is contingent upon any material changes to the current mine layout. Under the current mine design, these areas are not expected to be accessed or disturbed, and therefore, the likelihood of the impact is rated low (unlikely). The magnitude of change is rated negligible considering the unlikelihood of the impacts occurring under the current mine plan. The sensitivity of impact varies, based on their hydrological characteristic, current utility and cultural relevance. Due to the ephemeral nature

and limited usage of Voer Te Koop Granite Oasis 02 and Aniswept Granite Oasis, their sensitivities are rated low. In contrast, the Water Well at Hamas Village, as it is actively being used, is rated medium. Under the current mine plan, the significance of impacts, before mitigation measures are incorporated, are expected to be adverse low (Voer Te Koop Oasis 02 and Aniswept Granite Oasis) and adverse minor (Water Well at Hamas Village), respectively. The impact assessment ratings are summarised in Table 31 and the mitigation measures are provided in the final ESMP (Appendix A).

The following mitigation measures pertain to the management of Voer Te Koop Granite Oasis 01. These mitigation measures are further detailed in the ESMP:

- Ensure that all TSF personnel, including subcontractors, are informed about the location, cultural and heritage significance of the water pool;
- Restrict TSF operations strictly to the designated and approved footprint, as far as reasonably practicable to avoid encroachment of the site;
- The Proponent must obtain heritage consent from the National Heritage Council (NHC) prior to undertaking activities at the TSF; and
- Ensure full compliance with all conditions outlined in the heritage consent, including the provision for periodic reports (every six (6) months) to NHC and renewal of the heritage consent (annual renewal).

7.5.3 POTENTIAL FOR PROJECT ACTIVITIES TO ENCROACH ON: (I) A CEMETRY, (II) A CHRISTIAN BURIAL SITE AND (III) A HISTORIC GRAVE SITE, LOCATED IN PROXIMITY TO THE PLANNED MINE OPERATIONAL AREAS

Three (3) grave sites (ancient cemeteries, Christian burials and old unmarked historic graves) were identified during the specialist field assessment. These sites are considered to hold varying cultural and historic significance and are understood historically to be associated with communities at Aniswept, Hamas, Katora farm and other adjacent settlements (Nankela, 2025). These sites are summarised below, in terms of their relative locations to proposed Project infrastructure and development areas (Figure 25):

- The field survey located a potential ancient cemetery site on farm Aniswept, with approximately twenty (20) un-marked graves or burial cairns (Figure 27). The site lies approximately 720 m east (E) of the D3714 road;
- Christian grave site on farm Hamas. The gravesite bears four (4) un-marked Christian graves (Figure 29). The site is located approximately 800 m west (W) of the D3712 road; and
- A graveyard at Aniswept Village comprises of approximately thirty (30) marked and unmarked graves. The site is well preserved (fenced) and is located approximately 6 km west (W) of the D3714 road (Figure 30).

Under the current mine layout, no additional mining infrastructure directly overlaps, intersect or encroach upon the immediate areas of the abovementioned sites.

All the identified graves and burial sites are estimated to be over fifty (50) years old and therefore qualify as heritage significant in terms of Section 1(a) of the National Heritage Act, No. 27 of 2004 (Nankela, 2025). In addition, the sites are afforded legal protection under the Burial Places Ordinance, No. 27 of 1966, as referenced in the Local Authorities Act, No. 23 of 1992 and further regulated by the Cemetery Regulations (No. 4291 of 2009). As such, these sites are declared as no-go zones and must be protected and preserved *in situ* as part of the Project's heritage management commitments.

The potential impact on the identified burial and grave sites is assessed as adverse, direct and irreversible in nature. Any physical encroachment or disturbance to these heritage significant sites resulting from Project activities could compromise the structural integrity of the surrounding ground and may cause permanent and irreparable damages. The presence of un-marked burial graves suggests that the burial grounds may have historically served a broader community over time. Additionally, as the graveyard at Aniswept is fenced further indicates its continued relevance and use by the broader community. Therefore, the impact is considered localised in extent. However, the likelihood of impacts occurring across all three (3) sites is considered low (unlikely) as the sites are situated at considerable distances from the D3714 route (ranging between approximately 720 m and 6 km), and no other mine infrastructure is planned within their immediate areas under the current mine layout. The likelihood of the impact will also be reduced to improbable (rare) over time as only ancillary/linear infrastructure (i.e. the D3714 and its rerouted section) are planned in proximity to these sites and it is expected that all Project-related traffic will be strictly confined to the designated road corridors. The magnitude of change is assessed high as any structural damage, although deemed unlikely to occur would result in irreversible and immeasurable losses. The sensitivity of the sites is rated high in recognition of their legal protection under the National Heritage Act, No. 27 of 2004 and the Burial Place Ordinance, No. 27 of 1996. It is expected that community access to the burial grounds and cemeteries will be maintained throughout the life of mine (LoM) (11 years) and post closure. The sites are anticipated to retain their customary, cultural and historical significance, provided that all the specialists recommended mitigation measures are fully implemented and strictly adhered to. Overall, the significance of the impact across all three (3) identified burial and grave sites is rated adverse minor, before mitigation (Table 31). The precautionary measures and buffer zones relating to the management and protection of these sites are provided in the final ESMP (Appendix A).

7.5.4 THE POTENTIAL FOR PROJECT ACTIVITIES TO CAUSE STRUCTURAL INSTABILITY AND COLLAPSE OF THE ABANDONED RUIN BUILDING AT ANISWEPT

The abandoned ruin building at Aniswept is constructed from local stones bound with sand-based mortar (Figure 28). According to Nankela (2025), the structure is of low heritage significance in terms of the National Heritage Act, No. 27 of 2004. It primarily reflects past human occupation of the area and was abandoned following extended drought periods.

The ruin building is located approximately 950 m northeast (NE) of the D3714 road and 7 km from the outer edge of the main open pit 519 m blast radius (safe zone) (Figure 25). As the structure is not planned to be dismantled or demolished prior to Project execution, it may be susceptible to blast-related impacts or disturbances arising from other Project activities. Any structural impacts are deemed adverse, direct and irreversible. Potential impact could include the formation of cracks, which could compromise the building's structural integrity and eventual collapse due to instability. The impact will be confined to the site as the structure is isolated, and no similar structures have been recorded in the immediate vicinity. The likelihood of the impact occurring is rated low (unlikely) as no Project activities are currently planned in the vicinity of the structure (based on the current mine plan). In addition, at approximately 7 km from the main open pit, the energy, intensity and magnitude of blasting-related impacts (air overpressure, fly rock and ground vibrations) are expected to be significantly low as they naturally diminish with an increase in distance. Both the sensitivity and magnitude of change are both assessed as low as the building is considered to have a low cultural and heritage significance in terms of the Heritage Act, No. 27 of 2004. Overall, the significance of the impact is rated adverse low, before mitigation (Table 31). The mitigation measures are provided in the final ESMP (Appendix A).

7.5.5 POTENTAIL FOR PROJECT ACTIVITIES TO ENCROACH UPON AND DISSTURB CULTURAL AND HERITAGE FEATURES SITUATED OUTSIDE EPL 4818: (I) PREHISTORIC ROCK ART PAINTINGS (II) THE MINE SHAFT, (III) ABANDONED HISTORIC SETTLEMENT AND (IV) TOW (2) CHRISTIAN GRAVES

There is a potential risk of unintentional encroachment, un-authorised access and disturbance to cultural and heritage features located outside the boundaries of EPL 4818. These features include prehistoric rock art paintings, an abandoned mine shaft, a historic settlement and two (2) fenced Christian graves situated at the old mine site (Figure 35). These sites are located between 3.25 km, 1.11 km, 1.43 km and 1.68 km south (S) of the EPL boundary, respectively. Visual overviews of these sites are shown in Figure 32 through to Figure 35.

The potential disturbances to the heritage features located outside the EPL boundary are assessed as adverse, indirect and irreversible. These impacts are considered indirect as any encroachment or disturbance to these sites/features is not expected to result directly from primary Project activities (construction, operational or decommissioning activities conducted exclusively within the EPL) as the heritage sites are located considerable distances from the EPL boundary (i.e. > 1 km away). Although these heritage sites fall beyond the EPL boundary and core operational areas, their proximity to the Project footprint presents a potential risk of indirect impacts, potentially resulting from movements of Project personnel, contractors and subcontractors in adjacent areas, development of Project infrastructure beyond the EPL boundary as the Project develops or evolving land use patterns (e.g. growth of informal settlements near the Project site over time).

In the unlikely event of encroachments, interactions or disturbances, the heritage features may not be feasibly restorable to their original conditions. The impacts are considered unlikely to occur under the current mine plan, as no developments are planned in the immediate vicinity of the identified heritage sites. According to Project Biodiversity Assessment (Cunningham, 2025) (Appendix N), the surrounding landscape is ecologically sensitive and requires protection through designated buffer zones. These zones will also incorporate the heritage sites (Figure 25). This will demonstrate the Proponent's commitment to the preservation and protection of heritage resources.

Considering the severity, irreversibility and potential permanent loss of cultural values, the magnitude of the impact across all heritage sites has been assessed as moderate. The sensitivity of the impacts varies across the identified heritage sites. According to Nankela (2025), the fenced graveyard and prehistoric artworks are well preserved, reflect unique cultural traditions of the area and are therefore highly significant in terms of the National Heritage Act, No. 27 of 2004. The rock artworks also hold significant potential for academic research. Therefore, these sites are rated with a medium sensitivity. In contrast, the abandoned human settlement and historic mine shaft are assigned a low sensitivity rating, although they represent evidence of past human occupation and land use patterns, the sites are altered and retain limited heritage integrity. Overall, the significance impacts are expected to range between adverse low (abandoned mine shaft and historic mine settlement) and adverse minor (Christian graveyard and prehistoric rock art works), before mitigation (Table 31). The mitigation measures are provided in the final ESMP (Appendix A).

7.5.6 POTENTIAL TO DISCOVER OR UNEARTH NEW HERITAGE OBJECTS, ARTEFACTS AND ARHCAEOLOGICAL REMAINS IN THE DESIGNATED DEVELOPMENT AREAS AND IMMEDIATE PROJECT SITE

The heritage specialist study conducted for the Project was limited to desktop literature reviews and surface level field surveys and no sub-surface archaeological investigations were undertaken. As a result, there is a probability that buried or hidden heritage resources such as artefacts, features or sites of archaeological significance exist within the Project area, particularly given the area's historical occupation by hunter-gatherer communities and former settlers at the old mine site. These heritage resources may be encountered during land clearing, excavation or other earthwork activities undertaken throughout the LoM (11 years). In such events, the chance find procedure guidelines must be adopted to promptly ensure that newly discovered heritage finds are reported, properly managed and assessed by qualified specialists in accordance with the legal standards.

The discovery of new heritage resources is considered a beneficial, direct and irreversible impact as it contributes to the understanding and preservation of the area's cultural history.

These discoveries can be unearthed throughout the LoM (11 years); therefore, the impact is considered permanent. Although the discovery of heritage resources is beneficial, there is a risk of accidental disturbance or destruction of these features due to the contractors and subcontractors lack of awareness. The likelihood of the impact is considered possible (medium) as the broader site was historically occupied by hunter-gatherer communities and communities that settled at the old mine site. Both the magnitude of change and sensitivity of the impact are rated high due to significant heritage resources that may be discovered which could prompt careful and rigorous management and preservation strategies to avoid irreversible losses. Overall, the significance of the impact is rated beneficial major (Table 31).

Project personnel must receive heritage awareness training and the chance find procedure must be integrated into operational protocols to minimise the risk of disturbance to newly discovered heritage finds. The measures are also provided in the final ESMP (Appendix A).

Table 31 - Heritage impact assessment ratings, before mitigation measures

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Historic water resources (within EPL 4818)						
Project construction and operational activities	Cultural heritage (Voer Te Koop Granite Oasis 01)	Potential for Project activities to cause destruction or structural damages to the historic water resources.	Adverse Direct Irreversible Permanent On-site Likely	Low	Moderate	Adverse moderate (4)
	Cultural heritage (Voer Te Koop Granite Oasis 02)		Adverse Direct Irreversible On-site Permanent Unlikely	Low	Negligible	Adverse low (2)
	Cultural heritage (Aniswept Granite Oasis)		Adverse Direct Irreversible On-site Permanent Unlikely	Low	Negligible	Adverse low (2)
	Cultural heritage (Water Well at		Adverse Direct Irreversible On-site	Medium	Negligible	Adverse minor (4)

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
	Hamas Village)		Permanent Unlikely			
Ancient cemeteries, Christian burial sites and unmarked historic graves (within EPL 4818)						
Project construction and operational activities	Cultural heritage (ancient cemetery with twenty (20) un-marked graves at Aniswept)	Potential for Project activities to encroach upon the heritage site and result in the loss of its cultural, customary and historical significance.	Adverse Direct Irreversible Local Permanent Unlikely	Medium	Major	Adverse Minor (4)
	Cultural heritage (Christian grave site with four un-marked graves at farm Hamas)		Adverse Direct Irreversible Local Irreversible Permanent Unlikely	Medium	Major	Adverse Minor (4)
	Cultural heritage (a graveyard with approximately thirty (30) marked and un-marked graves at Aniswept).		Adverse Direct Local Irreversible Permanent Unlikely	High	Major	Adverse Minor (4)
Abandoned ruin structure (within EPL 4818)						
Project construction and operational activities (including main open pit blasting operations)	Cultural heritage (abandoned ruin structure at Aniswept)	Potential for Project activities to cause structural instability and collapse of the abandoned ruined building.	Adverse Direct Irreversible On-site Permanent Unlikely	Low	Low	Adverse Low (2)
Rock arts, old mine shaft, abandoned historic settlement and Christian graves (outside EPL 4818)						

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Project construction and operational activities	Cultural heritage (prehistoric rock art works)	Potential for Project-related activities aligned to encroach upon the heritage site, resulting in disturbances that alter its cultural and heritage significance.	Adverse Indirect Irreversible On-site Permanent unlikely	Medium	Moderate	Adverse Minor (4)
	Cultural heritage (abandoned mine shaft)		Adverse Indirect Irreversible On-site Permanent Unlikely	Low	Moderate	Adverse Low (2)
	Cultural heritage (historic mine settlement)		Adverse Indirect Irreversible On-site Permanent Unlikely	Low	Moderate	Adverse Low (2)
	Cultural heritage (Christian graveyard with two (2) marked graves)		Adverse Indirect Irreversible On-site Permanent Unlikely	Medium	Moderate	Adverse Minor (4)
Project construction and operational activities	Cultural heritage (new heritage objects and artefacts)	Potential discovery of new objects, artefacts and site of heritage significance within the mine operational areas or immediate Project site.	Beneficial Direct Irreversible Regional Medium (possible) Permanent	High	High	Beneficial Major (9)

7.6 SOCIAL ENVIRONMENT: NOISE IMPACTS

The noise impact assessment section addresses the potential impacts of Project-induced noise on the surrounding acoustic environment and noise sensitive receptors (NSRs), during the construction, operational and decommissioning phases. Noise will be generated by activities such as land clearing, earthworks, drilling, blasting, ore and waste handling (loading and unloading), movements of haul trucks, use of mobile equipment (including reverse alarms) and ore processing activities such as crushing, screening and grinding.

Airshed Planning Professionals (Pty) Ltd (hereto referred to as "Airshed") was commissioned in 2025 to conduct a baseline noise survey for the Project area and develop noise simulation and propagation models for the noise impact assessment (Appendix F). Ambient noise is likely to propagate in certain directions or over greater distances depending on key meteorological conditions, particularly wind speed, wind direction and temperature. Additional factors such as relative humidity, air pressure, solar radiation and cloud cover also influence atmospheric stability (i.e. inversion layers) and the atmosphere's capacity to absorb sound energy (Airshed, 2025). These models have been incorporated into the assessment, and the mitigation measures have been included in the relevant sections and the final ESMP (Appendix A).

The assessment of noise impacts on receptors considers both pre-relocation and post-relocation conditions of the affected communities (NSRs), to ensure that the assessment reflects changes in receptor sensitivity and proximity due to resettlement. The map indicating the NSR's utilised for this assessment can be viewed in chapter 5 (Figure 36). The potential noise impacts during the different phases of the Project are discussed in the following sections below.

7.6.1 NOISE IMPACTS DURING THE CONSTRUCTION PHASE

During the mine development phase, noise will be generated by a variety of activities such as land clearing, earthworks, civils and equipment operations. Key sources of noise include heavy machinery such as excavators, bulldozers, graders and haul trucks, diesel generators, concrete mixers, cranes, compressors and construction tools such as jackhammers and grinders. Additional noise will result from transport vehicles, staff movements and safety systems (e.g. reverse alarms). Although these activities are deemed short-term (two-year construction period), they may still impact the surrounding acoustic environment and NSRs.

An overview of the specific noise impacts during the construction phase, before mitigation (apart from the occupational health and safety impact) is presented in Figure 84, for illustrative purposes only. The impacts are discussed in detail in this section.

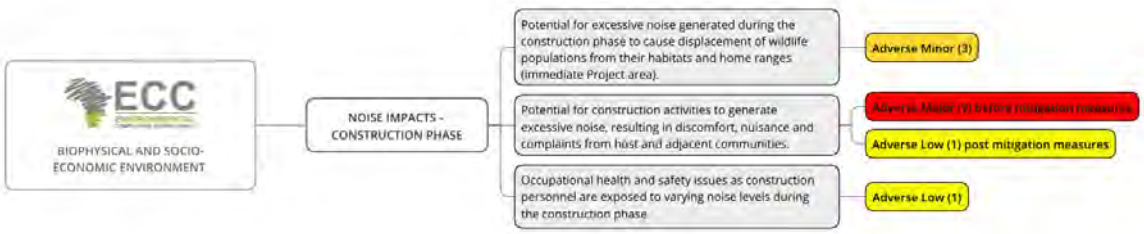


Figure 84 - Overview of the noise impacts during the construction phase

7.6.1.1 Construction activities may potentially generate excessive noise that could displace local fauna from their habitats and establish home ranges in the immediate Project area

Noise generated by the Project during the construction phase may potentially disturb and displace local wildlife from the immediate Project area. Wildlife populations are generally sensitive to changes in ambient sound levels and alteration in land use, of which both interfere with their natural behaviours and may lead to migration from the affected areas in search for less disturbed and suitable habitats. These behaviours are particularly common among small mammals (e.g. rodents, shrews, moles etc). In contrast, large-bodied mammals such as *Oryx gazella* (gemsbok), *Tragelaphus strepsiceros* (greater kudu) and Equus zebra hartmannae (Hartmann's Mountain Zebra) tend to show greater tolerance to environmental disturbances by adapting to modified home ranges. However, according to Cunningham (2025) (Appendix N), the likelihood of large-bodied, migratory species occurring within the immediate Project area is relatively low, primarily due to current anthropogenic activities. These species are more likely to be restricted to areas within the neighbouring conservancies (i.e. Tsiseb Conservancy which lies to the west (W) of the Project and covers approximately 7 913 km² and Ohungu Conservancy, which lies to the north (N) of the Project and covers approximately 1 196 km^2). Ecological conditions are more suitable in these areas. Nonetheless, this does not entirely preclude the possibility of occasional wildlife migrations into the Project areas or adjacent areas, particularly during the rainy season when these species expand their home ranges in search for good grazing pastures and water sources.

The impact is considered adverse, partly reversible and direct as noise generated by various construction activities may potentially disrupt natural behaviours and displace wildlife, particularly small mammal species from their established habitats and home ranges. Large-bodied mammals typically possess a greater degree of tolerance to noise and land-use changes; therefore, significant displacements are unlikely to occur, as most species within the broader Project area have gradually adapted to ongoing human presence and landscape modifications. The impact is deemed partly reversible as some wildlife species will be reintroduced, following decommissioning, while other may demonstrate tolerance to elevated noise levels. The impact duration is considered short-term, corresponding to the two-year construction period.

The spatial extent of the impact is considered on-site as only species present within the immediate Project footprint and areas targeted for development will likely be impacted. Considering that noise-generating activities will be undertaken, the likelihood of the impact is considered medium (possible), as actual wildlife displacements will depend on species-specific responses. Both magnitude of change and sensitivity of the impact are considered low as species present or expected in the broader Project area are highly adaptable to anthropogenic activities and no threatened or critically endangered species is at risk of being displaced due to noise generated by construction activities. Overall, the impact is rated adverse minor, before mitigation (Table 32). The mitigation measures are provided in the final ESMP (Appendix A).

7.6.1.2 Potential for mine construction activities to generate excessive noise leading to discomfort, nuisance and complaints from the host and adjacent communities

A range of construction activities such as the operation of heavy machinery, earthmoving equipment, vehicle movements and general site development activities are expected to increase ambient noise levels beyond existing baseline conditions. As noise propagates from noise sources, it is likely to adversely impact the NSRs, depending on its intensity and the duration of exposure. The resulting noise levels at these receptor points may disrupt daily activities, hinder communication and cause discomfort within local communities. In some cases, prolonged exposure to excessive noise could lead to community complaints and negative perceptions on the Project.

The NSRs mainly include small rural communities at Katora Village, which lies closest to the main areas designated for infrastructure development (TSF, WRDs, main open pit, explosive magazine and processing plant).

Construction activities are expected to generate noise that will increase ambient noise levels at the nearest NSRs, particularly at Katora Village and surrounding communities. Notably, some communities of Katora Village lie adjacent to the area designated for the main open pit, while other communities lie approximately 700 m to 1.5 km from areas planned for the WRDs, TSF and processing plant. Although it is planned that construction works will be restricted to daytime hours, some individuals may perceive exposure to noise or increases in ambient noise levels as intrusive and could lead to measurable discomforts.

The nature of this impact is assessed as adverse, direct and reversible as increases in ambient noise levels are expected to result from various construction activities being undertaken over the two (2) year construction phase. Additionally, the duration of the impact is considered short term as construction-related noise is expected to subside only upon the completion of construction activities. The likelihood of this impact occurring is deemed definite, considering the close proximity of the receptors to areas planned for extensive development. These

activities are required to be undertaken for the Project to develop and transition into the operational phase.

Noise generated during construction activities is expected to be predominantly concentrated within the immediate work areas and the immediate surrounding, rather than being widespread into the broader local area. Additionally, these noise emissions are anticipated to diminish with distance from the source, and therefore, the impact is considered on-site. The magnitude of the impact is assessed as moderate as it is planned for construction activities to be strictly restricted to daytime hours, thereby avoiding the more sensitive nighttime periods, during which human tolerance to noise is reduced and the risk of sleep disturbance is significantly higher. Moreover, construction noise is anticipated to be intermittent and task-specific, rather than continuous, which may further mitigate the potential for disturbance. The sensitivity of the impact is rated high, particularly for receptors at Katora Village, due to several compounding factors. Firstly, the receptors are located in close proximity to areas planned for extensive development and are therefore highly vulnerable to noise impacts. Secondly, residential structures generally lack effective soundproofing or insulation to attenuate noise and therefore residents will be vulnerable to frequent varying noise levels throughout the construction phase. Thirdly, the community members frequently engage in outdoor subsistence activities such as farming, as well as social interactions in open communal spaces and therefore may unlikely adapt to changes in ambient noise levels. Overall, the significance of impact is rated adverse major, before mitigation (Table 32).

It is anticipated with certainty that communities situated within or adjacent to the planned main open pit, processing plant, TSF and WRDs areas will be exposed to significant noise levels generated by various construction activities. The location of the pit is fixed and geologically constrained by the position of the underground orebody; therefore, no alternative sites were considered. The locations of the processing plant, TSF and WRDs have been strategically selected to avoid ecologically sensitive areas and reduce haulage distance and operational costs. To mitigate and minimise this impact, the Proponent commit to relocate the NSRs from high exposure zones to safer areas where noise levels are expected to be more tolerable. The relocation process will be formally agreed upon with the affected parties and the Traditional Authorities (TA), and it is planned to be completed prior to the commencement of construction activities.

The relocation is deemed a key mitigation measure and is expected to effectively eliminate direct exposure to both construction and operational noise for most vulnerable receptors. In addition, the implementation of best practice noise control measures will further reduce the likelihood and severity of the impact to low. As a result of these interventions, the sensitivity and magnitude of the impact are expected to significantly reduce to low as there are less receptors likely to be impacted and noise levels are expected to be tolerable. Post mitigation measures, the significance of the impact is rated adverse low.

In addition to the planned relocation of the pre-determined NSRs (NSRs 1, 2 & 3), the following mitigation measures must be implemented prior to/throughout the construction phase to ensure that construction activities do not generate significant noise levels that would propagate and impact off-site receptors (NSRs 4 and 5 (once the accommodation village is inhabited)). These mitigation measures are also outlined in the final ESMP (Appendix A) (Airshed, 2025):

- Provide prior notice to the affected communities in the form of notice boards that indicate the commencement of construction activities;
- Avoid unnecessary idling of equipment and machinery;
- Nighttime construction works are strictly prohibited. In exceptional circumstances where night work is deemed necessary, prior written authorisation must be obtained from the Proponent;
- All diesel-powered equipment and construction fleet must be kept at a high level of maintenance;
- A noise complaints register must be kept. Noise complaints received must be promptly addressed following the complaints resolution mechanisms; and
- Construction personnel must be trained on appropriate noise mitigation practices, including proper equipment and machinery use and adherence to working hours.

7.6.1.3 Occupational health and safety issues related to noise exposure during the construction phase

Construction personnel (contractors and subcontractors) are likely to be regularly exposed to high-intense noise levels generated by equipment, machinery and various construction processes. Prolonged exposure to high-intense noise levels can pose significant occupational health and safety issues, if effective noise control and mitigation measures are not implemented.

This impact is assessed post mitigation, on the basis that the implementation of noise control measures, use of appropriate personal protective equipment (PPE), routine risk assessments and adherence to occupational health and safety procedures are legal requirements under national labour and safety regulations. These measures are therefore considered an integral part of the construction process and are expected to be enforced throughout the construction phase.

The risk of construction-related noise impacting Project personnel is assessed as adverse, direct and irreversible. During the construction phase, personnel will be exposed to varying noise levels depending on the specific tasks performed and duration of exposure. This exposure is considered short-term as the construction phase is scheduled to be completed within two (2) years. However, the likelihood of long-term or permanent hearing loss is considered low due to the mandatory use of appropriate PPE, which also includes hearing protection.

Considering the scale of the Project, the use of PPE is deemed a standard industry practice and is expected to be strictly enforced and upheld through site specific codes of conduct and contractual obligations signed with the Proponent. Collectively, these measures reduce the likelihood of the impact to low. The magnitude of change is rated low, as noise exposure risks will be typically well-managed, controlled and closely monitored and therefore, no significant occupational health issues are anticipated. Although construction personnel will be exposed to varying noise levels, the sensitivity of impact is rated low as proactive site noise management protocols will be established and implemented to effectively minimise personnel exposure to excessive noise levels and ensure compliance with occupational health and safety standards. Overall, the significance of impact is rated adverse low, post mitigation (Table 32). The mitigation measures are outlined in the final ESMP (Appendix A).

Table 32 - Noise impact assessment ratings – construction phase

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
Construction activities	Wildlife	Potential for construction activities to generate noise that would cause displacement of wildlife away from the immediate Project area	Adverse Direct Partly reversible Short-term On-site Medium (possible)	Low	Low	Adverse Minor (3)
	Community (Katora community)	Potential for construction activities to generate excessive noise, resulting in discomfort, nuisance and complaints from host and adjacent communities	Adverse Direct Reversible Short-term On-site Definite	High	Moderate	Adverse Major (9)[5]
	Occupational health and	The construction	Adverse Direct	Low	Low	Adverse

[5] Impact rating before mitigation is rated adverse major. Post mitigation (i.e. relocation of NSRs outside the defined noise propagation buffer zone), the impact is rated adverse low.

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
	safety (construction workforce)	Workforce exposed to varying noise levels, resulting in occupational health issues.	Irreversible Short-term On-site Unlikely			Low (1)[6]

7.6.2 NOISE IMPACTS DURING THE OPERATIONAL PHASE

The operational phase is expected to generate continuous and intermittent noise from a range of mining activities associated with the mine 24-hour operational schedule. Primary noise sources are expected to include drilling and blasting, ore handling (loading, unloading, hauling and dozing), stockpile management and ore processing activities such as crushing, screening and milling. Additionally, haul trucks and diesel-powered mobile equipment (including those fitted with reverse alarm systems), will also generate noise. An overview of the potential noise impacts before mitigation (apart from the occupational health and safety impact) during the operational phase is shown in Figure 85, for illustrative purposes only. The impacts are discussed in detail in the sections below.

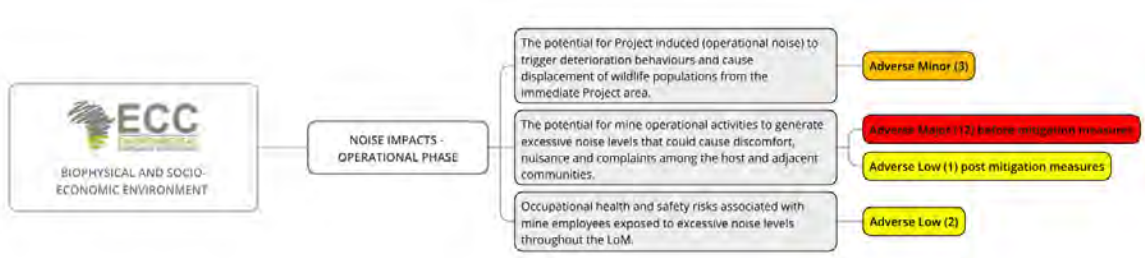


Figure 85 - Overview of the noise impacts during the operational phase

7.6.2.1 The potential for Project-induced (operational noise) to trigger deterioration behaviours and cause displacement of wildlife populations from the immediate Project area

Operational noise generated throughout the life of mine (LoM) has the potential to cause various ecological impacts, including behavioural disturbances among noise-sensitive species and, in some cases, the displacement of wildlife populations from the immediate Project area.

According to Cunningham (2025) (Appendix N), the broader Project area is sparsely populated by wildlife, as majority of the species are confined to the Tsiseb and Ohungu Conservancies.

[6] Impact rating post mitigation.

As discussed in section 5.12.9, most of these species are not expected to occur in the immediate Project area.

However, species that are present, including seasonal migrants are expected to exhibit some degree of tolerance to anthropogenic activities and operational noise levels. In some cases, small mammals may adapt to disturbances by utilising mine infrastructure as alternative shelters or habitats (e.g. WRDs).

The nature of this impact is assessed as adverse, direct and partially reversible as noise emissions will result from various operational activities. Noise is considered an adverse impact due to its potential to cause displacement of wildlife, forcing some species to abandon established home ranges and adapt to unfamiliar environments or less suitable environments. The impact is deemed partly reversible as some wildlife species will be reintroduced, following decommissioning, while other may demonstrate tolerance to elevated noise levels. The impact is considered localised, as operational noise, particularly from drilling, blasting operations and processing plant operations is expected to propagate beyond the immediate operational areas, potentially affecting receptors in adjacent areas and the broader landscape. As operational noise will be generated throughout the LoM (11 years), the duration of impact is considered medium-term (a period of 5 - 15 years). The likelihood of operational noise leading to displacement of wildlife from the immediate area is rated as medium (possible), considering that species responsiveness and adaptability to noise vary. For example, large-bodied mammals such as greater kudu and gemsbok generally exhibit greater tolerance while small mammals such as rodents, shrews and moles may be more vulnerable to noise disturbances. The magnitude of change is assessed as moderate, as certain species groups may be vulnerable to operational noise, whereas others are expected to persist and adapt under post-impact conditions. The sensitivity of the impact is rated low as the broader Project area is already subject to anthropogenic influences, supports low wildlife densities and therefore no significant wildlife displacements are anticipated. Furthermore, similar patterns of wildlife and mining co-existence have been observed at comparable open pit mining operations in Namibia, suggesting that certain species may continue to inhabit or utilise areas in and around active mine site. Overall, the significance of impact is rated adverse minor, before mitigation (Table 34). The mitigation measures are outlined in the final ESMP (Appendix A).

7.6.2.2 Potential for mine operational activities to generate excessive noise, leading to discomfort, nuisance and complaints from host and adjacent communities

The continuous noise generated by 24-hour mining operations is anticipated to cause varying levels of disturbance and discomfort, which may be perceived as nuisance by both host and adjacent communities. Over time, this could lead to increased level of dissatisfaction and a rise in community complaints.

To assess the potential extent and intensity of noise during the operational phase, Airshed (2025) conducted a detailed noise dispersion model study for both daytime and nighttime operational scenarios (Appendix F).

The model considered key noise-generating activities such as drilling, blasting, ore hauling and processing operations as well as the site's local meteorological conditions (such as wind speed, wind direction, temperature and atmospheric stability) and terrain characteristics to simulate noise propagation under normal operations. The modelling outputs provide a spatial representation of noise contours. The predicted daytime noise levels during operations in relation to NSRs are presented in Figure 86, while the predicted nighttime noise levels are presented in Figure 87.

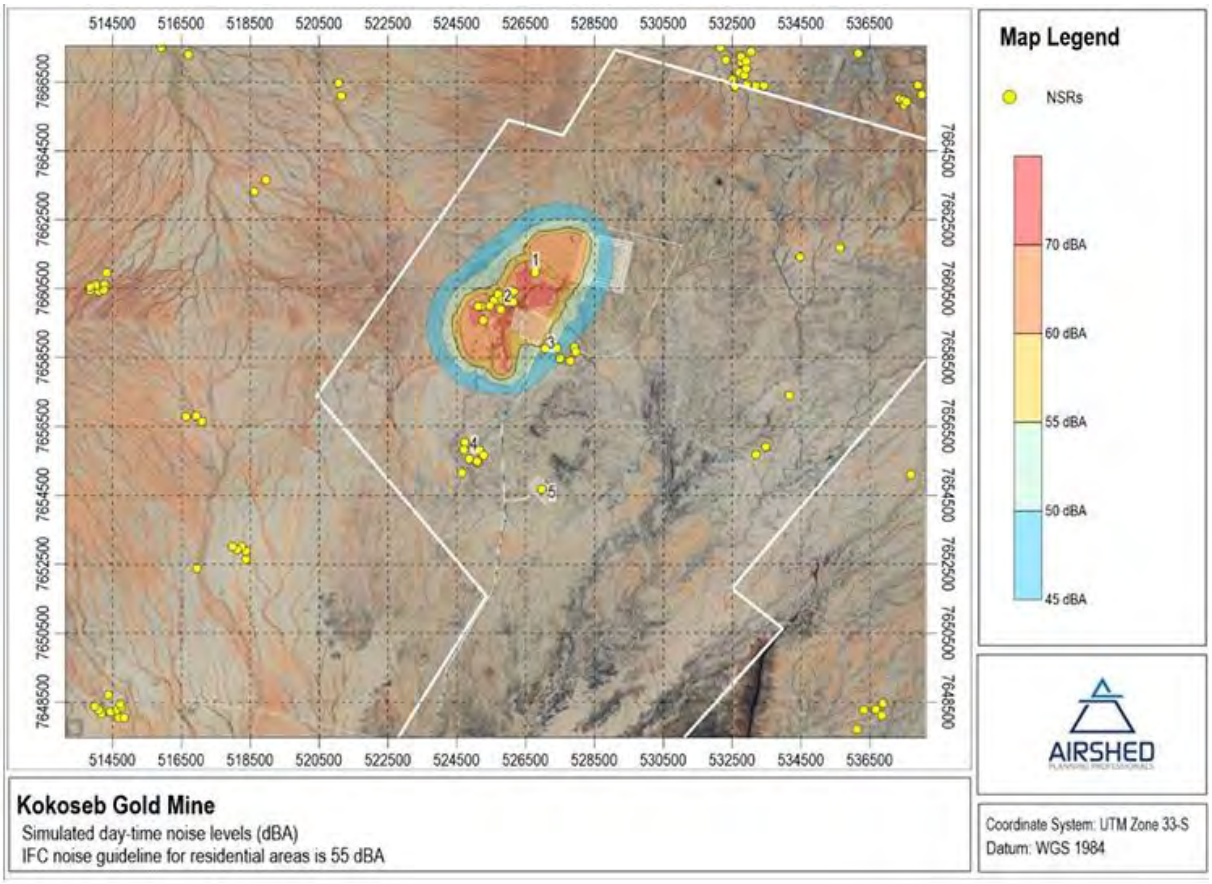


Figure 86 - Simulated daytime noise levels during normal Project operations in relation to NSRs (Airshed, 2025)

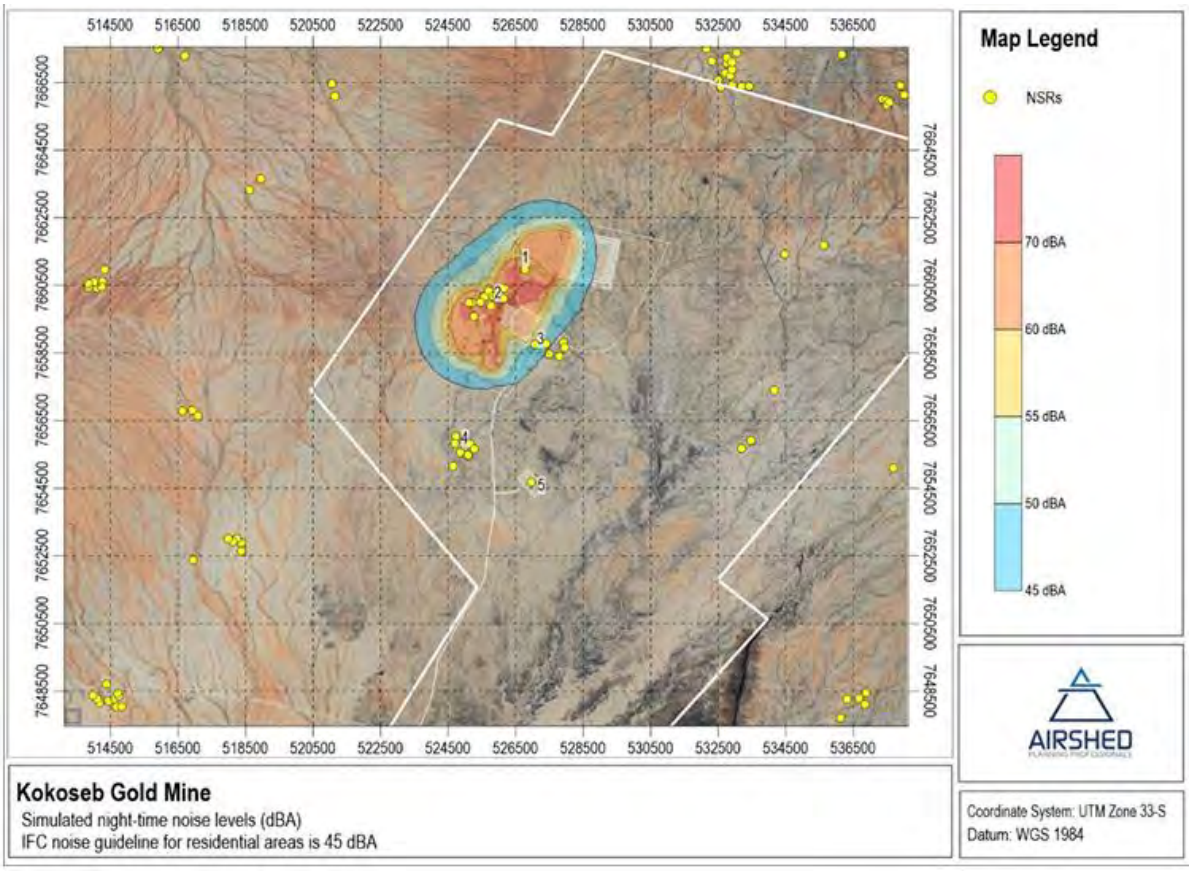


Figure 87 - Simulated nighttime noise levels during normal Project operations in relation to NSRs (Airshed, 2025)

As shown in Figure 86 and Figure 87, the noise propagation models indicate that predicted sound levels during normal daytime and nighttime Project operations are expected to exceed the IFC residential noise guidelines (threshold bands) of 55 dBA for daytime and 45 dBA for nighttime at NSRs 1-3. These receptors are located at Katora Village, which generally lies within the key areas designated for mine infrastructure development. These areas include the main open pit, WRDs, TSF, explosive magazine and processing plant.

Based on the modelling output, the forecasted sound levels from both daytime and nighttime mine operations are expected to trigger "strong" to "very strong" community reactions (Airshed, 2025). As a result, sporadic to frequent noise-related complaints from affected receptors are anticipated.

The nature of this impact is assessed as adverse, direct and reversible as noise will result directly from continuous operational activities (i.e. primary production-related activities such as drilling, blasting, loading, haulage and production processes such as ore crushing and grinding) and will directly impact the identified NSRs. The impact is regarded reversible as noise complaints from the community can be addressed effectively through grievance redress mechanisms and trust can be rebuilt over time through engagement and transparent communication. In addition to noise being a general nuisance and prompting potential community complaints, exposure to excessive noise levels may lead to further impacts such

as disruption of communication, reduced comfort and sleep disturbances. These impacts are of particular concern as the mine is scheduled to operate all year round (i.e. 365 days) throughout the LoM (11 years). Operations will be conducted in three (3) eight (8) hour rotating shifts, meaning noise-generating activities will occur consistently, both day and night. The likelihood of impact is rated definite as the affected communities currently overlap with or lie adjacent to areas planned for mine infrastructure development. Modelled projections indicate that operational noise levels will exceed the IFC guideline thresholds for residential areas, with predicted levels ranging between 60 dBA and 70 dBA (see Figure 86 and Figure 87) at NSRs 1 - 3. These exceedances are expected to generate strong to very strong community reactions, including frequent complaints, increased frustration and resistance to Project activities. However, off-site receptors such as the mine accommodation village (NSR 5) and adjacent communities (NSR 4) located considerable distances from core mine operational areas are expected to experience relatively lower daytime and nighttime noise levels that are within the IFC guideline thresholds (refer to Table 33). Therefore, the extent of the impact is considered on-site.

Table 33 - Summary of simulated noise levels (provided in dBA) at NSRs during Project operations (Airshed, 2025)

NSR	IFC noise guideline for residential areas		Project operations [a]		Baseline [b]		Increase above baseline [c]	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
NSR 1	55	45	**73.7**	**73.7**	29.6	30.8	44.1	42.9
NSR 2	55	45	**69.6**	**69.6**	38.4	28.9	31.2	40.7
NSR 3	55	45	52	**51**	32.7	28.7	19.3	22.3
NSR 4	55	45	34.7	34.7	32.7	28.7	4.0	7.0
NSR 5	55	45	32.1	31.4	55.0	45.0	0.0	0.2

Notes:

a) Exceedance of the IFC noise guideline is provided in bold.
b) Baseline noise levels at NSR 3 and NSR 4 are based on an average of the measured baseline noise levels for the site and assumed to be representative of the background noise levels at these NSRs. The baseline noise levels for the proposed accommodation camp were assumed to be within IFC noise guidelines for residential areas.
c) Likely community response in accordance with SANS 10103:

< 3 dBA	< 5 dBA	< 10 dBA	< 15 dBA	< 20 Dba
Change is 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.

The magnitude of change is considered very high due to significant noise levels anticipated and the strong likelihood of intense responses from the identified NSRs. The sensitivity of impact is rated high due to the vulnerability of the identified NSRs, and the impact's significant effects on community social cohesion, overall quality of life and the risk of psychological stress, particularly among vulnerable groups such as elderly, children and individual with pre-existing health conditions. Overall, the significance of the impact is rated adverse major, before mitigation (Table 34).

Considering the predicted exceedance of IFC noise guidelines at NSRs 1-3 and the vulnerability to noise impacts, the Proponent has committed to relocating these receptors outside the defined noise propagation buffer zone prior to Project development (as discussed in section 7.6.1.2). However, these resettlement areas are yet to be formally agreed upon with the relevant Traditional Authorities (TA) and the affected parties. This commitment will also ensure alignment with the IFC environmental and social performance standards for sustainable mining.

The relocation of these vulnerable communities is considered necessary as no alternative locations for the main open pit and associated infrastructure are feasible. The proposed relocation of these vulnerable communities is expected to significantly reduce the likelihood of the impact to low as the resettlement areas are expected to be located outside the noise propagation buffer zones. This is expected to significantly reduce the risk of exposure to elevated noise levels during both daytime and nighttime mine operations. The magnitude of change and sensitivity of impact are both expected to reduce to low as the relocated receptors will no longer be subjected to elevated noise conditions. Furthermore, occupants of the mine accommodation village (NSR 5) and other off-site receptors (NSR 4) are expected to tolerate operational noise with greater ease as modelled noise levels are expected to remain within the IFC threshold bands at these points. This effective mitigation measure is expected to reduce the significance of impact to adverse low (Table 34).

The additional noise mitigation measures and monitoring requirements outlined below are also included in the final ESMP (Appendix A) (Airshed, 2025);

- A noise complaints register must be kept. Noise complaints received must be promptly addressed following the complaints resolution mechanisms;
- In the event that noise related complaints are received, short-term ambient noise measurements should be conducted as part of investigating the complaints. The results of the measurements should be used to inform any follow up interventions;
- Maintain road surfaces regularly to repair potholes;
- Keep all roads well maintained and avoid steep inclines or declines to reduce acceleration/brake noise;
- Avoid unnecessary idling at all times;
- As reversing is an operational process that could not be entirely avoided, alternatives to the traditional reverse 'beeper' alarm such as a 'self-adjusting' or 'smart' alarm must

be considered in place of conventional tonal beepers. These alarms automatically adjust their sound output to approximately 5 -10 dB above the prevailing ambient noise level;
- Where possible, other non-routine noisy activities such as construction, decommissioning, start-up and maintenance, should be limited to day-time hours; and
- Provision of general notices to the community in the form of notice boards indicating blast times and dates.

7.6.2.3 Occupational health and safety issues related to mine employees exposed to excessive noise levels through the LoM

Mine employees are at risk of prolonged exposure to excessive noise levels, which are associated with a range of adverse health effects. Intense noise generated from the processing plant operations, drill and blasting and hauling activities may result in temporal, partial or permanent hearing loss, if not adequately managed. The Project's noise propagation models indicate that noise levels from active operational areas such as the main open pit, WRDs and processing plant are expected to reach peak levels exceeding 70 dBA during both daytime and nighttime operations (Figure 86 and Figure 87). These levels significantly exceed the IFC guideline for occupational exposure in residential contexts and present a clear risk of noise-induced impairment for employees working in these high exposure areas.

This impact is assessed post mitigation, on the basis that the implementation of noise control measures, use of appropriate PPE, safety training sessions, routine risk assessments and adherence to occupational health and safety procedures are legal requirements under national labour and safety regulations. These measures are therefore considered an integral part of all operational processes and are expected to be enforced throughout the operational phase. In addition, regular health surveillance and awareness programs to ensure personnel are informed about the risk of noise exposure and are empowered to adhere to all safety protocols. The Proponent will further commit to engage in sustainable mining practices and maintain a safe working environment in accordance with best industry standards, as well as the provisions of the Labour Act, No. 11 of 2007 and the Regulation Relating to the Health and Safety of Employees at Work (Government Notice 156 of 1997).

Mine employee's exposure to prolonged noise levels is regarded an adverse, direct and irreversible impact as it poses a risk of hearing loss and other significant health issues. The duration of impact is assessed as medium, considering that the employees will be retained throughout the LoM (11 years). The mine Occupational Health and Safety and Department (OHSD) will be responsible for ensuring consistent use of appropriate PPE by all personnel across all operational areas. The use of PPE is mandatory, will be outlined in the mine's code of conduct and employment contracts and will be enforced through strict compliance protocols.

These measures are expected to reduce the likelihood of the impact to low (unlikely). With the occupational health and safety provisions in place, the magnitude of the impact is considered low. The sensitivity of impact is rated low as the workforce will be well-equipped and trained to manage noise exposure.

Overall, the significance of impact is assessed as adverse low, before mitigation (Table 34). Occupational health and safety measures are outlined in the final ESMP (Appendix A).

Table 34 - Noise impact assessment ratings - operational phase

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
Operational activities	Wildlife	Potential for operational activities to generate noise that would cause displacement of wildlife away from the immediate Project area	Adverse Direct Partly reversible Medium term Local Medium (possible)	Low	Moderate	Adverse Minor (3)
	Katora community (NSRs 1-3)	Potential for operational activities to generate noise that would cause discomfort, nuisance and complaints among host and adjacent communities	Adverse Direct Reversible On-site Definite Medium term	High	Major	Adverse Major (12)[7]
	Occupational health and safety (on-site mine employees)	Excessive noise generated during mine operations may impact the	Adverse Direct Irreversible Medium-term	Low	Low	Adverse Low (2)[8]

[7] Impact rating before mitigation. Post mitigation (i.e. relocation of NSRs outside the defined noise propagation buffer zone), the impact is rated adverse low.
[8] Impact rating post mitigation.

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
		health and safety of mine employees	On-site Unlikely			

7.6.3 NOISE IMPACTS DURING THE DECOMMISSIONING PHASE

During the decommissioning phase, intermittent noise levels are expected to be generated from the dismantling and removal of mine infrastructure, as well as site rehabilitation works following the cessation of mining operations. As no industrial mining activities will be conducted during this phase, noise generation will primarily result from activities such as the demolition of infrastructure (e.g. processing plant, workshops and storage facilities), the operation of heavy machinery (e.g. excavators, bulldozers and front-end loaders), and loading and hauling of materials for backfilling purposes. Additional noise sources will include the use of power tools and cutting equipment, land rehabilitation activities such as backfilling and re-contouring of disturbed land and the transportation of equipment and materials offsite.

An overview of the potential noise impacts during the decommissioning phase post mitigation is shown in Figure 88, for illustrative purposes only. The impacts are discussed in detail in the section below.

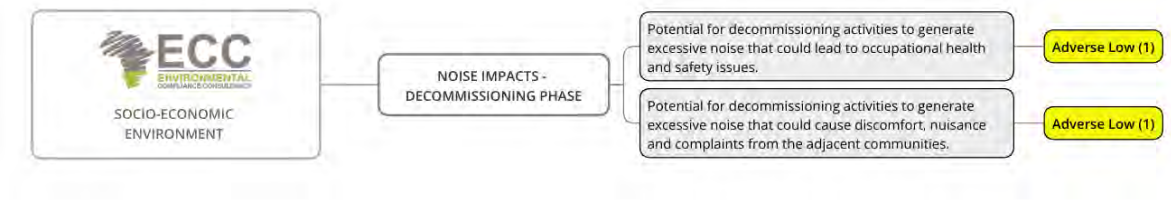


Figure 88 - Overview of the noise impacts during the decommissioning phase

7.6.3.1 Occupational health and safety issues associated with employees exposed to excessive noise levels during the decommissioning phase

A reduced workforce will be commissioned for the site rehabilitation program. This will mainly consist of engineering and maintenance staff, health and safety personnel, waste management personnel, site security, specialist contractors engaged for demolition and rehabilitation works and environmental personnel to conduct/monitor compliance with environmental and safety standards. These employees are expected to be exposed to varying levels of noise generated by the range of decommissioning activities.

Precautionary measures, including the mandatory use of appropriate PPE and oversight by certified health and safety personnel, will be enforced to prevent significant noise exposure to the rehabilitation team.

Therefore, the impact is considered effectively mitigated, as the Proponent will be required to implement occupational health and safety protocols in line with sustainable mining practices and internationally recognised mine closure standards. As a result, this impact is assessed post mitigation.

The nature of this impact is assessed as adverse, direct and irreversible as employees will be exposed to noise generated by various decommissioning activities. The impact is considered irreversible as sustained exposure to high noise levels poses a risk of irreversible hearing loss among exposed personnel. As no continuous large-scale industrial operations will be undertaken during this phase, significant noise levels are expected; however, these will be intermittent in duration (these events may range in duration from a few minutes to several hours). Due to the duration, the resulting noise levels are not expected to pose significant health and safety issues to the workforce on-site. Therefore, the likelihood of the impact is considered low. The duration of impact is regarded as temporary, as the decommissioning phase schedule will be pre-planned and carefully coordinated, with all major activities expected to be completed at least within a year. The extent of noise impacts during this phase is considered on-site as noise emissions are not expected to propagate significantly beyond active work areas and affect off-site receptors. The magnitude of the impact is rated as negligible as continuous noise exposure (i.e. through 24-hour operations) is not anticipated and as a result no occupational hearing loss or serious health issues are expected. The sensitivity of the impact is rated low as employees will be at a relatively low risk of noise-induced health effects due to the planned nature of activities. Overall, the significance of the impact is rated as adverse low, post mitigation (Table 35). The mitigation measures are provided in the final ESMP (Appendix A).

7.6.3.2 Potential for noise from decommissioning activities to cause discomfort, nuisance and complaints from adjacent communities

Decommissioning activities such as demolition of infrastructure and transportation of materials could generate noise that could propagate beyond the immediate work areas. Although these activities are temporary in nature and generally less intensive than active operational activities, mining, they have the potential to disturb nearby communities, particularly if they are conducted outside typical working hours.

The potential for noise generated during decommissioning activities to impact adjacent communities is assessed as adverse, direct and reversible in nature. It is expected that activities such as infrastructure dismantling, backfilling works and material transport will be pre-planned and carefully coordinated to minimise disruption. Resultant noise levels are expected to be confined within active work areas and will not extensively propagate beyond the Project boundary to reach off-site receptors. The duration of the impact is expected to be temporary, as the decommissioning phase schedule will likely be completed within a year.

The likelihood of the impact is considered low (unlikely) due to the nature of the activities, their temporary durations (expected to be conducted between dawn and dusk) and the considerable distances between noise sources and NSRs (following their relocation from mine operational areas). Noise intensity diminishes significantly as the distance from the source increases. As noise intensity diminishes significantly with increasing distance from the source and considering that decommissioning activities are expected to generate relatively low noise emissions compared to active mining operations, the magnitude of change is assessed as negligible. The sensitivity of the impact is rated low as there would likely be no vulnerable receptors in proximity to the noise-generating activities during the decommissioning phase. Overall, the significance of this impact is rated as low adverse, before mitigation (Table 35). The mitigation measures are provided in the final ESMP (Appendix A).

Table 35 - Noise impacts assessment ratings - decommissioning phase

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
Decommissioning activities	Occupational health and safety (on-site rehabilitation workforce)	Potential for decommissioning activities to generate excessive noise that could lead to occupational health and safety issues.	Adverse Direct Irreversible Temporary On-site Unlikely	Low	Moderate	Adverse Low (1)
	Project adjacent communities	Potential for decommissioning activities to generate excessive noise that could cause discomfort, nuisance and complaints from adjacent communities.	Adverse Direct Reversible Temporary On-site Temporary	Low	Negligible	Adverse Low (1)

7.7 SOCIAL ENVIRONMENT: BLAST AND VIBRATION IMPACTS

A blast impact assessment for the Project was conducted by Blast Management and Consulting (BMC) (2025) (Appendix G) to determine the potential impacts related to operational open pit blasting activities on the community, built environment, fauna points of interest, heritage sites and water sources/boreholes. The aspects assessed include ground vibration, air blast, fly rock and noxious fumes and are required to comply with specific South

African and international legislative standards, due to no Namibian standards existing for ground vibration and air blast limits. Cumulative impacts were also assessed. Construction and blasting drilling related impacts are not deemed significant, will form part of the operational drill and blast assessment scoring and mitigation requirements and were not further assessed for this report. Potential drilling impacts are only discussed under section 0. Details related to each specific impact is discussed further in the sections below.

The 2025 BMC assessment considered the potential impacts of blasting based on the planned blast design for the Project over a general area of 3 500 metres (m) from open pit blasting operations, with some specific receptors as far as 18.6 km (Figure 39). The significance of all receptors were assessed before mitigation, based on the distance to the blasting operations from the main open pit activities, regardless of the Proponent planning to relocate households falling within the mining industry standard blast/unsafe zone radius of 500 m. Through the assessment process, the specialist determined that specifically for this Project, the blast radius or unsafe zone should be extended to 519 m, mostly due to the clearance required for impacts from fly rock. Three (3) sensitivity zones were identified, a high sensitivity zone (500/519 m), medium sensitivity zone (500 – 1 500 m) and low sensitive zones (>1 500 m) (Figure 39). Therefore, all receptors falling within the high sensitivity zone or blast zone radius would be prone to greater impacts from ground vibration, air blasts and fly rock. The planned mining accommodation is located approximately 3.1 km south (S) of the pit area and impacts on personnel residing here during operations was also assessed. The classification used for the sensitive receptors and the list, with the respective GPS co-ordinates, can be viewed in Table 4 and Table 5 of the BMC (2025) report (Appendix G), respectively. Note that village houses (No. 62 – 66) and the D3714 road (No. 61) inside the pit area are excluded from the assessment as they will be destroyed prior to the commencement of mining activities.

This BMC (2025) report mainly concentrated on the drilling and blasting of the overburden (i.e. waste rock material) as the overburden blasts are considered a worst-case scenario and are used as an indicator of possible influence. Blast design parameters were provided by the Proponent, and the JKSimblast blast design software was used to design and simulate the blast and used in the evaluation of the significance of the receptors. The simulation of the blast provided the best prediction possible for operational blasting activities for the Project and is 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 165 mm diameter single blast hole, and the maximum charge was extracted from the blast simulation in JKSimblast.

The maximum charge relates to the total number of blast holes that detonate simultaneously based on the blast layout and initiation timing of the blast. Thus, the maximum mass of explosives detonating at once. The maximum charge relates to 689 kg. These values were applied in all predictions for ground vibration and air blast (BMC, 2025).

7.7.1 IMPACTS FROM GROUND VIBRATION

The potential significant impacts or impacts that have specific interest to the community and stakeholders for operational blasting ground vibration impacts, before mitigation, are summarised in Figure 89, for illustrative purposes only. Each specific impact is discussed in detail in the section below.

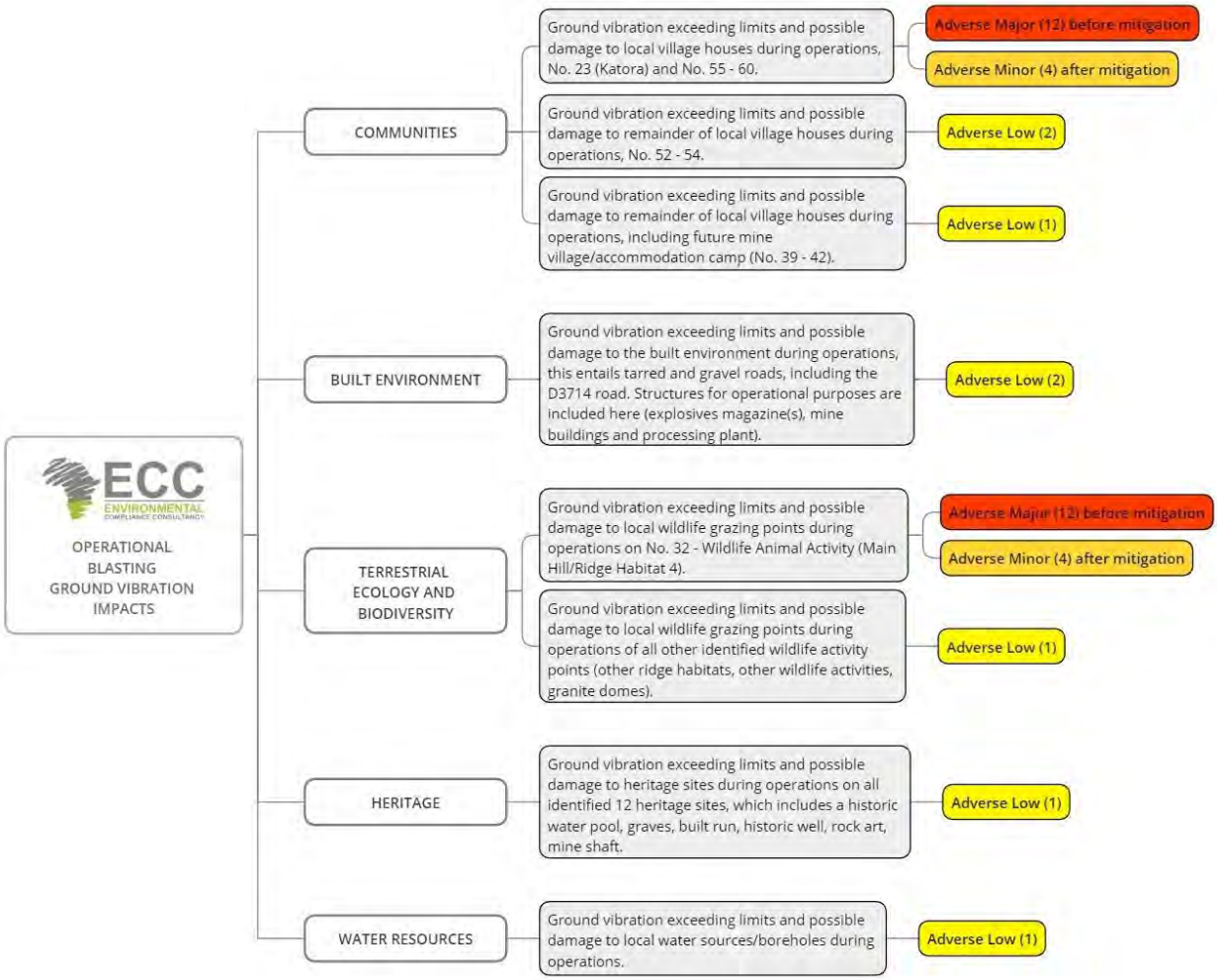


Figure 89 - Operational blasting related ground vibration impacts

Ground vibration is measured in velocity as millimetres per second (mm/s) and different types of structures have different tolerances to ground vibration. Therefore, different ground vibration limits are applicable to different structures to prevent damage. Additionally, ground vibration limits are also dependent on the frequency of the ground vibration. Structures experiencing lower frequencies are more susceptible to structural vibrations, as structures have a natural low frequency and this may lead to formation of cracks or damage. Guidelines applied therefore need to conform to United States Black Metal (USBM) criteria.

According to the USBM, 6 mm/s apply to traditional mud structures, 12.5 mm/s to lesser proper construction and 25 mm/s limit apply to general houses of proper construction, built to official building specifications (BMC, 2025).

Additionally, a further aspect to be considered is human perception. The legal limits set for structures is significantly greater than the comfort zone and sensitivity experienced for human beings and animals. Response to ground vibration is dependent on different frequency levels. The assessment considered three (3) levels being, perceptible (0.8 or 1 mm/s), unpleasant (6 mm/s) and intolerable (12.5 - 50 mm/s). This guideline helps with managing ground vibration and the complaints that could be received due to blast-induced ground vibration. Majority of complaints received from blasting activities by third party stakeholders is windows and roofs rattling, as a result of air blast(s) and not in fact ground vibrations (BMC, 2025).

Based on the expected drilling and charging designs presented, Table 36 provides the expected ground vibration levels (PPV) for various distances calculated at the maximum charge mass (689) kg for the pit area. Figure 90 provides a visual overview when the assessment ground vibration limits are applied and is influenced by distance from the pit area. Perceptible levels of ground vibration may be experienced up to 2011 m, unpleasant up to 745 m and intolerable up to 336 m from the blasting activities. Problematic levels of ground vibration are expected up to 268 m from the pit edge for the maximum charge. Any blast operations further away from the boundary will have less influence on receptors. The nearest public structures are located approximately 2270 m from the pit boundary. Structural conditions range from industrial construction to poor condition structures (BMC, 2025).

Table 36 - Expected ground vibration levels at various distances from charges applied in the BMC (2025) assessment

No.	Distance (m)	Expected PPV (mm/s) for 689 kg charge
1	50	394.7
2	100	202.2
3	150	64.4
4	200	40.1
5	250	27.7
6	300	20.5
7	400	12.8
8	500	8.8
9	600	6.5
10	700	5.1
11	800	4.1
12	900	3.4
13	1 000	2.8
14	1 250	1.9
15	1 500	1.4
16	1 750	1.1
17	2 000	0.9
18	2 500	0.6

No.	Distance (m)	Expected PPV (mm/s) for 689 kg charge
19	3 000	0.5
20	3 500	0.4

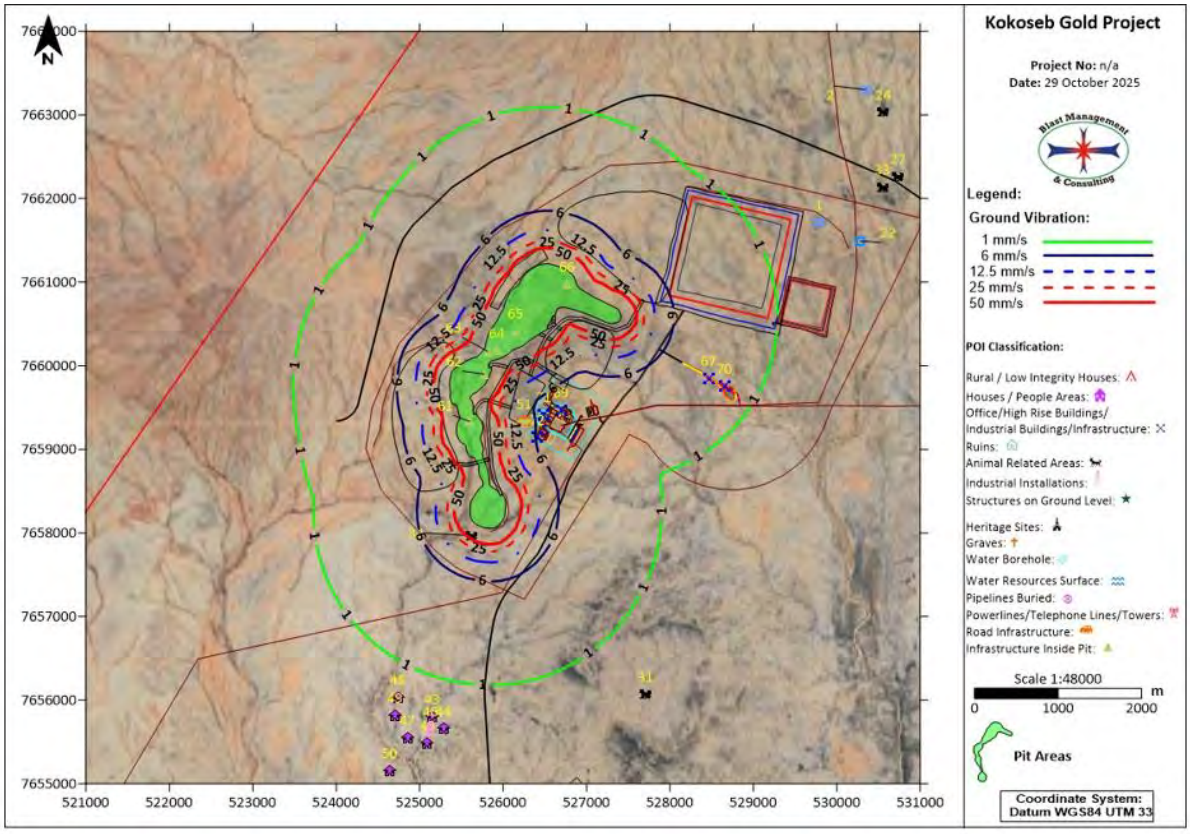


Figure 90 - Ground vibration influence from the maximum charge per delay (Source: BMC, 2025)

7.1.1.1 Ground vibration exceeding limits and possible damage to local village houses during operations, No. 23 (Katora) and No. 55 – 60

Based on Table 10 as per the BMC (2025) assessment report (Appendix G), village houses No. 23 (Katora) and No. 55 - 60 ground vibration limit is 12.5 mm/s. Katora village house is located approximately 89 m from the blasting activities and will experience a maximum charge predicted (PPV) of 152.7 mm/s, house No. 55 is located approximately 81 m from the blasting activities and will experience a maximum charge predicted (PPV) of 176.6 mm/s, house No. 56 is located approximately 103 m from the blasting activities and will experience a maximum charge predicted (PPV) of 120.4 mm/s, house No. 57 is located approximately 6 m from the blasting activities and will experience a maximum charge predicted (PPV) of 12 046.9 mm/s, house No. 58 is located approximately 184 m from the blasting activities and will experience a maximum charge predicted (PPV) of 46.1 mm/s, house No. 59 is located approximately 268 m from the blasting activities and will experience a maximum charge predicted (PPV) of 24.7 mm/s and house No. 60 is located approximately 120 m from the blasting activities and will

experience a maximum charge predicted (PPV) of 93 mm/s. All measured values are problematic for a structure response at 10 Hz and human tolerance intolerable at 30 Hz.

The potential ground vibration impact on village houses No. 23 and No. 55 – 60, due to their distance from open pit blasting activities (i.e. high sensitivity zone, within 500 m radius) will be adverse, direct, medium term for the duration of the Project (life of mine which is >11 years) and irreversible, as structural damage due to ground vibration will occur and the ground vibration levels will be intolerable for the residents perception. The scale of the impact is regional, as livelihoods will be lost due to structural damage and the residents will need to seek alternative housing in the region, which influences housing and services pressure on other towns. The probability of this impact occurring is definite, as drill and blasting are operational activities that are required for effective open pit mining operations to remove overburden and extract the ore mineral. The value of sensitivity is expected to be high and magnitude of change very high, due to the impacts on the village resident's homes and livelihoods, due to permanent loss/damage to structures and ground vibration being intolerable. The overall significance of the impact is expected to be adverse major, before mitigations (Table 37). With mitigation, the significance of the impact is reduced to adverse minor. It must be noted that at all houses within the mining area high risk zone are planned to be relocated as a form of mitigation by the Proponent, apart from village houses No. 43 – 50, which are located south (S) of Project site.

Mitigation measures have been included in the final ESMP (Appendix A) and are further discussed below:

- Implement a blast and vibration monitoring programme throughout the operational phase;
- A detailed inspection of the area and accurate identification of structures will also need to be done to ensure the levels of ground vibration allowable and limit to be applied will be sufficient;
- Ground vibration to be maintained within the required identified limits (6 mm/s, 12.5 mm/s, and 25 mm/s);
- Blast designs must consider the distance between point of concern and blast, specifically for blasts closer than 519 m (blast zone) to nearest point of concern;
- Shorter distances between blast holes to be investigated and implemented where feasible during operations;
- Smaller diameter blast holes to be investigated and implemented where feasible during operations;
- Using electronic initiation to ensure single hole firing; and
- Relocation of houses within 519 m (blast zone) from pit boundary and those identified in the medium risk zone (500 – 1 500 m radius).

7.1.1.2 Ground vibration exceeding limits and possible damage to the built environment during operations, No. 52 – 54

Based on Table 10 as per the BMC (2025) assessment report (Appendix G), village houses No. 52 - 54 ground vibration limit is 12.5 mm/s. Village house No. 52 is located approximately 1 469 m from the blasting activities and will experience a maximum charge predicted (PPV) of 1.5 mm/s, house No. 53 is located approximately 1 425 m from the blasting activities and will experience a maximum charge predicted (PPV) of 1.6 mm/s and house No. 54 is located approximately 1 099 m from the blasting activities and will experience a maximum charge predicted (PPV) of 2.4 mm/s. All measured values are acceptable for a structure response at 10 Hz and human tolerance perceptible at 30 Hz.

Village houses No. 52 – 54 falls within the medium sensitivity zone of blasting operations (500 – 1 500 m radius). Therefore, the potential ground vibration impact on these houses will be adverse, direct, medium term (life of mine which is >11 years) and partly reversible, as the structural response is acceptable, but the human tolerance is perceptible. The scale of the impact is regional, as livelihoods will be influenced and residents may need to seek alternative housing in the region, which influences housing and services pressure on other towns. The probability of this impact occurring is low, due to the distance of the houses outside of the immediate highly sensitive blast zone (i.e. 500 m). The value of sensitivity is expected to be medium and magnitude of change very low/minor, as the residents may need some assistance to adjust to these changes from the influence of the ground vibration perceptions where they live, as they have not been exposed to blasting operations prior.

The overall significance of the impact is expected to be adverse low, before mitigation (Table 37). It must be noted that at all houses within the mining area medium risk zone are planned to be relocated as a form of mitigation by the Proponent, apart from village houses No. 43 – 50, which are located south (S) of Project site. Mitigation measures have been included in the final ESMP (Appendix A).

7.1.1.3 Ground vibration exceeding limits and possible damage to remainder of local village houses during operations, including future mine village/accommodation camp (No. 39 - 42)

Based on Table 10 as per the BMC (2025) assessment report (Appendix G), village houses No. 36 – 45 and 47 - 50 ground vibration limit is 12.5 mm/s. Village houses No. 36 - 38 are located at a distance between 1 759 – 1 933 m from the blasting activities and will experience a maximum charge predicted (PPV) between 0.9 - 1.1 mm/s. All measured values are acceptable for a structure response at 10 Hz and human tolerance perceptible at 30 Hz. The mine accommodation camp (No. 39 – 42) are located at a distance between 3 146 – 3 990 m from the blasting activities and will experience a maximum charge predicted (PPV) between 0.3 – 0.4 mm/s. All measured values are acceptable for a structure response at 10 Hz and human tolerance response too low at 30 Hz. Village houses No. 43 - 45 are located at a distance

between 2 343 – 2 664 m from the blasting activities and will experience a maximum charge predicted (PPV) between 0.6 – 0.7 mm/s. All measured values are acceptable for a structure response at 10 Hz and human tolerance response too low at 30 Hz. Village houses No. 47 - 50 are located at a distance between 2 270 – 3 116 m from the blasting activities and will experience a maximum charge predicted (PPV) between 0.4 – 0.7 mm/s. All measured values are acceptable for a structure response at 10 Hz and human tolerance response too low at 30 Hz.

Village houses and the future mine operational accommodation camp No. 36 – 45 and village houses No. 47 - 50 falls within the low sensitivity zone of blasting operations (>1 500 m radius). Therefore, the potential ground vibration impact on these houses will be adverse, direct, medium term (life of mine which is >11 years) and partly reversible, as the structural response is acceptable but the human tolerance ranges from perceptible (No. 36 – 38) to too low (No. 39 – 45; 47 – 50), based on distance from the pit. The scale of the impact is regional, as livelihoods may be influenced and residents may need to seek alternative housing in the region, especially for village houses No. 36 - 38, which influences housing and services pressure on other towns. The probability of this impact occurring is low, due to the distance of the houses outside of the immediate highly sensitive blast zone (i.e. 500 m) and medium sensitivity zone (500 – 1500 m). The value of sensitivity is expected to be low and magnitude of change very low/minor, as the residents need minimal assistance to adjust to these changes from the influence of the ground vibration perceptions where they live, as they have not been exposed to blasting operations prior. Additionally, for the accommodation camp, the residents here are employed by the mine and will be accustomed to blasting activities.
The overall significance of the impact is expected to be adverse low, before mitigations (Table 37). It must be noted that village houses No. 36 – 38 within the mining area low risk zone are planned to be relocated as a form of mitigation by the Proponent, apart from village houses No. 43 – 50, which are located south (S) of Project site. Mitigation measures have been included in the final ESMP (Appendix A).

7.1.1.4 Ground vibration exceeding limits and possible damage to the built environment during operations, this entails tarred and gravel roads, including the D3714 road. Structures for operational purposes are included here (explosives magazine(s), mine buildings and processing plant)

The influence of ground vibration on tarred roads is expected when levels are in the order of 150 mm/s and greater or when there is actual movement of ground when blasting is conducted too close to the road, or subsidence is caused due to blasting operations. Normally, 100 blast hole diameters is a minimum distance between the structure and blast hole to prevent any cracks from forming in the surrounds of a blast hole. Crack forming is not restricted to this distance. Improper timing arrangements may also cause excessive back break and cracks further than expected. It is therefore important that blasting must be controlled in the vicinity of roads (BMC, 2025).

Based on Table 10 as per the BMC (2025) assessment report (Appendix G), the D3714 road No. 51 ground vibration limit is 150 mm/s, the explosive magazine(s) (No. 67 and 70) are 25 mm/s, the processing plant (No. 69) is 50 m/s and the mine buildings (No. 71 – 72) are 25 mm/s. The D3714 road is located approximately 500 m from the blasting activities and will experience a maximum charge predicted (PPV) of 8.8 mm/s, which is acceptable for a structure response at 10 Hz. The explosive magazine(s) are located approximately 1 267 m and 1 477 m from the blasting activities and will experience a maximum charge predicted (PPV) of 1.9 and 1.5 mm/s, respectively, which is acceptable for a structure response at 10 Hz and perceptible for human tolerance at 30 Hz. The processing plant is located approximately 896 m from the blasting activities and will experience a maximum charge predicted (PPV) of 3.4 mm/s, which is acceptable for a structure response at 10 Hz and perceptible for human tolerance at 30 Hz. The mine buildings are located approximately 743 m and 659 m from the blasting activities and will experience maximum charge predicted (PPV) of 4.6 and 5.6 mm/s, respectively, which are acceptable for a structure response at 10 Hz and perceptible for human tolerance at 30 Hz.

Ground vibration levels expected at the road are 8.8 mm/s, which is well within the limits of 150 mm/s. The Proponent is planning that during operations, the D3714 will be diverted around the Project infrastructure (north/northwest). The maximum charge on a human perception scale indicated five (5) receptors, where ground vibration may be experienced as perceptible. These are mainly the mine-owned buildings and infrastructure (No. 67, 69, 70, 71 and 72). The built infrastructure receptors fall within the medium sensitivity zone of blasting operations (500 – 1500 m radius).

Therefore, the potential ground vibration impact on these structures will be adverse, direct, medium term (life of mine which is >11 years) and partly reversible, as the structural response is acceptable, but the human tolerance is perceptible. Only Kokoseb (mine) staff, contractors, sub-contractors and invited visitors will be allowed on the Project site, therefore they will be made aware of the blast times scheduled by the blaster on a daily basis and expect blasting operations to occur during operational activities. The scale of the impact is regional, as the D3714 road traverses the Project site and is used by the public. The probability of this impact occurring is low, due to the distance of the built infrastructure receptors outside of the immediate highly sensitive blast zone (i.e. 500 m) and no influence is expected on the D3714 road from ground vibrations. The value of sensitivity is expected to be medium and magnitude of change very low/minor, as the public and employees may need some assistance to adjust to these changes from the influence of the ground vibration perceptions, especially if they have not been exposed to blasting operations prior. The overall significance of the impact is expected to be adverse low, before mitigation (Table 37). Mitigation measures have been included in the final ESMP (Appendix A).

7.1.1.5 Ground vibration exceeding limits and possible damage to local wildlife grazing points during operations on No. 32 - wildlife animal activity (main hill/ridge habitat 4)

Based on Table 10 as per the BMC (2025) assessment report (Appendix G), the ground vibration limit for wildlife animal activities is 25 mm/s. Wildlife animal activity No. 32 (main hill/ridge habitat 4) is located approximately 148 m from the blasting activities (i.e. high risk zone of 500 m) and will experience a maximum charge predicted (PPV) of 66.2 mm/s, which is problematic for a structure response at 10 Hz and may be intolerable on a human perception scale (and thus livestock or wildlife) of 30 Hz.

Therefore, the potential ground vibration impact on the main hill/ridge habitat 4 (No. 32) will be adverse, direct, medium term for the duration of the Project (life of mine which is >11 years) and irreversible, as structural damage due to ground vibration will occur and the ground vibration levels will be intolerable for local residents using this ridge to graze livestock and for wildlife grazing or residing here. The scale of the impact is regional, as livelihoods will be influenced as this wildlife activity point will not be able to be used anymore for grazing and falls within the 500 m sensitive blast. Additionally, wildlife will not be able to graze here anymore and those nesting or living on burrows will be displaced and need to seek shelter elsewhere. The probability of this impact occurring is definite, as drill and blasting are operational activities that are required for effective open pit mining operations to remove overburden and extract the ore mineral. The value of sensitivity is expected to be high and magnitude of change very high, due to the impacts on the village resident's livelihoods, livestock and wildlife due to permanent loss/damage to structures and ground vibration being intolerable. The overall significance of the impact is expected to be adverse major, before mitigation (Table 37). With mitigation, the significance of the impact is reduced to adverse minor.

Mitigation measures have been included in the final ESMP (Appendix A) and are further discussed below:

- Implement a blast and vibration monitoring programme throughout the operational phase);
- Ground vibration to be maintained within the required identified limits (6 mm/s, 12.5 mm/s, and 25 mm/s);
- Blast designs must consider the distance between point of concern and blast, specifically for blasts closer than 519 m (blast zone) to nearest point of concern;
- Shorter distances between blast holes to be investigated and implemented where feasible during operations;
- Smaller diameter blast holes to be investigated and implemented where feasible during operations;
- Using electronic initiation to ensure single hole firing;
- Relocation of houses within 519 m (blast zone) from pit boundary and those identified in the medium risk zone and thus relocation of livestock to other grazing points; and

– Relocation (if required) of fauna residing on main hill/ridge habitat 4 before construction activities commence.

7.1.1.6 Ground vibration exceeding limits and possible damage to local wildlife grazing points during operations of all other identified wildlife activity points (other ridge habitats, other wildlife activities, granite domes)

Based on Table 10 as per the BMC (2025) assessment report (Appendix G), the ground vibration limit for wildlife animal activities is 25 mm/s. Wildlife animal activities No. 27 – 31 (black rhino rubbing post, raptor nest and main hill/ridge habitat 1 – 3) and No. 33 – 35 (main hill/ridge habitat 5 – 7) are located approximately 2 681 m – 12 616 m from the blasting activities and will experience maximum charge predicted (PPV) between 0 – 0.4 mm/s, which are acceptable for a structure response at 10 Hz. The ground vibration limit for granite domes is 150 mm/s. Granite dome No. 24 – 26 is located approximately 3 958 m – 5 610 m from blasting activities and will experience a maximum charge predicted (PPV) between 0.2 – 0.3 mm/s, which is acceptable for a structure response at 10 Hz.

All the above-mentioned receptors fall within the low sensitivity zone of blasting operations (>1500 m radius). Therefore, the potential ground vibration impact on these wildlife animal activities/ridges/granite domes will be adverse, direct, medium term (life of mine which is >11 years) and partly reversible, as the structural response is acceptable and thus the tolerance will be too low based on distance from the pit. The scale of the impact is regional, due to the distance of the receptors from blasting activities and livestock and wildlife have not been previously exposed to blasting operations. The probability of this impact occurring is low, due to the distance of the receptors outside of the immediate highly sensitive blast zone (i.e. 500 m) and medium sensitivity zone (500 – 1500 m), therefore minimal expected influence on livestock or wildlife.

The value of sensitivity is expected to be low and magnitude of change very low/minor, as the residents, including their livestock and wildlife need minimal assistance to adjust to these changes from the influence of the ground vibration perceptions. The overall significance of the impact is expected to be adverse low, before mitigation (Table 37). Mitigation measures have been included in the final ESMP (Appendix A).

7.1.1.7 Ground vibration exceeding limits and possible damage to heritage sites during operations on all twelve (12) identified heritage sites, which includes historic water pools, graves, built ruin, historic well, rock art and mine shaft

Based on Table 10 as per the BMC (2025) assessment report (Appendix G), the ground vibration limit varies for heritage sites, based on the actual site composition/structure. Heritage sites ground vibration limit for No. 1 – 4, No. 6 – 8, No. 10 and No. 12 is 50 mm/s (combination between historic water pools, graves/graveyard(s) and mine shaft), No. 5 (built ruin) and No. 11 (old mining ruins) is 6 mm/s and No. 9 (prehistoric rock art) is 150 mm/s.

Heritage sites No. 1 – 4, No. 6 – 7 and No. 12 are located approximately 2 617 m – 13 828 m from the blasting activities and will experience maximum charge predicted (PPV) between 0 – 0.6 mm/s, respectively, which is acceptable for a structure response at 10 Hz. Heritage site No. 5 is located approximately 8 102 m from the blasting activities and will experience a maximum charge predicted (PPV) of 0.1 mm/s, which is acceptable for a structure response at 10 Hz and too low for a human tolerance response at 30 Hz. Heritage sites No. 8 & 10 are located approximately 6 538 m and 13 692 m from blasting activities and will experience a maximum charge predicted (PPV) between 0.1 and 0 mm/s, respectively, which are acceptable for a structure response at 10 Hz and too low a response for human tolerance at 30 Hz. Heritage site No. 9 is located approximately 14 753 m from the blasting activities and will experience a maximum charge predicted (PPV) of 0 mm/s, which is acceptable for a structure response at 10 Hz and too low for a human tolerance response at 30 Hz. Heritage site No. 11 is located approximately 13 773 m from the blasting activities and will experience a maximum charge predicted (PPV) of 0 mm/s, which is acceptable for a structure response at 10 Hz and too low for a human tolerance response at 30 Hz.

All the above-mentioned receptors fall within the low sensitivity zone of blasting operations (>1500 m radius) and will experience acceptable structural response and human tolerance too low to perceive. Therefore, the potential ground vibration impact on the identified heritage sites will be adverse, direct, medium term (life of mine which is >11 years) and partly reversible, as the structural response is acceptable and the human tolerance will be too low based on distance from the pit. The scale of the impact is regional, due to the distance of the heritage sites from blasting operations and the regional importance of the sites and graves to the communities within the greater Project area. The probability of this impact occurring is low, due to the distance of the receptors outside of the immediate highly sensitive blast zone (i.e. 500 m) and medium sensitivity zone (500 – 1500 m).

The value of sensitivity is expected to be low and magnitude of change very low/minor, as the local communities and heritage structures will need minimal assistance to adjust to these changes from the influence of the ground vibration perceptions. The overall significance of the impact is expected to be adverse low, before mitigation (Table 37). Mitigation measures have been included in the final ESMP (Appendix A).

7.1.1.8 Ground vibration exceeding limits and possible damage to local water sources/boreholes during operations

Based on Table 10 as per the BMC (2025) assessment report (Appendix G), the ground vibration limit for boreholes (No. 13 – 22) and the cement dam (No. 46) is 50 mm/s. The boreholes are located approximately 3 003 m – 18 609 m from blasting activities and will experience a maximum charge predicted (PPV) between 0 – 0.5 mm/s, which is acceptable for a structure response at 10 Hz. The cement dam is located approximately 2 494 m from blasting activities and will experience a maximum charge predicted (PPV) at 0.6 mm/s, which is acceptable for a structure response at 10 Hz.

All the above-mentioned receptors fall within the low sensitivity zone of blasting operations (>1500 m radius), will experience acceptable structural response and therefore no damage is expected to occur to the boreholes or the cement dam. Therefore, the potential ground vibration impact on the identified boreholes and cement will be adverse, direct, medium term (life of mine which is >11 years) and reversible, as the structural response is acceptable and therefore no damage will be sustained to these structures and in turn no impacts are expected on the use of these boreholes or the cement dam for local communities livelihoods and for their livestock. The scale of the impact is regional, due to the distance of the boreholes and cement dam from blasting operations and the regional importance of the water in an arid environment to the communities within the greater Project area. The probability of this impact occurring is low, due to the distance of the receptors outside of the immediate highly sensitive blast zone (i.e. 500 m) and medium sensitivity zone (500 – 1500 m). The value of sensitivity is expected to be low and magnitude of change very low/minor, as the local communities and the boreholes/cement dam structures will need minimal assistance to adjust to these changes from the influence of the ground vibration perceptions. The overall significance of the impact is expected to be adverse low, before mitigation (Table 37). Mitigation measures have been included in the final ESMP (Appendix A).

7.1.1.9 Summary of operational drill and blast ground vibration impacts

Table 37 below provides a summary of the operational ground vibration impacts from blasting activities, before mitigation.

Table 37 - Impact assessment for direct impacts from operational blasting ground vibration impacts on receptors

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Ground vibration during blasting operations	Community	Ground vibration exceeding limits and possible damage to local village houses during operations, No. 23 (Katora) and No. 55 - 60.	Adverse Direct Irreversible Medium term Regional Definite	High	Very high	Adverse Major (12)

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		Ground vibration exceeding limits and possible damage to remainder of local village houses during operations, No. 52 - 54.	Adverse Direct Partly reversible Medium term Regional Low probability	Medium	Low/minor	Adverse Low (2)
		Ground vibration exceeding limits and possible damage to remainder of local village houses during operations, including future mine village/accommodation camp (No. 39 - 42).	Adverse Direct Partly reversible Medium term Regional Low probability	Low	Low/minor	Adverse Low (1)
	Built environment	Ground vibration exceeding limits and possible damage to the built environment during	Adverse Direct Partly reversible Medium term Regional Low probability	Medium	Low/minor	Adverse Low (2)

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		operations, this entails tarred and gravel roads, including the D3714 road. Structures for operational purposes are included here (explosives magazine(s), mine buildings and processing plant).				
	Terrestrial ecology and biodiversity	Ground vibration exceeding limits and possible damage to local wildlife grazing points during operations on No. 32 - wildlife animal activity (main hill/ridge habitat 4).	Adverse Direct Irreversible Medium term Regional Definite	High	Very high	Adverse Major (12)

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		Ground vibration exceeding limits and possible damage to local wildlife grazing points during operations of all other identified wildlife activity points (other ridge habitats, other wildlife activities, granite domes).	Adverse Direct Parly reversible Medium term Regional Low probability	Low	Low/minor	Adverse Low (1)
	Heritage	Ground vibration exceeding limits and possible damage to heritage sites during operations on all twelve (12) identified heritage sites, which includes a historic water pool,	Adverse Direct Parly reversible Medium term Regional Low probability	Low	Low/minor	Adverse Low (1)

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		graves, built run, historic well, rock art and mine shaft.				
	Water resources	Ground vibration exceeding limits and possible damage to local water sources/boreholes during operations.	Adverse Direct Reversible Medium term Regional Low probability	Low	Low/minor	Adverse Low (1)

7.7.2 IMPACTS FROM AIR BLASTS

The potential significant impacts or impacts that have specific interest to the community and stakeholders for operational blasting air blast impacts, before mitigation, are summarised in Figure 91, for illustrative purposes only. Each specific impact is discussed in detail in the section below.

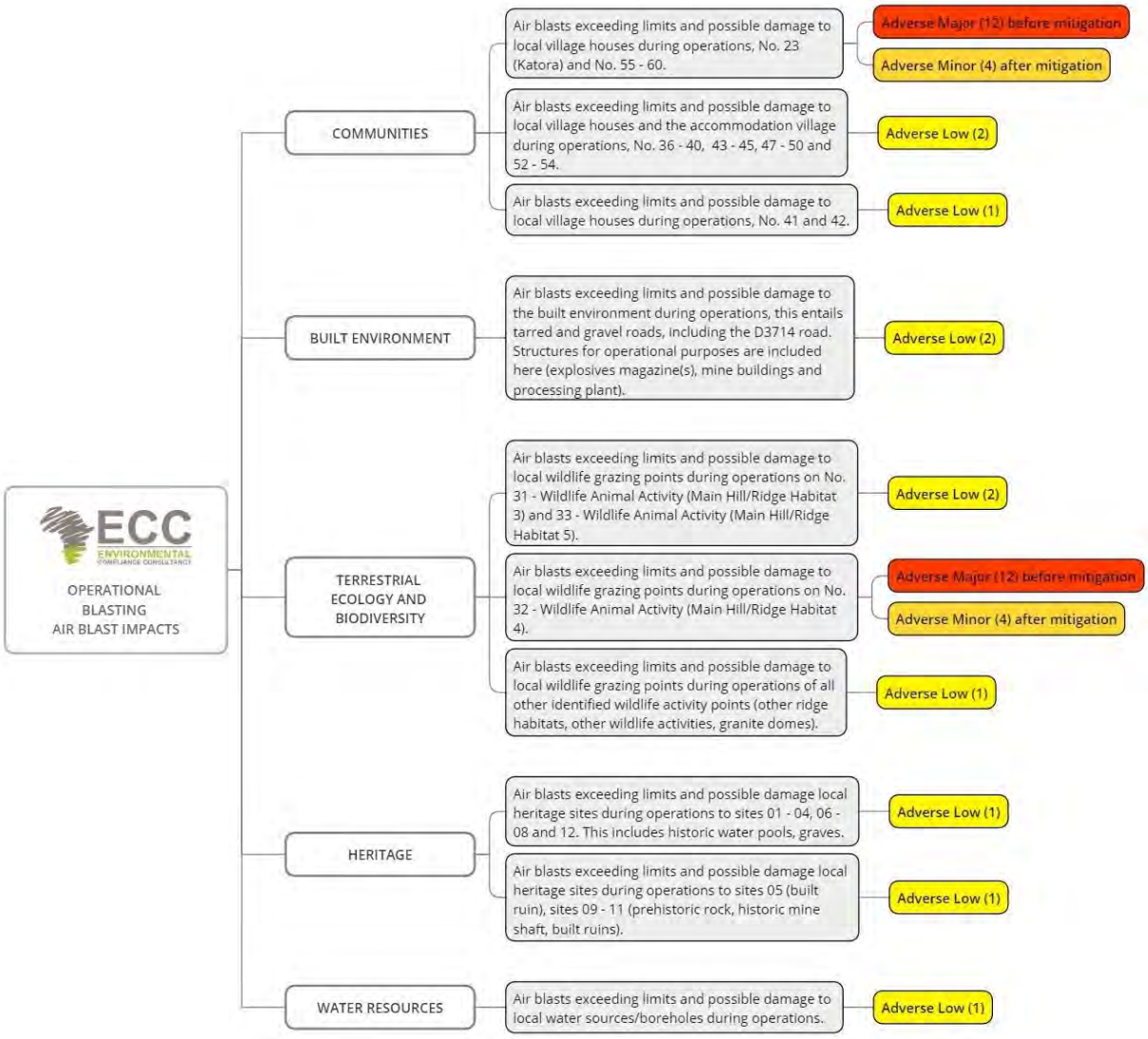


Figure 91 - Operational blasting air blast impacts

An air blast or air-over pressure is a pressure wave generated from a blasting event and is measured in pascals (Pa) and reported as a decibel value (dB(L)). Air blasts are associated with a frequency level less than (<) 20 Hertz (Hz), which is the threshold for hearing. Air blasts are also influenced by metrological conditions and blasting methodology and can be controlled to a great degree by implementing basic rules.

Three (3) main causes if air blasts can be observed (BMC, 2025):

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

The USBM recommended nuisance limit for an air blast is 134 dB(L), however the level is reduced to 128 dB(L) in proximity to hospitals, schools and sensitive areas where people congregate. Complaints from structural damages as a result of an air blast(s) can commence from >130 dB(L) and human perception from >120 dB(L), therefore, it is recommended that

air blast levels from blasting operations be <120 dB(L) for third party stakeholders (BMC, 2025). This will ensure that fewer complaints are received from the public. Therefore, the limits used in this assessment are 120 dB(L), 120 to 134 dB(L) and >134 dB(L), respectively (BMC, 2025). The prediction of an air blast is very subjective, therefore, Table 38 below is a summary of values predicted of an air blast calculated for a 689 kg mass charge, accordingly to equations outlined in the BMC report (2025). Figure 92 provides a visual overview when the assessment air blast limits are applied. Review of the air blast levels predicted for the maximum charge ranges between 109.3 and 139.7 dB(L) for all the receptors considered. Air blast levels expected at the houses identified ranged between 120.9 dB(L) and 122.8 dB(L). These levels may contribute to effects such as rattling of roofs, doors or windows but will not expect any damaging effects (which is levels >134 dB(L)). However, it may lead to complaints. The possible negative effects from air blasts are expected to be the same as those of ground vibration. It is maintained that if basic blasting principles and stemming control are not exercised, this effect could be greater, with a greater range of complaints or damage (BMC, 2025).

Table 38 - Expected air blast(s) at various distances from charges applied in the BMC (2025) assessment

No.	Distance (m)	Air blast (dB(L)) for 689 kg charge
1	50	146.3
2	100	143.8
3	150	139.6
4	200	137.8
5	250	136.4
6	300	135.3
7	400	133.5
8	500	132.2
9	600	131.0
10	700	130.1
11	800	129.3
12	900	128.5
13	1 000	127.9
14	1 250	126.5
15	1 500	125.4
16	1 750	124.4
17	2 000	123.6
18	2 500	122.2
19	3 000	121.1
20	3 500	120.2

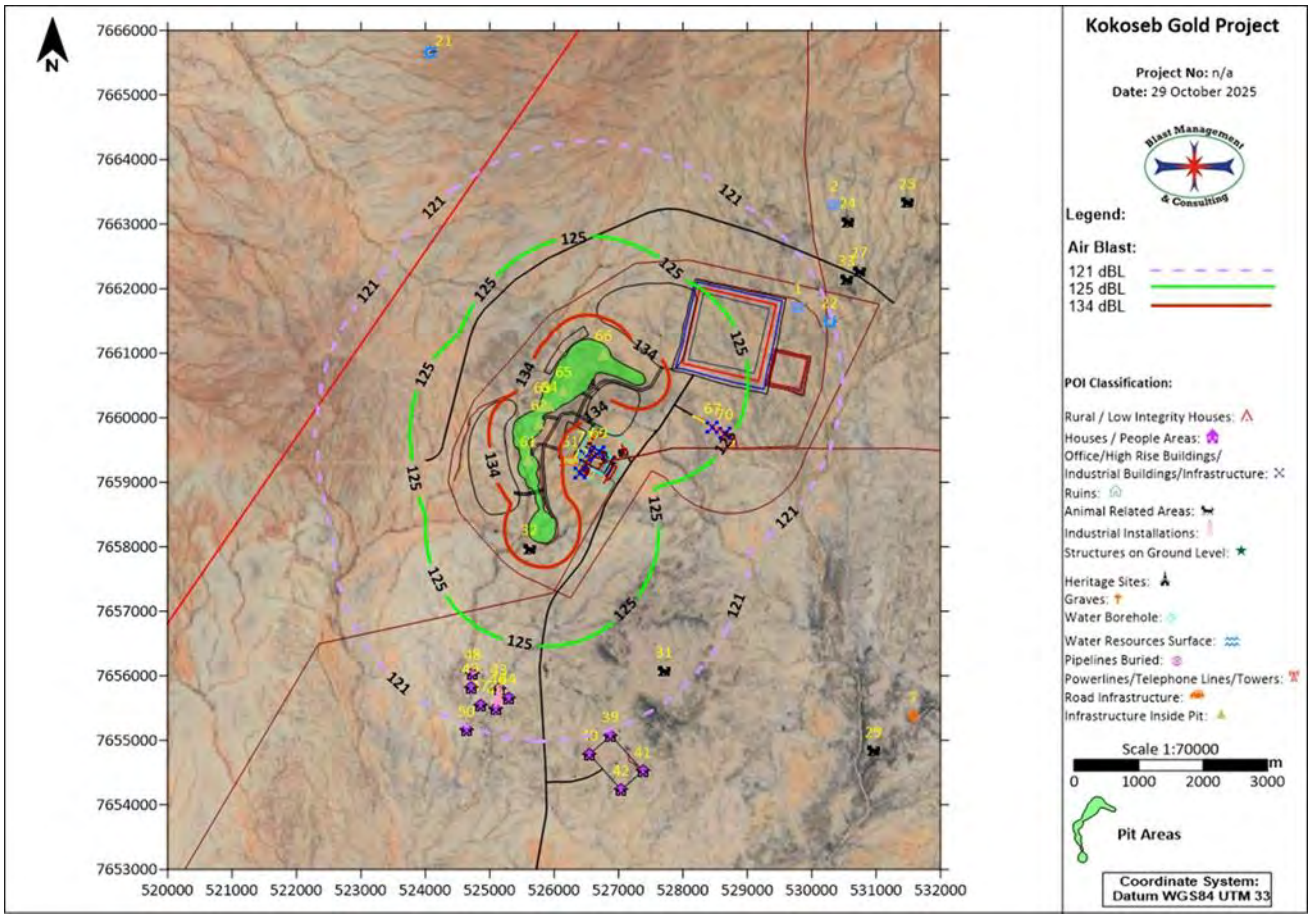


Figure 92 - Air blast influence from the maximum charge per delay (689 kg) (Source: BMC, 2025)

7.7.2.1 Air blasts exceeding limits and possible damage to local village houses during operations, houses No. 23 (Katora) and No. 55 – 60

Based on Table 10 as per the BMC (2025) assessment report (Appendix G), the air blast limit is 134 dB(L) for village houses. Katora village house is located approximately 89 m from the blasting activities and will experience a maximum charge air blast of 142.8 dB(L), house No. 55 is located approximately 81 m from the blasting activities and will experience a maximum charge air blast of 143.3 dB(L), house No. 56 is located approximately 103 m from the blasting activities and will experience a maximum charge air blast of 141.9 dB(L), house No. 57 is located approximately 6 m from blasting activities and will experience a maximum charge air blast of 159.1 dB(L), house No. 58 is located approximately 184 m from blasting activities and will experience a maximum charge air blast of 138.3 dB(L), house No. 59 is located approximately 268 m from blasting activities and will experience a maximum charge air blast of 136 dB(L) and house No. 60 is located approximately 120 m from blasting activities and will experience a maximum charge air blast of 140.9 dB(L). The maximum air blast charge predicted of all the above-mentioned houses is a problematic charge concern compared to the limit for structural damage and human perception.

The potential air blast impact on village houses No. 23 and No. 55 – 60, due to their distance from open pit blasting activities (i.e. high sensitivity zone, within 500 m radius) will be adverse, direct, medium term for the duration of the Project (life of mine which is >11 years) and irreversible, as structural damage due to an air blast will occur and for the residents perception the air blast will be problematic, which will lead to complaints. The scale of the impact is regional, as livelihoods will be lost due to structural damage and the residents will need to seek alternative housing in the region, which influences housing and services pressure on other towns. The probability of this impact occurring is definite, as drill and blasting are operational activities that are required for effective open pit mining operations to remove overburden and extract the ore mineral. The value of sensitivity is expected to be high and magnitude of change very high, due to the impacts on the village resident's homes and livelihoods, due to permanent loss/damage to structures and air blast limits being problematic (above the limit of 134 dB(L)). The overall significance of the impact is expected to be adverse major, before mitigations (Table 39). With mitigation, the significance of the impact is reduced to adverse minor. It must be noted that at all houses within the mining area high risk zone are planned to be relocated as a form of mitigation by the Proponent, apart from village houses No. 43 – 50, which are located south (S) of Project site.

Mitigation measures have been included in the final ESMP (Appendix A) and are further discussed below:

- Implement a blast and vibration monitoring programme throughout the operational phase;
- Specific blast designs to be done;
- Shorter distances between blast holes to be investigated and implemented where feasible during operations;
- Smaller diameter blast holes to be investigated and implemented where feasible during operation;
- Use of specific stemming materials to manage air blast;
- Increased stemming lengths to reduce air blast effect;
- Stop and Go when blasting within the unsafe distance;
- Ensure proper clearance of unsafe areas prior to blasting; and
- Relocation of houses within 519 m from pit boundary and those identified in the medium risk zone.

7.7.2.2 Air blasts exceeding limits and possible damage to local village houses during operations, houses No. 36 – 40, No. 43 – 45, No. 47 – 50 and No. 52 – 54

Village houses No. 36 – 38 are located approximately 1 759 m – 1 933 m from blasting activities and will experience a maximum charge air blast between 123.8 – 124.4 dB(L), mine accommodation camp houses No. 39 – 40 are located approximately 3 146 m – 3 342 m from blasting activities and will experience a maximum charge air blast between 120.5 – 120.8 (L), village houses No. 43 – 45 are located approximately 2 343 – 2 664 m from the blasting

activities and will experience a maximum charge air blast between 121.9 – 122.6 dB(L), village houses No. 47 - 50 are located approximately 2 270 – 3 116 m from blasting activities and will experience a maximum charge air blast between 120.9 – 122.8 dB(L) and village houses No. 52 - 54 are located approximately 1 099 m – 1 425 m from blasting activities and will experience a maximum charge air blast between 125.5 – 127.3 dB(L). The maximum air blast charge predicted of all the above-mentioned houses is a complaint charge concern compared to the limit.

Village houses No. 52 – 54 falls within the medium sensitivity zone of blasting operations (500 – 1500 m radius), however, these houses have been grouped with village houses/mine accommodation camp No. 36 – 40, No. 43 – 45, No. 47 – 50, as low sensitivity. Therefore, the potential air blast impact on these receptors will be adverse, direct, medium term (LoM which is >11 years) and partly reversible, as the structural damage is not expected to occur, but the human tolerance is a complaint concern. The scale of the impact is regional, as livelihoods may be influenced and residents may need to seek alternative housing in the region, which influences housing and services pressure on other towns. The probability of this impact occurring is medium, due to the distance of the houses within the medium sensitive blast zone (i.e. 500 – 1 500 m) and houses and accommodation camp in the low sensitive blast zone (>1 500 m). The value of sensitivity is expected to be low and magnitude of change moderate, as the residents will need some assistance to adjust to these changes from the influence of the air blast perceptions where they live, as they have not been exposed to blasting operations prior. Additionally, the mine accommodation village (No. 39 – 40) will house employees working on the mine, therefore they will expect blasts to occur and will be informed when the blasts will take place. The overall significance of the impact is expected to be adverse low, before mitigation (Table 39).

It must be noted that at all houses within the mining area medium risk zone and selected houses from the low sensitivity zone are planned to be relocated as a form of mitigation by the Proponent, apart from village houses No. 43 – 50, which are located south (S) of Project site. Mitigation measures have been included in the final ESMP (Appendix A).

7.7.2.3 Air blasts exceeding limits and possible damage to local village houses during operations, houses No. 41 – 42

Mine accommodation camp houses No. 41 - 42 are located approximately 3 835 m – 3 990 m from blasting activities (low blast sensitivity zone) and will experience a maximum charge air blast between 119.4 – 119.6 dB(L). The maximum air blast charge predicted of all the above-mentioned houses is an acceptable charge concern compared to the limit.

Therefore, the potential air blast impact on these receptors will be adverse, direct, medium term (life of mine which is >11 years) and partly reversible, as the structural damage is not expected to occur and the human tolerance is an acceptable complaint concern. The scale of the impact is regional, due to the various different employees sourced from the region

residing in the mine accommodation camp. The probability of this impact occurring is low, due to the distance of the accommodation camp from blasting operations (>1 500 m) and air blast levels are well within the defined limits (134 dB(L)). The value of sensitivity is expected to be low and magnitude of change low/minor, as the mine accommodation village will house employees working on the mine, therefore they will expect blasts to occur and will be informed when the blasts will take place. It is expected that they will be accustomed to these operations over time. The overall significance of the impact is expected to be adverse low, before mitigations (Table 39). Mitigation measures have been included in the final ESMP (Appendix A).

7.7.2.4 Air blasts exceeding limits and possible damage to the built environment during operations, this entails tarred and gravel roads, including the D3714 road. Structures for operational purposes are included here (explosives magazine(s), mine buildings and processing plant)

Air blast from blasting does not have an influence on road surfaces (BMC, 2025). Based on Table 10 as per the BMC (2025) assessment report (Appendix G), the D3714 road (No. 51) has no air blast limit, however the limit is 134 dB(L) for the other built structures, being the explosive magazine(s) (No. 67 and 70), the processing plant (No. 69) and the mine buildings (No. 71 – 72) is 25 mm/s. The D3714 road is located approximately 500 m from the blasting activities and will experience a maximum charge air blast of 132.2 dB(L). The explosive magazine(s) are located approximately 1 267 m and 1 477 m from the blasting activities and will experience a maximum charge air blast of 126.4 and 125.5 dB(L), respectively, which is a complaint charge concern compared to the limit. The processing plant is located approximately 896 m from the blasting activities and will experience a maximum charge air blast of 128.6 dB(L), which is a complaint charge concern compared to the limit.

The mine buildings are located approximately 743 and 659 m from the blasting activities and will experience a maximum charge air blast of 129.7 and 130.5 dB(L), respectively, which is a complaint charge concern compared to the limit. Air blast impacts on infrastructure within the pit areas, such as roads and mine plant are not expected influence or damage these installations (BMC, 2025).

The potential air blast impact on these structures will be adverse, direct, medium term (life of mine which is >11 years) and partly reversible, as the structural response is acceptable, but the human tolerance could lead to complaints from the public or employees compared to the limit of 134 dB(L). Only Kokoseb (mine) staff, contractors, sub-contractors and invited visitors will be allowed on the Project site, therefore, they will be made aware of the blast times scheduled by the blaster daily and expect blasting operations to occur during operational activities. The scale of the impact is regional, as the D3714 road traverse the Project site and is used by the public. The probability of this impact occurring is improbable/rare, due to the distance of the built infrastructure receptors outside of the immediate highly sensitive blast zone (i.e. 500 m) and no influence is expected on the D3714 road from air blasts. The value of

sensitivity is expected to be medium and magnitude of change none/negligible, as the public and employees may need some assistance to adjust to these changes from the influence of an air blast perceptions, especially if they have not been exposed to blasting operations prior. The actual structures as receptors will not be influenced. The overall significance of the impact is expected to be adverse low, before mitigations (Table 39). Mitigation measures have been included in the final ESMP (Appendix A).

7.7.2.5 Air blasts exceeding limits and possible damage to local wildlife grazing points during operations on No. 31 - wildlife animal activity (main hill/ridge habitat 3) and No. 33 - wildlife animal activity (main hill/ridge habitat 5)

The air blast limit for wildlife animal activities and granite domes is 134 dB(L). Wildlife animal activity No. 31 (main hill/ridge habitat 3) and No. 33 (main hill/ridge habitat 5) are located approximately 2 681 m and 3 489 m from blasting activities and will experience a maximum charge air blast of 121.8 and 120.2 dB(L), respectively, which is a complaint charge concern compared to the limit.

The potential air blast impact on these structures will be adverse, direct, medium term (life of mine which is >11 years) and partly reversible, as the structural response is acceptable, but the human, livestock or wildlife tolerance could lead to complaints from the public or influence livestock and wildlife grazing or wildlife nesting/residing on these ridges. The scale of the impact is regional, due to the distance of the receptors from the blasting activities. The probability of this impact occurring is medium, due to the measurements taken that there could be perceptive complaints compared to the limit for no perception (<120 dB(L)). The value of sensitivity is expected to be low and magnitude of change moderate, as the local communities may remove their livestock to alternative grazing points or the specific wildlife utilising these two (2) ridges might be displaced.
The overall significance of the impact is expected to be adverse low, before mitigation (Table 39). Mitigation measures have been included in the final ESMP (Appendix A).

7.7.2.6 Air blasts exceeding limits and possible damage to local wildlife grazing points during operations on No. 32 - wildlife animal activity (main hill/ridge habitat 4)

Wildlife animal activity No. 32 (main hill/ridge habitat 4) is located approximately 148 m from blasting activities and will experience a maximum charge air blast of 139.7dB(L), which is a problematic charge concern compared to the limit.

The potential air blast impact on the main hill/ridge habitat 4 (No. 32) will be adverse, direct, medium term for the duration of the Project (life of mine which is >11 years) and irreversible, as structural damage due to air blast(s) will occur and the air blast levels (>134 dB(L)) will be problematic for local residents using this ridge to graze livestock and for wildlife grazing or residing here. The scale of the impact is regional, as livelihoods will be influenced as this wildlife activity point will not be able to be used anymore for grazing and falls within the 500

m sensitive blast zone. Additionally, wildlife will not be able to graze here anymore and those nesting or living in burrows will be displaced and need to seek shelter elsewhere. The probability of this impact occurring is definite, as drill and blasting are operational activities required for effective open pit mining operations to remove overburden and extract the ore mineral. The value of sensitivity is expected to be high and magnitude of change very high, due to the impacts on the village resident's livelihoods, livestock and wildlife due to permanent loss/damage to structures and air blast being problematic to human perception. The overall significance of the impact is expected to be adverse major, before mitigations (Table 39). With mitigation, the significance of the impact is reduced to adverse minor.

Mitigation measures have been included in the final ESMP (Appendix A) and are further discussed below:

- Implement a blast and vibration monitoring programme throughout the operational phase;
- Specific blast designs to be done;
- Shorter distances between blast holes to be investigated and implemented where feasible during operations;
- Smaller diameter blast holes to be investigated and implemented where feasible during operations;
- Use of specific stemming materials to manage air blast;
- Increased stemming lengths to reduce air blast effect;
- Ensure proper clearance of unsafe areas prior to blasting; and
- Relocation of houses and livestock within 519 m from pit boundary and those identified in the medium risk zone.

7.7.2.7 Air blasts exceeding limits and possible damage to local wildlife grazing points during operations of all other identified wildlife activity points (other ridge habitats, other wildlife activities and granite domes)

Wildlife animal activities No. 27 – 30 (black rhino rubbing post, raptor nest and main hill/ridge habitat 1 – 2) and No. 34 – 35 (main hill/ridge habitat 6 – 7) are located approximately 3 712 m – 12 616 m from the blasting activities and will experience a maximum charge air blast between 112.3 – 119.8 dB(L), which are acceptable charge concern compared to the limit. Granite domes No. 24 – 26 are located approximately 3 958 m – 5 610 m from blasting activities and will experience a maximum charge air blast between 117.3 – 119.4, which are acceptable charge concern compared to the limit.

All the above-mentioned receptors fall within the low sensitivity zone of blasting operations (>1500 m radius) and below the limit of 120 dB(L) for perception of air blasts. Therefore, the potential air blast impact on these wildlife animal activities/ridges/granite domes will be adverse, direct, medium term (life of mine which is >11 years) and partly reversible, as the structural response is acceptable and the air blast within the perceptible limits, based on distance from the pit. The scale of the impact is regional, due to the distance of the receptors

from blasting activities and livestock and wildlife have not been previously exposed to blasting operations. The probability of this impact occurring is low, due to the distance of the receptors outside of the immediate highly sensitive blast zone (i.e. 500 m) and medium sensitivity zone (500 – 1500 m), therefore minimal influence on livestock or wildlife is expected. The value of sensitivity is expected to be low and magnitude of change very low/minor, as the residents, including their livestock and wildlife need minimal assistance to adjust to these changes from the influence of the air blast perceptions. The overall significance of the impact is expected to be adverse low, before mitigation (Table 39). Mitigation measures have been included in ESMP (Appendix A).

7.7.2.8 Air blasts exceeding limits and possible damage local heritage sites during operations to sites 01 - 04, 06 - 08 and 12. This includes historic water pools and graves

Based on Table 10 as per the BMC (2025) assessment report (Appendix G), the air blast limit varies for heritage sites, with historic water pools/well and graves having no defined limit. Heritage sites No. 1 – 4, No. 6 – 8 and No. 12 are located approximately 2 617 m – 13 828 m from the blasting activities and will experience a maximum charge air blast that cannot be measured. Therefore, the possible charge concerns are not applicable.

All the above-mentioned receptors fall within the low sensitivity zone of blasting operations (>1500 m radius) and do not have a measurable structural response. Therefore, the potential air blast impact on the identified heritage sites (historic water pools/wells and graves) will be adverse, direct, medium term (life of mine which is >11 years) and reversible, as the structural response is acceptable and no complaints will be received by the public based on distance from the pit.

The scale of the impact is regional, due to the distance of the heritage sites from blasting operations and the regional importance of the sites and graves to the communities within the greater Project area. The probability of this impact occurring is improbable, due to the distance of the receptors outside of the immediate highly sensitive blast zone (i.e. 500 m) and medium sensitivity zone (500 – 1500 m) and that the possible charge will have no influence. The value of sensitivity is expected to be low and magnitude of change none/negligible, as the local communities and heritage structures will require no assistance as the impact will not be perceptible or induce structural damage of the heritage sites. The overall significance of the impact is expected to be adverse low, before mitigations (Table 39). Mitigation measures have been included in the final ESMP (Appendix A).

7.7.2.9 Air blasts exceeding limits and possible damage local heritage sites during operations to sites 05 (built ruin), sites 09 – 11 (prehistoric rock, historic mine shaft and built ruins)

Based on Table 10 as per the BMC (2025) assessment report (Appendix G), the air blast limit for heritage sites, which is 134 dB(L) for heritage sites No. 5 (built ruin), No. 9 (prehistoric rock are), No. 10 (historic mine shaft) and No. 11 (old mining ruins). Heritage site No. 5 is located approximately 8 102 m from blasting activities and will experience a maximum charge air blast of 115 dB(L), which is an acceptable charge concern compared to the limit. No. 9 – 11 are located approximately 13 692 m – 14 753 m from blasting activities and will experience maximum charge air blast between 111.3 – 111.8 dB(L), which are acceptable charge concern compared to the limit.

All the above-mentioned receptors fall within the low sensitivity zone of blasting operations (>1500 m radius) and have a measurable response below 120 dB(L), which entails no structural damage or public perception complaints. Therefore, the potential air blast impact on the identified heritage sites (prehistoric rock, historic mine shaft and built ruins) will be adverse, direct, medium term (life of mine which is >11 years) and partly reversible, as the structural response is acceptable and therefore no damage will be sustained to these structures and in turn no impacts are expected. The scale of the impact is regional, due to the distance of the heritage sites from blasting operations and the regional importance of the sites and graves to the communities within the greater Project area. The probability of this impact occurring is low, due to the distance of the receptors outside of the immediate highly sensitive blast zone (i.e. 500 m) and medium sensitivity zone (500 – 1500 m). The value of sensitivity is expected to be low and magnitude of change low/minor, as the local communities and heritage structures will require minimal assistance as the impact will not be perceptible or have structural damage. The overall significance of the impact is expected to be adverse low, before mitigation (Table 39). Mitigation measures have been included in the final ESMP (Appendix A).

7.7.2.10 Air blasts exceeding limits and possible damage to local water sources/boreholes during operations

Based on Table 10 as per the BMC (2025) assessment report (Appendix G), the air blast limit varies for boreholes and the cement dam have no defined limit, however measurements could be taken. Boreholes No. 13 – 21 are located approximately 5 035 m – 18 609 m from blasting activities and will experience maximum charge air blast between 109.9 – 117.9 dB(L). Borehole No. 22 is located approximately 3 003 m from blasting activities and will experience a maximum charge air blast of 121.1 dB(L). The cement dam No. 46 is located approximately 2 494 m from blasting activities and will experience a maximum charge air blast of 122.3 dB(L). No charge concerns are noted as there is no set limit defined.

All the above-mentioned receptors fall within the low sensitivity zone of blasting operations (>1500 m radius) and will experience acceptable structural response. Therefore, no damage

is expected to occur to the boreholes or the cement dam. Therefore, the potential air blast impact on the identified boreholes and cement dam will be adverse, direct, medium term (life of mine which is >11 years) and reversible, as no structural damages will be sustained and therefore no damage will be sustained to these structures and in turn no impacts are expected on the use of these boreholes or the cement dam for local communities livelihoods and for their livestock. The scale of the impact is regional, due to the distance of the boreholes and cement dam from blasting operations and the regional importance of the water in an arid environment to the communities within the greater Project area. The probability of this impact occurring is improbable, as no damage is expected compared to the limit (134 dB(L). The value of sensitivity is expected to be low and magnitude of change none/negligible, as the local communities and the boreholes/cement dam structures will need no assistance to adjust to these changes from the influence of the air blast perceptions. The overall significance of the impact is expected to be adverse low, before mitigation (Table 39). Mitigation measures have been included in ESMP (Appendix A).

7.7.2.11 Summary of operational blasting air blast impacts

Table 39 below provides a summary of the operational air blast impacts from blasting activities.

Table 39 - Impact assessment for direct impacts from operational blasting air blast impacts on receptors

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Air blast during blasting operations	Community	Air blasts exceeding limits and possible damage to local village houses during operations, No. 23 (Katora) and No. 55 - 60.	Adverse Direct Irreversible Medium term Regional Definite	High	Very high	Adverse Major (12)
		Air blasts exceeding limits and possible damage to local village houses and the accommodation village during operations (No. 36 - 40, 43 - 45,	Adverse Direct Partly reversible Medium term Regional Medium probability	Low	Moderate	Adverse Low (2)

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		47 - 50 and 52 – 54).				
		Air blasts exceeding limits and possible damage to local village houses (No. 41 and 42) during operations.	Adverse Direct Partly reversible Medium term Regional Low probability	Low	Low/minor	Adverse Low (1)
	Built environment	Air blasts exceeding limits and possible damage to the built environment during operations, this entails tarred and gravel roads, including the D3714 road. Structures for operational purposes are included here (explosives magazine(s), mine buildings and processing plant).	Adverse Direct Partly reversible Medium term Regional Improbable/rare	Medium	None/negligible	Adverse Low (2)
	Terrestrial ecology and biodiversity	Air blasts exceeding limits and possible damage to local wildlife grazing points during operations on No. 31 - wildlife	Adverse Direct Partly reversible Medium term Regional	Low	Moderate	Adverse Low (2)

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		animal activity (main hill/ridge habitat 3) and No. 33 - wildlife animal activity (main hill/ridge habitat 5).	Medium probability			
		Air blasts exceeding limits and possible damage to local wildlife grazing points during operations on No. 32 - wildlife animal activity (main hill/ridge habitat 4).	Adverse Direct Irreversible Medium term Regional Definite	High	Very high	Adverse Major (12)
		Air blasts exceeding limits and possible damage to local wildlife grazing points during operations of all other identified wildlife activity points (other ridge habitats, other wildlife activities and granite domes).	Adverse Direct Partly reversible Medium term Regional Low probability	Low	Low/minor	Adverse Low (1)
	Heritage	Air blasts exceeding limits and possible damage local heritage sites during operations to sites 01 - 04, 06 -	Adverse Direct Reversible Medium term Regional Improbable/rare	Low	None/negligible	Adverse Low (1)

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		08 and 12. This includes historic water pools and graves.				
		Air blasts exceeding limits and possible damage local heritage sites during operations to sites 05 (built ruin), sites 09 – 11 (prehistoric rock, historic mine shaft and built ruins).	Adverse Direct Partly reversible Medium term Regional Low probability	Low	Low/minor	Adverse Low (1)
	Water resources	Ground vibration exceeding limits and possible damage to local water sources/boreholes during operations.	Adverse Direct Reversible Medium term Regional Improbable/rare	Low	None/negligible	Adverse Low (1)

7.7.3 IMPACTS FROM FLY ROCK

The potential significant impacts or impacts that have specific interest to the community and stakeholders for operational blasting fly rock impacts, before mitigation, are summarised in Figure 93, for illustrative purposes only. Each specific impact is discussed in detail in the section below.

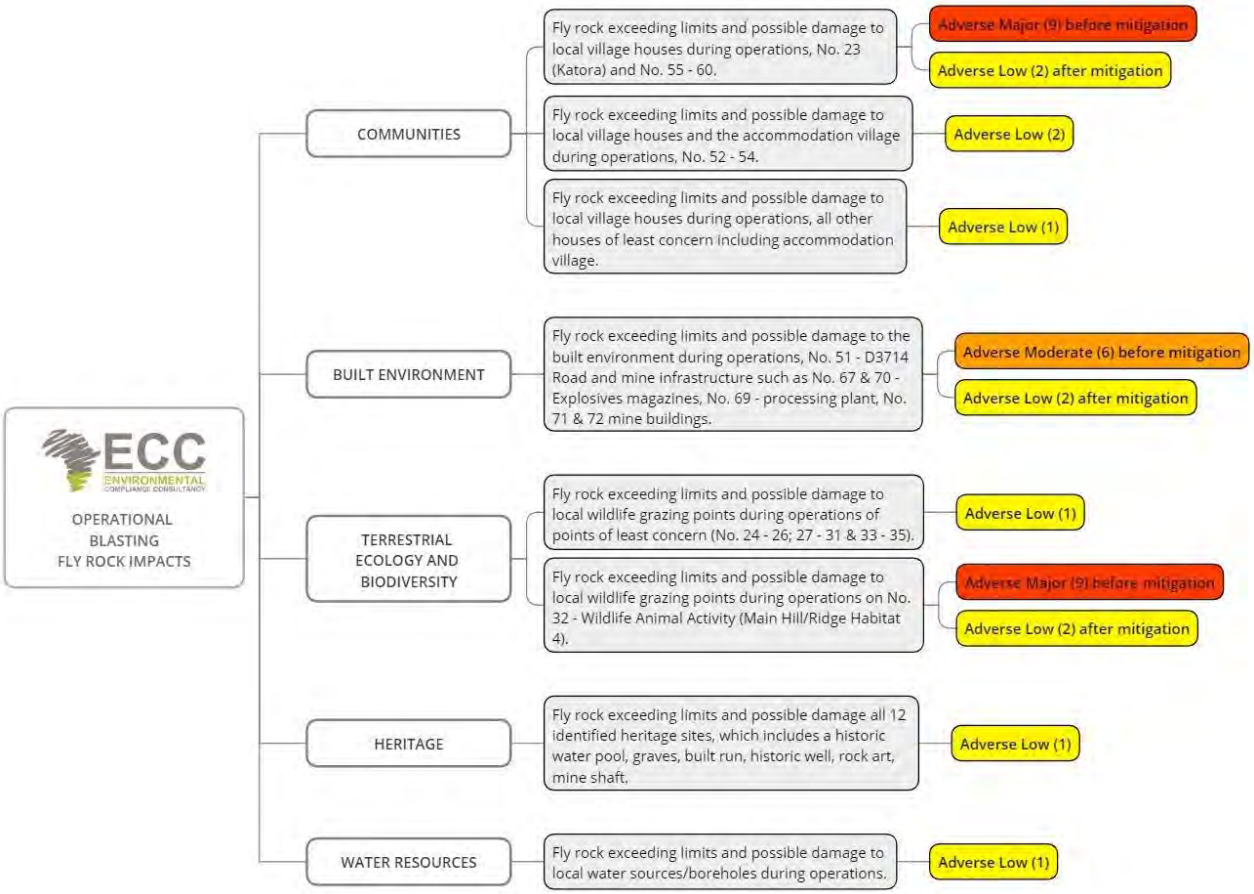


Figure 93 - Operational blasting fly rock impacts

Blasting requires the movement of rock to excavate waste and ore material for mining. The extent of movement is dependent on the scale and type of operation. The orientation of the blast is important for an open pit mining operation, such as the Project. Material travelling outside of the expected range is considered fly rock and is classified as the following (Figure 94) (BMC, 2025):

- Throw - the planned forward movement of rock fragments that form the muck pile within the blast zone;
- Fly rock - the undesired propulsion of rock fragments through the air or along the ground beyond the blast zone by the force of the explosion that is contained within the blast clearance (exclusion) zone. When using this definition, fly rock, while undesirable, is only a safety hazard if a breach of the blast clearance (exclusion) zone occurs; and
- Wild fly rock - the unexpected propulsion of rock fragments that travels beyond the blast clearance (exclusion) zone when there is some abnormality in a blast or a rock mass.
- Fly rock is caused when burdens are too large or small or if the stemming material used is not of the correct quality or volume. Stemming material of the correct type and length ensure explosive energy is efficiently used to its maximum and to control fly rock (BMC, 2025).

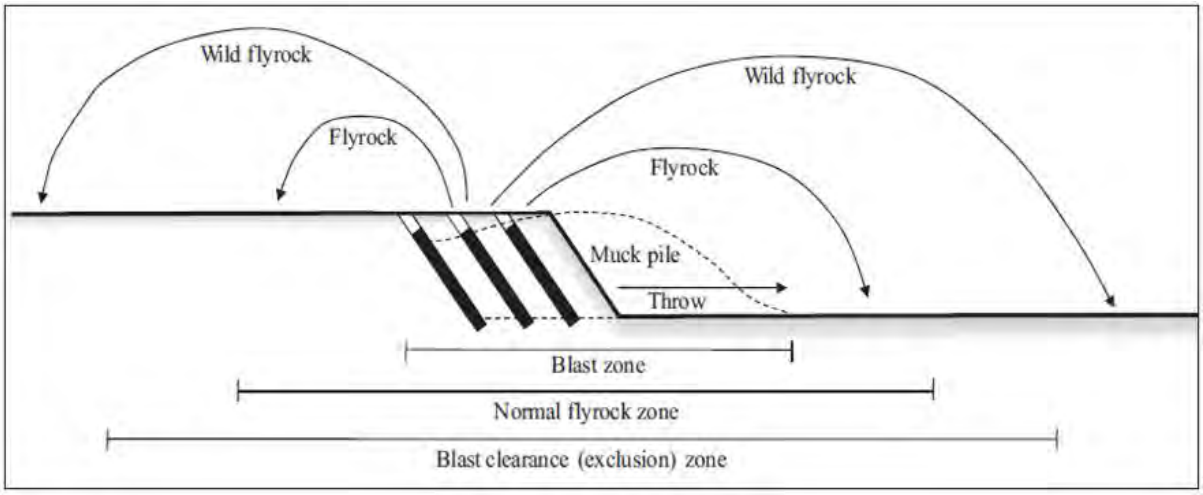


Figure 94 - Schematic of fly rock terminology (Source; BMC, 2025)

The occurrence of fly rock in any form will have an adverse impact if found to have travelled outside of the blast safe zone and cause damage to roads, vehicles or even death to people or animals. This safe boundary is determined by the appointed blaster or as per the mine code of practice. BMC (2025) uses a prediction calculation defined by the International Society of Explosives Engineers (ISEE) to assist with determining the minimum distance and can be anything between 10 and 1 000 m, the general unsafe zone applied is 500 m. For this assessment as discussed earlier, the safe zone is calculated at 519 m using a safety factor of 2, based on the current blast design (165 mm diameter blast hole and 3 m stemming length) (Figure 95).

The occurrence of fly rock can be mitigated, but the possibility of its occurrence can never be eliminated. Generally, the fly rock becomes smaller the further the distance from the blasting activities. The visual representation of the fly rock concerns, in relation to receptors and the blast safe zone, is depicted in Figure 96. Currently, there are nine (9) receptors identified within the unsafe zone; village house No. 23 (Katora), village houses No. 55 – 60, wildlife animal activity (main hill/ridge 4) (No. 32) and the D3714 road (No.51), which is to be diverted north/northwest of the Project.

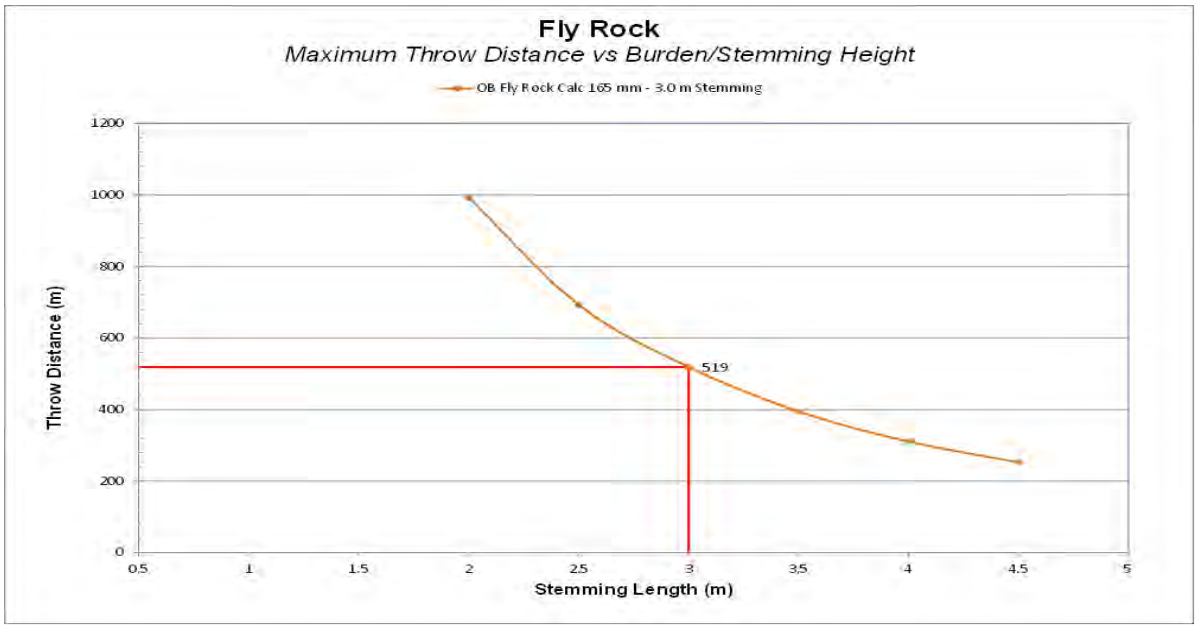


Figure 95 - Fly rock prediction calculation (Source; BMC, 2025)

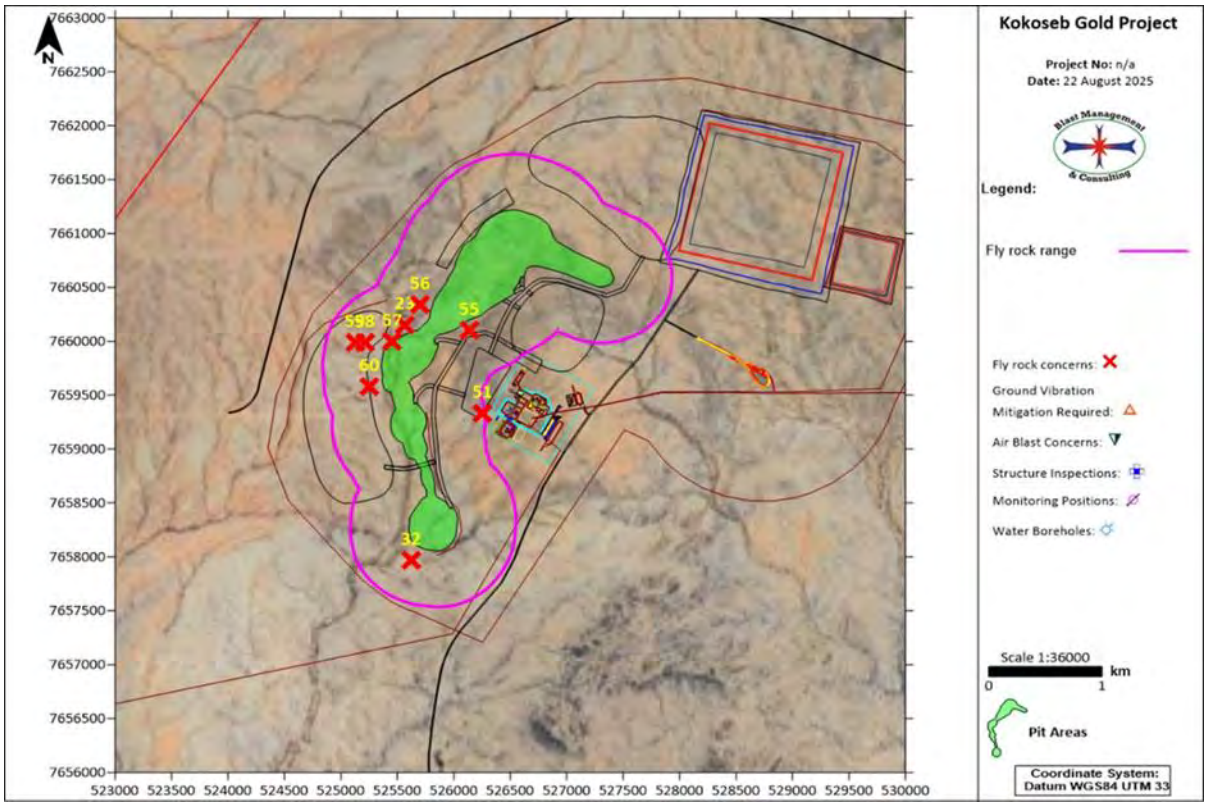


Figure 96 - Predicted fly rock exclusion zone for the Kokoseb Gold Project open pit operations (Source; BMC, 2025)

7.7.3.1 Fly rock exceeding limits and possible damage to local village houses during operations, No. 23 (Katora) and No. 55 – 60

Due the distance of village houses No. 23 and No. 55 – 60 within 500 m of blasting activities and thus in the high-risk blast zone, taking the calculated blast unsafe zone limit of 519 m into account, the potential impacts from fly rock, leading to structural damage, fatality or injury to people during operations is definite. Therefore, the potential fly rock impacts on these identified house structures and members of the community is adverse, direct, medium term (>11 years life of mine) and irreversible, as damage to structures will occur on a continuous basis and the potential loss of life or injury cannot be reversed fully or at all. The impact is regional, affecting households, the resident's health and their livelihoods in the greater community of Erongo Region. The probability of the impact occurring is high, as the houses are located within the 500 m unsafe zone, where fly rock can be ejected within. The sensitivity of the receptor is high and the magnitude of change very high, as damage to houses and the loss of livelihoods for the residents will need assistance from the Proponent to start over in adjacent towns. Additionally, injury or the loss of life is not replaceable. Therefore, the significance of this impact occurring is adverse major, before mitigation (Table 40). With mitigation, the impact will be reduced to adverse low. Note that the identified village houses are planned to the relocated by the Proponent prior to the commencement of the operational phase.

The mitigation measures are further discussed below and described in the final ESMP (Appendix A):

- Implement a blast and vibration monitoring programme throughout the operational phase;
- Specific blast design to be done;
- Shorter distances between blast holes to be investigated and implemented where feasible during operations;
- Smaller diameter blast holes to be investigated and implemented where feasible during operations;
- Use of specific stemming materials to manage air blast;
- Increased stemming lengths to reduce air blast effect;
- Ensure proper clearance of unsafe areas prior to blasting; and
- Relocation of houses within 519 m from pit boundary (as already planned by the Proponent).

7.7.3.2 Fly rock exceeding limits and possible damage to local village houses during operations, No. 52 – 54

Due the distance of village houses No. 52 – 54 within 500 – 1 500 m of blasting activities and thus in the medium-risk blast zone, taking the calculated blast unsafe zone limit of 519 m into account, the potential impacts from fly rock, leading to structural damage, fatality or injury to people during operations could occur. Therefore, the potential fly rock impacts on these identified house structures and members of the community is adverse, direct, medium term

(>11 years life of mine) and partly reversible, as damage to structures could occur but not on a continuous basis and there is potential for the loss of life or injury. Structures could be repaired and injuries are expected to be minimal, if at all. The impact is regional, affecting households, the resident's health and their livelihoods in the greater community of Erongo Region. The probability of the impact occurring is considered low, as the houses are located approximately 1 099 – 1 425 m from blasting activities and are well outside the unsafe zone of 519 m. The sensitivity of the receptor is medium and the magnitude of change is low/minor, as damage to houses and the loss of livelihoods for the residents is expected to be low and not require assistance from the Proponent. Additionally, injury to human health is expected to be low due to the distance of the houses from operational activities. Therefore, the significance of this impact occurring is rated as adverse low, before mitigation (Table 40). Note that the identified village houses are planned to the relocated by the Proponent prior to the commencement of the operational phase. Mitigation measures are further described in the final ESMP (Appendix A).

7.7.3.3 Fly rock exceeding limits and possible damage to local village houses during operations, all other houses of least concern, including accommodation camp (No. 39 – 42)

Considering that the village houses No. 36 – 38, 43 – 45, 47 – 50 and the mine accommodation camp (No. 39 – 42) are located >1 500 m from blasting activities and thus are in the low-risk blast zone, the potential impacts from fly rock, leading to structural damage, fatality or injury to people during operations is not expected to occur (taking the calculated blast unsafe zone limit of 519 m into account). Therefore, the potential fly rock impacts on these identified house structures, mine accommodation camp and members of the community is adverse, direct, medium term (>11 years life of mine) and partly reversible, as damage to structures is not expected to occur or the potential for loss of life or injury and if it were to occur, it would be minimal. The impact is regional, considering the distance of the houses and accommodation village from the blasting activities. The probability of the impact occurring is low, as the houses are located over 1 500 m from blasting activities and well outside the unsafe zone of 519 m. The sensitivity of the receptor is low and the magnitude of change low/minor, as damage to houses and the loss of livelihoods for the residents is expected to be low, if at all (but cannot be fully ruled out) and would not require assistance from the Proponent. Additionally, injury to human health is expected to be low due to the distance of the houses from operational activities. Therefore, the significance of this impact occurring is rated as adverse low, before mitigation (Table 40). Note that the village houses No. 36 - 38 are planned to be relocated, apart from No. 43 – 50. Mitigation measures are further described in the final ESMP (Appendix A).

7.7.3.4 Fly rock exceeding limits and possible damage to the built environment during operations, No. 51-D3714 Road and mine infrastructure such as No. 67 & 70 - explosives magazines, No. 69 - processing plant, No. 71 & 72 - mine buildings

Fly rock will have a greater influence on roads compared to ground vibration and air blast(s) as damage from falling debris may impact the road surface, if no control on fly rock is considered (BMC, 2025). The D3714 road is located approximately 500 m from blasting activities and therefore falls into the unsafe zone limit calculated as 519 m. The remainder of the built infrastructure is located within the 500 – 1 500 m medium risk zone, and are outside of the unsafe zone limit. Therefore, impacts of fly rock are expected on the D3714 road, however this road is planned to be relocated to the north/northwest of the Project site. During operations, the relocated road will fall into the medium sensitivity zone and the impacts will be reduced.

The potential fly rock impacts on the identified built infrastructure is adverse, direct, medium term (>11 years life of mine) and partly reversible, as damage to structures or roads could occur but not on a continuous basis and there is potential for the loss of life or injury. Structures will be repaired and injuries are expected to be minimal.

As the D3714 road borders the limit of the unsafe zone, this structure and road users utilising the road is at a greater risk of damage or injury sustained than employees or visitors on the mine site at the other structures. The impact is regional, as third-party road users utilise the D3714 road and employees are from the greater Erongo Region. However, this road is not as frequently used as the C36 road that is located to the south (S) of the Project site. The probability of the fly rock occurring is high, as the D3714 road is within the 519 m unsafe zone. The impact occurring on the processing plant, explosive magazines or mining buildings can also not ruled out entirely. The sensitivity of the receptor is medium and the magnitude of change very high, as damage to the D3714 road and potential for injury or loss of life could occur and assistance will be required from the Proponent to restore road surfaces and assist with medical injuries. Therefore, the significance of this impact occurring is rated as adverse moderate, before mitigation (Table 40). With mitigation the impact will be reduced to adverse low.

The mitigation measures are further discussed below and described in the final ESMP (Appendix A):

- Relocation of the D3714 road before construction and operational activities commence (as already planned by the Proponent);
- Implement a blast and vibration monitoring programme throughout the operational phase;
- Specific blast design to be done;
- Shorter distances between blast holes to be investigated and implemented where feasible during operations;

- Smaller diameter blast holes to be investigated and implemented where feasible during operations;
- Use of specific stemming materials to manage air blast;
- Increased stemming lengths to reduce air blast effect;
- Ensure proper clearance of unsafe areas prior to blasting; and
- Relocation of houses (structures) within 519 m from pit boundary

7.7.3.5 Fly rock exceeding limits and possible damage to local wildlife grazing points during operations of points of least concern (No. 24 – 26; 27 – 31 & 33 – 35)

Wildlife animal activities No. 27 – 31 (black rhino rubbing post, raptor nest and main hill/ridge habitat 1 – 3) and No. 33 – 35 (main hill/ridge habitat 5 – 7) are located approximately 2 681 m – 12 616 m from the blasting activities. Granite domes No. 24 – 26 is located approximately 3 958 m – 5 610 m from blasting activities.

All the above-mentioned receptors fall within the low sensitivity zone of blasting operations (>1500 m radius). Therefore, the potential fly rock impacts on these wildlife animal activities/ridges/granite domes will be adverse, direct, medium term (life of mine which is >11 years) and partly reversible, as fly rock impacts are not expected to occur due to the distance from blast activities and the safe zone limit commencing from 519 m. The scale of the impact is regional, due to the distance of the receptors from blasting activities and livestock and wildlife have not been previously exposed to blasting operations. The probability of this impact occurring is low, due to the distance of the receptors outside of the immediate highly sensitive blast zone (i.e. 500 m) and medium sensitivity zone (500 – 1500 m), therefore minimal influence is expected on livestock or wildlife. The value of sensitivity is expected to be low and magnitude of change very low/minor, as the residents, including their livestock and wildlife need minimal assistance to adjust to these changes from the influence of the fly rocks, which are not expected to occur or expected to be negligible (minimal). The overall significance of the impact is expected to be adverse low, before mitigation (Table 40). Mitigation measures have been included in the final ESMP (Appendix A).

7.7.3.6 Fly rock exceeding limits and possible damage to local wildlife grazing points during operations on No. 32 -wildlife animal activity (main hill/ridge habitat 4).

Wildlife animal activity No. 32 (main hill/ridge habitat 4) is located approximately 148 m from the blasting activities (i.e. high-risk zone of 500 m) and will experience the impacts of fly rock. The potential fly rock impact on the main hill/ridge habitat 4 (No. 32) will be adverse, direct, medium term for the duration of the Project (life of mine which is >11 years) and irreversible, as structural damage due to fly rock and the potential for injury or loss of life to local residents using this ridge to graze livestock, the livestock or wildlife grazing or residing here will occur. The scale of the impact is regional, as livelihoods will be influenced as this wildlife activity point will not be able to be used anymore for grazing as it falls within the 500 m sensitive

blast. Additionally, wildlife will not be able to graze here anymore and those nesting or living on burrows will be displaced and need to seek shelter elsewhere. Additionally, loss of life to the local community, livestock and wildlife is not replaceable. The probability of this impact occurring is high, as drill and blasting are operational activities that are required for effective open pit mining operations to remove overburden and extract the ore mineral. The direction and type of fly rock cannot be determine until after the blast has been executed.

The value of sensitivity is expected to be high and magnitude of change very high, due to the impacts on the village resident's livelihoods, livestock and wildlife due to permanent loss/damage to structures and injury or loss of life to receptors. The overall significance of the impact is expected to be adverse major, before mitigation (Table 40). With mitigation, the significance of the impact is reduced to adverse low.

The mitigation measures are further discussed below and described in the final ESMP (Appendix A):

- Biodiversity monitoring programmes to be implemented for operational activities;
- Implement a blast and vibration monitoring programme throughout the operational phase;
- Specific blast design to be done;
- Shorter distances between blast holes to be investigated and implemented where feasible during operations;
- Smaller diameter blast holes to be investigated and implemented where feasible during operations;
- Use of specific stemming materials to manage air blast;
- Increased stemming lengths to reduce air blast effect;
- Ensure proper clearance of unsafe areas prior to blasting; and
- Relocation of houses within 519 m from pit boundary, therefore including livestock (as already planned by the Proponent).

7.7.3.7 Fly rock exceeding limits and possible damage all twelve (12) identified heritage sites, which includes historic water pools, graves, built run, historic well, rock art and mine shaft

Due the distance of all heritage sites >1 500 m from blasting activities and thus in the low-risk blast zone, taking the calculated blast unsafe zone limit of 519 m into account, the potential impacts from fly rock, leading to structural damage to heritage sites during operations is not expected to occur. Therefore, the potential fly rock impacts on these identified heritage sites is adverse, direct, medium term (>11 years life of mine) and partly reversible, as damage to structures is not expected to occur and if it were to occur, it would be minimal. The impact is regional, taking the distance of the heritage sites into account the importance of cultural heritage in Namibia and in the local community. The probability of the impact occurring is low, as the heritage sites are located over 1 500 m from blasting activities and well outside the unsafe zone of 519 m. The sensitivity of the receptor is low, and the magnitude of change

is low/minor, as damage to heritage sites is expected to be low, if at all (but cannot be fully ruled out) and would not require assistance from the Proponent. Therefore, the significance of this impact occurring is rated as adverse low, before mitigation (Table 40). Mitigation measures are further described in the final ESMP (Appendix A).

7.7.3.8 Fly rock exceeding limits and possible damage to local water sources/boreholes during operations

Due the distance of all boreholes and the cement dam >1 500 m from blasting activities and thus in the low-risk blast zone, taking the calculated blast unsafe zone limit of 519 m into account, the potential impacts from fly rock, leading to structural damage to boreholes or the cement dam during operations is not expected to occur.

Therefore, the potential fly rock impacts on these identified heritage sites is adverse, direct, medium term (>11 years life of mine) and reversible, as damage to structures is not expected to occur and if it were to occur, it would be minimal. The impact is regional, taking the distance of the boreholes and cement dam into account the importance of water as a scarce resource in Namibia and in the local community. The probability of the impact occurring is low, as the boreholes and cement dam are located over 1 500 m from blasting activities and are well outside the unsafe zone of 519 m. The sensitivity of the receptor is low and the magnitude of change low/minor, as damage to boreholes and the cement dam is expected to be low, if at all (but cannot be fully ruled out) and would not require assistance from the Proponent. Therefore, the significance of this impact occurring is rated adverse low, before mitigation (Table 40). Mitigation measures are further described in the final ESMP (Appendix A).

7.7.3.9 Summary of operational blasting fly rock related impacts

Table 40 below provides a summary of the operational blasting fly rock impacts on receptors.

Table 40 - Impact assessment for direct impacts from operational blasting fly rock on receptors

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Blasting fly rock during operations	Community	Fly rock exceeding limits and possible damage to local village houses during operations, No. 23 (Katora) and No. 55 - 60.	Adverse Direct Irreversible Medium term Regional High probability	High	Very high	Adverse Major (9)
		Fly rock exceeding limits	Adverse Direct	Medium	Low/minor	Adverse Low (2)

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		and possible damage to local village houses and the accommodation village during operations, No. 52 - 54.	Partly reversible Medium term Regional Low probability			
		Fly rock exceeding limits and possible damage to local village houses during operations, all other houses of least concern including accommodation camp.	Adverse Direct Partly reversible Medium term Regional Low probability	Low	Low/minor	Adverse Low (1)
	Built environment	Fly rock exceeding limits and possible damage to the built environment during operations, No. 51-D3714 Road and mine infrastructure such as No. 67 & 70 - explosives magazines, No. 69 - processing plant, No. 71 & 72 - mine buildings.	Adverse Direct Partly reversible Medium term Regional High probability	Medium	Very high	Adverse Moderate (6)
		Fly rock exceeding limits	Adverse Direct	Low	Low/minor	Adverse Low (1)

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
	Terrestrial ecology and biodiversity	and possible damage to local wildlife grazing points during operations of points of least concern (No. 24 – 26; 27 – 31 & 33 – 35).	Partly reversible Medium term Regional Low probability			
		Fly rock exceeding limits and possible damage to local wildlife grazing points during operations on No. 32 - wildlife animal activity (main hill/ridge habitat 4).	Adverse Direct Irreversible Medium term Regional High probability	High	Very high	Adverse Major (9)
	Heritage	Fly rock exceeding limits and possible damage all twelve (12) identified heritage sites, which includes historic water pools, graves, built run, historic well, rock art and mine shaft.	Adverse Direct Partly reversible Medium term Regional Low probability	Low	Low/minor	Adverse Low (1)
	Water resources	Fly rock exceeding limits and possible damage to local water sources/borehol	Adverse Direct Reversible Medium term Regional	Low	Low/minor	Adverse Low (1)

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		es during operations	Low probability			

7.7.4 IMPACTS FROM NOXIOUS FUMES

The potential significant impacts or impacts that have specific interest to the community and stakeholders for operational drilling and blasting noxious fumes impacts, before mitigation, are summarised in Figure 97, for illustrative purposes only. Each specific impact is discussed in detail in the section below.

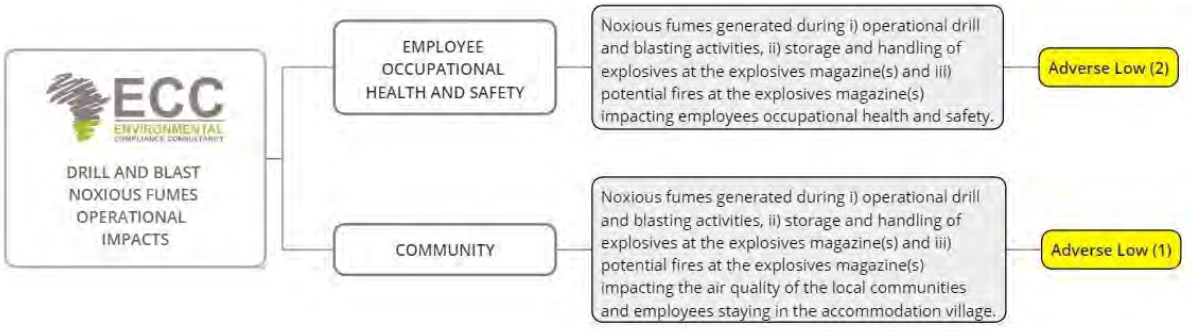


Figure 97 - Operational drill and blast and explosives magazine(s) noxious fumes impacts

Explosives used in the mining environment are required to be oxygen-balanced. Oxygen balance refers to the stoichiometry of the chemical reaction and the nature of gases produced from the detonation of the explosives. The creation of poisonous fumes such as nitrous oxides (N_20) and carbon monoxide (CO) is particularly undesirable. These fumes present themselves as red brown cloud after the blast has detonated, 10 to 20 parts per million (ppm) can be mildly irritating, exposure to >150 ppm could cause death from pulmonary oedema and that 50% lethality would occur following exposure to 174 ppm for one (1) hour. Anybody exposed must be taken to the hospital for proper treatment (BMC, 2025).

Factors contributing to undesirable fumes are typically (BMC, 2025):

- Poor quality control on explosive manufacture;
- Damage to the explosive;
- lack of confinement;
- insufficient charge diameter;
- Excessive sleep time;
- Water in blast holes;
- Incorrect product used or product not loaded properly; and
- Specific types of rock/geology can also contribute to fumes.

Note that the air quality impacts to employees and third parties from the legal requirement to burn explosive material waste are discussed under air quality impacts and not discussed further in this section.

7.7.4.1 Noxious fumes generated during i) operational drill and blasting activities, ii) storage and handling of explosives at the explosives magazine(s) and iii) potential fires at the explosives magazine(s) impacting employee's occupational health and safety

Noxious fumes are associated with industrial activities, such as mining, as a by-product of the specific aspect and are a hazard to human health if inhaled. If controls are not effectively in place for activities associated with blasting, which are drilling, storage and handling of explosive materials, the chemicals utilised and the chemical reactions could lead to the release of noxious fumes into the immediate surrounding environment. Mishandling and not following the legislative or site procedural requirements around storage areas for explosives or during handling and deposition into blast holes (e.g. smoking) could also lead to fires, that release chemical fumes. Employees are most at risk due to the direct interaction with the activities and chemicals utilised during day-to-day operational activities. Since blasting controls are required to be strictly controlled on the mine site and staff handling blast materials are required to be trained or legally compliant and wear the required PPE, exposure to fumes is expected to be low. The occurrence of fumes in the form of the NOx gas is not a given and is very dependent on various factors. However, the occurrence of fumes should be closely monitored.

The potential occupational health and safety impacts from noxious fumes released during operational drill and blast activities, storage and handling of explosive materials and potential fires to the mine employees during operations will be adverse, direct, medium term (life of mine which is >11 years) and reversible, due to the limited time employees are exposed to fumes during their eight (8) hour shifts and not over a twenty-four (24) hour period. Therefore, employees are able to recover from inhalation and seek immediate medical attention if exposure is of concern, as paramedics are legally required to be stationed on the mine site. Additionally, for fires, the length of the burn time will not be known but there are fire extinguishers and fire services required on mining sites that will assist to extinguish fires. The scale of the impact is local, as the exposure will be in the direct working areas where the activities are taking place. The probability of this impact occurring is medium (possible), as fumes are expected to be released during operational activities from the above-mentioned blasting related activities. The value of sensitivity is expected to be low and magnitude of change moderate, as the receptors are mine employees that will be able to recover with assistance from the Proponent when exposed to the fumes and the exposure will only be for a short term. The overall significance of the impact is expected to be adverse low, before mitigation (Table 41). Mitigation measures and the required controls that will be implemented to prevent occupational health and safety impacts on employees as a result of noxious fumes from blasting activities are discussed in the final ESMP (Appendix A).

7.7.4.2 Noxious fumes generated during i) operational drill and blasting activities, ii) storage and handling of explosives at the explosives magazine(s) and iii) potential fires at the explosives magazine(s) impacting the air quality of the local communities and employees staying at the accommodation village

Community receptors that could be exposed to noxious fumes resulting from operational drill and blast activities, storage and handling of explosives and potential fires include mine operations staff staying at the mine accommodation camp, third party receptors located south (S) of mining operations or new users of the diverted D3714 road during operations (500 – 1 500m). The C36 road located to the south of the project site (> 1 500m) can also be considered. Since community members residing within the high (>500 m) and medium risk areas (500 – 1 500 m) sensitivity zones of the operational activities will be relocated, the closest living residents are located south (S) of the mine site, within the low sensitivity rating area (>1 500 m). Village house No. 43 is closest to the mining activities as it is located approximately 2 343 m from the pit edge while village house No. 50 is located approximately 116 m away. The accommodation village is adjacent to these village houses (No. 39 – 42) and are located approximately 3 146 and 3 990 m, respectively from the edge of the pit. Based on the distance of the receptors to the associated blasting activities that could produce noxious fumes, exposure to fumes will be low.

The potential community health impacts from noxious fumes released during operational drill and blast activities, storage and handling of explosive materials and potential fires to the mine employees during operations will be adverse, indirect, medium term (life of mine which is >11 years) and reversible, due to the limited direct exposure of third party receptors to these fumes, as exposure could only occur from wind dispersal. The scale of the impact is local, as the exposure will be in the direct working areas where the activities are taking place. The probability of this impact occurring is low, due to the distance of receptors from the related blasting activities. The value of sensitivity is expected to be low and magnitude of change low/minor, as the receptors are only expected to be exposed to fumes when meteorological conditions account for this and will be able to recover if exposed to fumes, as fumes will also be diluted at the distance from operational activities. The overall significance of the impact is expected to be adverse low, before mitigation (Table 41). Mitigation measures and the required controls that will be implemented to prevent community health impacts as a result of noxious fumes from blasting activities are further discussed in the final ESMP (Appendix A).

7.7.4.3 Summary of operational drill and blast and explosives magazine(s) noxious fumes impacts

Table 41 below provides a summary of the drill and blast and explosives magazine(s) noxious fumes impacts on receptors.

Table 41 - Impact assessment for direct and indirect impacts from operational drill and blast and explosives magazine(s) noxious fumes on receptors

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Drill and blast and explosive magazine(s) noxious fumes during operations	Employee occupational health and safety	Noxious fumes generated during i) operational drill and blasting activities, ii) storage and handling of explosives at the explosives magazine(s) and iii) potential fires at the explosives magazine(s) impacting employee's occupational health and safety.	Adverse Direct Reversible Medium term Local Medium probability	Low	Moderate	Adverse Low (2)
	Community	Noxious fumes generated during i) operational drill and blasting activities, ii) storage and handling of explosives at the explosives magazine(s) and iii) potential fires at the explosives magazine(s) impacting the air quality of the local communities and employees staying in the	Adverse Indirect Reversible Medium term Local Low probability	Low	Low/minor	Adverse Low (1)

Activity	Receptor/s	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		accommodation village.				

7.8 SOCIAL ENVIRONMENT: VISUAL AND SENSE OF PLACE IMPACTS

The Project is classified as a Greenfields Project that will permanently change the physical landscape and character of the area. Five gravel district roads, namely the D3714, D3712, D2344, D3715 and C36, offer potential viewpoints from which mining infrastructure, activities and earthworks may be visible to third party receptors for the Project. Local communities and residents, along with passing motorists and tourists, may experience visual amenity impacts from the construction and operational activities associated with the development of the open pit, WRDs, TSF and associated operational infrastructure. The D3714 is proposed for realignment around the northern boundary of the mine site (as shown in Figure 13). While it will not pass directly through the mining area, elements of the mine layout and infrastructure will remain visible through the LOM.

Figure 40, Figure 41 and Figure 42 present the results of the viewshed analysis from the north, east, south and west directions, at distances of 5 km, 10 km and 20 km, respectively, from the Project site. In these figures, the areas in yellow indicate locations that are visible from the respective observer points. This analysis demonstrates the extent to which mining operational infrastructure and disturbed areas may be visible from various directions, distances and vantage points, helping to identify sensitive viewpoints and potential impacted receptors. A summary of these findings is listed below:

- From the 5 km observation points construction related activities including earthworks, operational earthworks and landscape changes, as well as mining infrastructure, will likely be visible from all four main wind directions;
- At a distance of 10 km visibility is primarily limited to the WRDs, which are most apparent from the western through to the northern viewpoints;
- At 20 km observation points the WRDs, TSF and processing plant are predominantly visible from the east; and
- For the viewshed analysis, only the dominant viewing directions were assessed in relation to key areas of interest, such as roads and farms. It is therefore possible that the construction and operational earthworks and landscape changes, as well as mining infrastructure, may also be visible from other angles, directions and distances that were not analysed in the viewshed analysis.

Although progressive rehabilitation will assist in reducing these impacts, the presence of earthworks and hauling overburden from the pit will be particularly noticeable given the relatively flat terrain of the mining area and dust created during clearing activities. The Project site, including its open pit and potential borrow pit(s), is located close to several receptors.

This includes nearby communities (the Tsiseb, Ohungo and Otjimboyo communal conservancies) and village houses to the south that will not be relocated (2.27 km from the Project site edge of final pit layout (nearest homestead)). Progressive rehabilitation requirements should be implemented to minimise visual amenity impacts and facilitate the integration of disturbed areas into the surrounding landscape, thereby reducing their visual prominence to receptors.

7.8.1 DESIGN AND PLANNING PHASE

Proper planning and design are essential to reduce potential adverse visual impacts on the surrounding environment. Mining projects often result in a loss of sense of place due to large-scale alterations of the natural landscape. The Kokoseb Gold Mine will be located between Omaruru and Uis, as well as en route to the popular Twyfelfontein / Damaraland tourism destination. Although the D3714 road traversing the mining area, proposed to be diverted, is not one of the primary tourist routes, the C36 and D2344 roads are more likely to be used by visitors travelling to these areas. Nevertheless, visual disturbances associated with the mine may still adversely affect nearby villages, communities and farm owners who occasionally use these roads.

The potential visual impacts related to the design and planning phase of the Kokoseb Project, before mitigation, can be seen in Figure 98 and are summarised in Table 42.

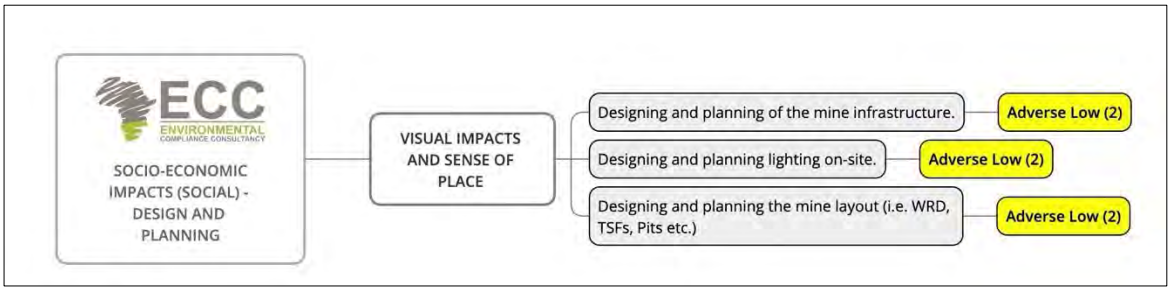


Figure 98 - Visual and sense of place impacts – design and planning phase

During the design and planning phase, the following should be carefully avoided:

- Inadequate planning and design of mine infrastructure (e.g., poor colour selection, inappropriate siting of facilities, and unsuitable lighting), which could amplify negative visual impacts;
- Improper site selection or orientation of infrastructure, as this may result in prominent visual intrusion when observed from key viewpoints, including surrounding communities, public roads, and tourist areas; and
- Poorly designed lighting systems, which can cause light pollution, degrade dark sky conditions, and alter the visual character of the area.

Integrating visual sensitivity considerations into the design stage is therefore critical to minimising long-term impacts on the landscape and preserving the area's overall sense of place.

7.8.1.1 Designing and planning of the mine infrastructure

The early design and planning of mine infrastructure plays a critical role in determining the scale and visibility of future visual impacts. Inadequate planning, such as inappropriate siting of facilities, poor colour selection, or failure to integrate infrastructure with the surrounding topography, can increase the prominence of the mine in the landscape and reduce its compatibility with the surrounding environment.

The impact is assessed as direct, reversible, temporary and on-site, with a medium probability of occurrence if design considerations are overlooked. The magnitude of change is considered low / minor, while receptor sensitivity is rated medium, given the presence of surrounding villages, farms and tourist routes.

Although the impact is rated as adverse low (Table 42), the following mitigation measures should be considered, integrating visual sensitivity considerations into the design stage as well as taking note of the potential design flaws mentioned in section 7.8.1.1. These requirements are included in the final ESMP (Appendix A).

7.8.1.2 Designing and planning lighting on site

Lighting design during the planning phase is essential to minimise future light pollution and skyglow that may affect surrounding communities and the region's natural dark skies. Poorly planned lighting layouts, inappropriate light types and unnecessary illumination could increase visual disturbance during operations.

The impact is assessed as direct, reversible, temporary and on-site, with a medium probability of occurrence if design considerations are overlooked. The magnitude of change is considered low / minor, while receptor sensitivity is rated medium, as communities, farms and tourism assets place value on dark sky conditions.

Although the impact is rated as adverse low (Table 42), the following mitigation measures should be considered: the implementation of downward-directed, shielded lighting, limited night-time illumination and use of appropriate light intensity (white light versus yellow lighting). These requirements are included in the final ESMP (Appendix A).

7.8.1.3 Designing and planning the mine layout (i.e WRDs, TSF and pit)

The layout of major mining components such as WRDs, TSFs and the two pits will strongly influence the Project's long-term visual footprint. Poorly planned positioning of these features

can result in highly visible and intrusive landforms, particularly when located near sensitive receptors such as villages, roads or tourist areas.

The impact is assessed as direct, reversible, temporary and on-site, with a medium probability of occurrence if design considerations are overlooked. The magnitude of change is considered low / minor, while receptor sensitivity is rated medium, given the visibility of these landforms over long distances and their potential to alter the sense of place.

Although the impact is rated as adverse low (Table 42), the following mitigation measures should be considered: carefully selecting locations, aligning landforms with natural topography, applying progressive shaping and rehabilitation. These requirements are included in the final ESMP (Appendix A).

Table 42 - Visual and sense of place impacts – design and planning phase

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Design and planning Design and planning Design and planning	Farmers Community Motorists Tourists	Designing and planning of the mine infrastructure	Adverse Direct Reversible Temporary On-site Medium Probability	Medium	Low / Minor	Adverse Low (2)
		Designing and planning lighting on-site	Adverse Direct Reversible Temporary On-site Medium Probability	Medium	Low / Minor	Adverse Low (2)
		Designing and planning the mine layout (i.e. WRD, TSFs, Pits, etc.)	Adverse Direct Reversible Temporary On-site Medium Probability	Medium	Low / Minor	Adverse Low (2)

7.8.2 CONSTRUCTION PHASE

During the construction phase, communities and residents within and around the EPL area may experience a loss of sense of place due to accelerated landscape transformation. Construction activities, stockpiling and the establishment of WRDs and the TSF may be visible

from surrounding communities, local roads and tourist routes, as indicated in Figure 40, Figure 41 and Figure 42; however, the heights and sizes of infrastructure used in the viewshed maps apply mainly to the operational phase. Potential visual disturbances include temporary fragmentation of the landscape and increased nighttime illumination from construction lighting. These changes may affect the visual amenity of the area and alter its aesthetic appeal.

The potential visual impacts related to the construction phase of the Kokoseb Project, before mitigation, can be seen in Figure 99 and are summarised in Table 43.

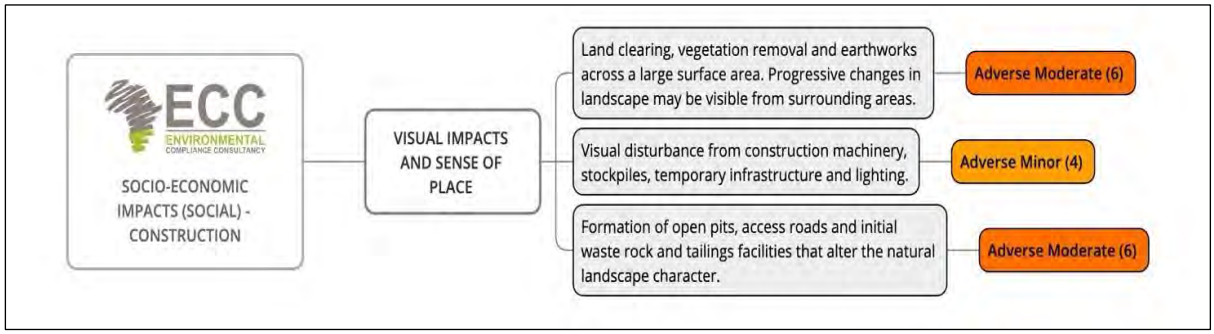


Figure 99 - Visual and sense of place impacts – construction phase

7.8.2.1 Land clearing, vegetation removal, and earthworks across a large surface area. Progressive changes in the landscape may be visible from the surrounding areas.

During construction, extensive land clearing, vegetation removal and earthworks will take place across a relatively large area. These activities will progressively alter the natural landscape, resulting in noticeable changes visible from surrounding areas. The impact is assessed as direct, partly reversible, short-term (2 years) and local, which will mainly be during construction earth works and land clearing and is mainly expected to impact the surrounding communities, residents and tourists using nearby roads. The chance of occurrence is definite as these activities are required for the setting up of the Project. The magnitude of change has been classified as moderate and the sensitivity of the receptor as medium. The impact is rated as adverse moderate, primarily due to the scale of disturbance and the sensitivity of receptors surrounding the site, including nearby villages that will remain in place (Table 43). This represents a major change to the landscape and may result in a potential loss of sense of place.

With the application of mitigation measures, such as careful site planning, limiting clearing to essential areas and in phases, retaining vegetation near sensitive boundaries, dust suppression, community liaison and progressive rehabilitation, the residual impact could be reduced to adverse minor. These requirements are included in the final ESMP (Appendix A).

7.8.2.2 Visual disturbance from construction machinery, stockpiles, temporary infrastructure, increase in road traffic and lighting

The presence and movement of construction machinery, stockpiles, temporary infrastructure, increase in road traffic and lighting during the construction phase will potentially cause visual disturbance to nearby receptors. These effects, while temporary, may still diminish the natural character of the area, particularly when observed from surrounding communities and roads.

The impact is assessed as direct, partly reversible, short-term (2 years) and local, which will mainly be applicable during the construction of the plant, associated infrastructure and earthworks. This is also only expected to impact the surrounding communities and residents. The chance of occurrence is high probability as these activities are required for the construction and installation of mining infrastructure and associated earthworks. The magnitude of change has been classified as moderate and the sensitivity of the receptor as medium, which is mainly due to the sensitivity of receptors surrounding the site, including nearby villages that will remain in place, which may be affected by the sudden alteration of their surroundings and the resulting loss of sense of place caused by the introduction of machinery, man-made infrastructure and large-scale earthworks.

The impact is assessed as adverse minor (Table 43). Mitigation measures are included in the final ESMP (Appendix A).

7.8.2.3 Formation of open pits, access roads, and initial waste rock and tailings facilities that alter the natural landscape character

The development of open pits, access roads and the establishment of waste rock and initial tailings facilities will alter the natural landscape character. These features introduce lasting changes that contrast with the surrounding environment and may be visible from multiple vantage points. The impact is assessed as direct, partly reversible, short-term and local, which will mainly be applicable during landscape preparation and construction of the WRDs, TSF, pits and other associated earthworks. This is also only expected to impact the surrounding communities during the construction phase. The chance of occurrence is definite, as these activities will occur during the construction of these features and will also be clearly visible to the surrounding areas due to the height and nature of these sites.

The magnitude of change is classified as moderate, with receptor sensitivity assessed as medium. This is largely due to the presence of nearby villages that will remain in place and be directly exposed to the alterations.

Such changes may influence the area's sense of place, as local communities are accustomed to a relatively undisturbed landscape and way of life. The rapid transformation of the environment is therefore expected to diminish this sense of place.

The impact is rated as adverse moderate (Table 43) due to the permanence of landscape alteration. Implementation of mitigation measures, including sensitive alignment of access roads, appropriate engagement with the communities prior to any major landscape changes or construction activities and progressive rehabilitation, could potentially reduce the impact to adverse minor. These requirements are included in the final ESMP (Appendix A).

Table 43 - Visual and sense of place impacts – construction phase

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction (landscape change)	Farmers Community Motorists Tourists	Land clearing, vegetation removal, and earthworks across a large surface area. Progressive changes in the landscape may be visible from the surrounding areas.	Adverse Direct Partly reversible Short term Local Definite	Medium	Moderate	Adverse Moderate (6)
Construction	Farmers Community Motorists Tourists	Visual disturbance from construction machinery, stockpiles, temporary infrastructure and lighting.	Adverse Direct Partly reversible Short term Local High probability	Medium	Moderate	Adverse Minor (4)
Construction (mining)	Farmers Community Motorists	Formation of open pits, access	Adverse Direct	Medium	Moderate	Adverse Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
	Tourists	roads, and initial waste rock dumps and tailings storage facility that alter the natural landscape character.	Partly reversible Short term Local Definite			

7.8.3 OPERATIONAL PHASE

Mining operations will introduce several permanent or semi-permanent visual features into the landscape. WRDs may be visible within a 5, 10 and 20 km radius, potentially altering the landscapes sense of place and constituting a noticeable visual intrusion, including from village houses located approximately 2.27 – 3 km south of the edge of the open pit boundary, which will not be relocated. The TSF will also be visible from several kilometres away and may further contribute to visual disturbances. The processing plant, due to its height and industrial appearance, will likely be a dominant feature, visible from nearby settlements, including the village houses 3.5 – 4 km to the southwest. Linear infrastructure such as access roads, pipelines and powerlines may create visual lines and disrupt the natural cohesion of the landscape. Night-time illumination could increase skyglow, impacting both community views and tourist experiences. These changes may collectively diminish the area's aesthetic value, potentially reducing tourism appeal.

The potential visual impacts related to the operational phase can be seen in Figure 100 and are also outlined in Table 44.

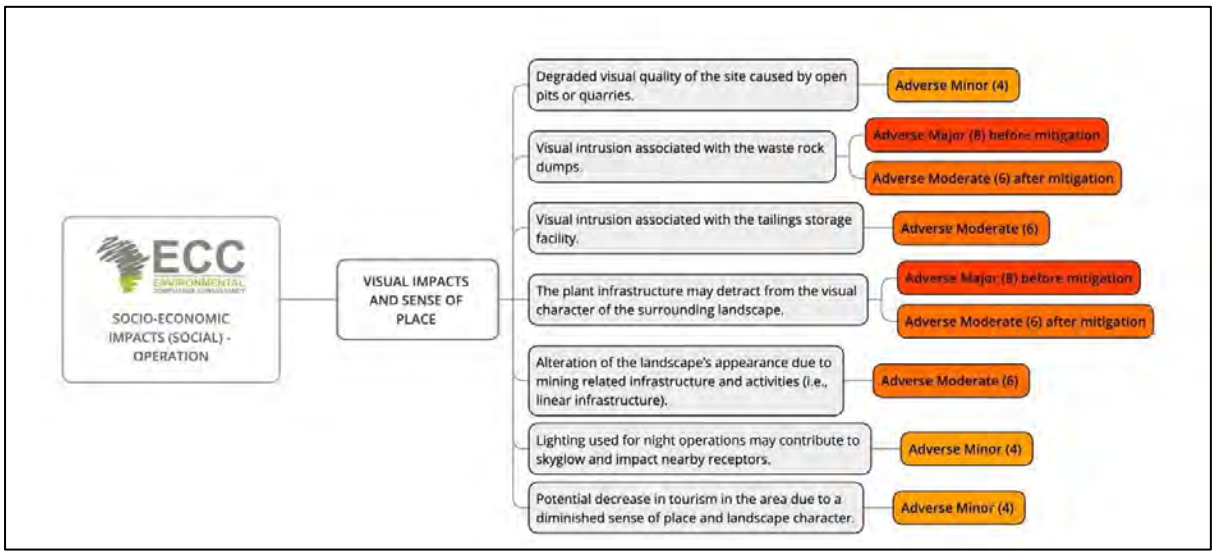


Figure 100 - Visual and sense of place impacts – operational phase

7.8.3.1 Degraded visual quality of the site caused by open pits or quarries

The presence of large open pits and quarry areas will significantly alter the natural landscape, reducing its overall visual quality. These features form strong contrasts with the surrounding environment and are likely to be visible from several nearby viewpoints, although visibility from further distances is expected to be limited by the surrounding topography and the presence of larger features such as WRDs and TSF.

The impact is assessed as direct, irreversible, permanent and local, reflecting the inherent nature of open pits, which typically result in long-lasting and irreversible alterations to the landscape. The likelihood of this impact is considered medium, as the open pits will be actively mined during the operational phase of the Project. However, their visibility may be partially reduced by intervening features such as WRDs, other mine infrastructure or forms of progressive rehabilitation. The magnitude of change has been classified as moderate and the sensitivity of the receptor as medium, which is mainly due to the sensitivity of receptors surrounding the site, including nearby villages that will remain in place, as well as adjacent roads (i.e., used by tourists and local residents) from which the open pits and quarry areas may be visible.

The impact is assessed as adverse minor (Table 44). Mitigation measures are included in the final ESMP (Appendix A).

7.8.3.2 Visual intrusion associated with the waste rock dumps

Waste rock dumps represent one of the most prominent and visually intrusive elements of mining operations. Their scale, shape and colour often stand in contrast with the surrounding landscape, creating long-term visual impacts.

The impact is assessed as direct, irreversible, permanent and local, which is mainly due to the nature of WRDs in general, resulting usually in permanent irreversible changes to the landscape. The chance of impact occurring is a definite as these activities will occur during the operational phase of the Project. The magnitude of change has been classified as major/high and the sensitivity of the receptor as medium, which is mainly due to the sensitivity of receptors surrounding the site, including nearby villages that will remain in place, as well as roads (i.e., used by tourists and local residents) and other receptors such as Farm Gross Okombahe, from which the WRDs may be visible, as indicated in Figure 40, Figure 41 and Figure 42.

The impact is rated as adverse major (Table 44). By incorporating measures such as shaping dumps to blend in with the topography and progressive revegetation and rehabilitation. The latter is the best mitigation and a critical part of the Namibian Mine Closure Framework (Chamber of Mines of Namibia, 2010). When applying these mitigation measures, the impact can potentially be reduced to adverse moderate. These requirements have been included in the final ESMP (Appendix A).

The higher ratings are mainly attributed to the scale and height of the WRDs, ranging from 45 m (northern WRD) to 59 m (western WRD), which will be visible over long distances and result in substantial changes to the landscape for nearby communities and villages that remain in place.

7.8.3.3 Visual intrusion associated with the tailings storage facility

The TSF introduces another significant and visually dominant feature into the landscape. Its size and artificial form can detract from the natural scenery and remain visible over long distances.

The impact is assessed as direct, irreversible, permanent and local, which is mainly due to the nature of TSFs in general, resulting usually in permanent irreversible changes to the landscape. The chance of impact occurring is a definite as the TSF will form part of the operational phase of the Project.

The magnitude of change has been classified as moderate and the sensitivity of the receptor as medium. This is largely due to the sensitivity of receptors surrounding the site, including nearby villages that will remain in place, as well as adjacent roads from which the TSF may be visible for nearby residents or tourists. Although the TSF is a dominant feature, the WRDs will block views from certain directions.

The main visual impact will be experienced by receptors to the east of the TSF, primarily within 5 km, while topography is expected to screen views at around 10 km. However, the TSF may again become visible from approximately 20 km, as indicated in Figure 40 and Figure 42, respectively.

The impact is considered adverse moderate (Table 44). With the introduction of mitigation measures, including careful site placement and progressive rehabilitation, the impact is lowered to adverse minor. These requirements have been included in the final ESMP (Appendix A).

7.8.3.4 The plant infrastructure may detract from the visual character of the surrounding landscape

The processing plant and associated infrastructure will introduce large-scale industrial features into the landscape. Their form and artificial appearance are likely to detract from the natural visual character of the surrounding area, particularly when viewed from nearby receptors such as communities and roads.

The impact is assessed as direct, partly reversible, long-term (11 years) and local, with a definite likelihood of occurrence during the operational phase. The magnitude of change is classified as major/high, while receptor sensitivity is considered medium, given the presence of villages that will remain in place and be exposed to these anthropogenic changes.

The impact significance is therefore rated as adverse major (Table 44). Through mitigation measures such as appropriate colour selection of buildings, low-profile design where feasible, screening and integration of the plant into the surrounding topography, the impact may be reduced to an adverse moderate.

The major significance is primarily attributed to the sensitivity of nearby receptors from which the plant infrastructure will be visible. The scale and height of the structures (up to 20 m) further contribute to this significance, as the area currently lacks industrial-type developments. The introduction of such features may alter the sense of place for surrounding communities. These requirements have been included in the final ESMP (Appendix A).

7.8.3.5 Alteration of the landscape's appearance due to mining related infrastructure and activities (i.e., linear infrastructure)

Mining-related linear infrastructure, including access roads, powerlines and conveyors, will alter the natural appearance of the landscape. These features create visible artificial lines that disrupt the natural topography and can extend across long distances, thereby introducing potential visual impacts.

The impact is considered direct, partly reversible, long-term (11 years) and local, with a definite likelihood of occurrence. The magnitude of change is classified as moderate, with receptor sensitivity also rated medium due to the exposure of surrounding communities and travellers using nearby roads.

As such, the impact is rated as adverse moderate (Table 44). By aligning new routes with existing infrastructure corridors, progressive rehabilitation of disturbed areas and avoiding unnecessary linear developments (where feasible), the residual impact can be reduced to an adverse minor. These requirements have been included in the final ESMP (Appendix A).

7.8.3.6 Lighting used for night operations may contribute to skyglow and impact nearby receptors

Lighting required for night-time mining and plant operations (shift work) may contribute to skyglow and localised light intrusion, affecting nearby receptors and diminishing dark sky conditions in the region. These effects may alter the natural nighttime character of the area, which is valued for its remoteness and clear skies.

The impact is assessed as direct, reversible, long-term (operational 11 years) and local, with a medium probability of occurrence. The magnitude of change is classified as high / major, while receptor sensitivity is rated medium, given that both communities and tourism-related receptors value Namibia's natural nightscape.

The impact is rated as adverse minor (Table 44). Mitigation measures are included in the final ESMP (Appendix A).

7.8.3.7 Potential decrease in tourism in the area due to a diminished sense of place and landscape character

Tourism in the surrounding region is strongly tied to the area's natural landscape and sense of place, particularly given the proximity to destinations such as Twyfelfontein and Damaraland. The introduction of increased traffic volumes on the roads, large-scale mining infrastructure, waste dumps, and associated visual alterations may reduce the scenic appeal and deter some visitors, leading to potential indirect socio-economic effects.

The impact is assessed as indirect, partly reversible, long-term and regional, with a medium probability of occurring depending on the effectiveness of mitigation. The magnitude of change is classified as moderate, while receptor sensitivity is rated medium due to the importance of tourism as a regional economic driver. The specific area is not a tourism hotspot, with almost no major tourism establishments nearby (within 40 km of the proposed site), however the D3714 road will pass directly north of the Kokoseb Project and C36 to the south, which is a major route to Uis from Omaruru.

The impact significance is rated as adverse minor (Table 44). Mitigation measures are included in the final ESMP (Appendix A).

Table 44 - Visual and sense of place impacts – operational phase

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Operations (Mining)	Farmers Community Motorists Tourists	Degraded visual quality of the site caused by open pits or quarries.	Adverse Direct Irreversible Permanent Local Medium probability	Medium	Moderate	Adverse Minor (4)
Operations (Mining)	Farmers Community Motorists Tourists	Visual intrusion associated with the waste rock dumps.	Adverse Direct Irreversible Permanent Local Definite	Medium	High / Major	Adverse Major (8)
Operations (Mining)	Farmers Community Motorists Tourists	Visual intrusion associated with the tailings storage facility.	Adverse Direct Irreversible Permanent Local Definite	Medium	Moderate	Adverse Moderate (6)
Operations (structures)	Farmers Community Motorists	The plant infrastructure may detract from the visual character of the surrounding landscape.	Adverse Direct Partly reversible Long-term Local Definite	Medium	High / Major	Adverse Major (8)
Operations (structures)	Farmers Community Motorists Tourists	Alteration of the landscape's appearance due to mining	Adverse Direct Partly reversible Long-term Local Definite	Medium	Moderate	Adverse Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
		related infrastructure and activities (i.e., linear infrastructure)				
Operations (lighting)	Farmers Community Motorists Tourists	Lighting used for night operations may contribute to skyglow and impact nearby receptors.	Adverse Direct Reversible Long term Local Medium probability	Medium	High / Major	Adverse Minor (4)
Operations (tourism)	Farmers Community Motorists Tourists	Potential decrease in tourism in the area due to a diminished sense of place and landscape character.	Adverse Indirect Partly reversible Long term Regional Medium probability	Medium	Moderate	Adverse Minor (4)

7.8.4 DECOMMISSIONING PHASE

The removal of the processing plant infrastructure, operational infrastructure, linear infrastructure and other facilities during decommissioning may reveal previously covered disturbed areas, increasing visual exposure and dust emissions. Dismantling activities and associated vehicle movements could temporarily heighten visual disruption for nearby receptors. Without effective rehabilitation residual landforms, including WRDs, the TSF, open pits and borrow areas, may remain as prominent visual scars on the landscape. Long-term visual legacy impacts can be avoided through careful landform reshaping, vegetation restoration and integration of disturbed areas into the surrounding environment.

The potential visual impacts related to the decommissioning phase can be seen in Figure 101 and are also outlined in Table 45.

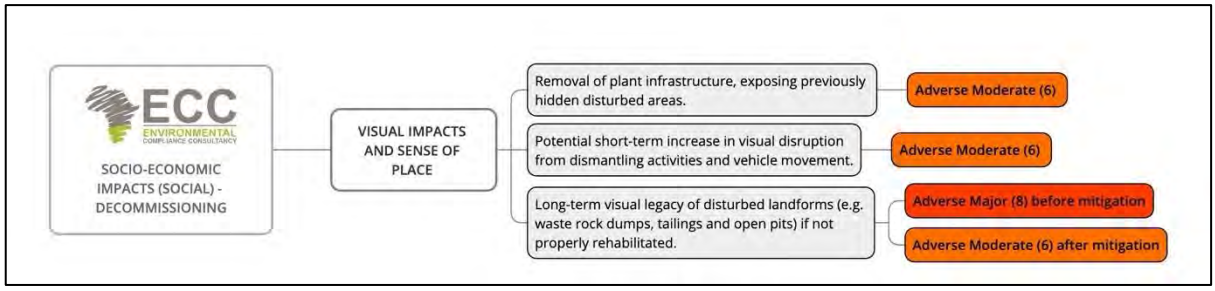


Figure 101 - Visual and sense of place impacts – decommissioning phase

7.8.4.1 Removal of plant infrastructure, exposing previously hidden disturbed areas

The dismantling and removal of plant infrastructure will uncover previously concealed disturbed areas, including compacted ground, service corridors, potential contaminated soil and cleared vegetation zones. While removal reduces the industrial presence in the landscape, it also temporarily exposes barren surfaces that contrast sharply with the surrounding environment and increase dust emissions.

The impact is assessed as direct, partly reversible, permanent and local, with a high probability of occurrence during the decommissioning phase. The magnitude of change is considered moderate, while receptor sensitivity is rated medium, given the proximity of communities, tourists and land users who may observe these exposed areas. Certain disturbances, such as surface scarring and soil compaction, will result in permanent damage. The impact is therefore rated as adverse moderate (Table 45). With appropriate rehabilitation, including reshaping and revegetation, the residual impact can be reduced to an adverse minor. These requirements have been included in the final ESMP (Appendix A).

7.8.4.2 Potential short-term increase in visual disruption from dismantling activities and vehicle movement

Decommissioning will involve the use of heavy vehicles, cranes and equipment for dismantling and transport of plant components, thus increasing traffic, especially abnormal loads, on adjacent Project roads. These activities may generate short-term visual disruption through movement, dust and temporary stockpiling of materials.

The impact is assessed as direct, reversible, short-term and local, with a definite likelihood of occurring during dismantling. The magnitude of change is classified as moderate, while receptor sensitivity is considered medium due to nearby villages and roads (i.e., used by tourists and local residents) where the activities may be visible. The impact is however, considered to only last for a short term during the decommissioning phase.

The impact is rated as adverse moderate (Table 45). With mitigation, such as dust suppression, controlled traffic management and phased dismantling to minimise visible disruption, the impact can be reduced to adverse minor. These requirements have been included in the final ESMP (Appendix A).

7.8.4.3 Long-term visual legacy of disturbed landforms (e.g. residual dumps, tailings, pits, and borrow areas) if not properly rehabilitated

If not properly rehabilitated, disturbed landforms such as waste rock dumps, the tailings storage facility, open pits, linear infrastructure and borrow areas will remain as permanent scars on the landscape, creating a lasting visual legacy that detracts from the area's natural character.

The impact is assessed as direct, irreversible, permanent and local, with a definite likelihood of occurrence in the absence of proper rehabilitation. The magnitude of change is considered major / high, while receptor sensitivity is rated medium, reflecting the presence of nearby communities, farms, tourists and nearby roads.

Accordingly, the impact is rated as adverse major (Table 45). Implementation of progressive and final rehabilitation, in line with the Namibia Mine Closure Framework (add ref here), is critical to reducing long-term effects. Effective shaping of landforms, revegetation with indigenous species and post-closure monitoring can reduce the impact to adverse moderate, or lower if rehabilitation proves successful over time. Liaison with landowners and adjacent communities is required to reach agreed upon closure objectives. These requirements have been included in the final ESMP (Appendix A).

Table 45 - Visual and sense of place impacts - decommissioning

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Decommissioning	Farmers Community Motorists Tourists	Removal of plant infrastructure, exposing previously hidden disturbed areas.	Adverse Direct Partly reversible Permanent Local High Probability	Medium	Moderate	Adverse Moderate (6)
Dismantling	Farmers Community Motorists Tourists	Potential short-term increase in visual disruption from	Adverse Direct Reversible Short term Local Definite	Medium	Moderate	Adverse Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
		dismantling activities and vehicle movement.				
Decommissioning	Farmers Community Motorists Tourists	Long-term visual legacy of disturbed landforms (e.g. residual dumps, tailings, pits, and borrow areas) if not properly rehabilitated.	Adverse Direct Irreversible Permanent Local Definite	Medium	High / Major	Adverse Major (8)

7.9 SOCIAL ENVIRONMENT: AIR QUALITY IMPACTS

Air quality is influenced by the concentration and particle size of solid particulate matter (PM) and chemical pollutants in the atmosphere over a given period of time. Airborne emissions such as PM (categorised according to particle size and composition i.e. (total suspended particles (TSP), PM_{10} and $PM_{2.5}$), gaseous pollutants (sulphur dioxide (SO_2), nitrogen oxide (Nox), volatile organic compounds (VOCs) carbon monoxide (CO)) can affect human health, ecological systems and overall integrity of the atmosphere. Dust and gaseous pollutants are anticipated from Project activities throughout the construction, operational and decommissioning phases. Dispersion of these emissions will likely be controlled by the prevailing south-westerly winds, which will influence the extent on surrounding areas and the air quality sensitive receptors (AQSRs).

Airshed Planning Professionals (Pty) Ltd (Airshed) was commissioned in 2025 to undertake an air quality impact assessment study for the Project and develop dispersion models to quantify the potential impacts of the proposed activities on the surrounding environment and human health (Appendix H .

Project activities such as land clearing, earthworks, material handling (e.g. ore extraction, haulage, crushing, processing and waste rock dumping), operation of heavy machinery and vehicle fleets, blasting, mineral processing and fuel combustion are expected to generate dust and gaseous emissions. These emissions may result in temporary or long-term changes in ambient air quality within and beyond the Project site.

The construction, operational and decommissioning phases present distinct sources of air emissions and associated impact pathways. Air quality impacts are therefore assessed per Project phase to ensure that appropriate mitigation and management measures are developed for implementation. Additionally, the assessment takes into consideration the pre-relocation and post-relocation scenarios of affected communities. This is to ensure that the changes in receptor sensitivity are adequately reflected.

7.9.1 AIR QUALITY IMPACTS DURING THE CONSTRUCTION PHASE

During the mine construction phase dust, airborne particulate matter and gaseous pollutants will be generated by a range of activities such as land clearing, excavation and earthworks, road construction and site access preparation, vehicle fleet operations, material handling (stockpiling, loading and unloading of overburden), operation of heavy machinery, fuel combustion, cement and concrete batching. Key emission sources include heavy machinery such as bulldozers, excavators, front end-loaders, compressors and equipment and construction tools such as jackhammers and grinders. Although construction activities are expected to result in short-term alteration of ambient air quality over the two (2) year construction period, these emissions can be effectively controlled and monitored through established air quality control measures.

An overview of the specific air quality impacts during the construction phase, before mitigation (except for occupational health and safety impact) is presented in Figure 102, for illustrative purposes only. Each specific impact is discussed in detail in the sections below and the impact assessment ratings are summarised in Table 46.

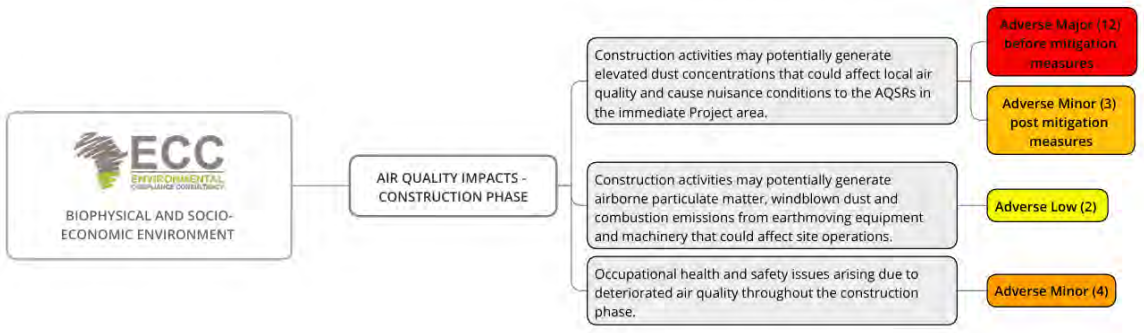


Figure 102 - Overview of the air quality impacts during the construction phase

7.9.1.1 Construction activities may potentially generate elevates concentrations of dust, airborne particulate matter and gaseous pollutants that could result in altered ambient air quality visual nuisance and complaints from AQRs

Baseline air quality conditions within the Project area, as discussed in section 5.11, typically reflects conditions of an arid to semi-arid environment, where natural background dust levels are elevated during dry and windy periods. Construction activities are expected to introduce additional anthropogenic sources of airborne pollutants, primarily associated with the operation of earthmoving equipment and construction vehicles.

Fugitive dust (FD) generated by construction activities may temporarily affect ambient air quality within active work areas and the immediate Project site. The key sources of fugitive dust include:

- Loading, unloading, dumping and storage of dry materials such as soil and aggregate;
- Land clearing, removal and stockpiling of topsoil, bulldozing, compaction, opening and backfilling of borrow pits;
- Scraping and grading of access and haul roads;
- Movement of heavy equipment and trucks on unpaved roads; and
- General construction activities such as foundation excavation, concrete mixing, operation of construction vehicles and machinery, civil and mechanical groundworks.

These activities disturb exposed soil surfaces and fine materials, which may become airborne under dry and windy conditions. Alterations in ambient air quality may result in nuisance conditions, reduced visibility and temporary or short-term impacts on the AQSRs in the immediate Project area. The extent and severity of dust, airborne pollutants and gaseous emissions will vary daily, depending on the nature of construction activities, the prevailing meteorological conditions and the proximity of AQSRs to key operational areas. Figure 45 illustrates the AQSRs in the Project area relative to key operational areas.

The impact is considered adverse, partly reversible and direct, as changes in air quality will be generated by various construction activities though the release of PM, depositional dust and combustion emissions from diesel powered equipment. Elevated dust levels may result in reduced visibility (visual nuisance) and discomfort for onsite workers and the identified AQSRs, particularly under dry and windy conditions. Prolonged exposure to altered ambient air quality may result in community complaints. The impact is considered partly reversible as air quality is expected to return to baseline levels once construction activities cease. The duration of the impact is considered short-term as air quality impacts are expected to be restricted to the construction phase, which is expected to span approximately two (2) years.

The probability of the impact occurring is considered definite, as construction activities will intermittently generate dust, airborne particulate matter and gaseous pollutant throughout the construction phase. There is a potential that these emissions will propagate and disperse to the AQSRs, particularly those located within areas planned for mine development (within 0 m – 1 500 m) (Figure 45, green circles). Depositional dust, airborne particulate matter and

gaseous pollutants concentrations are expected to decrease with increasing distance from the source. Therefore, it is expected that AQSRs located considerate distances from the Project site will unlikely experience significant air quality impacts (> 1 500 m). The severity of the impact will depend on prevailing meteorological conditions as these conditions influence the transport and dispersion of air pollutants from construction areas to offsite AQSRs. The magnitude of change is rated very high as AQRSs will be exposed to varying air pollutant concentrations that potentially could result in nuisances and complaints. The sensitivity of the receptor is rated high as the AQSRs will be exposed to elevated air pollutant concentrations that could temporary disrupt normal daily activities and livelihoods. Although construction activities are intermittent, receptors may have difficulties adapting to the altered ambient air quality environment. Overall, the significance of the impact is rated adverse major, before mitigation (Table 46).

It is anticipated with certainty that the AQSRs (Figure 45, green circles) located within or adjacent to the planned main open pit, processing plant, TSF and WRDs areas will be exposed to significant air quality impacts from construction activities. To mitigate and minimise this impact, the Proponent commit to relocate these AQSRs from high exposure zones to safer areas where air quality impacts are expected to be more tolerable. The relocation process will be formally agreed upon with the affected parties and the traditional authorities (TA) and will be completed prior to the commencement of construction activities.

The relocation of AQSRs is deemed a key mitigation measure and is expected to effectively eliminate community direct exposure to both construction and operational air quality impacts. Additionally, the implementation of dust control measures will further reduce the likelihood and severity of the impacts. As a result of these interventions, both receptor sensitivity and the magnitude of change are expected to be low as fewer AQSRs will be impacted (Figure 45, yellow circles). These receptors are located considerate distances from the Project site. Post mitigation, the residual impact is rated adverse minor. Mitigation measures are detailed in the final ESMP (Appendix A).

7.9.1.2 Construction activities may potentially generate airborne particulate matter, windblown dust and combustion emissions from earthmoving equipment and machinery that could affect site operations

Project construction activities such as vegetation clearing, bulk earthworks, excavation works, trenching, stockpiling of topsoil and subsoil, opening and backfilling of borrow pits and the construction of access and haul roads will require the use of diesel-powered machinery such as excavators, front-end loaders, graders and haul trucks. Additionally, materials such as sand, rock, aggregate, cement and chemical additives will be delivered to site and stored for use in various construction activities.

The unloading, transfer, storage and handling of these materials have the potential to generate dust and PM through wind-driven dispersion. The simultaneous operation of equipment and machinery has the potential to cause localised elevation in pollutant concentrations in active work areas such as SO_2, NOx and CO.

Elevated dust concentrations may result in reduced visibility and dust inhalation, potentially causing respiratory irritation, eye discomfort and temporary reductions in worker comfort and productivity. Prolonged exposure to exhaust emissions may also pose occupational health risks, particularly during periods of continuous equipment operation or where multiple machinery operates simultaneously in localised areas with limited dispersion.

Typical meteorological conditions in the Project area (e.g. periodic SW winds), may enhance dust generation and dispersion during construction. This could affect workflow efficiency and require additional safety precautions.

The impact is considered adverse, direct and partly reversible, as temporary changes in ambient air quality on-site result directly from construction activities and will persist throughout the construction phase (<2 years). The impact is regarded partly reversible as altered atmospheric conditions are expected to return to baseline conditions following completion of construction activities. The duration of the impact is considered short-term as it is expected that dust and gaseous air pollutants will be generated throughout the construction phase. The probability of the impact is rated low, as disturbance of exposed soils are expected to be infrequent and dust generated from the handling of fine materials will likely disperse quickly offsite.

The magnitude of change is rated low as windblown dust and other air pollutant may be generated both in active work areas and cleared zones. These emissions may temporarily reduce visibility and minor nuisance conditions for workers. However, exposure is expected to be intermittent and tolerable and will not necessarily hinder their ability to perform various construction activities across the site. The sensitivity of the receptor is rated low as it is expected that workers will be able to tolerate and adapt to short-term dust exposure, particularly where appropriate dust control measures are in place. As construction activities are intermittent in nature, clouds of dust are expected to disperse in the beyond the Project area. Therefore, no halt of construction activities is anticipated, unless due to natural environmental conditions render work unsafe or visibility poor (e.g. gale force south westerly or easterly winds). Overall, the significance of the impact is rated adverse low, before mitigation (Table 46). The mitigation measures are outlined in the final ESMP (Appendix A).

7.9.1.3 Occupational health and safety issues arising from deteriorated air quality throughout the construction phase

Construction personnel (including contractors and subcontractors) will be routinely exposed to airborne PM, windblown dust and combustion-related emissions generated by a range of

construction activities. These include vegetation clearing, earthworks, drilling, blasting, stockpiling of topsoil, foundation excavations, establishment of access and haul roads as well as material handling and storage. The operation of diesel-powered machinery such as excavators, front-end loaders, graders, haul trucks, generators and pumps will produce gaseous emissions such as SO_2, NOx and CO.

Inhalation of PM_{10} and $PM_{2.5}$ may allow fine particles to penetrate the respiratory system, and if not adequately managed may pose occupational health and safety risks. Prolonged or repeated exposure to elevated dust concentrations and combustion emissions may also result in respiratory irritation, coughing, aggravation of pre-existing respiratory conditions, eye irritation and general discomfort. Construction personnel working in close proximity to active construction areas, stockpiles and unpaved haul roads are likely to experience higher exposure concentrations, particularly during peak construction activities.

The impact is considered adverse, direct and partly reversible as changes in ambient air quality will arise directly as a result of construction activities and are expected to diminish once these activities cease. The duration of the impact is regarded short-term as it is anticipated that construction activities will be completed in two (2) years. The likelihood of the impact occurring is considered medium (possible), as several dust generating activities will be undertaken simultaneously. This exposes workers to dust, airborne particulate matter and gaseous emissions.

The magnitude of change is assessed as moderate, as construction-related emissions are expected to be temporary alter ambient air quality. No permanent deterioration of air quality or long-term health effects are anticipated. Nonetheless, personnel who are repeatedly exposed over extended periods, particularly those with existing respiratory issues, could experience health impacts in the absence of effective control measures. The sensitivity of the receptor is rated medium as workers will be directly exposed to an altered ambient air quality environment. However, this is expected to be temporary as dust and other air pollutants will likely propagate and disperse offsite. With the implementation of appropriate mitigation measures, including the use of appropriate PPE and adherence to safe work practices, workers are expected to maintain their pre-impact health status. Overall, the significance of the impact is rated adverse minor, post mitigation (Table 46). The mitigation measures are outlined in the final ESMP (Appendix A).

Table 46 - Air quality impact assessment ratings – construction phase

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
Construction activities	Community health and safety, (the identified AQSRs)	Construction activities may generate windblown dust, airborne particulate matter and gaseous pollutant that could affect local air quality and result in visual nuisances and complaints from AQSRs.	Adverse Direct Partly reversible Short-term Local Definite	High	High	Adverse Major (12)[9]
	Construction workforce (occupational health and safety)	Construction activities may potentially generate airborne particulate matter, blown dust and combustion emissions from earthmoving equipment and machinery that could affect site operations.	Adverse Direct Partly reversible Short-term On-site Unlikely	Low	Low	Adverse Low (2)
		Potential for Project construction activities to cause occupational health and safety issues related to air quality deterioration.	Adverse Direct Partly reversible Short-term On-site Possible	Medium	Moderate	Adverse Minor (4)

[9] Post mitigation, the impact is rated adverse minor.

7.9.2 AIR QUALITY IMPACTS DURING THE OPERATIONAL PHASE

During the operational phase, the Project will undertake continuous 24-hour mining and processing activities, which will result in the generation of both fugitive dust and combustion-related gaseous pollutants. The primary sources of dust and pollutant gases include drilling and blasting activities, ore handling processes (loading, unloading, hauling and dozing), stockpile formation and management, ore processing activities such as crushing, screening, milling, tailings material handling and waste rock dumping. Combustion emissions will arise primarily from the routine operations of haul trucks, operations at the onsite helipad and other diesel-powered equipment and machinery. These sources are expected to emit pollutants such as NOx, SO_2 and CO. Additional dust emissions may originate from exposed surfaces, unpaved haul roads and blasting areas. The dispersion of these emissions is likely to be more pronounced during dry and windy conditions, when loose materials can be readily entrained and transported away from the source areas.

An overview of the potential air quality impacts during the operational phase (prior to mitigation and excluding the occupational health and safety impact) are shown in Figure 103, for illustrative purposes only. Each specific impact is discussed in detail in the sections below and the impact assessment ratings are summarised in Table 47.

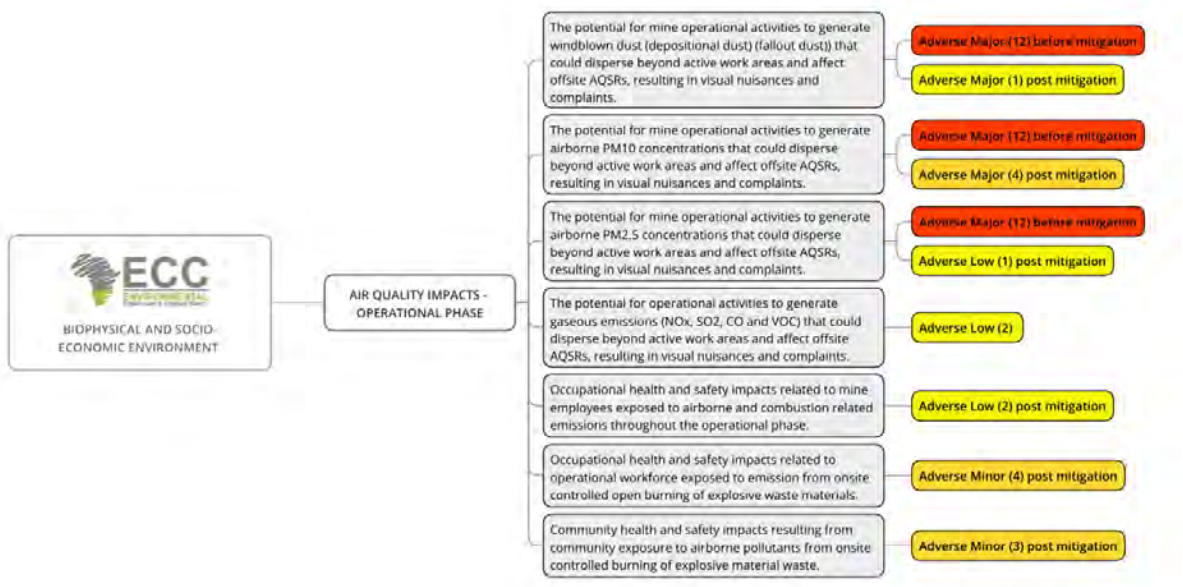


Figure 103 - Overview of the air quality impacts during the operational phase

7.9.2.1 The potential for mine operational activities to generate windblown dust (depositional dust (fallout dust)) that could disperse beyond active work areas and affect offsite AQSRs, resulting in visual nuisances and complaints

Mine operational activities have the potential to generate windblown depositional dust (fallout dust) from exposed surfaces, material handling, haul roads, waste rock storage areas, tailings material handling, open pit mining activities (drilling, blasting and excavation), haulage

of ore and waste rock on unpaved haul roads, ore processing activities such as crushing and other disturbed areas. Once entrained, dust may disperse beyond the Project footprint depending on prevailing meteorological conditions, particularly wind speed and direction. The offsite AQSRs could therefore be exposed to increased dust deposition, which may result in reduced visual amenity and complaints.

The dust fallout dispersion models developed by Airshed illustrate the potential dispersion of dust from sources towards the identified AQSRs. To quantify the potential exposure risk, the models were assessed against the Southern African National Dust Control Regulations (NDCR) residential dust fallout limit of 600 mg/m2/day. The resulting dust fallout isopleth plot (before mitigation) during year three (3) of operations (i.e. worst-case scenario) is presented in Figure 104.

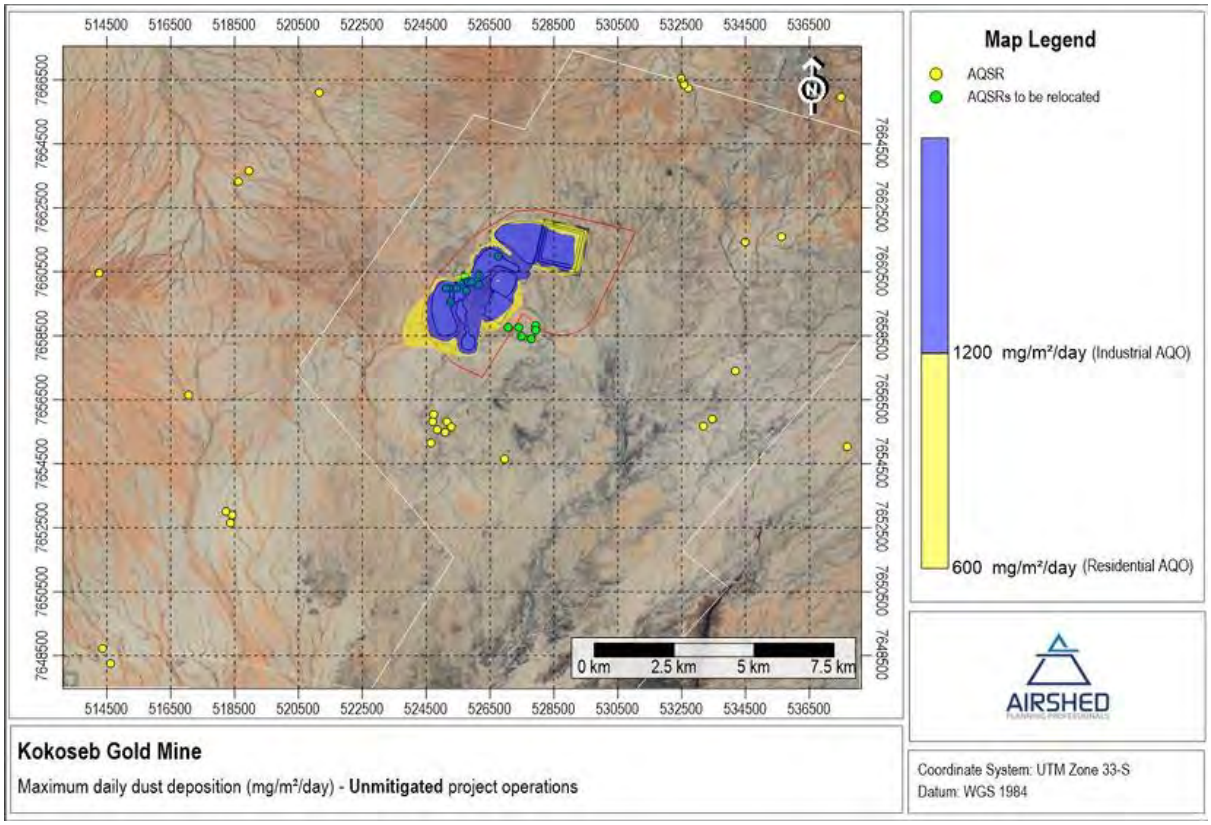


Figure 104 - Dust fallout dispersion concentrations (before mitigation) during year three (3) of operations (Source: Airshed, 2025)

As shown in Figure 104, maximum daily dust fallout rates will only exceed the 600 mg/m^2/day threshold at twelve (12) AQSRs. These receptors are located at Katora Village, which generally lies within key areas designated for mine infrastructure development. These areas include the main open pit, WRDs, TSF, explosive magazine and processing plant. Prior to the implementation of mitigation measures, these communities will likely experience elevated dust concentrations during operations, prior to the implementation of any mitigation measure. This could result in visual nuisances and complaints.

The nature of this impact is assessed as adverse and direct as dust will be generated by operational activities and have the potential to disperse offsite. The potential consequences resulting from exposure to significant and repeated fallout dust include respiratory and eye irritation, reduced visibility, community complaints, dissatisfaction with living conditions and strained relations between the Proponent and the AQSRs. These impacts are of particular concern as the mine is scheduled to operate all year round (i.e. 365 days) throughout the LoM (12 years). The impact is considered partly reversible, as i) complaints from the community can be addressed through effective grievance redress mechanisms and trust can be rebuilt over time through continued engagement and transparent communication, and ii) air quality is expected to return to baseline conditions following the cessation of operational activities. The likelihood of the impact occurring is rated definite (before mitigation) as the simulated dust models (before mitigation) indicate that AQSRs located with the planned mine infrastructure areas are expected to experience elevated dust concentrations (Figure 104). The extent of the impact is likely expected to be onsite as receptors, particularly the Katora community will be exposed to significant dust concentrations (≥ 1 200 mg/m^2/day). No significant dust clouds are expected at receptors that are located approximately > 2 km from the main open pit (Figure 104).

The magnitude of change is rated high (before mitigation) as exposure to elevated dust is likely to adversely affect the overall quality of life of the Katora community. The sensitivity of the receptor is rated high due the vulnerability of the AQSRs and that this impact affects their overall well-being, particularly among vulnerable sensitive groups such as the elderly, children and individual with pre-existing respiratory conditions. Overall, the significance of impact is rate adverse major, before mitigation (Table 47).

As discussed in section 7.9.1, the relocation of the vulnerable communities (Katora community) is considered necessary as no other alternative locations for the main open pit and other mine infrastructure are feasible. The relocation of these AQSRs is expected to significantly reduce the likelihood of the impact to low. Furthermore, the magnitude of change and the sensitivity of the receptor are expected to be low as the relocated AQSR will no longer be exposed to deteriorated air quality environments. This effective mitigation measure is expected to significantly reduce the impact to adverse minor. Mitigation measures are described in the final ESMP (Appendix A).

With the additional mitigation measures, the dust fallout concentrations are not expected to impact any of the identified AQSRs as they are located approximately > 2 km from the mine. The simulated dust dispersion model, post mitigation is presented in Figure 105.

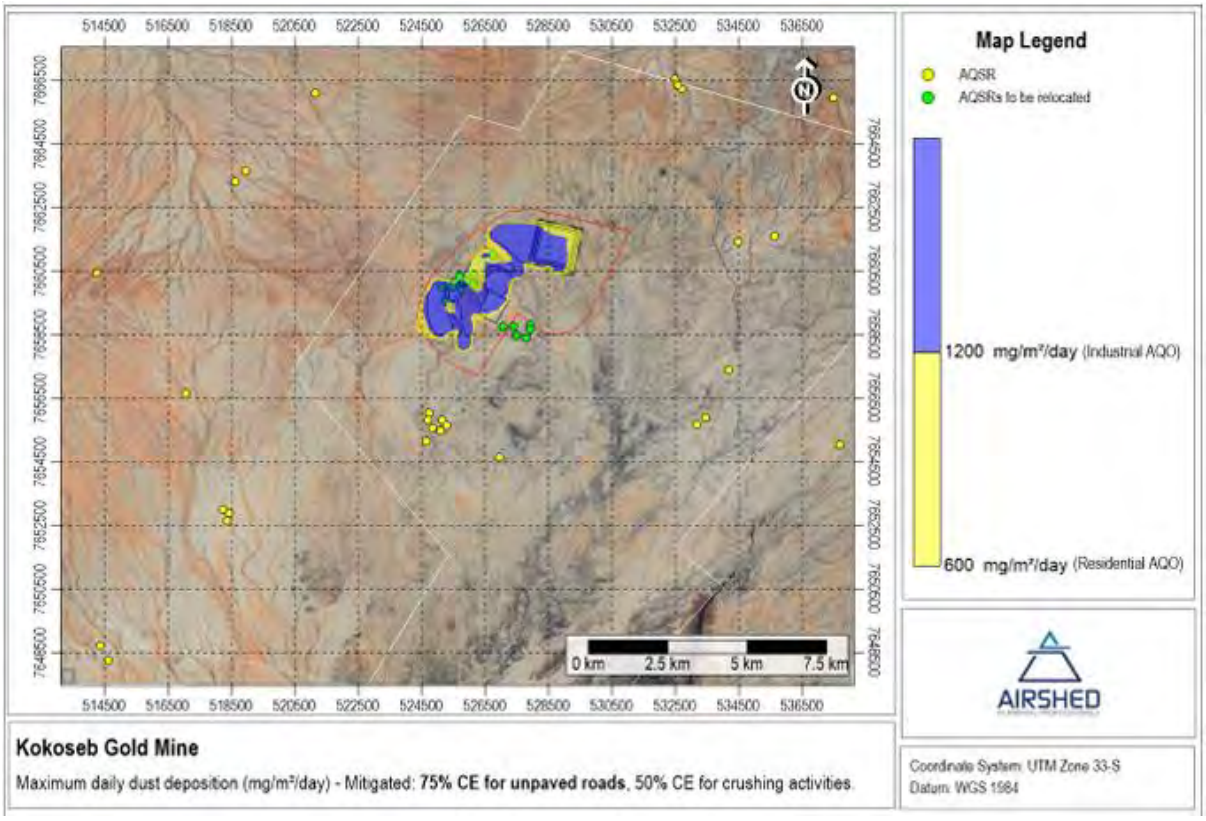


Figure 105 - Dust fallout concentration (post mitigation) during year three (3) of operations (Source: Airshed, 2025)

7.9.2.2 The potential for mine operational activities to generate airborne PM_{10} concentrations that could disperse beyond active work areas and affect offsite AQSRs, resulting in visual nuisances and complaints

Mine operational activities such as drilling, blasting, loading and unloading of materials, haul road traffic, material crushing and screening, stockpile management, earthworks and site preparation have the potential to generate PM_{10} particles that can be transported by prevailing meteorological weather conditions and dispersed beyond the Project footprint. These particles can potentially affect offsite AQSRs and result in health risks, visual nuisances and reduced amenity for surrounding communities.

The PM_{10} dispersion model developed by Airshed illustrates the potential dispersion of PM_{10} particles towards the AQSRs located in the broader community. To quantify the potential risk of exposure, simulated PM_{10} concentrations were assessed against the World Health Organisation (WHO) Interim-Target 3 (IT-3) guidelines of 75 µg/m³. The resulting daily PM10 isopleth plot (before mitigation) during year three (3) of operations is presented in Figure 106.

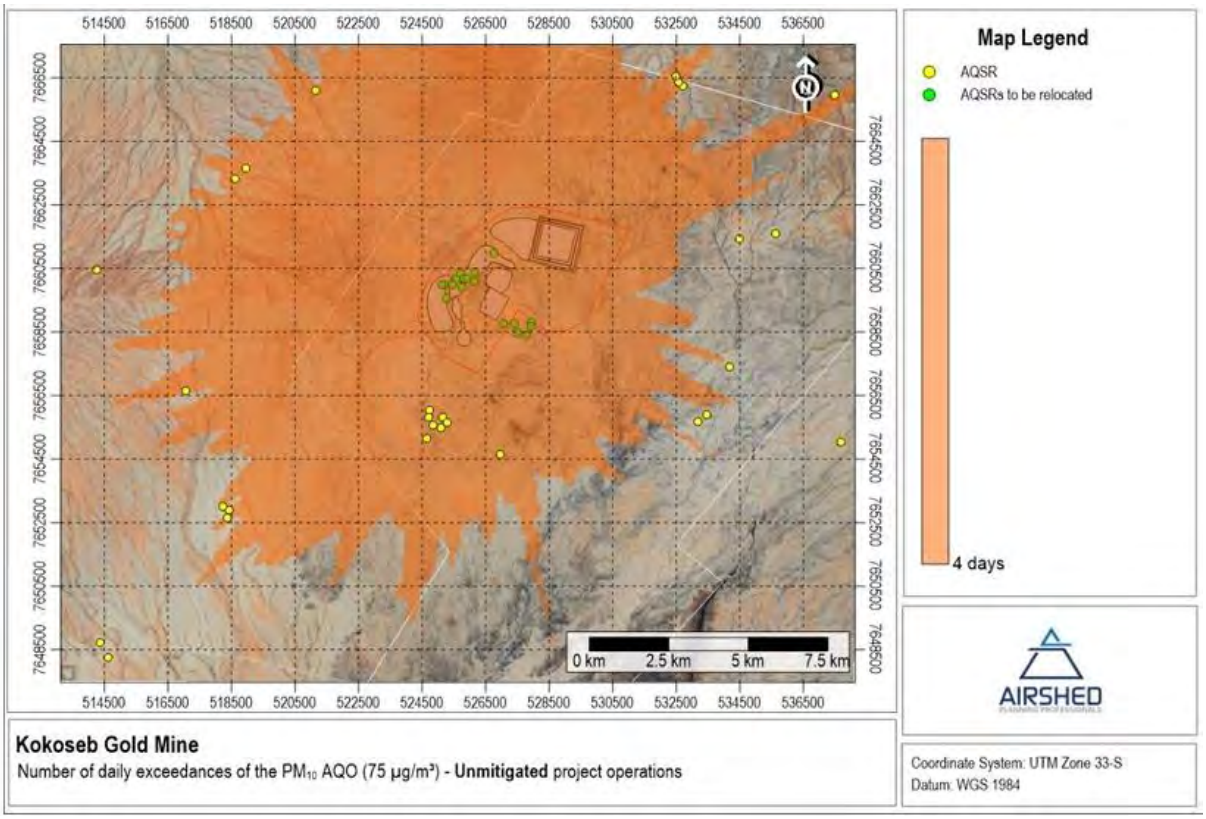


Figure 106 - Simulated daily PM10 dispersion concentrations (before mitigation) during year three (3) of operations (Source: Airshed, 2025)

The PM_{10} daily dispersion model indicates that before mitigation, daily ground level PM_{10} concentrations are expected to exceed the WHO IT-3 guidelines at thirty-six (36) AQSRs during year three (3) when operations is expected to be at the worst-case scenario (Figure 106) (Airshed, 2025). Prolonged exposure could result in health risks, visual nuisances and complaints from the affected communities.

The nature of this impact is assessed as adverse and direct as PM_{10} emissions are a result of operational activities and have the potential to disperse beyond active working areas and affect offsite AQSRs, if no mitigation measures are implemented. PM_{10} deposits in the nose, throat and upper respiratory tract. The short-term effects of PM_{10} exposure include shortness of breath, irritation of eyes, nose, throat, coughing and shortness of breath while prolonged exposure may result in chronic respiratory diseases. This may also lead to community complaints, dissatisfaction with living conditions and strained relations between the Proponent and the AQSRs. These impacts are of particular concern as the mine is scheduled to operate all year round (i.e. 365 days) throughout the LoM (12 years). The impact is considered partly reversible, as i) complaints from the community can be addressed through effective grievance redress mechanisms and trust can be rebuilt over time through continued engagement and transparent communication, and ii) air quality is expected to return to baseline conditions following the cessation of operational activities. However, chronic conditions and respiratory diseases may be long lasting.

The likelihood of the impact occurring is rated definite (before mitigation) as the simulated models (before mitigation) indicate that thirty-six (36) AQSRs located in the broader area will be exposed to PM_{10} concentrations (Figure 106). The prevailing wind in the Project area is from the southwest (SW); thus, it is expected that communities located northeast (NE) of the Project will be more susceptible to elevated PM_{10} concentrations throughout the LoM (12 years). The extent of the impact is considered local as the AQSRs are primarily within the immediate vicinity of the Project.

The magnitude of change is rated high (before mitigation) as exposure to elevated PM_{10} concentrations, is likely to adversely affect the overall quality of life of surrounding communities. The sensitivity of the receptor is rated high due the vulnerability of the AQSRs and that this impact affects their overall well-being, prolonged exposure may result in chronic respiratory diseases, particularly among vulnerable sensitive groups such as the elderly, children and individual with pre-existing respiratory conditions. Overall, the significance of impact is rate adverse major, before mitigation (Table 47).

The relocation of the vulnerable communities (Katora community) and the implementation of the additional mitigation measures is expected to significantly reduce the likelihood of the impact to low. Furthermore, the magnitude of change and the sensitivity of the receptor are expected to be moderate and medium, respectively, as the relocated AQSR will no longer be exposed to deteriorated air quality environments. The remainder of the AQSRs (including occupants at the accommodation village) are located considerable distances from the Project site (> 2 km) and will unlikely be exposed to PM_{10} concentrations (Figure 107).

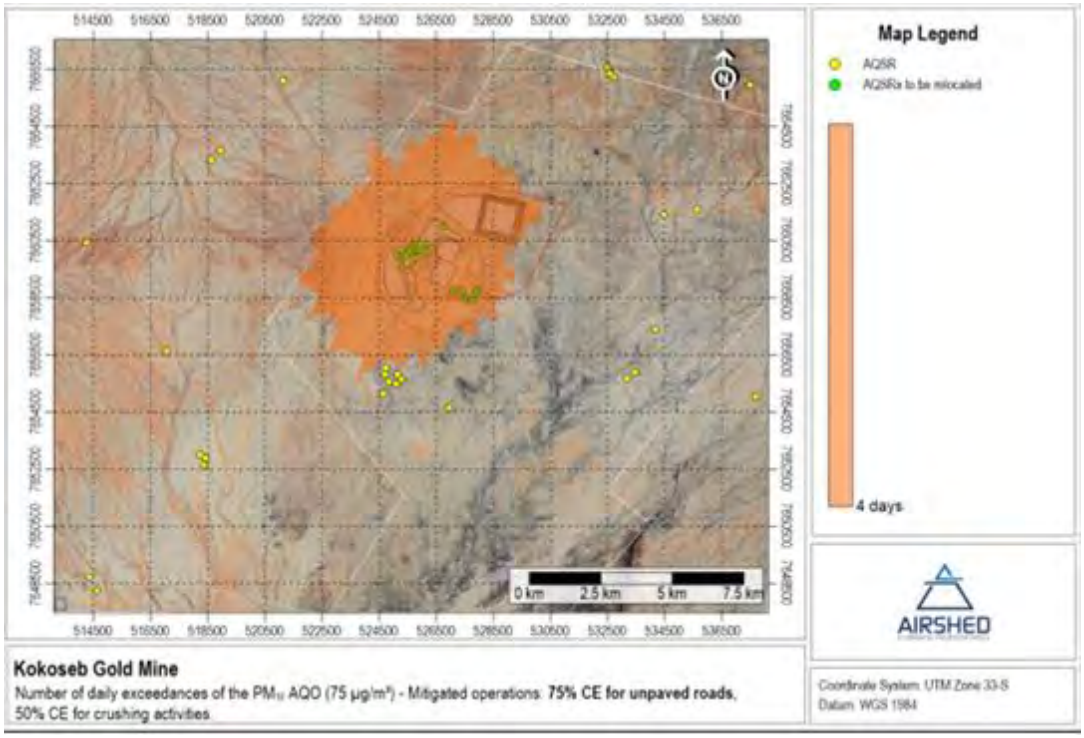


Figure 107 - Simulated daily PM10 dispersion concentrations (post mitigation) during year three (3) of operations (Source: Airshed, 2025)

With the implementation of the additional mitigation measures, the significance of the impact is rated adverse minor. The mitigation measures are described in the final ESMP (Appendix A).

7.9.2.3 The potential for mine operational activities to generate airborne $PM_{2.5}$ concentrations that could disperse beyond active work areas and affect offsite AQSRs, resulting in visual nuisances, chronic health conditions and complaints

During mining operations, activities such as blasting, drilling and vehicle movements have the potential to generate $PM_{2.5}$ concentrations which can become airborne and disperse beyond active work areas or sources.

$PM_{2.5}$ particles are small enough to penetrate deep into the lungs and may enter the bloodstreams. Short term exposure can result in respiratory conditions such as asthma, bronchitis and increase the risk of respiratory infections. Long-term exposure is associated with more serious health effects such as heart diseases, stroke, cancer and reduced lung function.

The $PM_{2.5}$ daily dispersion model developed by Airshed illustrates the potential dispersion of $PM_{2.5}$ particles towards the AQSRs located in the broader community. To quantify the potential risk of exposure, simulated PM2.5 concentrations were assessed against the WHO IT-3 guidelines of 37.5 µg/m³. The resulting daily $PM_{2.5}$ isopleth plot (before mitigation) during year three (3) of operations is presented in Figure 108.

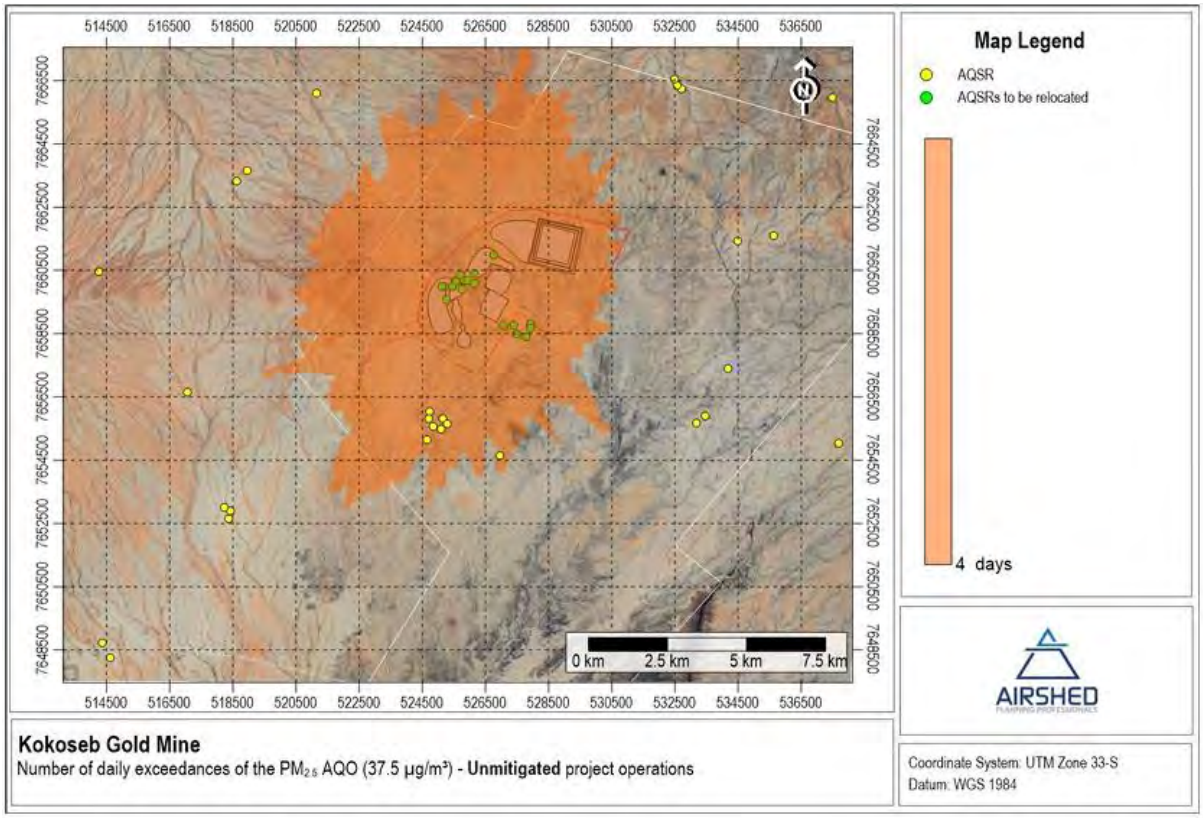


Figure 108 - Simulated daily $PM_{2.5}$ dispersion concentrations (before mitigation) during year three (3) of operations (Source: Airshed, 2025)

The $PM_{2.5}$ daily dispersion model indicates that before mitigation, daily ground level PM_{10} concentrations are expected to exceed the WHO IT-3 guidelines at twenty-five (25) AQSRs, during year three (3), when operations is expected to be at the worst case scenario (Figure 108) (Airshed, 2025). Prolonged exposure could result in health risks, visual nuisances and complaints from the affected communities (AQSRs).

The nature of this impact is assessed as adverse and direct as $PM_{2.5}$ emissions are a result of operational activities and have the potential to disperse beyond active work and affect offsite AQSRs, if no mitigation measures are implemented. $PM_{2.5}$ are considered more harmful than PM_{10} as their smaller size allows them to penetrate deeper into the respiratory system and reach the alveoli in the lungs. $PM_{2.5}$ particles can also enter the bloodstream and result in cardiovascular diseases, stroke and other chronic conditions, even at lower concentrations. These scenarios may lead to community complaints, dissatisfaction with living conditions and strained relations between the Proponent and the AQSRs. These impacts are of particular concern as the mine is scheduled to operate all year round (i.e. 365 days) throughout the LoM (12 years).

The impact is considered partly reversible, as i) complaints from the community can be addressed through effective grievance redress mechanisms and trust can be rebuilt over time through continued engagement and transparent communication, and ii) air quality is expected to return to baseline conditions following the cessation of operational activities.

However, chronic conditions such as asthma and other respiratory diseases may be long lasting. The likelihood of the impact occurring is rated definite (before mitigation) as the simulated models (before mitigation) indicate that twenty-five (25) AQSRs located in the broader area will be exposed to $PM_{2.5}$ concentrations (Figure 108). The AQSRs located NE of the Project site are expected to be more susceptible to $PM_{2.5}$ concentrations throughout the LoM (12 years) as the wind field is predominated by the prevailing SW winds. The extent of the impact is considered local as the AQSRs are primarily within the immediate vicinity of the Project.

The magnitude of change is rated very high (before mitigation) as exposure to elevated $PM_{2.5}$ concentrations, is likely to adversely result in serious chronic conditions, respiratory effects and affect the overall quality of life of surrounding communities. The sensitivity of the receptor is rated high due the vulnerability of the AQSRs and that this impact affects their overall well-being and prolonged exposure may result in chronic respiratory diseases, particularly among vulnerable sensitive groups such as the elderly, children and individual with pre-existing respiratory conditions. Overall, the significance of impact is rate adverse major, before mitigation (Table 47).

The relocation of the vulnerable communities (Katora community) and the implementation of the additional mitigation measures is expected to significantly reduce the likelihood of the impact to low.

Furthermore, both magnitude of change and the sensitivity of the receptor are expected to be low as the relocated AQSR will no longer be exposed to deteriorated air quality environments. The remainder of the AQSRs (including occupants at the accommodation village) are located considerable distances (> 2 km) from the Project site and will not be exposed to $PM_{2.5}$ concentrations as it is expected that $PM_{2.5}$ concentrations will remain confined within the active work areas, as shown in Figure 109.

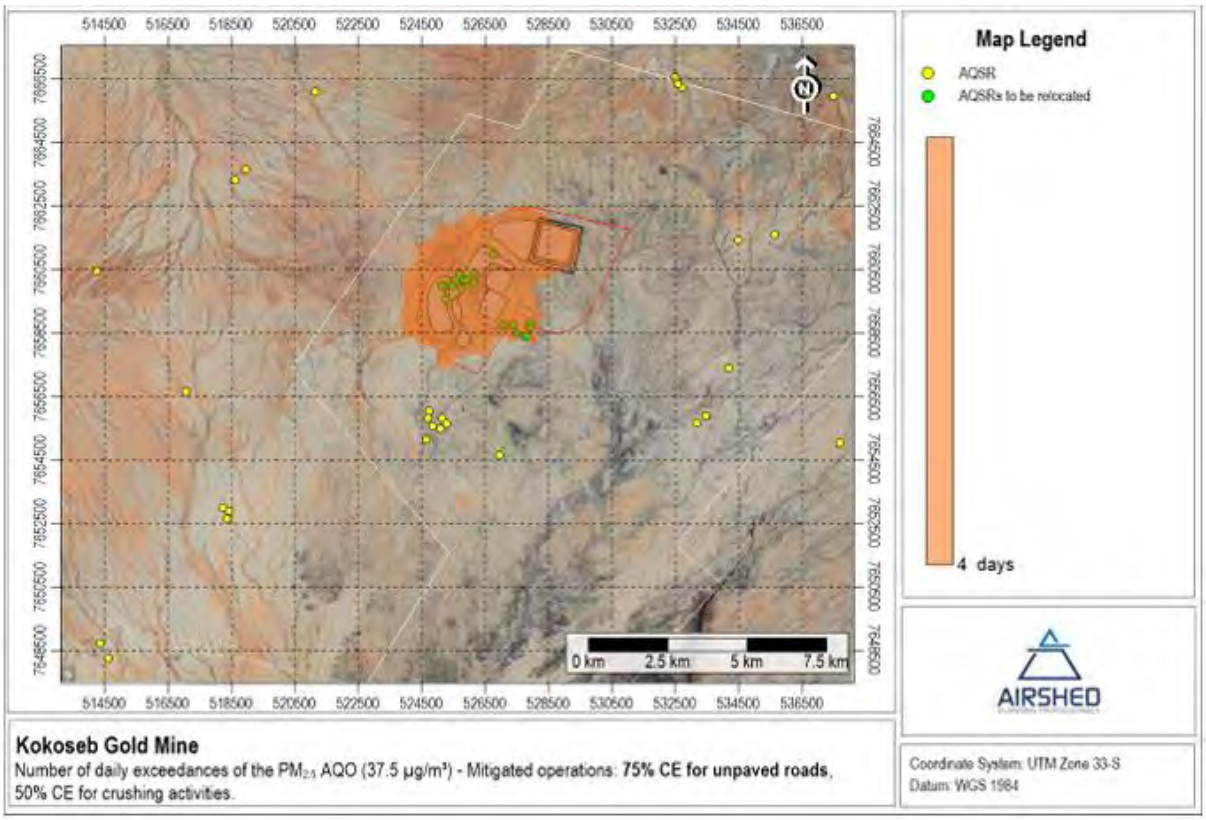


Figure 109 - Simulated daily $PM_{2.5}$ dispersion concentrations (post mitigation) during year three (3) of operations (Source: Airshed, 2025)

With the implementation of the additional mitigation measures, the significance of the impact is rated adverse low.

The following additional mitigation measures are also described in the final ESMP (Appendix A):

- Vehicle-entrained dust emissions shall be mitigated through the application of chemical surfactants and routine water spraying;
- The dust fallout monitoring program must be maintained, with monthly dust fallout results used to assess the effectiveness of the mitigation measures;
- Establish vehicle speed limits on unpaved roads to reduce dust entrainment;
- Dust from drilling activities shall be controlled through the application of water sprays at the drill holes;
- Emissions from crushing and screening processes shall be mitigated by applying water sprays to the ore stream to ensure that sufficient moisture levels are maintained;
- Progressive rehabilitation of inactive areas, WRDs and stockpiles shall be undertaken to minimise windblown dust;
- Diesel powered equipment shall be maintained in good working order to prevent excessive exhaust emissions;
- Quarterly PM_{10} and $PM_{2.5}$ monitoring shall be conducted at the mine boundary and in proximity to AQSRs;

- Passive sampling to be considered for inclusion in the air quality monitoring programme;
- Environmental awareness training shall be provided to operational personnel, and an environmental control officer (ECO) must be appointed to oversee the implementation of mitigation measures; and
- A complaints register shall be maintained throughout the operational phase, and all community complaints shall be addressed in accordance with established grievance resolution procedures.

7.9.2.4 The potential for operational activities to generate gaseous emissions that could disperse beyond active work areas and affect offsite AQSRs, resulting in visual nuisance and complaints

During mining operations, activities such as blasting, fuel combustion in vehicles and machinery and ore processing have the potential to generate gaseous emissions such as NOx, SO_2, CO and VOCs. These emissions can disperse beyond active work areas and, in the absence of mitigation measures may contribute to visual nuisance such as dust haze or odours.

The nature of this impact is considered adverse and direct as these gaseous emissions are resultant of the operational activities. The impact is considered partly reversible as gaseous emissions and visual nuisances will cease once operational activities ceases. Air quality is expected to gradually return to baseline conditions after mine closure. The duration of the impact is rated medium as gaseous emissions will be generated intermittently throughout the LoM (12 years). The probability of the impact occurring is rated low as the concentration of gaseous emissions diminish with increase distance from the source. Therefore, dispersion of emissions towards the AQSRs under normal atmospheric conditions is expected to be limited. The extent of the impact is considered local as the AQSRs are widespread in the immediate vicinity of the Project. The magnitude of change is rated low as it is anticipated that routine operational emissions will not result in chronic respiratory conditions and cardiovascular effects. The sensitivity of the receptor is rated low as predicted exposure levels are minimal and unlikely to significantly affect overall well-being or quality of life. Overall, the significance of the impact is rated adverse low, before mitigation (Table 47). Mitigation measures are described in the final ESMP (Appendix A).

7.9.2.5 Occupational health and safety impacts related to mine employees exposed to airborne dust and combustion-related emissions throughout the operational phase

Mine operational activities have the potential to generate airborne particulate matter and combustion-related emissions that may pose occupational health and safety risks to the operational workforce. Personnel undertaking activities such as drilling, blasting, excavation of ore and waste rock, haulage on unpaved haul roads, ore handling, stockpiling, crushing, tailings material handling and waste rock dumping are particularly susceptible to depositional

dust and PM exposure. In addition, diesel-powered mobile and stationary equipment generate gaseous pollutants such as SO_2, NO_x, CO and CO_2. Exposure to these gaseous emissions may result in both short-term and long-term respiratory and cardiovascular health effects. Furthermore, elevated dust concentrations can reduce visibility within work areas, which increases the risk of operational accidents.

This impact is assessed post mitigation, as it is a legislative requirement for a Project of this magnitude and scale to enforce occupational health and safety measures during operations to protect the workforce from exposure to dust, particulate matters and combustion-related emissions.

The nature of the impact is considered adverse and direct, as changes in ambient air quality will arise as a result of the mine operational activities. The impact is assessed as partly reversible, as prolonged or uncontrolled exposure to air pollutants and dust could potentially cause long-term health effects. However, such outcomes are considered unlikely under normal operating conditions, where dust suppression, proper ventilation systems, equipment maintenance and use of PPE are in place. Any respiratory related health effect can be managed or mitigated through timely medical interventions and strict adherence to established occupational health and safety protocols. The duration of the impact is considered medium-term as dust generating activities will be conducted throughout the LoM (12 years). The extent of the impact is restricted to the mine site, where personnel will be directly exposed to dust and airborne PM generated by various operational activities.

The likelihood of the impact occurring is rated low (unlikely), considering that legislative and industry occupational health and safety (OHS) measures, engineering controls, dust suppression systems, equipment maintenance and the mandatory use of appropriate PPE will be implemented and monitored. It is expected that these measures will be incorporated into the mine's daily operational plan and employment contracts. In addition, the operational workforce will be subjected to medical screening, site-specific health and safety procedures, training and ongoing monitoring programs to ensure adherence to occupational health and safety standards.

The Proponent is committed to engage in sustainable mining practices and maintain a safe working environment for the operational workforce in accordance with best industry standards, as well as the provisions of the Labour Act, No. 11 of 2007 and the Regulation Relating to the Health and Safety of Employees at Work (Government Notice 156 of 1997).

With these measures in place, the magnitude of the impact is considered moderate, and the sensitivity of the receptor is considered low, as personnel are equipped, trained and experienced in managing elevated dust and PM exposure. Overall, the significance of the impact is rated adverse low, post mitigation (Table 47). The mitigation measures are outlined in the final ESMP (Appendix A).

7.9.2.6 Occupational health and safety impacts as a result of the operational workforce exposed to emissions from the controlled open burning of explosive material waste

The disposal of explosive material waste (e.g. cartridges, packaging etc.) generated during mining operations is subject to strict legal and safety requirements and is typically undertaken through controlled and carefully managed open burning or in pits. Although precautionary measures are implemented to ensure the safe destruction of explosive waste materials, the activity results in short-term release of PM, NO_x, CO and other combustion by-products. These emissions may temporarily affect ambient air quality within the mine site and presents a exposure risk to employees. Under certain meteorological conditions, off-site dispersion towards the neighbouring AQSRs is likely.

The impact is considered adverse as the release of combustion-related pollutants such as PM, NO_x and CO may negatively affect the health and well-being of employees, particularly those present within or near the burning area. This is a direct impact as the emissions result from the disposal and burning of the Project explosive material waste and exposure occurs without intermediary pathways. No permanent degradation of ambient air quality is anticipated as pollutant concentrations diminish once burning ceases. Therefore, the impact is regarded as reversible. In terms of duration, the impact is associated with intermittent, short-term burning events. However, these activities are expected to recur periodically throughout the LoM (12 years). Therefore, the duration of the impact is rated medium. The extent of the impact is on-site, confined to the immediate vicinity of the designated burning area, although off-site dispersal may occur under certain meteorological conditions (i.e. inversion layer, wind direction and speed etc.). The likelihood of the impact is considered possible (medium), considering that the disposal of explosive waste is an operational requirement throughout the LoM (12 year). The magnitude of change is considered moderate as burning events will be temporary (could be once a week depending on the blasting schedule). The sensitivity of the receptor is considered medium as employees, particularly those within these operational environments will repeatedly be exposed to emissions and could be vulnerable to respiratory irritations or short-term health effects.

However, these emissions are not expected to result in long-term degradation of ambient air quality, nor are they likely to result in significant or irreversible health effects when appropriate occupational health and safety measures are implemented. Overall, the significance of the impact is rated adverse minor, post mitigation (Table 47). The mitigation measures are provided in the final ESMP (Appendix A).

7.9.2.7 Community health and safety impacts resulting from exposure to airborne pollutants released from onsite controlled open burning of explosive material waste

Emissions from the controlled open burning of on-site explosive waste material such as PM, NO_x and CO compounds and other combustion by-products have the potential to disperse

beyond the mine boundary, depending on prevailing meteorological weather conditions (e.g. strong wind events). As a result, nearby communities may be intermittently exposed to low concentrations of these pollutants. The AQSRs are shown in Figure 45 (yellow circles).

The nature of this impact is considered adverse, as clouds of emissions from the open controlled burning of explosives waste alter the ambient air quality, potentially affecting the health and well-being of local communities. This is a direct impact as community exposure will arise as a result of the burning events. Although it is expected that burning events will be intermittent and planned in advance, the duration of the impact is rated as medium term as these activities are expected to be occur periodically throughout the LoM (12 years). The extent of the impact is considered local as the AQSRs are widespread in the broader Project surrounding. Communities located NE of the mine are most susceptible to emissions exposure as the wind field is predominated by the SW winds. The likelihood of the impact occurring is rated definite as the dispersion modelling (before mitigation) (Figure 104 and Figure 105) indicate that AQSRs located within the immediate Project surroundings are expected to be exposed to dust and airborne pollutant concentrations.

The magnitude of change is rated moderate due to the intermittent nature of the burning events. As pollutants concentrations decrease with distance from the source, the AQSRs are expected to be exposed to low concentrations of airborne pollutants. Although community exposure is intermittent and concentrations are expected to be generally low, repeated events over time could contribute to minor respiratory irritations or discomfort among sensitive individuals. The sensitivity of receptor is rated low as the receptors are expected to adapt to the altered ambient air quality environment and exposure is not expected to significantly compromise their overall health and quality of life throughout the LoM (12 years). It should be noted that the controlled on-site burning of explosive material waste alone is not expected to result in significant community health issues, but overall air quality may be affected by all operational emissions. Overall, the significance of the impact is rated adverse minor, before mitigation (Table 47). The mitigation measures are provided in the final ESMP (Appendix A).

Table 47 - Air quality impact assessment ratings - operational phase

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
Operational activities	Air quality (the identified AQSRs, particularly the Katora community)	The potential for mine operational activities to generate windblown dust	Adverse Direct Partly reversible On-site Medium term	High	High	Adverse Major (12)[10]

[10] Post mitigation, the significance of the impact is rated adverse low.

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
		(depositional dust) that could disperse beyond active work areas and affect offsite AQSRs, resulting in visual nuisances and complaints.	Definite			
	Air quality (the identified AQSRs)	The potential for operational activities to generate airborne PM_{10} concentrations that could disperse beyond active work areas and affect offsite AQSRs, resulting in visual nuisance and complaints.	Adverse Direct Partly reversible Local Medium term Definite	High	High	Adverse Major (12)[11]
		The potential for operational activities to generate airborne $PM_{2.5}$ concentrations that could disperse beyond active work areas and affect AQSRs,	Adverse Direct Partly reversible Local Medium term Definite	High	Very high	Adverse Major (12)[12]

[11] Post mitigation, the significance of the impact is rated adverse minor.
[12] Post mitigation, the significance of the impact is rated adverse minor.

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
		resulting in visual nuisance, chronic respiratory health conditions and complaints.				
		The potential for operational activities to generate gaseous emissions (NO_x, SO_2, CO and VOC) that could disperse beyond active work areas and affect AQSRs, resulting in visual nuisances, chronic respiratory conditions and complaints.	Adverse Direct Partly reversible Medium term Unlikely Local	Low	Low	Adverse Low (2)
	Occupational health and safety (operational workforce)	Occupational health and safety impacts resulting from exposure to airborne dust and combustion-related emissions throughout the	Adverse Direct Partly reversible On-site Unlikely	Low	Moderate	Adverse Low (2)[13]

[13] Significance of impact post mitigation.

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
		operational phase.				
Onsite burning of explosive material waste		Occupational health and safety impacts related to the operational workforce exposed to emissions from onsite controlled open burning of explosive waste materials.	Adverse Direct Reversible Onsite Medium term Possible	Medium	Moderate	Adverse Minor (4)[14]
	Community health and safety (the identified AQSRs)	Community health and safety impacts resulting from community exposure to airborne pollutants from onsite controlled open burning of explosive material waste.	Adverse Direct Reversible Medium term Local Definite	Low	Moderate	Adverse Minor (3)

7.9.3 AIR QUALITY IMPACTS DURING THE DECOMMISSIONING PHASE

During the decommissioning phase, air quality impacts will mainly result from the dismantling of mine infrastructure and site rehabilitation activities following the cessation of mining operations. Although no large-scale mining operational activities will be undertaken, activities such as infrastructure demolition, operation of heavy machinery, material handling, backfilling, re-contouring and off-site transport may generate FD and limited combustion-related emissions from diesel-powered equipment. These emissions are expected to be

[14] Significance of the impact post mitigation.

temporary, localised and of lower intensity than during operations, particularly with appropriate mitigation measures in place.

An overview of the potential air quality impacts during the decommissioning phase, before mitigation (unless indicated otherwise) is shown in Figure 110, for illustrative purposes only. The impacts are discussed in detail in the section below and shown in Table 48.

Figure 110 - Overview of the air quality impacts during the decommissioning phase

7.9.3.1 Occupational health and safety impacts associated with employees exposed to airborne dust and combustion related emissions during the decommissioning phase

A reduced workforce will be engaged during the decommissioning and rehabilitation phase. This workforce will primarily comprise engineering and maintenance personnel, health and safety staff, waste management personnel, site security, specialist demolition contractors and environmental personnel. During this phase, employees will be intermittently exposed to airborne dust and combustion-related emissions generated by decommissioning activities. As a precautionary measure, the mandatory use of appropriate PPE such as dust masks or respirators will be enforced. In addition, dust suppression measures (e.g. water spraying) and continuous oversight by certified health and safety personnel will be implemented throughout the decommissioning phase. These measures are considered good industry practices and are aligned with sustainable mine closure principles as well as applicable occupational health and safety legislation. Therefore, the impact is assessed post mitigation.

The nature of the impact is considered adverse and direct, as emissions will arise directly from decommissioning activities. The impact is considered reversible as the potential health risks associated with prolonged airborne pollutants exposure will cease upon completion of decommissioning activities.

No chronic illnesses or significant respiratory issues are anticipated throughout the decommissioning phase. Decommissioning activities are intermittent in nature (active decommissioning expected to be completed within two (2) years). Therefore, the duration of the impact is rated short-term. The likelihood of the impact is regarded low as the workforce will be equipped with appropriate PPE and various work areas will be supervised by the appointed site managers and supervisors.

The extent of the impact is on-site as the decommissioning team will be based onsite and will undertake various rehabilitation activities within the Project footprint. The magnitude of change is rated negligible, as continuous high-level exposure to dust and airborne particulate matters is not anticipated. The sensitivity of the receptor is rated low due to the controlled nature of the working environment, the intermittent presence of employees in emission prone areas, the use of PPE, continuous supervision by the site manager and supervisors. These factors are expected to reduce the significance of the impact. Overall, the significance of the impact is rated adverse low, post mitigation (Table 48). Mitigation measures are included in the final ESMP (Appendix A).

7.9.3.2 Potential for air quality impacts from decommissioning activities to cause nuisance and complaints from adjacent communities

Decommissioning activities such as infrastructure demolition, material handling, backfilling works and transportation of materials have the potential to generate fugitive dust that could affect local air quality beyond the immediate work areas. Although these activities are temporary and less intensive than full-scale mining operations, they may cause short-term nuisance to nearby communities if not adequately managed, particularly under dry and windy conditions.

The nature of the impact is considered adverse, direct and reversible. Dust emissions during decommissioning are expected to be localised and limited in duration, with activities pre-planned and carefully sequenced to minimise disturbance. No continuous high-emission activities are anticipated. The duration of the impact is considered short term as it is anticipated that active decommissioning activities will be completed within two (2) years. The spatial extent of the impact is considered local, as emissions are unlikely to propagate beyond the Project boundary and impact off-site AQSRs in the broader Project area. However, it is noted that the offsite AQSRs are located considerate distances (> 2 km) from the Project site. It is unlikely expected that significant clouds of dust and airborne particulate matters will propagate and impact these receptors. Both the magnitude of change and the sensitivity of receptor are rated low as decommissioning activities are expected to generate relatively low concentrations of dust and airborne particulate matter, which are unlikely result in visual nuisances and community complaints. Overall, the significance of this impact is rated adverse low, before mitigation (Table 48). The mitigation measures are outlined in the final ESMP (Appendix A).

Table 48 - Air quality impacts assessments ratings - decommissioning phase

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
Decommissioning	Occupational health and safety	Occupational health and safety	Adverse Direct	Low	Negligible	Adverse Low (1)[15]

[15] Significance of impact post mitigation.

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
activities	(rehabilitation team)	impacts associated with employees exposed to airborne particulate matter, dust and combustion related emissions during the decommissioning phase.	Reversible Short term On-site Unlikely			
	Community health and safety (the identified AQSRs)	Potential for decommissioning activities to generate elevated concentrations of dust and airborne particulate matter that could result in visual nuisances and complaints from the AQSRs.	Adverse Direct Reversible Short term Local Unlikely	Low	Low	Adverse Low (2)[16]

7.10 BIOPHYSICAL ENVIRONMENT: CLIMATE CHANGE (PROJECT RELATED – GREENHOUSE GAS (GHG) EMISSIONS) IMPACTS

Climate change poses a critical and growing risk to mining operations in Namibia, particularly within the arid Erongo Region where the Project is located. Namibia's total greenhouse gas emissions were about 14.3 million tonnes CO_2-equivalent ($MtCO_2e$) in 2021 as documented

[16] Significance of impact post mitigation.

by Emission Index, which is 0.03% of total global emissions (Boyle, 2024). The baseline climate assessment conducted by (RDJ Consulting Services CC, 2025) (Appendix I) indicates that the Project area falls within a subtropical desert (BWh) climate characterised by high temperatures, very low and erratic rainfall and prolonged drought cycles that are intensifying over time. Historical trends indicate steadily rising temperatures and increasingly variable precipitation patterns, exposing the region to more frequent and severe droughts and episodic flooding events (ASSAR, 2021). These changing climatic conditions pose physical risks such as water scarcity and heat stress (RDJ Consulting Services CC, 2025). This section assesses how these climate-related aspects may interact with Project activities, influence greenhouse gas (GHG) emissions and affect operational resilience during the life of mine, drawing on site-specific environmental baselines.

Total global greenhouse gas (GHG) emissions from gold mining operations in 2024, limited to Scope 1 and Scope 2 sources, were estimated at approximately 29.9 million tonnes of CO2-equivalent (MtCO2e) (Parker, 2025; Rajkotwalla, 2025). When this aggregate figure is averaged across the 329 primary gold mines included in major global benchmarking datasets, it equates to an estimated mean annual emission of roughly 90 000 – 91 000 tCO_2e per mine (Gian Seblos, 2024). This value represents a simple arithmetic average and is intended to provide an indicative benchmark rather than a site-specific emission profile. In practice, emissions vary substantially between operations depending on mine size, ore grade, mining method (open-pit versus underground), energy intensity and reliance on fossil-fuel-based versus renewable electricity sources. The estimate reflects direct operational emissions and emissions associated with purchased electricity and does not account for Scope 3 value-chain emissions, which are reported inconsistently across the sector and would materially increase the total carbon footprint, if included.

At a regional level, Southern African gold mines are among the highest contributors to GHG emissions due to energy intensive underground mining and continued reliance on coal dominated electricity grids (Appian Capital Advisory, 2025; Motaung, 2023; Ulrich *et al*., 2022). These estimates are limited to Scope 1 and Scope 2 emissions and exclude downstream (Scope 3) emissions.

In Namibia, the Otjikoto Mine, the country's largest gold producer, emitted approximately 98 000 tCO_2e in 2024 from Scope 1 and Scope 2 sources (Jones *et al.,* 2024). This level of emission is broadly consistent with the global per mine average and lower than that of high emitting Southern African operations. This is partly due to Namibia's cleaner electricity mix and Scope 3 emissions are excluded from this estimate.

An overview of the potential climate change related impacts (Scope 1 and Scope 2) on the biophysical environment is illustrated in Figure 111, before mitigation, Scope 3 is excluded from this assessment. Each specific impact is discussed in detail in the section below and the impact assessment ratings are summarised Table 49.

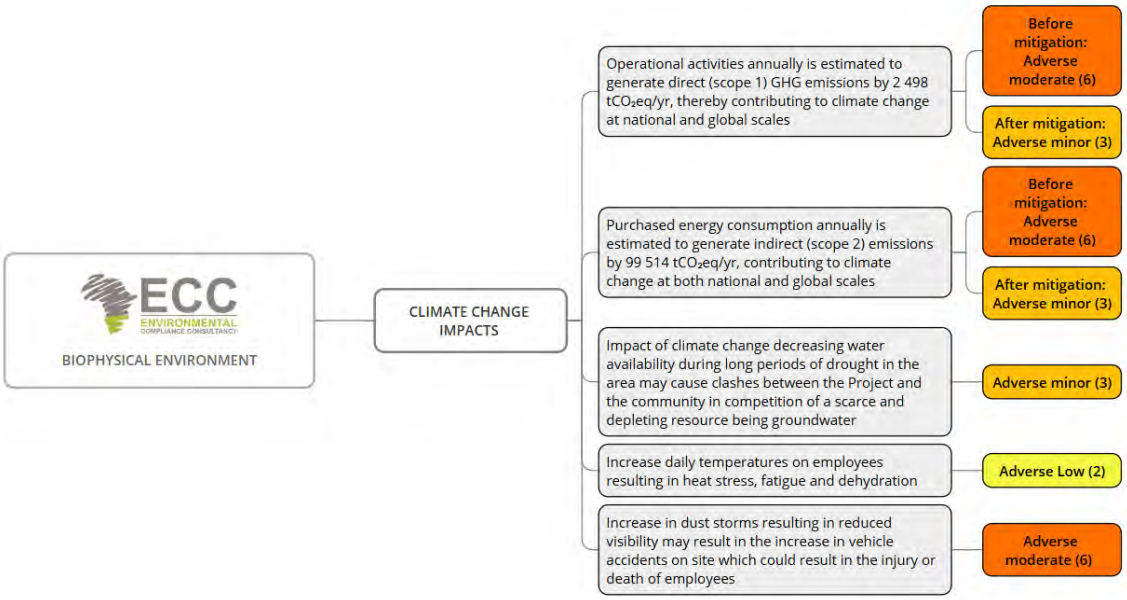


Figure 111 - An overview of climate change related impacts on the biophysical environment

7.10.1 OPERATIONAL ACTIVITIES IN A SINGLE REPORTING YEAR IS ESTIMATED TO INCREASE DIRECT (SCOPE 1) GHG EMISSIONS BY 2 498 TCO_2 EQ, THEREBY CONTRIBUTING TO CLIMATE CHANGE AT A NATIONAL LEVEL

Operational activities in a single reporting year are projected to result in an increase in direct (Scope 1) greenhouse gas emissions, quantified at approximately 2 498 tCO_2eq (Figure 112). Which would equate an estimate of to 29 976 tCO_2eq over the LOM (~12 years). These emissions arise primarily from on-site fuel combustion, chemical reactions and process-related activities. Modelled data indicates that diesel emissions contribute approximately 97.5% of total Scope 1 outputs (RDJ Consulting Services CC, 2025).

Scope 1 emissions are significant as these emissions represent the direct release of CO_2, CH_4 and N_2O from stationary, mobile combustion sources and material handling activities within the mine's operational boundary. However, the estimated projected Project emissions account for only 0.017% of Namibia's annual national GHG inventory. Consequently, the Project is expected to contribute a negligible increase to both national and global Scope 1 emissions.

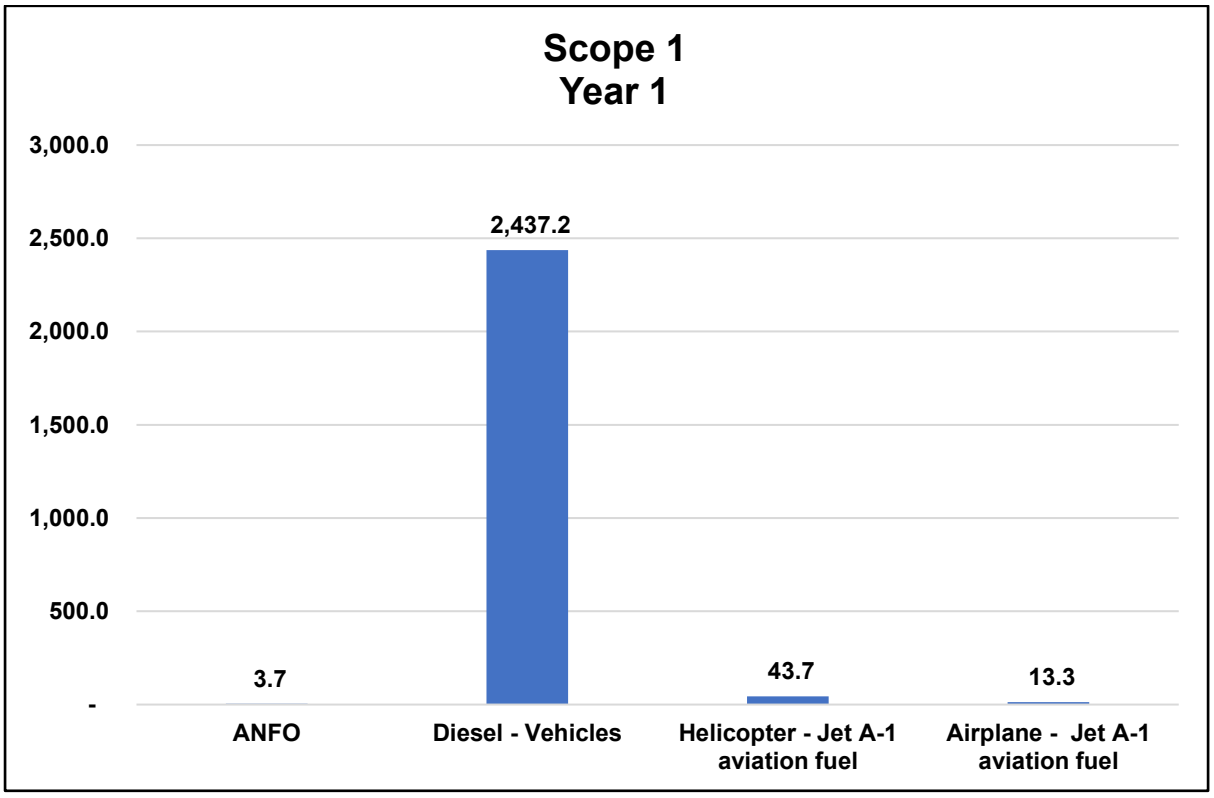


Figure 112 - Scope 1 in a reporting year: 2 498 tonnes carbon dioxide equivalent (tCO2eq) (Source: RDJ Consulting Services CC, 2025)

The nature of the impact is considered adverse and direct as the mine operations will directly release GHGs, mainly from diesel combustion. The impact is considered partly reversible as the release of emissions may be mitigated through operational controls and natural processes can gradually remove GHGs over time. The duration of the impact is rated as medium term (5 - 15 years) as the mine operational phase is projected to be 12 years, where GHG emissions will cease following cessation of operations.

The magnitude of change is rated negligible as the Project's projected Scope 1 emissions are quantifiably low and will contribute measurable contributions to Namibia's greenhouse gas balance. As Namibia is a net GHG sink, these emissions will not materially affect the national sink status or climate vulnerability. The extent of the impact is considered international as the GHG emissions will not remain confined to Namibia or the mine area. These long-lived GHGs mix and disperse throughout the global atmosphere and contribute to climate change, irrespective of their origin.

Although normal Project operations are expected to emit GHGs, the likelihood that these emissions will result in significant contributions to global climate change is rated low.

The precise scale and materialisation of these GHG emissions is uncertain as this is also influenced by numerous external factors (e.g. global carbon cycle, atmospheric circulation patterns and absorption of CO_2 by terrestrial sinks). The sensitivity of the receptor is rated high as the global climate systems, particularly the atmosphere connects all global GHG

concentrations to cumulative climate effects. Overall, the significance of the impact is rated adverse moderate (before mitigation), as shown in Table 49. With mitigation, the impact is reduced to adverse minor.

The mitigation measures are listed below and are included in the final ESMP (Appendix A):

- Reduce diesel use through fleet efficiency, optimised payloads, reduced idling and better shovel–truck matching;
- Promote proper vehicle housekeeping (tyre pressure management, removing excess load) to reduce fuel use;
- Improve energy efficiency in motors, air conditioners and processing equipment;
- Apply strict idling reduction policies and advanced fleet management;
- Improve water efficiency to reduce pumping and treatment energy needs;
- Implement land restoration and nature-based carbon offsets on disturbed areas; and
- Develop a site-specific greenhouse gas inventory for operational activities with short, medium and long-term objectives that the Proponent would like to meet to reduce Scope 1 emissions.

7.10.2 THE PROJECT'S PURCHASED ENERGY CONSUMPTION IN A SINGLE REPORTING YEAR IS ESTIMATED TO RESULT IN 99 514 TCO_2EQ OF (SCOPE 2) GHG EMISSIONS, THEREBY CONTRIBUTING TO CLIMATE CHANGE AT NATIONAL LEVELS

In a single reporting year, the Project's operations will require substantial electrical energy input, estimated at approximately 280 million kilowatt-hours (kWh) per annum. This electricity demand will be sourced from the national grid and will result in indirect (Scope 2) GHG emissions due to the carbon intensity of Namibia's electricity generation mix, which comprises both imported and domestically generated fossil-fuel-based energy sources (RDJ Consulting Services CC, 2025).

Modelled data indicates that annual indirect Scope 2 emissions will be approximately 99 514 tCO_2eq (Figure 113), equating to an estimate of 1.2 $MtCO_2eq$ over the LOM (~12 years). These emissions will arise exclusively from purchased electricity consumption and will be the Project's main contributor to indirect GHG emissions. The magnitude of Scope 2 emissions is primarily determined by grid emission factors, operational energy efficiency and production throughput (RDJ Consulting Services CC, 2025).

Figure 113 - Scope 2 in a reporting year: 99,514 tonnes carbon dioxide equivalent (tCO2e) (RDJ Consulting Services CC, 2025)

Scope 2 emissions are generated off-site at the point of electricity generation. However, they are included in the Project's GHG inventory in accordance with the principle of indirect responsibility. Modelled Project CO_2, CH_4 and N_2O emissions contribute approximately 0.7% to national annual GHG emissions.

The nature of the impact is considered adverse as the Project's bulk electricity demand will generate high indirect GHG emissions. This impact is regarded indirect, as the emissions will be generated offsite at power generation facilities, although they will result from the Project operational electricity demand. The impact is partly reversible as these emissions can be mitigated through the adoption of cleaner energy sources or reductions in electricity consumption. As Namibia draws effort to increase renewable energy in its energy mix, the carbon intensity of purchased electricity decreases. Furthermore, residual emissions are slowly absorbed by natural carbon sinks (forests, soils and oceans), therefore part of the atmospheric impact diminishes over time. The duration of impact is rated as medium term (5 - 15 years), reflecting the anticipated LoM (~12 years). Following cessation or significant reduction of operations, indirect emissions will likewise cease.

The magnitude of change is considered low as the projected Project's Scope 2 emissions (~99 514 tCO_2e per annum are quantifiably low and do not signify significant contributions to the

nation's GHG balance (Table 49). Mitigation measures have been included in the final ESMP (Appendix A).

7.10.3 INCREASE IN THE INTENSITY AND ERRATIC CYCLES OF RAINFALL MAY RESULT IN FLOODS, DAMAGING INFRASTRUCTURE OR EQUIPMENT, RESULTING IN A HALT OF OPERATIONS

An increase in the intensity and erratic cycles of rainfall can significantly heighten the risk of flooding, leading to damage or loss of mining infrastructure and equipment. Intense rainfall events generate large volumes of surface runoff that can exceed the capacity of drainage systems. This cause water to accumulate and flow over mine roads, haul routes and work areas. The high energy of these flows can erode soil, undermine foundations and wash away unprotected structures such as pipelines, powerlines, access roads and stormwater channels (de Almeida *et al*., 2021). Erratic rainfall patterns also reduce the predictability of water management, as periods of drought are followed by sudden heavy downpours that the ground cannot easily absorb. This results in rapid surface water accumulation and increased sediment transport, which can block culverts, silt up settling ponds and compromise drainage efficiency. Prolonged or repeated flooding can destabilise pit slopes, tailings dams/storage facilities and stockpiles, increasing the likelihood of structural failure (Tetteh *et al*., 2025). In addition, inundation of workshops, storage areas or machinery can cause corrosion, electrical damage and costly operational delays. Overall, the combination of more intense rainfall and unpredictable wet-dry cycles amplifies hydrological stress on mine infrastructure.

The assessment of 1-in-50-year and 1-in-100-year flood return intervals impacts on the Project and the flood assessment conducted for the Project is assessed in detail in section 7.13.1.2.8 and is not discussed in depth in this section.

7.10.4 IMPACT OF CLIMATE CHANGE DECREASING WATER AVAILABILITY DURING LONG PERIODS OF DROUGHT IN THE AREA MAY CAUSE CLASHES BETWEEN THE PROJECT AND THE COMMUNITY IN COMPETITION OF A SCARCE AND DEPLETING RESOURCE BEING GROUNDWATER

Climate change is projected to intensify drought frequency and severity in Namibia, particularly in the Erongo Region, which already falls within a subtropical desert (BWh) climate characterised by extremely low rainfall and very high evaporation rates. Baseline data shows that annual precipitation is typically <250 mm, with up to 83% of rainfall lost directly to evaporation in arid regions (MEFT, 2024).

Groundwater availability is inherently unreliable due to high rainfall variability and low recharge rates. This condition is explicitly noted in the baseline chapter, which states that groundwater reserves in many areas "are not reliable" as recharge patterns are highly variable and unpredictable.

Within the Daures Constituency, where the Project is located, water supply is supported by approximately 347 boreholes, four (4) dams and numerous community water points that provide water for domestic use, livestock and small-scale agriculture. These sources rely predominantly on groundwater abstraction. During prolonged drought periods, shallow aquifers become depleted. This result in reduced borehole yields and intermittent failure of community water infrastructure to meet the demand (RDJ Consulting Services CC, 2025).

For the Project, water is a critical input for ore processing, dust suppression, tailings management and potable supply for the workforce. Under severe drought conditions, groundwater abstraction for mining operations may intensify pressure on the same aquifers relied upon by surrounding communities. This includes communities such as Uis, Okombahe and smaller rural settlements. The baseline assessment indicate that drought and-water scarcity events are "likely" during the LoM. Namibia has experienced repeated nationally declared drought emergencies (1992–1993, 1995–1996, 2012–2014, 2015–2016, 2018–2019, 2024), driven by extreme water shortages. These historical trends confirm a high degree of hydroclimatic vulnerability, particularly in arid regions such as the Erongo Region (RDJ Consulting Services CC, 2025).

As climate change drives increasing temperatures and declining mean precipitation, aquifer recharge rates are likely to decrease. This occurs concurrently with rising water demand from the rural population and existing industrial users such as the Uis Tin Mine, which consumes approximately 187 603 m³ of water per annum for mineral processing (RDJ Consulting Services CC, 2025).

The Project is situated in a hydrological region characterised by limited and highly contested water resources. Additional abstraction during droughts may be perceived by local communities as worsening water scarcity. Under such conditions, the potential for tension or conflict between the Project and local residents increases. Community expectations regarding water access are shaped by a strong reliance on boreholes and public water points to meet daily needs. Any perceived decline in groundwater levels, reduction in borehole yields or increased reliance on water trucking may give rise to social grievances.

The baseline assessment indicates that the local economy is highly vulnerable and climate sensitive. As a result, drought-related water shortages directly affect livelihoods and social sensitivity to competition over water resources. Under these conditions, climate driven reductions in groundwater availability have the potential to translate into operational, reputational and social licence risks for the Project.

The nature of the impact is considered adverse as declining groundwater availability during drought periods can compromise community water security, elevate risk of conflicts, threaten livelihoods and disrupt Project operations. The impact is indirect as water shortage is driven primarily by climate variability rather than Project activities. Water shortage may also lead to competition between the community and the Project.

The impact is regarded reversible as effective water management, alternative water supply options and proactive community engagement can alleviate competition for groundwater and aquifer levels can recover after drought conditions ease. The duration of the impact is medium term (5 - 15 years), reflecting that potential water-related competition and associated social tension are likely to persist only for the duration of the LoM (~ 12 years).

The magnitude of change is rated low because the impact will likely cause minor, manageable changes to community water access. This is not expected to significantly alter the characteristics or integrity of the local groundwater resource. The impact is localised as local communities that rely on shared groundwater resources are the primary receptors. The probability of the impact occurring is rated possible because drought conditions could create water shortages and trigger competition. However, these outcomes would only arise under specific circumstances and can be mitigated through appropriate management. The sensitivity of the receptor is rated medium as groundwater sources are locally important, and local communities rely on them for their daily activities (e.g. household use and subsistence farming). Any alteration to the water supply would require some form of immediate mitigation measures. Overall, the significance of the impact is rated adverse minor (before mitigation), as shown in Table 49. The mitigation measures are included in the final ESMP (Appendix A).

7.10.5 IMPACT OF INCREASED DAILY TEMPERATURES ON EMPLOYEES RESULTING IN HEAT STRESS, FATIGUE AND DEHYDRATION

Increased daily temperatures can have a direct physiological impact on employees, leading to heat stress, fatigue and dehydration. When ambient temperatures rise, the body's natural cooling mechanisms, primarily sweating and increased blood circulation to the skin are activated to maintain a stable core temperature (Osilla *et al.,* 2023). However, sustained exposure to high temperatures, particularly during physically demanding work such as mining, can overwhelm these thermoregulatory processes. This compromise worker's health and performance.

The nature of the impact is considered adverse as higher temperatures directly affect workers' health by causing heat stress, dehydration, fatigue and an increased risk of accidents and unsafe working conditions. The impact is considered indirect because climate-driven temperature increases occur outside the Project's control and give rise to secondary health and safety risks for employees. Additionally, the impact is deemed reversible as heat stress, dehydration and fatigue can be alleviated once workers are cooled, hydrated, rested or removed from high-temperature conditions. These impacts do not cause permanent damage when managed promptly. The duration of the impact is rated temporary considering that the impact only occurs while workers are exposed to high temperatures and ceases once conditions changes (heat exposure and associated effects will likely be more severe during the dry seasons than the cold/winter season).

The magnitude of change is rated negligible as the effects on workers are expected to be minor, easily manageable, and will not result in major occupational health issues and possibly the halt of operations. The probability of the impact occurring is considered possible as the climatic conditions capable of causing health issues are frequent as they are associated with arid conditions that are experienced in the greater region. The sensitivity of receptor is rated low as the impact is confined to the operational workforce. However, the workforce is expected to possess sufficient capacity to accommodate heat exposure through standard occupational health and safety measures. Overall, the significance of the impact is rated adverse low (before mitigation), as shown in Table 49. The mitigation measures are included in the final ESMP (Appendix A).

7.10.6 INCREASE IN DUST STORMS RESULTING IN REDUCED VISIBILITY MAY RESULT IN THE INCREASE IN VEHICLE ACCIDENTS ON SITE WHICH COULD RESULT IN THE INJURY OR DEATH OF EMPLOYEES

Prolonged drought conditions dry out soil and exposed surfaces. This reduces moisture content and loosen fine particles. Strong winds, which are more likely during erratic weather patterns associated with climate change, lift these dry particles into the air and form dust clouds that can travel longer distances across the Project site. The presence of airborne dust reduces visibility for operators of haul trucks, loaders and other mobile equipment, making it difficult to judge distances, detect obstacles or see other vehicles and personnel. Dust accumulation on windshields, cameras, sensors and lighting systems further impairs visibility and can compromise the functioning of safety systems such as proximity alarms or collision avoidance technology.

In addition to visibility hazards, dust can also infiltrate braking systems, engines and other mechanical components, potentially leading to equipment malfunctions or sudden failures that create additional accident collusions which could result in injury or death of employees (Alzaid & Aljassar, 2024). Overall, the combination of reduced visibility and compromised equipment performance makes vehicle movement on mining sites more hazardous during dust storms.

The nature of the impact is adverse as dust from drought and strong winds reduces visibility, increases accident risk, damages equipment and worsens road and working conditions. The impact is indirect because climate-driven drought and wind create dust conditions, which then lead to safety and operational hazards. The impact is irreversible as dust-related accident-causing injury, death or permanent equipment damage cannot be reversed. The duration of the impact is permanent because the harmful consequences that result from dust-related hazards do not recover or return to their original state, even if the dust event itself is temporary. The extent of the impact is deemed on-site as the operational workforce is particularly at risk of sustaining road collisions as a result of dust storms.

The magnitude of change is rated high as dust-related aspects can cause severe, lasting, and in the worse-case scenario, irreversible impacts on workers, equipment and site safety conditions. The extent of the impact is considered on-site as all dust-related hazards and their consequences occur within the mine's operational area. The sensitivity of the receptor is rated medium as the operational workforce will require the mine's interventions to ensure uninterrupted operations. Overall, the significance of this impact is rated adverse moderate (before mitigation), as shown in Table 49. With mitigation, the impact is reduced to adverse minor. The mitigation measures have been included in the final ESMP (Appendix A) and are listed below:

- Apply treated/recycled water and dust-binding agents during drought periods, maintain road conditions through grading, compacting and adding stabilisers to reduce dust lift-off and improve traction;
- Improve visibility with high-intensity LED lighting, dust-resistant windscreen wipers, automated camera-cleaning systems and enforce reduced speed limits during low-visibility events;
- Implement a dust hazard protocol with visibility-triggered response levels, use one-way traffic routes, enhance radio communication and stagger haulage schedules during peak dust and wind periods;
- Train workers in low visibility driving, dust hazards and emergency response; and
- Maintain a dust emergency response plan, including criteria to halt operations during extreme dust events and conduct regular dust-related collision and equipment-failure drills.

Table 49 - Climate change impact assessment ratings

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
Mining operations	Global atmosphere	Operational activities annually increase direct (scope 1) GHG emissions (2 498 tCO_2eq) thereby contributing to climate change.	Adverse Direct Partly reversible Medium term International Unlikely	High	Negligible	Adverse Moderate (6)
Consumption of purchased electricity		Consumption of purchased electricity annually will	Adverse Indirect Partly reversible	High	Low	Adverse Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
		indirectly increase (scope 2) GHG emissions (99 514 tCO_2eq) thereby contributing to climate change	Medium term International Unlikely			
Competition for groundwater	Community	Impact of climate change decreasing water availability during long periods of drought in the Project area may cause conflicts and clashes between the Project and the community.	Adverse Indirect Reversible Medium term Local Possible	Low	Low	Adverse Minor (4)
Climate change – increased daily temperatures	Employee occupational health and safety	Impact of increased daily temperatures on employees, resulting in heat stress, fatigue and dehydration.	Adverse Direct Reversible Temporary On-site Medium	Low	Negligible	Adverse Low (2)

Activity	Receptor	Impact	Nature of impact	Value and sensitivity	Magnitude of change	Significance of impact
Climate change – dust storms	Employee occupational health and safety	Increase in dust storms resulting in reduced visibility may result in the increase in vehicle accidents on site which could result in injuries or death of employees.	Adverse Direct Irreversible Permanent On-site Possible	Medium	High	Adverse Moderate (6)

7.11 BIOPHYSICAL ENVIRONMENT: SOIL AND LAND USE IMPACTS

The soil characteristics within the Project area forms a critical foundation for understanding the potential impacts associated with the proposed mine's construction and operational phases. As part of the ESIA, a comprehensive baseline study was undertaken to characterise existing soil conditions across the Project area, recognising that soil quality, erodibility and land capability directly influence ecosystem resilience, rehabilitation potential, and the stability of mine infrastructure (Jarrett, 2025) (Appendix J).

Fieldwork involved excavating and logging six (6) representative soil profiles, followed by laboratory analysis of physical and chemical properties, including texture, structure, nutrient content, pH, organic matter and trace metal concentrations to establish a robust baseline against which future changes can be measured (Jarrett, 2025) (Appendix J).

The baseline findings indicate that the Project area is dominated by Eutric Skeletic Regosols, which are young, sandy to loamy soils with minimal horizon development, low organic content, limited moisture retention and moderate susceptibility to erosion. Calculated K-factors (0.11 – 0.17) reflect low to moderate erodibility typical of loamy sands, while fertility assessments show predominantly neutral to alkaline pH conditions with high calcium concentrations but generally low nutrient richness (Renard *et al.,* 1997). These characteristics suggest that the soils possess limited agricultural potential but are suitable for extensive grazing and can serve as a resource for rehabilitation material if carefully managed.

This section assesses how the proposed mining activities may affect these sensitive soil resources, through vegetation clearing, excavation, infrastructure development, stockpiling and operational disturbances and identifies appropriate mitigation and management measures to minimise degradation and support long-term land restoration objectives.

The potential soil related impacts during the construction phase are illustrated in Figure 114, before mitigation and are expanded on in detail in Table 50.

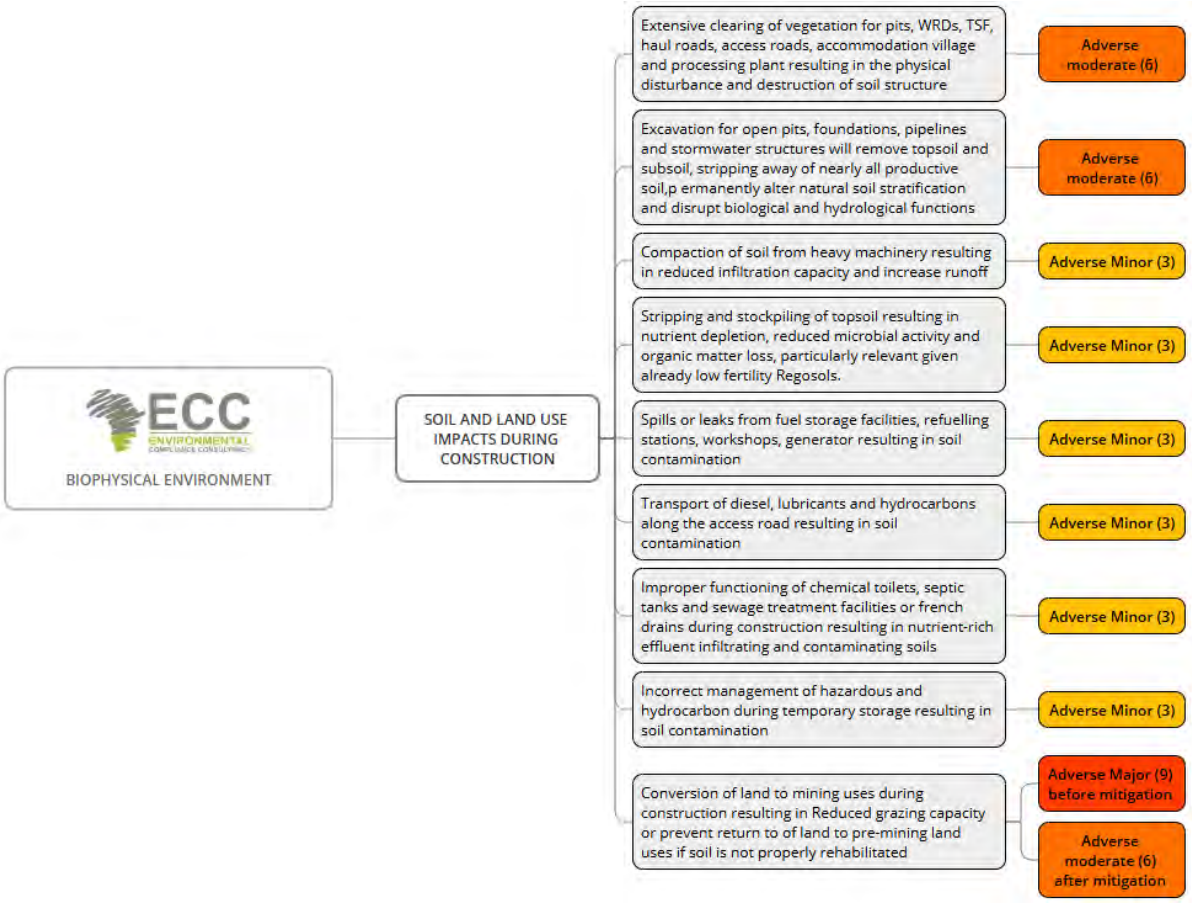


Figure 114 - Impact of construction of mine infrastructure and the development of the open pits on soils within the Project area

7.11.1 CONSTRUCTION PHASE

7.11.1.1 Extensive clearing of vegetation for pits, WRDs, TSF, haul roads, access roads, accommodation village and processing plant and other mining infrastructure may lead to physical disturbance and destruction of soil structure

The Project will require extensive vegetation clearing for the open pit, WRDs, TSF, roads, processing plant and associated infrastructure, predominantly on shallow, weakly developed Eutric Skeletic Regosols. These soils have thin A-horizons, coarse sandy textures, low organic matter and poor structural stability, making them highly sensitive to disturbance. Vegetation removal eliminates root systems that stabilise the soil, intercept rainfall and reduce runoff energy, thereby significantly increasing susceptibility to wind and water erosion. Given the low cohesion, low aggregate stability and moderate erodibility of these soils, surface disturbance rapidly leads to structural collapse, reduced infiltration, soil crusting and accelerated sheet and rill erosion. The loss of vegetation also impairs soil ecological and hydrological functions, including microbial activity, nutrient cycling and moisture retention, particularly under the region's hot desert climate with high evapotranspiration and episodic intense rainfall.

The nature of the impact is adverse as vegetation clearing and conducting earthworks on the naturally shallow, sandy and weakly developed Regosols will cause rapid and largely irreversible soil degradation. The type of impact is direct because the soil degradation occurs due to the Project's own clearing, excavation and machinery activities resulting in an immediate cause-and-effect relationship. The impact is irreversible because once vegetation is removed and the soil structure is destroyed or compacted, the loss of topsoil, reduced fertility, disrupted microbial activity and increased erosion cannot naturally recover within a meaningful timeframe. The duration of the impact is permanent because the soil degradation and loss of ecological function caused by vegetation clearing, excavation and compaction will persist for the foreseeable future. The magnitude of change is high because the proposed development will result in the substantial loss and severe degradation of the Eutric Skeletic Regosols. Mechanical clearing, grubbing and earthworks will strip the already thin, coarse-textured topsoil, destroy natural soil structure and disrupt key physical and ecological functions, including cohesion, nutrient cycling and moisture retention. The extent of the impact is on-site because the soil disturbance and vegetation clearing will occur only within the defined Project footprint, the open pit, WRDs, TSF, haul/access roads, plant area and associated infrastructure. The probability of the impact occurring is definite because the activities that cause the impact, vegetation clearing, topsoil stripping, excavation, heavy machinery movement and infrastructure development, are integral and unavoidable components of the Project's construction phase, therefore the impact will occur. However, the sensitivity of the impact is low because the affected soils are naturally shallow, weakly developed, low in organic matter, and widely distributed across the Project area and surrounding landscapes, meaning they are not unique, rare, or high-value soil types within the region.

Therefore, the significance of this impact has been rated adverse moderate (before mitigation) as shown in Table 50. With mitigation, the impact is reduced to minor. The mitigation measures have been included in the final ESMP (Appendix A).

The following mitigation measures are recommended for implementation to better manage the anticipated impact:

- Minimise disturbance footprint by refining infrastructure layout, clustering facilities, marking no-go zones, and limiting vegetation clearing strictly to surveyed boundaries;
- Implement controlled topsoil salvage, stripping the full thin A-horizon in a single pass (300 mm), storing topsoil in low (≤2 m) vegetated stockpiles, and preventing contamination or mixing with subsoil;
- Re-use topsoil as soon as possible to maintain fertility and microbial viability;
- Prevent compaction and unnecessary disturbance by restricting machinery to designated access routes, using temporary geotextiles or granular layers on haul roads, enforcing speed limits, and avoiding vehicle movement during wet conditions;
- Apply robust erosion and stormwater control, including contour-aligned drains, berms, silt fences, sediment traps, rip-rap outlets, and stabilisation of exposed slopes using mulch, erosion-control blankets, or temporary vegetation cover;
- Progressive rehabilitation of completed work areas through ripping or scarifying compacted surfaces, reshaping slopes, re-spreading topsoil, applying organic amendments, mulching and establishing native vegetation using locally sourced seeds or seedlings;
- WRD and TSF management through staged construction, stable benching, run-on/run-off control, perimeter drains, toe protection and covering or stabilising exposed fine material to reduce erosion and dust generation;
- Bunding fuel/lube areas,, using impermeable pads for maintenance zones prevents soil contamination, providing spill kits and enforcing immediate clean-up and remediation of contaminated soils;
- Monitoring and adaptive management using vegetation cover targets, erosion inspections, bulk density/infiltration measurements and sediment load checks, with predefined corrective actions where recovery indicators are not met; and
- Rehabilitation success criteria and maintenance include maintaining stormwater structures, controlling weeds, protecting establishing vegetation and ensuring rehabilitated areas remain stable after storm events.

7.11.1.2 Excavation for open pits, foundations, pipelines, powerlines and stormwater structures will remove topsoil and subsoil, altering natural profiles

Excavation for the open pit, foundations, pipelines, powerlines and stormwater structures will remove the already shallow topsoil and subsoil layers characteristic of the Eutric Skeletic Regosols in the Project area. Because these soils have very thin A-horizons, coarse textures and weak profile development, excavation will strip away nearly all productive soil,

permanently alter natural soil stratification and disrupt biological and hydrological functions. Exposed skeletal subsoils are highly vulnerable to erosion and the loss of intact horizons reduces infiltration and increases runoff. The limited availability of topsoil also poses significant challenges for future rehabilitation, making careful stripping, separation and stockpiling essential to preserve growth media for mine closure.

Accordingly, the nature of the impact is adverse as excavation removes the already shallow and weakly developed soils, stripping nearly all productive topsoil and altering natural soil profiles. The type of impact is direct because excavation for pits, foundations, pipelines and stormwater structures physically removes and alters the soil in the Project area. The impact is irreversible because excavation permanently removes the naturally thin A-horizons and weakly developed soil profiles of the Eutric Skeletic Regosols, which cannot be fully reconstructed. The duration of the impact is permanent because excavation permanently removes the naturally thin topsoil and subsoil layers, fundamentally altering the soil profile. The magnitude of change is high because excavation results in the loss of the already limited topsoil and subsoil, which are key components of the soil resource. The extent of the impact is onsite because the effects of excavation, removal of topsoil and subsoil, alteration of soil profiles and increased erosion are confined to the physical footprint of the open pits, foundations, pipelines and stormwater structures. However, the sensitivity of the impact is low because the soil type is common and not particularly rare or highly valued locally. Therefore, the significance of this impact has been rated adverse moderate (before mitigation) as shown in Table 50. After mitigation, the impact reduces to adverse minor. The mitigation measures have been included in the final ESMP (Appendix A).

The following mitigation measures are recommended for implementation to better manage the anticipated impact:

- Carefully strip, segregate and stockpile topsoil separately from subsoil, protecting stockpiles with mulch or temporary vegetation to preserve fertility and prevent erosion; re-spread topsoil promptly during rehabilitation;
- Limit excavation to necessary areas, minimise soil compaction and progressively rehabilitate disturbed areas using native or locally adapted vegetation;
- Implement sediment traps, diversion berms, or mulching to reduce soil loss and stabilise exposed subsoil;
- Conduct soil quality and erosion monitoring, adjusting management practices as needed to ensure successful rehabilitation; and
- Educate site personnel on proper soil handling, erosion control and rehabilitation practices to ensure ESMP compliance.

7.11.1.3 Compaction from the use of heavy machinery during construction will reduce infiltration capacity of soil and increase runoff

Compaction caused by heavy machinery during construction will compress the already coarse, sandy Regosol soils, reducing macroporosity and significantly lowering infiltration

capacity. Given that these soils naturally exhibit moderate infiltration and low cohesion, compaction will further restrict water movement into the profile, leading to increased surface runoff and a heightened risk of sheet and rill erosion, particularly during intense rainfall events common to the area. Compaction also disrupts soil structure, root penetration and microbial activity, diminishing the soil's ability to support vegetation and complicating future rehabilitation efforts.

The nature of the impact is adverse because compaction from heavy machinery degrades the naturally coarse, sandy Regosols soils by reducing porosity and infiltration, increasing surface runoff and erosion risk. The type of impact is direct because the construction activity (cause) directly alters soil structure, infiltration and porosity (effect) without needing intermediate processes or pathways. The impact is reversible because the compacted soil can be restored through measures such as ripping, adding organic amendments and revegetation, which recover porosity, microbial activity and root structure. The duration of the impact is short term (<5 years) because soil compaction will only occur during the period (construction) when heavy machinery is actively operating on the site. Once construction ceases the soil can begin to recover, meaning the adverse effects do not persist indefinitely. The magnitude of change is low because although compaction slightly alters soil structure, porosity and infiltration, the change affects only a few soil characteristics and is minor in scale. Key soil functions remain largely intact, and the alteration does not fundamentally compromise the overall quality or resilience of the soil. The extent of the impact is onsite because the compaction occurs directly where the heavy machinery operates, affecting only the soils within the construction footprint (e.g., access roads, pits, and working areas).

The probability of the impact occurring is definite because soil compaction is an inevitable consequence of heavy machinery use on loose, sandy Regosol soils and the impact is expected to occur. Furthermore, the sensitivity of the impact is low because the impact will occur on a local (onsite) scale, these soils are not rare and these soils have a moderate capacity to recover from compaction through natural processes or rehabilitation measures, meaning they are not highly sensitive to change. Therefore, the significance of the impact has been rated adverse low (before mitigation) (Table 50). The mitigation measures have been included in the final ESMP (Appendix A).

7.11.1.4 Stripping and stockpiling of topsoil during construction may result in nutrient depletion, reduced microbial activity and organic matter loss, particularly relevant given already low fertility Regosols

The primary impact of topsoil stripping and stockpiling risks significant nutrient depletion, particularly due to the very low percentage of organic compounds found in all samples, which are crucial for nutrient retention and cycling. Mechanical disturbance from stripping and the subsequent placement into stockpiles will compromise the natural granular soil structure, leading to compaction and reduced infiltration capacity. Furthermore, if stockpiles are not managed correctly, the essential microbial communities responsible for soil health and

nutrient cycling will be depleted, especially if the height exceeds 2 m or exposed for too long before reuse.

The nature of the impact is adverse due to topsoil stripping and stockpiling that degrade essential soil properties, including nutrient content, structure and microbial communities, which are critical for fertility and ecosystem function. This degradation, particularly given the low organic matter and loamy sand texture, compromises infiltration, nutrient cycling and vegetation rehabilitation, making long-term site restoration more challenging. The type of impact is direct because topsoil stripping and stockpiling mechanically alter the soil in situ. The disturbance affects the soil's physical structure, nutrient content and microbial communities at the exact location where the activity takes place. The impact is irreversible because organic matter content, microbial diversity, natural structure and indigenous seedbanks, cannot be fully restored once lost or severely degraded. The magnitude of change is high because topsoil stripping and stockpiling cause severe degradation of critical soil properties, including loss of nutrients, disruption of soil structure and depletion of microbial communities. These changes significantly damage the soil's key characteristics and integrity, reducing its fertility, water-holding capacity and potential to support vegetation. The extent of the impact however, is limited to onsite because the effects of topsoil stripping and stockpiling, such as nutrient loss, compaction, structural degradation, and microbial disruption, is confined to the area of soil handling and stockpiling. The probability of the impact occurring is likely because topsoil stripping and stockpiling are planned, unavoidable activities in the Project, and they will inevitably disturb the soil's structure, nutrients and microbial communities if not carefully managed. The sensitivity of the impact is low because the soil type is not rare or of high conservation value on a local (onsite) scale. Therefore, the significance of the impact has been rated adverse minor (before mitigation) as shown in Table 50. The mitigation measures are included in the final ESMP (Appendix A).

7.11.1.5 Spills or leaks from hazardous chemicals or hydrocarbons such as fuel storage facilities, refuelling stations, workshops, generator stations and vehicle wash bays during construction may contaminate soils

Spills or leaks hazardous chemicals or hydrocarbons such as from fuel storage areas, refuelling stations, workshops, generator units and wash bays during construction activities pose a significant contamination risk to the soils within ML 274/Project site. The receiving environment is dominated by weakly developed, coarse-textured soils with minimal topsoil, high sand and gravel content and very low organic matter. These soils exhibit high infiltration rates (8 cm/hr – 18 cm/hr) and low water-holding capacity, meaning hydrocarbons or other pollutants can rapidly percolate downward through the profile. Because the A-horizon is extremely shallow (often <4 cm), contamination would quickly bypass the biologically active layer and enter subsoil layers that have virtually no capacity for natural attenuation. Their low organic matter and limited microbial biomass further reduce biodegradation potential, resulting in long-lasting contamination.

The nature of this impact is adverse because spills and leaks from fuel-related activities can contaminate the fragile Eutric Skeletic Regosols onsite. The type of impact is direct because it results from an immediate and physically connected action or source. In this case, hazardous chemical or hydrocarbon spills or leaks from fuel storage areas, refuelling stations, workshops, generator units, and wash bays directly introduce contaminants into the soil at the Project site. There is a clear, pathway between the source of pollution (hydrocarbons or other chemicals) to the receptor (soils), without any intermediate steps or indirect mechanism. The impact is partly reversible because although some natural or engineered interventions can reduce contamination over time, full recovery of the soil to its original condition is unlikely. The duration of the impact is characterised as long-term (>15 years) because once hydrocarbons (depending on the size of the spill usual more than 200 L) enter the subsoil, remediation becomes difficult, costly, and time-consuming. In arid, low-organic desert soils such as these, natural attenuation processes operate slowly, often over decades. The magnitude of change of the impact is considered high because hydrocarbon infiltration would lead to the direct loss of soil quality, functionality and ecosystem services. The soils already have poor fertility, weak structural development and a natural predisposition to erosion due to their loamy sand texture and K-factor values of 0.11 – 0.17. Contamination would exacerbate these vulnerabilities by killing vegetation, destabilising the surface and increasing erodibility. The extent of the impact would remain on-site, limited to areas where spills occur and their immediate surroundings. The probability of occurrence is rated as likely, given the number of hazardous chemical and hydrocarbon-dependent activities during construction and the vulnerability of the soil. Minor leaks from hoses, fittings, machinery and fuel transfer points are common in construction settings, and even small spills can cause significant contamination in these soil conditions.

Although the soils are vulnerable, their sensitivity rating is low because they are not rare, nor agriculturally valuable and not ecologically sensitive. They are typical Regosols with limited fertility and low development, used mainly for extensive grazing rather than crop production. Therefore, the significance of this impact has been rated adverse minor (before mitigation) as shown in Table 50. The mitigation measures have been included in the final ESMP (Appendix A).

7.11.1.6 Spill of diesel, lubricants and hydrocarbons during transport along the access road during construction presents spill risks resulting in soil contamination

The primary impact of a liquid hydrocarbon spill on this type of soil is the rapid and deep vertical penetration of the contaminant, which drastically increases remediation difficulty. The Eutric Skeletic Regosols are characterised by a coarse texture, exhibiting a high sand content across all samples (ranging from 77% to 97%). This texture results in excellent drainage properties and low water retention. The baseline soil assessment confirms this risk, with estimated infiltration rates (EIR) ranging up to 18.38 cm/H and a profile-permeability class factor (fperm) of 6, corresponding to rapid infiltration. Consequently, any spilled liquid

hydrocarbon would quickly bypass the thin topsoil (A-horizon) and infiltrate the skeletal subsoil, leading to the contamination of deeper, less accessible soil layers.

The nature of the impact is adverse because spilled hydrocarbons quickly penetrate the coarse, sandy Eutric Skeletic Regosols, bypassing the thin topsoil and contaminating deeper subsoil layers. The type of impact is direct because the contamination directly affects the soil's structure, chemistry and biological function at the location of the spill, rather than being mediated through another biophysical pathway. The impact is partly reversible because although remediation and natural attenuation can eventually reduce contamination, complete recovery is unlikely, especially in these soils. The duration of the impact is short term (1 - 5 years) because the impact occurs only while the activity (e.g., construction, refuelling, or storage) is ongoing and is recoverable once the construction activities cease. The magnitude of change is high because a hydrocarbon spill in this environment would result in significant loss of soil quality and integrity, depending on the volume of contamination. The extent of the impact is onsite because the hydrocarbon spill affects the immediate area where the activity occurs. The probability of the impact occurring is possible because the activities involved, such as the transportation of fuel, which in the case of an accident, where spillage may occur. Accidental leaks, human error, or container failure could lead to contamination of the soil. The sensitivity of the impact is low because the affected soils are common in the local area (onsite along the length of the access road) and are not a rare or highly valued resource. Therefore, the significance of this impact has been rated adverse minor (before mitigation) as shown in Table 50. The mitigation measures have been included in the final ESMP (Appendix A).

7.11.1.7 Improper functioning of chemical toilets, septic tanks and sewage treatment facilities or french drains during construction may lead to nutrient-rich effluent infiltrating and contaminating soils.

The improper functioning of construction-phase sanitation facilities (septic tanks, chemical toilets) presents a high impact risk of soil contamination by nutrient-rich and potentially pathogenic effluent. Similar to hydrocarbons, the soil's rapid infiltration rates (EIR up to 18.38 cm/H) and excellent drainage characteristics preclude effective attenuation of effluent. The liquid effluent would quickly leach vertically, by passing the shallow topsoil where biological degradation typically occurs. This rapid transport carries dissolved contaminants (nutrients like nitrogen and phosphorus) and pathogens into the deeper soil layers. The localised, high influx of nutrients would drastically alter the chemical baseline of the natively nutrient-limited soil, potentially leading to nutrient loading which is toxic to native vegetation adapted to arid conditions. This contamination poses a distinct risk of polluting local water resources through leaching.

The nature of the impact is adverse because the malfunctioning sanitation systems release nutrient-rich and pathogen-laden effluent into soils that cannot naturally absorb or treat it. The type of impact is direct because the contamination occurs immediately and as a primary result of the activity itself, when sanitation facilities malfunction, the effluent is released

straight into the surrounding soil, where it infiltrates rapidly due to the soil's high permeability. The impact is partly reversible because even though the contamination will eventually lessen over time through natural breakdown and dilution processes, the environment cannot fully recover on its own. The duration of the impact is short term (1 - 5 years) as the impact only occurs while construction-phase sanitation facilities are in use. The magnitude of change is high because malfunctioning sanitation facilities can cause significant contamination of the soil, altering its natural chemical composition and nutrient balance. The probability of the impact occurring is possible due to the high probability that leaks, overflows, or improper maintenance could release effluent into the soil. The risk exists due to the reliance on temporary construction-phase facilities, which may be poorly managed or insufficiently maintained by construction teams and third parties' contractors. The sensitivity of the impact is low because the affected soil and vegetation, while locally (onsite) important, are not particularly rare or highly sensitive to short-term nutrient inputs or contamination. Therefore, the significance of this impact has been rated adverse minor (before mitigation) as shown in Table 50. The mitigation measures have been included in the final ESMP (Appendix A).

7.11.1.8 Incorrect management of hazardous and hydrocarbon chemicals during temporary storage for the construction phase may seep into soils resulting in soil contamination

Any uncontained leak from drums, storage tanks, or waste containers would quickly penetrate the thin A-horizon (topsoil) and migrate vertically through the profile. This rapid movement, facilitated by the high porosity of the sandy subsoil, increases the potential for contaminants to reach deeper, inaccessible soil layers and bypass natural attenuation processes. Contamination from hazardous materials and hydrocarbons would directly impair the fundamental functions of the soil and compromise future mine closure objectives. The soil is noted for having limited fertility due to minimal topsoil development and very low organic compound percentages.

The introduction of toxic substances, such as heavy metals (if present in hazardous waste) or petroleum hydrocarbons, would severely impact the soil microbiome, degrading essential ecosystem services like nutrient cycling and organic matter transformation. Contaminated soil loses its viability for use as a rehabilitation cover. As the loamy sand material is designated to be stripped and stockpiled for use in rehabilitating the waste rock dumps (WRD) and tailings storage facility (TSF), contamination during temporary storage would reduce the available volume of usable material.

The nature of the impact is adverse because any leak from storage containers would quickly penetrate the thin, sandy topsoil, spreading contaminants to deeper layers and bypassing natural attenuation. The impact is direct because the source of impact (hazardous material release) and results in the effect (soil degradation). The impact is partially reversible because some recovery of the soil may occur naturally over time through limited biological and

chemical processes. However, due to the soil's thin, fragile top layer, low fertility and minimal organic content, contamination from hazardous substances or hydrocarbons would cause lasting damage to the soil structure, microbiome and nutrient cycling. The duration of the impact is short term (1 - 5 years) because it occurs only while the activities (during construction) causing the contamination such as handling, storage, or transfer of hazardous materials are ongoing. Once construction activities cease and the source of contamination is removed, halting further soil degradation. The magnitude of change is high because contamination from hazardous and hydrocarbon substances would result in a significant loss of soil quality, both in terms of quantity and functional quality. The soil's integrity and key characteristics, including its structure, fertility, organic matter content and microbiome would be severely impaired. The extent of the impact is onsite because the contamination is confined to the immediate area where the hazardous materials are handled, stored or accidentally released. The probability of the impact occurring is likely because the activities involved; handling, storage, and transfer of hazardous materials carry an inherent risk of spills or leaks. The sensitivity of the impact is low because the affected soil, while important for rehabilitation, has limited intrinsic fertility, minimal organic matter and a thin topsoil layer, making it not highly rare or of exceptional value on a local scale. Therefore, the significance of this impact has been rated adverse minor (before mitigation) as shown in Table 50. The mitigation measures have been included in the final ESMP (Appendix A).

7.11.1.9 Conversion of land to mining uses during construction may permanently reduce grazing capacity or prevent return to pre-mining land uses if soils are not properly reclaimed

Conversion of land to mining uses will result in the direct removal and long-term modification of soils, with potential permanent reductions in grazing capacity and limitations on post-mining land use if rehabilitation is inadequate. The Project area is dominated by shallow, weakly developed Eutric Skeletic Regosols with low organic matter, limited water-holding capacity and moderate erodibility, making them highly vulnerable to disturbance. Large-scale clearing for mining infrastructure removes the biologically active topsoil layer and native seedbanks critical for communal grazing.

If topsoil is not properly stripped, stored and reinstated, soil functionality may be significantly reduced, resulting in increased erosion, reduced infiltration, poor nutrient status and difficulty re-establishing perennial forage species. Permanent landform changes associated with pits, WRDs, TSFs and roads further constrain the return to pre-mining land uses by altering drainage and increasing erosion risk. In the arid local climate, natural recovery is slow, making effective soil management and engineered rehabilitation essential to restore grazing potential.

The nature of the impact is adverse as mining activities directly remove and degrade the thin, weakly developed Eutric Skeletic Regosols, disrupting soil structure, depleting organic matter and seedbanks, and reducing land productivity. The impact is direct because it results from

immediate, physical disturbance of the land and soils by mining activities. Activities such as clearing for pits, waste rock dumps (WRDs), tailings storage facilitie (TSF), haul roads, processing areas and mining infrastructure physically removes or alters the topsoil and subsoil layers, disrupt soil structure and eliminate vegetation and seedbanks at the exact location where the mining occurs. The impact is irreversible as the removal and degradation of the thin, fragile Eutric Skeletic Regosols permanently alters soil structure, fertility and seedbanks, while large-scale landform changes from pits, WRDs and the TSF creates altered drainage and slopes that cannot naturally be restored. The duration of the impact is permanent because the changes to the land and soils caused by mining, such as removal of topsoil, loss of seedbanks, compaction and construction of pits, WRDs, the TSFs and access roads, persist indefinitely without intervention. Even after mine closure, natural recovery is extremely slow due to the arid climate, low rainfall (~172 mm/year), and high evapotranspiration, meaning the land cannot return to its pre-mining condition on its own.

The magnitude of change is very high because the mining activities cause irreparable loss and degradation of the soil characteristics, fundamentally altering its structure, fertility and seedbank. The extent of the impact is onsite the effects of mining, such as topsoil removal, soil structure disruption, loss of seedbanks and landform changes, occur directly within the boundaries of the Project area. The probability of the impact is possible as construction activities for mining infrastructure directly remove and degrade the fragile Eutric Skeletic Regosols, destroying topsoil, seedbanks and soil structure. Permanent landform changes from pits, WRDs, the TSFs and roads would alter drainage and increase erosion, while the arid climate and low rainfall prevent natural recovery. The sensitivity of the impact is high because the soils and land in the Project area are critical for supporting communal grazing and local ecosystems, which are of significant socio-economic and ecological importance at a national level in Namibia. There is also minimal potential for substituting or restoring these soils naturally, meaning any disturbance results in a loss of an irreplaceable resource. Therefore, the significance of the impact has been rated adverse high (before mitigation) as shown in Table 50. With mitigation, the impact is reduced to adverse moderate.

The mitigation measures mentioned below must be implemented and have been included in the final ESMP (Appendix A).

- Strip topsoil (300 mm) carefully before disturbance, keeping subsoil and topsoil separate;
- Limit stockpile heights to avoid compaction and overheating (generally <3 m);
- Cover stockpiles with mulch or fast-growing vegetation to prevent erosion and loss of seedbanks;
- Monitor moisture levels and periodically scarify stockpiles to maintain structure and microbial viability;
- Use topsoil promptly in reclamation to minimise loss of organic matter and nutrients;
- Restrict clearing to the minimum footprint necessary for operations;

- Sequence excavation to limit the area of exposed soil at any one time, reducing erosion and degradation risks;
- Avoid operating machinery on wet soil to prevent compaction and structural damage;
- Stabilise exposed slopes using mulch, or rapid-growing cover crops;
- Recontour landforms during closure to restore natural drainage patterns and reduce runoff concentration;
- Reapply salvaged topsoil to reshaped areas promptly after closure;
- Plant native grasses, shrubs and forage species suited to the arid environment and grazing needs;
- Implement soil amendments (e.g., compost, organic fertilisers) to improve nutrient availability and water retention;
- Design operational infrastructure, such as the WRDs, TSF and haul/service roads with gentle slopes and stable surfaces to minimise erosion.
- Establish a soil and vegetation monitoring program, tracking topsoil condition, compaction, organic matter, and vegetation establishment;
- Set clear performance indicators for rehabilitation success, including vegetation cover, species diversity, and soil stability;
- Adjust rehabilitation strategies based on monitoring results, e.g., reseeding areas with poor germination or applying additional soil amendments;
- Train staff and contractors in soil handling best practices, erosion control, and rehabilitation techniques; and
- Ensure awareness of the sensitivity of local soils and the importance of minimising disturbance.

Table 50 - Impact of construction of the Project on soil within the Project area

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Extensive clearing of vegetation for pits, WRDs, TSF, haul roads, access roads, accommodation village and processing plant	Soil	Physical disturbance and destruction of soil structure	Adverse Direct Irreversible Permanent On-site Definite	Low	High	Adverse moderate (4)
Excavation for open pits, foundations, pipelines and stormwater structures will		Permanently alter natural soil stratification and disrupt biological and	Adverse Direct Irreversible Permanent On-site Definite	Low	High	Adverse moderate (4)

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
remove topsoil and subsoil, stripping away of nearly all productive soil		hydrological functions				
Compaction of soil from heavy machinery		Reduced infiltration capacity and increase runoff	Adverse Direct Reversible Short term Onsite Definite	Low	Low	Adverse minor (3)
Stripping and stockpiling of topsoil		Nutrient depletion, reduced microbial activity and organic matter loss, particularly relevant given already low fertility Regosols	Adverse Direct Irreversible permanent On-site Likely	Low	High	Adverse minor (3)
Spills or leaks from fuel storage facilities, refuelling stations, workshops, generator stations and vehicle wash bays during construction		Soil contamination	Adverse Direct Partly reversible Long term On-site Likely	Low	High	Adverse minor (3)
Spill of diesel, lubricants and hydrocarbons during	Soil	Soil contamination	Adverse Direct Partly reversible Short term	Low	High	Adverse minor (3)

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
transport along the access road			On-site Possible			
Improper functioning of chemical toilets, septic tanks and sewage treatment facilities or leach drains during construction		Nutrient-rich effluent infiltrating and contaminating soils	Adverse Direct Partly reversible Short term On-site Likely	Low	High	Adverse minor (3)
Incorrect management of hazardous and hydrocarbon during temporary storage		Soil contamination	Adverse Direct Partly reversible Short term On-site Likely	Low	High	Adverse minor (3)
Conversion of land to mining uses during construction		Reduced grazing capacity or prevent return to of land to pre-mining land uses if soil is not properly rehabilitated	Adverse Direct Irreversible Permanent Onsite Possible	High	Very high	Adverse high (9)

7.11.2 OPERATIONAL PHASE

The potential significant impacts during the operational phase on soils are illustrated in Figure 115, before mitigation and are expanded on in detail in Table 51.

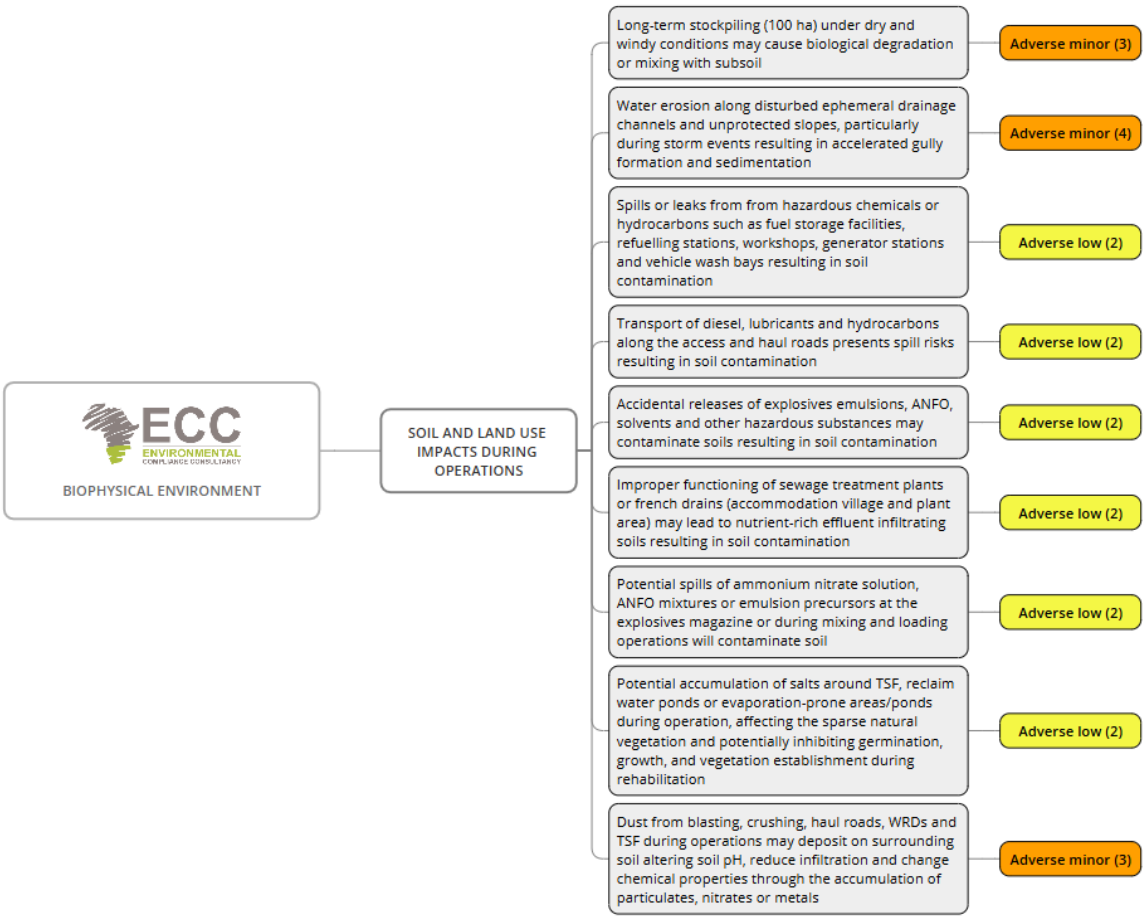


Figure 115 - Impacts of operations of mine infrastructure and the development of the open pit on soils within the Project area

7.11.2.1 Long-term stockpiling (100 ha) under dry and windy conditions may cause biological degradation or mixing with subsoil

The proposed long-term stockpiling of the thin, minimal A horizon topsoil ~300 ha over a large area ~100 ha within the arid and windy climate of the Project area, presents a significant risk to the limited soil resource, classified as Eutric Skeletic Regosols. Biologically, the long-term storage under high temperatures and desiccation will accelerate the decomposition and oxidation of the very low percentage of organic compounds, severely degrading the already limited fertility and depleting the microbial communities responsible for nutrient cycling. Physically, the loamy sand texture increases the susceptibility to wind erosion in dry conditions, risking the loss of fine, fertile particles and the indigenous seedbanks contained within the stockpile surface. Additionally, poor operational practices over the 100-ha footprint can lead to the physical mixing of the topsoil with the lower-quality subsoil or waste rock during stacking and retrieval, further diluting the nutrient content and compromising the material's suitability as an effective rehabilitation cover.

The impact is adverse because long-term stockpiling of the thin A horizon topsoil in the arid, windy Project area will severely degrade the limited Eutric Skeletic Regosols. High temperatures and desiccation will accelerate organic matter loss and reduce microbial

activity, lowering fertility. The loamy sand texture increases susceptibility to wind erosion, risking the loss of fine particles and indigenous seedbanks. Poor operational practices may further mix topsoil with lower-quality subsoil, reducing its suitability for rehabilitation and compromising ecosystem recovery. The impact is direct because stockpiling directly exposes the soil to harsh climatic conditions, erosion, organic matter loss and potential mixing with subsoil, causing immediate degradation of its physical, chemical and biological properties. The impact is reversible because some aspects of the topsoil can naturally recover over time if re-spread, but significant losses, such as depletion of organic matter, microbial communities, fine soil particles and indigenous seedbanks, will be permanent due to the harsh arid and windy conditions. The duration of the impact is long term (>15 years) because the degradation of the topsoil's physical, chemical and biological properties occurs over an extended period and can persist for many years. The magnitude of change is moderate because, although the long-term stockpiling of topsoil will result in loss of some fertility, organic matter and microbial activity, it does not destroy the soil's overall structure or integrity. The extent of the impact is onsite because the effects of the stockpiling activity are confined to the areas where the topsoil is stored and handled, approximately 100 ha – 300 ha within the Project site. The probability of the impact occurring is likely because the proposed activity, long-term stockpiling of topsoil in an arid, windy environment, directly exposes the soil to conditions that accelerate degradation. However, the sensitivity of the impact is low because Eutric Skeletic Regosols generally have some capacity to recover if managed properly. Therefore, the significance of this impact has been rated adverse minor (before mitigation) as shown in Table 51. The mitigation measures have been included in the final ESMP (Appendix A).

7.11.2.2 Water erosion along disturbed ephemeral drainage channels and unprotected slopes, particularly during storm events, during the operational phase, could accelerate gully formation and sedimentation

Although the universal soil loss equation (USLE) K-factor (ranging from 0.11 to 0.17) places it in the loamy sands category with low erodibility to water erosion, this low cohesion soil is present in a landscape interpreted as having a mild slope (below 10%) and a topography that generally decreases toward the SE flowing Omaruru River. The area receives summer rainfall, with an annual average of 172 mm, where the vast majority of rain falls between January and March. The disturbance of surface soils (loamy sands) during the construction of mining infrastructure (WRDs, TSF, haul roads etc.) and the removal of sparse vegetation will create unprotected slopes and interfere with existing ephemeral drainage channels. Despite the soil's moderate-to-rapid infiltration capacity (fperm of 6), intense but infrequent storm events characteristic of the hot desert climate (BWh) can generate significant surface runoff that will mobilise the non-cohesive material, thereby accelerating gully formation on exposed slopes and leading to sedimentation and deposition of mine waste material during operations within and adjacent to drainage features, potentially impacting the Omaruru River and water resources downstream.

The nature of the impact is adverse because although the soil has low inherent erodibility, the creation of artificial slopes and interference with natural drainage channels will increase runoff concentration during intense summer storm events. The impact is direct because ongoing mining activities, such as vehicle movement, blasting, waste handling and maintenance of WRDs, continually disturb exposed soils and slopes. The impact is partly reversible because the environment has some natural capacity to recover once mining activities cease. The impact is long-term (>15 years) because the disturbed, non-cohesive soils and altered drainage patterns recover very slowly in the hot desert climate, with natural vegetation and soil stability taking decades to re-establish. The magnitude of change is low as only minor alterations to the soil and landscape rather are expected than severe degradation. The extent of the impact is regional because the consequences of soil disturbance and erosion are not confined to the immediate mine site but can affect a wider area downstream. The probability of the impact occurring is possible because while the soils are non-cohesive and vegetation is sparse, making them susceptible to erosion, the region has a low annual rainfall (172 mm) and a generally mild slope (<10%), which reduces the frequency of triggering events. The sensitivity of the impact is medium because the soils and drainage features in the area have moderate value and importance at a regional scale. Therefore, the significance of the impact has been rated adverse minor (before mitigation) as shown in Table 51. The mitigation measures have been included in the final ESMP (Appendix A).

7.11.2.3 Spills or leaks from hazardous chemicals or hydrocarbons such as fuel storage facilities, refuelling stations, workshops, generator stations and vehicle wash bays during operations may contaminate soils

Spills or leaks hazardous chemicals or hydrocarbons such as from fuel storage areas, refuelling stations, workshops, generator units and wash bays during operation activities pose a significant contamination risk to the soils within ML 274/Project site. The predominant soil type, Eutric Skeletic Regosols, is characterised by a high sand content (mean 86%) and excellent drainage properties due to their coarse texture and a Profile Permeability Class Factor (fperm) of 6 (for rapid infiltration). While rapid drainage limits waterlogging issues it also means that spilled hydrocarbons or chemicals (like oils, greases, solvents, or contaminated wash water) will quickly move downwards through the porous soil matrix, significantly accelerating the infiltration process. This rapid vertical movement poses a high risk of subsurface contamination, potentially reaching and polluting the groundwater or local drainage lines. Although the baseline trace metal concentrations are currently low, these facilities introduce new chemical sources.

The nature of the impact is adverse because spills and leaks from improper handling and storage at storage facilities, refuelling stations, workshops, generation stations and vehicle wash bays may introduce hydrocarbons, chemicals and other contaminants into highly permeable sandy soils, which allows rapid downward movement. The impact is direct because the contamination occurs at the source, where the activity take place. The impact is partly reversible because the spilled hydrocarbons and chemicals would rapidly infiltrate the

highly porous Eutric Skeletic Regosols, contaminating deeper soil layers and potentially reaching groundwater. While some natural attenuation or limited biodegradation might occur in the upper soil layers, the rapid downward movement of pollutants would prevent full recovery, meaning only a portion of the soil's quality could naturally recover over time. The duration of the impact is medium term because once hazardous materials or hydrocarbon spills or leaks occur, the contaminants infiltrate the highly porous Eutric Skeletic Regosols and may persist in the soil for several years. The magnitude of change is high because spills or leaks from mining facilities can result in both the loss of soil quality and degradation of its integrity. The extent of the impact is onsite because the contamination from spills or leaks is largely confined to the areas immediately surrounding the mining facilities, such as fuel storage areas, workshops, generator stations, and wash bays. The probability of the impact occurring is likely because spills or leaks are common as large volumes of fuel and oil are handled under harsh operating conditions with heavy equipment, increasing the likelihood of leaks, mechanical failures, and human error, especially at fuel storage areas, refuelling stations, workshops, and wash bays. However, the sensitivity of the impact is low because these soils are naturally coarse-textured, low in nutrients and already limited in biological productivity, meaning they are not highly sensitive to additional disturbance or chemical inputs. Therefore, the significance of this impact has been rated adverse low (before mitigation) as shown in Table 51. The mitigation measures are included in the final ESMP (Appendix A).

7.11.2.4 Transport of diesel, lubricants and hydrocarbons along the access and haul roads during operations presents spill risks resulting in soil contamination

The transportation of necessary operational hazardous chemical fluids, including diesel, lubricants and various hydrocarbons, along the main access road to the Project site presents a direct and acute spill risk to the soil environment. The dominant soil type, Eutric Skeletic Regosols, is a coarse-textured loamy sand characterised by a high sand content (up to 97% in some samples) and a profile permeability class factor (fperm) of 6, indicating rapid infiltration. This rapid permeability, while mitigating surface waterlogging, is a critical disadvantage in a spill scenario, as it allows leaked hydrocarbons to quickly migrate vertically through the soil profile.

The nature of the impact is adverse because the transportation of hazardous chemicals, diesel, lubricants and hydrocarbons along the access road introduces a high risk of spills directly onto the soil. The dominant Eutric Skeletic Regosols, with up to 97% sand and high permeability (fperm = 6), allow spilled fluids to rapidly infiltrate the soil, increasing the potential for contamination of deeper soil layers and groundwater. The impact is direct as when a spill occurs the hydrocarbons come into immediate contact with the soil. The impact is partly reversible because natural attenuation processes, such as microbial degradation, may slowly reduce some of the contamination over time, allowing partial recovery of soil quality. The duration of the impact is medium term (5 - 15 years) because, although the transportation activity causing the spill stops, hydrocarbon or hazardous materials

contamination in the soil can persist for several years before natural processes significantly reduce it. The magnitude of change is high because a hydrocarbon or hazardous chemical spill would result in a loss of soil quality and integrity, severely affecting its key characteristics and functions. The extent of the impact is onsite as contamination from spilled hydrocarbons is largely confined to the areas where the transportation and handling of operational fluids occur, such as the access roads and immediate surrounding soils within the Project site. However, the sensitivity of the impact is low because the soil affected, while important for local vegetation and site operations has value and importance only on a local scale. Therefore, the significance of the impact has been rated adverse low (before mitigation) as shown in Table 51. The mitigation measures are included in the final ESMP (Appendix A).

7.11.2.5 Accidental releases of explosives emulsions, ANFO, solvents and other hazardous substances during operations may contaminate soils

Accidental releases of hazardous mining substances, including explosives emulsions, ammonium nitrate fuel oil (ANFO), solvents and other chemicals, pose a significant contamination threat to the soils of the Project area. The rapid infiltration capacity of the Project area soil type and characteristics means that in the event of a spill, hazardous materials will quickly bypass the minimal, low-organic matter topsoil and migrate vertically, leading to deep soil and subsurface contamination.

The potential impact is adverse because accidental releases of associated hazardous mining and blasting substances can rapidly infiltrate the highly permeable soils, causing deep soil and subsurface contamination. The impact is direct as it results from the accidental release of hazardous substances directly onto the soil. The impact is partly reversible, while some contamination (e.g., surface-soil spills) can be removed or remediated through measures like soil excavation, bioremediation or containment, deep soil and groundwater contamination may persist for a long time and be difficult or impossible to fully restore to baseline conditions. The duration of the impact is medium term (5 - 15 years) because hazardous substances associated with mining and blasting activities released into the soil would continue to persist and migrate through the highly permeable soils and potentially reach groundwater, even after mining activities have ceased. The magnitude of change is high because the accidental releases of hazardous substances can cause severe damage to the soil's quality and integrity, including contamination of topsoil and subsurface soils. The extent of the impact is onsite because the contamination from accidental releases is confined to the Project area where the hazardous substances are stored, handled or used. The probability of the impact occurring is likely bas mining activities inherently involve the handling, storage, and use of hazardous substances (e.g., explosives, ANFO, solvents) that carry an associated risk of accidental release. However, the sensitivity of the impact occurring is low because the soils in the Project area, while locally important for supporting vegetation and ecosystem functions, are not particularly rare or highly valuable on a broader scale and have a moderate capacity to absorb and recover from contamination. Therefore, the significance of this impact

has been rated adverse low (before mitigation) as shown in Table 51. The mitigation measures have been included in the final ESMP (Appendix A).

7.11.2.6 Potential leakage of cyanide-containing solutions from the CIL circuit, ILR system, electrowinning area, TSF or chemical storage zones or pipelines during operations may result in soil contamination

The potential for accidental leakage of cyanide-containing solutions from process areas such as the carbon-in-leach (CIL) circuit, intensive leach reactor (ILR) system, electrowinning area. TSF or associated chemical storage zones or pipelines poses a severe and high-priority contamination risk. The Project area's soil, characteristics indicates rapid infiltration. In the event of a leak, this high permeability will cause the cyanide solution to bypass the thin, low-organic-matter topsoil quickly, accelerating the vertical migration of contaminants to deeper soil layers.

The nature of the potential impact is adverse because leaks of cyanide-containing solution(s) pose a severe contamination risk to soil. The impact is direct because it results from immediate, physical interaction between the source of contamination (cyanide solutions) and the soil. if a leak occurs from the CIL circuit, ILR system, electrowinning area, TSF, chemical storage or pipelines, the cyanide enters the soil directly. The impact is partially reversible because while some contamination effects on the soil may naturally attenuate over time (through processes like dilution, volatilisation of certain cyanide species or microbial breakdown), complete recovery is unlikely without active intervention.

The duration of the impact is medium term (5 -15 years) because the contamination from cyanide leaks would persist in the soil for several years after the activity stops, due to the chemical's toxicity, mobility and interactions with soil components. The magnitude of change is high because a cyanide leak or spill would cause a significant loss of soil quality and integrity, directly affecting its chemical and biological properties.

The extent of the impact is onsite because the contamination from a cyanide leak is localised to the areas where the spill occurs, such as the CIL circuit, ILR system, TSF, electrowinning area, chemical storage areas or pipelines. While the probability of the impact occurring is possible because while the Project involves cyanide handling and storage, which inherently carries a risk of accidental leaks or spills, such events are not certain or frequent if standard operational controls are in place. However, the sensitivity of the impact is low because the affected soils, while locally important for supporting vegetation and surface stability, are not rare or of high ecological value on a broader scale. Therefore, the significance of this impact has been rated adverse low (before mitigation), as shown in Table 51. The mitigation measures are included in the final ESMP (Appendix A).

7.11.2.7 Improper functioning of the sewage treatment plants, drains, septic tanks and/ or French drains (accommodation village and operational area) during operations may lead to nutrient-rich effluent infiltrating and contaminating soils.

The potential for nutrient-rich effluent infiltrating soils due to the improper functioning of sewage treatment plant(s), drains, septic tanks or French drains poses a risk to soil quality and water resources. The rapid permeability of the soil allows effluent to bypass natural attenuation mechanisms in the soil, accelerating the vertical movement of contaminants. This influx of nutrient-rich effluent introduces high concentrations of nitrogen and phosphorus, potentially leading to the undesirable alteration of soil chemistry, including pH changes and increased electrical conductivity (EC). Given that the native soils are already low in organic compounds and only moderately fertile, the chemical imbalance caused by effluent could further complicate challenging post-mining rehabilitation efforts.

The nature of the potential impact is adverse because nutrient-rich effluent from malfunctioning sewage systems can significantly degrade soil. The highly permeable soils allow contaminants to bypass natural filtration, accelerating the movement of nitrogen and phosphorus into the environment. The impact is partly reversible because some of the nutrient enrichment and chemical changes in the soil can be mitigated through interventions like soil amendments, bioremediation or natural attenuation processes. The duration of the impact is medium-term (5 - 15 years) because nutrient-rich effluent can persist in the soil long after the sewage malfunction has stopped, continuing to alter soil chemistry and reduce fertility. Recovery is possible over time through natural processes like microbial degradation and leaching. The magnitude of change is high because the nutrient-rich effluent causes severe degradation of soil significantly altering their chemical composition and natural fertility. The extent of the impact is onsite because the nutrient-rich effluent primarily affects the soils within the immediate area of the sewage system or leach drains.

The probability of the impact occurring is possible because nutrient-rich effluent could infiltrate the soils if sewage systems or French drains malfunction. However, the sensitivity of the impact is low because the affected soils and water resources are not particularly rare or valuable on a local scale. Therefore, the significance of this impact has been rated adverse low (before mitigation) as shown in Table 51. Mitigation measures have been included in the final ESMP (Appendix A).

7.11.2.8 Incorrect management of hazardous, hydrocarbons, laboratory and medical/sanitary waste during temporary storage may result in seepage into soils and contaminating them

The incorrect management of temporarily stored waste including hazardous, hydrocarbon, laboratory and medical/sanitary waste present a risk of seepage and subsequent soil contamination at the Project site. This soil is a coarse-textured loamy sand characterised by a high sand content (up to 97% in some samples) and exceptionally rapid infiltration

properties indicate that any liquid or leachable contaminants from improperly contained waste will undergo rapid vertical migration through the porous matrix, significantly reducing the residence time available for natural chemical or biological attenuation. This swift penetration elevates the risk of subsurface contamination and potential groundwater pollution by toxic compounds and metals.

The nature of the impact is adverse because improper handling and temporary storage of hazardous, hydrocarbon, laboratory and medical waste directly expose the soils to harmful contaminants. The impact is direct because the contamination of soils results from the activity itself, namely, the incorrect handling and temporary storage of hazardous and other waste types. The impact is partly reversible because natural processes, such as limited biodegradation, dilution or dispersion may reduce some contaminants over time. The duration of the impact is medium term (5 - 15 years) because contaminants persist in the soil long after the waste handling activity ends. The magnitude of change is high because improper management of hazardous, hydrocarbon, laboratory and medical/sanitary wastes can cause significant loss of soil quality and integrity. The extent of the impact is onsite because contamination is confined to the area where the waste is stored or handled. The probability of the impact occurring is possible because the site contains hazardous waste and highly permeable soil that can allow contamination, but the impact is not certain and depends on factors like waste handling and containment. However, the sensitivity of the impact is low because the soil and local environment, while used and potentially affected by contamination, are of limited value or rarity at a local scale. Therefore, this impact has been rated adverse low (before mitigation) as shown in Table 51. Mitigation measures have been included in the final ESMP (Appendix A).

7.11.2.9 Potential spills of ammonium nitrate solution, ANFO mixtures or emulsion precursors at the explosives magazine or during mixing and loading operations during the operation of the mine may result in soil contamination

The potential for spills of ammonium nitrate solution, ANFO mixtures or emulsion precursors at the explosive's magazine, during mixing, or during blasting loading operations constitutes a significant chemical contamination impact to the local soil environment. The high toxicity and mobility of these substances are compounded by the inherent physical properties of the dominant Project area soil type. The soil's characteristic of extreme permeability means that liquid components, particularly the highly soluble ammonium nitrate, will experience rapid vertical migration through the soil matrix. This swift movement bypasses the limited natural attenuation found in the soil, which is characterised by low organic matter, significantly increasing the risk of subsurface contamination and subsequent groundwater pollution. The seepage of nitrate, a mobile and soluble contaminant, is especially concerning as it can readily pollute the water table.

The nature of the impact is adverse because spills of toxic, highly soluble chemicals (like ammonium nitrate) in extremely permeable soils will rapidly migrate downward, bypassing the soil's limited natural buffering, leading to direct contamination of soil. The impact is partly reversible because chemical contamination of soils can persist long-term, as highly soluble substances like ammonium nitrate can remain in the subsurface for extended periods and natural recovery is slow or limited due to the soil's low organic matter and high permeability, which prevents effective natural attenuation or breakdown of contaminants. The duration of the impact is medium-term (5 – 15 years) because contamination will persist after the activity stops, as chemicals like ammonium nitrate remain in the soil, recovery is possible but slow, due to the soil's low organic matter and limited natural attenuation capacity. The magnitude of change is high because the impact leads to a significant loss of soil quality, spills of highly soluble and toxic chemicals severely alter the key characteristics of the soil, such as its chemical composition and permeability. The extent of the impact is onsite because the contamination originates directly at the locations where chemicals are handled, mixed or stored, such as the explosive magazines or mixing/loading areas. The probability of the impact occurring is possible because spills and leaks of chemicals (ammonium nitrate, ANFO or emulsions) are not certain but could happen during handling, mixing or loading operations. However, the sensitivity of the impact is low affected soil are of local-scale importance, not considered rare or highly valuable in a broader context. Therefore, the significance of the impact has been rated adverse low (before mitigation) as shown in Table 51. Mitigation measures are included in the final ESMP (Appendix A).

7.11.2.10 Potential accumulation of salts around the TSF, reclaim water ponds or evaporation-prone areas/ponds during operations affecting the sparse natural vegetation and potentially inhibiting germination, growth and vegetation establishment during rehabilitation.

The potential accumulation of salts around the tailings storage facility (TSF), reclaim water and evaporation ponds poses a localised environmental impact due to the baseline characteristics of the Project soils, which are classified as Eutric Skeletic Regosols. These young, weakly developed soils are coarse-textured, with high sand content (77 – 97%), low clay and silt fractions, low organic matter and moderate permeability. While their high drainage capacity reduces waterlogging, it also limits salt retention and allows soluble salts from concentrated water flows or evaporation to accumulate near the soil surface.

The soils' neutral to slightly alkaline pH (7.0 – 8.1) and moderate nutrient content generally supports vegetation, but the low clay and organic matter content reduces the soils' ability to adsorb salts. Localised salt build-up in areas adjacent to the TSF or reclaim ponds can negatively affect the sparse natural vegetation and pasture species used in the predominantly livestock-based land use, potentially inhibiting germination, growth and vegetation establishment during rehabilitation. The risk is amplified in microenvironments with high evaporation rates and concentrated water application.

The nature of the impact is adverse because salt accumulation around the TSF, reclaimed water and evaporation ponds can degrade the weak, sandy soils, inhibit vegetation growth, reduce pasture availability and negatively affect local biodiversity and livestock-based land use, particularly in high evaporation areas. The impact is direct because salts from these sources accumulate in the nearby soils, directly affecting soil chemistry, vegetation growth and land use. The impact is partially reversible because some natural recovery of soils and vegetation may occur over time through processes like rainfall leaching salts or gradual recolonisation by tolerant plant species. The duration of the impact is long term (>15 years) because salt accumulation in soils and the associated damage to vegetation persists throughout the operational life of the TSF and continues even after the Project ceases, due to the slow natural recovery of weak, sandy soils with low clay and organic matter. The magnitude of change is high because the accumulation of salts around the TSF, reclaimed water and evaporation ponds can cause severe degradation of soil quality and integrity, which are key environmental resources on the site. The extent of the impact is onsite because the salt accumulation primarily affects areas immediately surrounding the TSF, reclaimed water and evaporation ponds. The probability of the impact occurring is possible because the conditions for salt accumulation exist but are not guaranteed to affect all areas uniformly. The sensitivity of the receptor is low because the soils and vegetation affected are not particularly rare or highly valuable on a local scale and the ecosystem has some capacity to tolerate or recover from changes such as localised salt accumulation. Therefore, the significance of the impact has been rated adverse low (before mitigation) as shown in Table 51. Mitigation measures have been included in the final ESMP (Appendix A).

7.11.2.11 Dust from blasting, crushing, haul roads, WRDs and the TSF during operations may deposit on surrounding soil, which can alter soil pH, reduce infiltration and change chemical properties through the accumulation of particulates, nitrates or metals

Dust generated from blasting, crushing, haul roads, WRDs and the TSF may alter the physical and chemical properties of surrounding soils under the arid and windy conditions of the Project area. Fine particulates are readily deposited onto Eutric Skeletic Regosols, which are shallow, coarse-textured, low in organic matter and have limited buffering capacity, making them sensitive to dust inputs.

Repeated deposition may introduce blasting residues or mineral particulates containing trace metals, potentially causing localised changes in soil pH, electrical conductivity and metal concentrations, with implications for microbial activity, nutrient cycling and vegetation establishment. Accumulation of fine particles on sandy soil surfaces can also lead to crust formation, reduced infiltration, increased runoff and higher erosion risk, while impeding seed germination and rehabilitation success.

The nature of the impact is adverse because dust from mining activities alters the chemical and physical properties of the already fragile soils. The impact is direct because it occurs

immediately at the source of the activity, dust generated from blasting, crushing, haul roads, and exposed WRDs/TSF surfaces is deposited directly onto the surrounding soils. The duration of the impact is long term (>15 years) because the changes to soil caused by dust deposition such as altered chemistry, reduced infiltration, surface crusting and impaired vegetation growth, persist for many years after mining activities have ceased. The magnitude of change is high because dust deposition from mining activities causes significant loss of soil quality and integrity. The extent of the impact is local because the dust effects are confined to the immediate surroundings outside of the Project site, such as soils near blasting, crushing, haul roads, and WRDs/TSF surfaces, onsite and outside of the ML. The probability of the impact occurring is likely because dust generation is an inherent and continuous part of mining activities such as blasting, crushing, haul road traffic, and exposure of WRDs/TSF surfaces. The sensitivity of the receptor is low because the affected soils (Eutric Skeletic Regosols) are not of high ecological value, rarity or importance and have a relatively high tolerance for disturbance compared to more developed or organic-rich soils. Therefore, the significance of the impact has been rated adverse minor (before mitigation) as shown in Table 51. Mitigation measures have been included in the final ESMP (Appendix A).

Table 51 - Impact of operations on soils within the Project area

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Long-term stockpiling (100 ha) under dry and windy conditions during operations	Soil	Biological degradation or mixing with subsoil	Adverse Direct Partly reversible Long term On-site Likely	Low	Moderate	Adverse minor (3)
Water erosion along disturbed ephemeral drainage channels and unprotected slopes, particularly during storm events		Accelerated gully formation and sedimentation	Adverse Direct Partly reversible Long term Regional Possible	Medium	Low	Adverse minor (4)
Spills or leaks from fuel storage facilities, refuelling stations,		Soil contamination	Adverse Direct Partly reversible	Low	High	Adverse low (2)

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
workshops, generator stations and vehicle wash bays			Medium term On-site Likely			
Transport of diesel, lubricants and hydrocarbons along the access road presents spill risks	Soil	Soil contamination	Adverse Direct Partly reversible Medium term On-site Likely	Low	High	Adverse low (2)
Potential leakage of cyanide-containing solutions from the CIL circuit, ILR system, electrowinning area or chemical storage zones during operations			Adverse Direct Partly reversible Medium term On-site Likely	Low	High	Adverse low (2)
Improper functioning of sewage treatment plants or leach drains (accommodation village and plant area) may lead to nutrient-rich effluent infiltrating soils			Adverse Direct Partly reversible Medium term On-site Possible	Low	High	Adverse low (2)
Incorrect management of hazardous hydrocarbons and laboratory			Adverse Direct Partly reversible	Low	High	Adverse low (2)

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
waste during temporary storage			Medium term On-site Possible			
Potential spills of ammonium nitrate solution, ANFO mixtures or emulsion precursors at the explosives magazine or during mixing and loading operations			Adverse Direct Partly reversible Long term On-site Possible	Low	High	Adverse low (2)
Potential accumulation of salts around TSF, reclaim water ponds or evaporation-prone areas/ponds during operation	Soil	Affecting the sparse natural vegetation and potentially inhibiting germination, growth, and vegetation establishment during rehabilitation	Adverse Direct Partly reversible Long term On-site Possible	Low	High	Adverse low (2)
Dust from blasting, crushing, haul roads, WRDs and TSF during operations may deposit on surrounding soil		Altering soil pH, reduce infiltration and change chemical properties through the accumulation of particulates, nitrates or metals	Adverse Direct Partly reversible Long term Local Likely	Low	High	Adverse minor (3)

7.12 BIOPHYSICAL ENVIRONMENT: GEOCHEMISTRY IMPACTS

7.12.1 ACID AND METALLIFEROUS DRAINAGE (AMD) IMPACTS

This section presents the assessment of potential geochemical and acid mine drainage (AMD) impacts associated with the proposed Project. The assessment is based on geochemical, hydrological and material characterisation data provided by geochemistry assessment results of the WIA Gold Kokoseb Project geochemistry assessment (Appendix K), conducted by the SANAS ISO/IEC 17025:2017 accredited analytical testing laboratory, Aquatico Scientific (Pty) Ltd. The analysis was conducted by the appointed environmental geochemistry specialist consultancy, RGS Environmental Consultants (Pty) Ltd. This includes the analysis of waste rock, ore and tailings samples. The objective is to identify and quantify the potential risks posed by mine materials, with a focus on their acid-generating and metal-leaching potential, to inform management strategies and ensure compliance with relevant environmental guidelines and regulatory standards. Figure 116 shows the proposed Project pit, waste rock dump (WRD) and tailings storage facility (TSF) layout for reference.

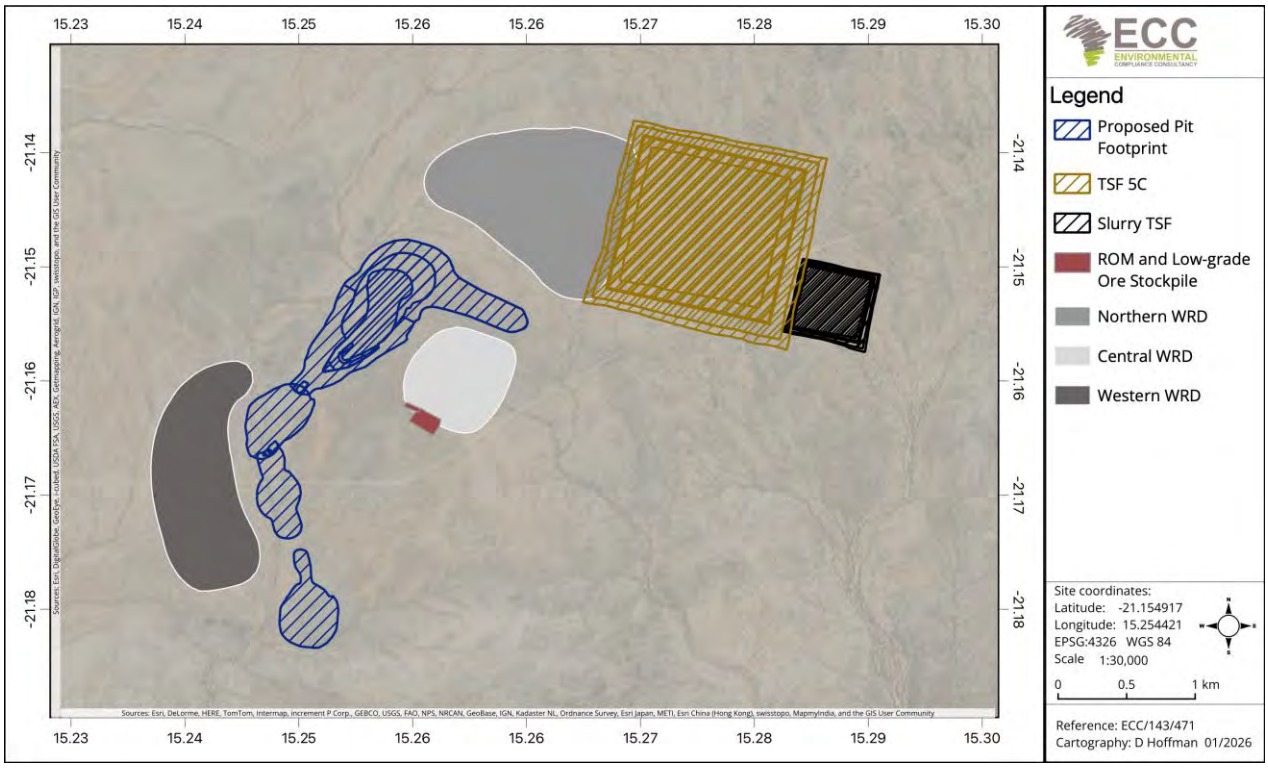


Figure 116 - Proposed Project layout showing the locations of the WRDs and TSF (Source: ECC, 2026)

Geochemical testing and characterisation of host rock samples is the best way to characterise the geochemical potential of the host rock. A geochemical sampling program was conducted based on the current mine plan. For the impact assessment, the characterisation was required to assess the likelihood of AMD, a term that can also include neutral metalliferous drainage (NMD) and saline drainage (SD), as well as consider mitigation options, if required.

The presence of sulphur in potentially acid-generating (PAG) materials in WRDs, ore stockpiles and tailings at mines, combined with exposure to air at surface and water as a transport mechanism, can lead to contamination of local water resources. The contamination can either be acid or metals leached by acid. In some cases, naturally occurring neutralising minerals within the mine rock and tailings can buffer acidity, thereby reducing the risk of AMD, NMD and SD. However, where neutralisation capacity is insufficient, acidic conditions may persist and lead to leaching and transport of metals from the host rocks and tailings.

A total of 75 samples were characterised for this assessment. The boreholes sampled are shown in Figure 55. These samples (comprised of four (4) ore samples, 63 waste rock and eight (8) potential tailings samples) are considered representative of the materials anticipated to be generated by the Project.

The results from the geochemistry assessment indicated that most of the samples analysed show negligible risk domains, have very low risk of acid generation potential and a high factor of safety with respect to potential acid generation.
As shown in Figure 60, only two (2) of the waste rock samples analysed indicate possible risk with respect to potential acid generation. However, all 75 samples have negative calculated net acid producing potential (NAPP) values, indicating that all samples are likely to have excess acid neutralising capacity (ANC) relative to their maximum potential acidity (MPA).

NAPP

The NAPP represents the difference between a sample's potential to produce acidity (MPA) and its ability to neutralise acidity (ANC). All 75 mine material samples showed negative NAPP values, ranging from -237.8 to -17.5 kg H_2SO_4/t, with a median of -78.4 kg H_2SO_4/t (Figure 61). This suggests that each sample likely possesses more neutralising capacity than is needed to counteract its acidity potential.

The acid base accounting (ABA) test data were then used to further classify the acid forming nature of each of the 75 samples of mine materials tested. Fifty-three (53) of the samples, or 71%, were classified as non-acid forming barren (NAF-Barren) due to having sufficiently low sulphur content as to be classified as barren of the element. The twenty-two (22) remaining samples were classified as non-acid forming (NAF) due to their very limited sulphur content as shown in Table 25 and Figure 58.

Further multi-element testing was carried out on 15 samples (two (2) individual samples and 13 composite samples made up from 65 of the 75 individual samples of mine materials) to identify any elements (metals or metalloids) and major ions that may be present in the mine materials at concentrations that could be of environmental concern with respect to materials handling, storage, revegetation and water quality.

Multi-element testing of water extracts from composite waste rock, potential tailings, and ore samples showed low concentrations of major ions, dominated by potassium (K), sodium (Na),

and sulfate (SO_4^{2-}), with SO_4^2 levels below livestock drinking water guidelines. Fluoride (F^-) exceeded the guideline slightly in six (6) samples, while most trace metals and metalloids, including cadmium (Cd), were below reporting limits or guideline values. Notable exceptions were elevated dissolved aluminium (Al) in 13 samples, likely influenced by colloidal material and elevated dissolved arsenic (As) in 12 samples, particularly from tailings and ore, with only one (1) ore sample exceeding livestock drinking water criteria. Overall, most water extract concentrations are within acceptable limits for livestock and freshwater aquatic ecosystems.

Based on these results, it is expected that the risk of potential impact on the quality of soils, surface water and groundwater from initial contact with PAG materials at the Project will be low.

Figure 117 provides an overview of the potential geochemistry impacts, for illustrative purposes, before mitigation. Each potential impact is discussed in detail in the sections below and the impact assessment ratings are summarised in Table 52.

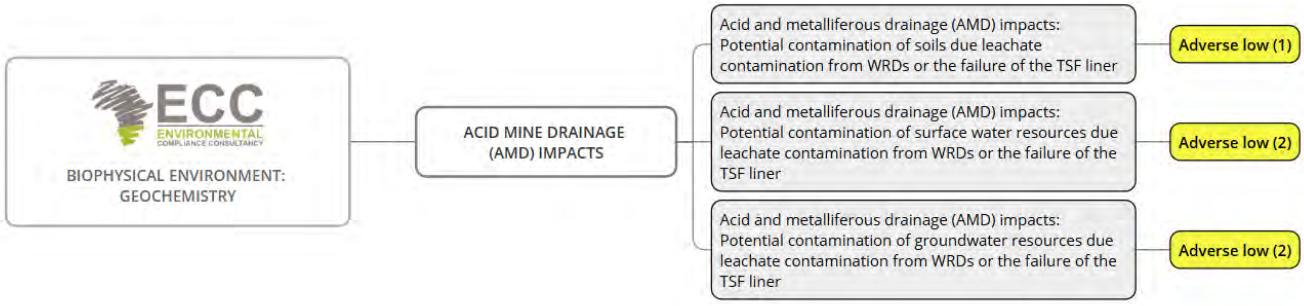


Figure 117 – Visual overview of the potential geochemistry impacts

7.12.1.1 Acid and metalliferous drainage (AMD) impacts on soils due to leaching from the WRDs, TSF and ore stockpiles

The static geochemical testing conducted indicates that waste rock, potential tailings and ore materials have low total sulphur (S) content, excess acid neutralising capacity (ANC) and are classified as non-acid forming (NAF), with 71% of samples further classified as NAF-Barren due to S contents ≤0.1%. As a result, oxidation of mine materials is not expected to generate acidic conditions in contact soils. Multi-element solid analyses also shows that metals and metalloids are generally not significantly enriched relative to median crustal abundances, with only minor and localised enrichment of Cd and As consistent with mineralised host rocks. Considering the alkaline nature of the materials (pH 8.3 – 10.2) and low solubility of most trace elements under these conditions, soil acidification, salinisation or metal toxicity impacts are unlikely during operations or closure.

The nature of this impact is considered adverse as the placement of WRD, TSF and ore stockpiles has the potential to disturb soil characteristics through leachate generation. This is

a direct impact as it results directly from ore, waste rock and tailings management activities. The impact is regarded reversible as the non-acid forming, alkaline materials are not expected to induce lasting geochemical changes and soils are expected to naturally recover once disturbance ceases. The magnitude of change is rated negligible because the mine materials (leachate) are non-acid forming, possess excess neutralising capacity to maintain alkaline pH. Any measurable changes are expected to be minor, resulting only in minor alterations of the soils chemical properties, soil quality or environmental vulnerability. The duration of the impact is rated temporary (<1 year) because the non-acid forming, alkaline mine materials are not expected to induce ongoing geochemical reactions, and any minor changes will naturally dissipate within months once disturbance contact occurs or ceases. The extent of the impact is considered on-site as any contact between leachate and soils will occur within the mine footprint (areas surrounding the WRDs, TSF and ore stockpiles). Due to the low contact mobility, the absence of sustained drainage and confinement of materials, no off-site effects are expected.

Furthermore, the probability of the impact occurring is deemed unlikely as the non-acid forming, alkaline mine materials lack the capacity to generate acidity or mobilise contaminants. The sensitivity of the receptor is rated low as the impact is confined to the site and no ecological disturbances are anticipated. The local Project soils are also expected to recover due to their buffering capacity. Overall, the significance of the impact is rated adverse low, before mitigation (Table 52). Mitigation measures are included in the final ESMP (Appendix A).

7.12.1.2 Acid and metalliferous drainage (AMD) impacts on surface water resources due to the operations of the WRDs, TSF and ore stockpiles

Water extract testing demonstrates that initial contact water from mine materials is alkaline (pH 8.2 – 9.9), non-saline (EC 117 – 363 µS/cm) and characterised by low dissolved ion concentrations. Sulphate (S) concentrations are at least an order of magnitude below livestock drinking water guideline values, indicating minimal risk of saline drainage. Furthermore, most dissolved metals and metalloids are below laboratory limits of reporting or guideline values. Elevated Al and As concentrations observed in laboratory extracts are attributed to worst-case sample preparation (pulverised material and high surface area) and are not representative of expected field conditions. Based on these results, surface water quality impacts from runoff or seepage are expected to be minimal.

The impact is considered adverse as contaminants runoff result in deterioration of surface water quality. This is a direct impact as it occurs as a result of mine contaminants runoff. Furthermore, the impact is regarded reversible as minor alterations to surface water quality are expected under alkaline and low saline conditions of the mine waste materials. The magnitude of is change is rated negligible as it is expected that contact water will be alkaline and will pose minor alterations to surface water quality. The duration of the impact is likely to be temporary (<1 year) as any water quality changes would occur only during runoff events

and would dissipate rapidly under alkaline, low-salinity conditions, typically within hours to days, and at most a few weeks under prolonged flow. The extent of the impact is considered regional as surface water forms part of a connected catchment and allow short-lived effects to be transported downstream, although they attenuate quickly and do not persist. The probability of the impact occurring is rated unlikely considering that contact water is alkaline, low salinity nature of the water and low dissolved metal concentrations. It is expected that measurable effects would only occur under limited, short-lived runoff conditions. The sensitivity of the receptor is rated medium as surface water resources are important on a regional scale and support various ecological systems and sustain downstream users who dependent on their quality. Overall, the significance of the impact is rated adverse low, before mitigation (Table 52). Mitigation measures are included in the final ESMP (Appendix A).

7.12.1.3 Acid and metalliferous drainage (AMD) impacts on groundwater resources due to the operations of the WRDs, TSF and ore stockpiles

All mine material samples have negative net acid producing potential (NAPP) values (−17.5 to −237.8 kg H_2SO_4/t), confirming a strong excess of neutralising capacity relative to any acid generation potential. This indicates that seepage from WRDs, ore stockpiles or TSF is unlikely to acidify groundwater. Laboratory leachates show low salinity and low dissolved metal concentrations. This suggests limited mobility of contaminants under alkaline conditions. Trace constituents such as F-, Al and As were detected in some extracts. Concentrations are expected to be significantly lower under in-situ field conditions, where intact rock, lower surface area and dilution prevail. Consequently, measurable deterioration of groundwater quality is unlikely.

The impact is considered adverse as it results in mine-related groundwater disturbance. This is a direct impact as it occurs at the point of seepage and contaminants originate directly from the mine ore and waste handling processes. The duration of impact is rated temporary because excess neutralising capacity and low contaminant mobility will prevent any lasting alteration to the groundwater chemistry. The magnitude of change is rated negligible as contact between groundwater and mine materials would not cause acidification, increased salinity or sustained metal mobilisation. This is demonstrated by the consistent negative NAPP values, excess neutralising capacity and low dissolved metals concentrates in leachates. Any change is expected to be minor, with no alteration to key groundwater quality characteristics or increased aquifer vulnerability without alteration of key groundwater quality characteristics or increased vulnerability of the aquifer. The duration of the impact is regarded temporary (<1 year) as groundwater quality changes would naturally attenuate within months due to excess neutralising capacity and low contaminant mobility. The extent of the impact is considered regional as groundwater is hydraulically connected across the wider aquifer and this would allow short-lived effects to disperse beyond the site. Furthermore, the probability of the impact occurring is considered unlikely as all mine materials are non-acid forming, have strong negative NAPP values, are less saline and have low dissolved metal concentrations. This implies that there is bi-credible geochemical

mechanism that would cause sustained groundwater degradation. Any contaminant seepages into groundwater resources are expected to be minor and short-lived. The sensitivity of receptor is rated medium as groundwater resources are interconnected, are shared and support downstream users. Any deterioration in water quality could adversely affect livelihoods, if remediation measures are not promptly implemented. Overall, the significance of the impact is rated adverse low, before mitigation (Table 52). Mitigation measures are included in final ESMP (Appendix A).

Table 52 - Impacts from acid mine drainage

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Operations and decommissioning	Soils	AMD impacts on soils due to the operations of the WRDs, TSF and ore stockpiles.	Adverse Direct Reversible Temporary On-site Unlikely	Low	Low	Adverse Low (1)
	Surface water	AMD impacts on surface water resources due to the operations of the WRDs, TSF and ore stockpiles.	Adverse Direct Reversible Temporary Regional Unlikely	Medium	Low	Adverse Low (2)
	Groundwater	AMD impacts on groundwater resources due to the operations of the WRDs, TSF and ore stockpiles.	Adverse Direct Reversible Temporary Regional Unlikely	Medium	Low	Adverse Low (2)

7.13 BIOPHYSICAL ENVIRONMENT: SURFACE WATER AND GROUND WATER IMPACTS

The surface water and groundwater impact assessments evaluate potential Project related impacts on water resources and the ecosystem services that such flows might support. At a high level, direct impacts are typically associated to changes in water quantity (flow, storage, groundwater level) and water quality. Indirect impacts may affect downstream users,

groundwater users, and aquatic or terrestrial ecosystems that rely on episodic surface flows or groundwater availability.

The hydrological assessment was completed by Hydrologic Consulting (Pty) Ltd and baseline monitoring and hydrogeological field work was completed by Environmental Compliance Consultancy (Pty) Ltd (Appendix L . Specialist groundwater studies and impact assessments were conducted by Umvoto Africa (Pty) Ltd (Appendix M .

Baseline monitoring initiated circa October 2023 comprised the measurement of groundwater level, water quality and abstracted volume from two (2) existing boreholes in the Project area. Further baseline and specialist investigations included the establishment of a weather station, a desktop assessment and hydrocensus at the Project site, geophysical surveying (EM), groundwater exploration borehole drilling, test pumping and groundwater quality sampling. Potential impacts were evaluated with reference to the proposed mine layout, mining method, processing plant, waste storage facilities, waste characteristics, materials handling practices and projected water demand within the context of the baseline climatic, hydrological and hydrogeological setting.

7.13.1 HYDROLOGICAL IMPACT ASSESSMENT

The hydrological assessment (Hydrologic, 2025) incorporated baseline information on rainfall, evaporation, design event rainfall, soils and land cover, as well as local terrain and regional and local catchment hydrology. Data were predominantly sourced from The Atlas of Namibia (2022) and supplemented with regional datasets due to limited site-specific rainfall records.
Because of the short on-site rainfall record, design flood conditions were simulated using regional rainfall data. Flood modelling for the 1:50-year and 1:100-year recurrence interval (RI) events were undertaken using HEC-RAS v6.6.

The results of the flood modelling (Figure 118, Figure 119 and Figure 120) provide insight to likely extent and occurrence of run-off being generated on the future mine site, prior to development and show potential for flow entering the site that may require diversion.
The modelling results indicate:

- Limited surface water flow across the proposed mining footprint under baseline conditions;
- Shallow, low-velocity flow paths associated with small catchments;
- Minor inundation of proposed infrastructure areas;
- No major perennial rivers intersecting the site; and
- Ephemeral drainage lines with infrequent flow.

Most of the active mining footprint is not intersected by flow paths draining catchments larger than approximately 5 km². Given the low rainfall, high evaporation rates and ephemeral nature of drainage features, the site is unlikely to generate sustained or high-volume surface flows under baseline conditions.

Stormwater management infrastructure designed to a 1:100-year RI standard is expected to provide an appropriate level of protection against flooding and uncontrolled contaminant transport.

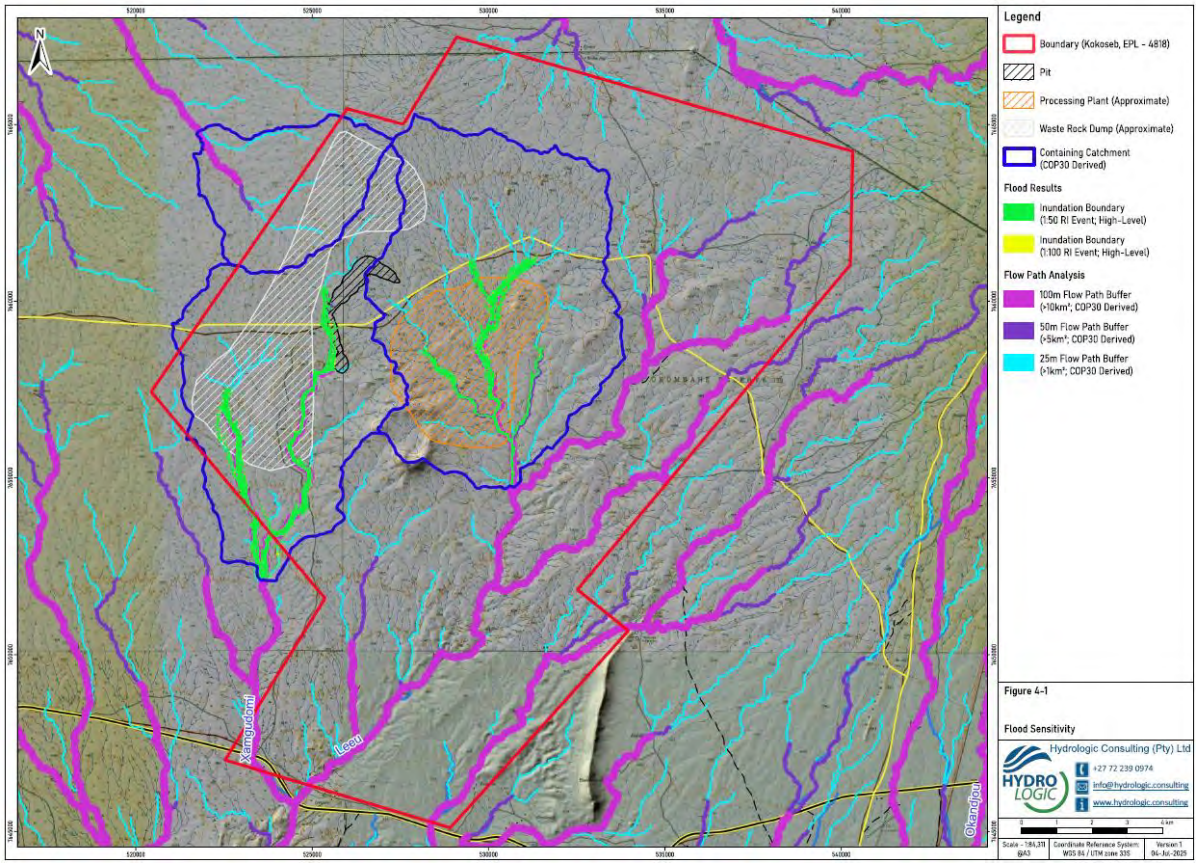


Figure 118 - 1:50 RI and 1:100 RI flood events (Hydrologic, 2025)

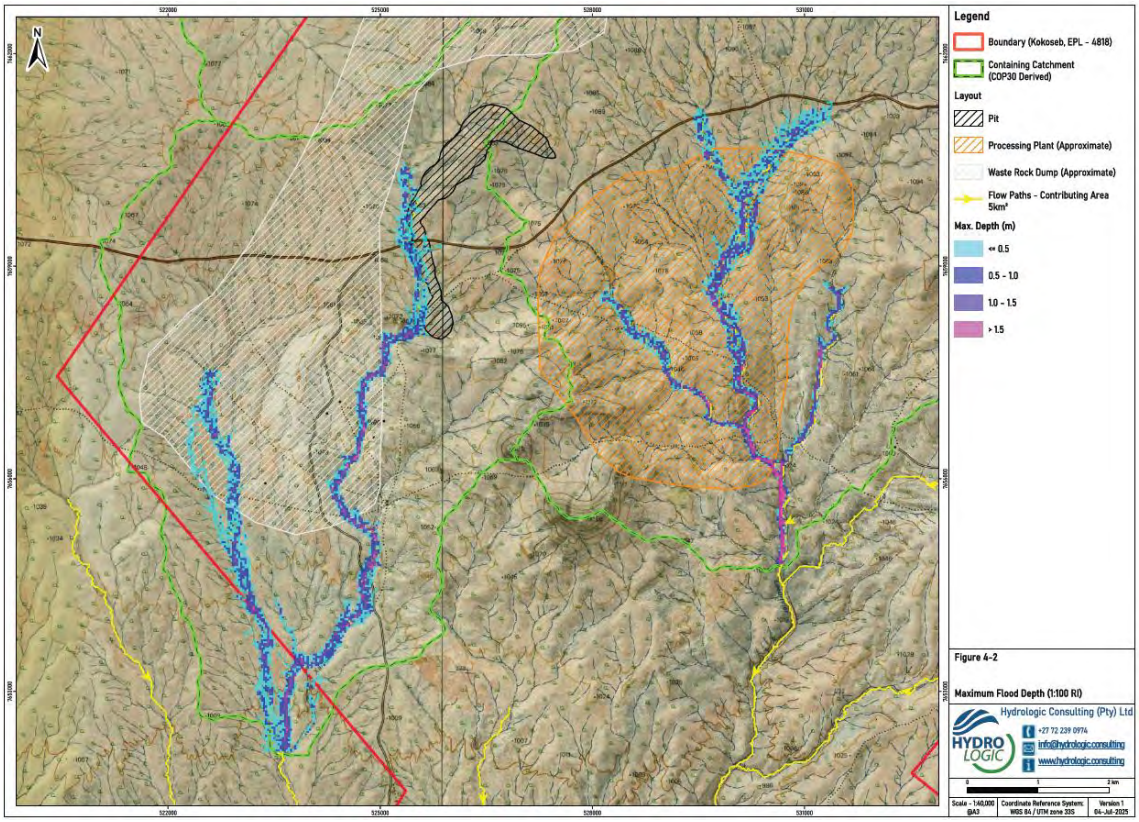


Figure 119 - Maximum depth of flooding for the 1:100 RI event (Hydrologic, 2025)

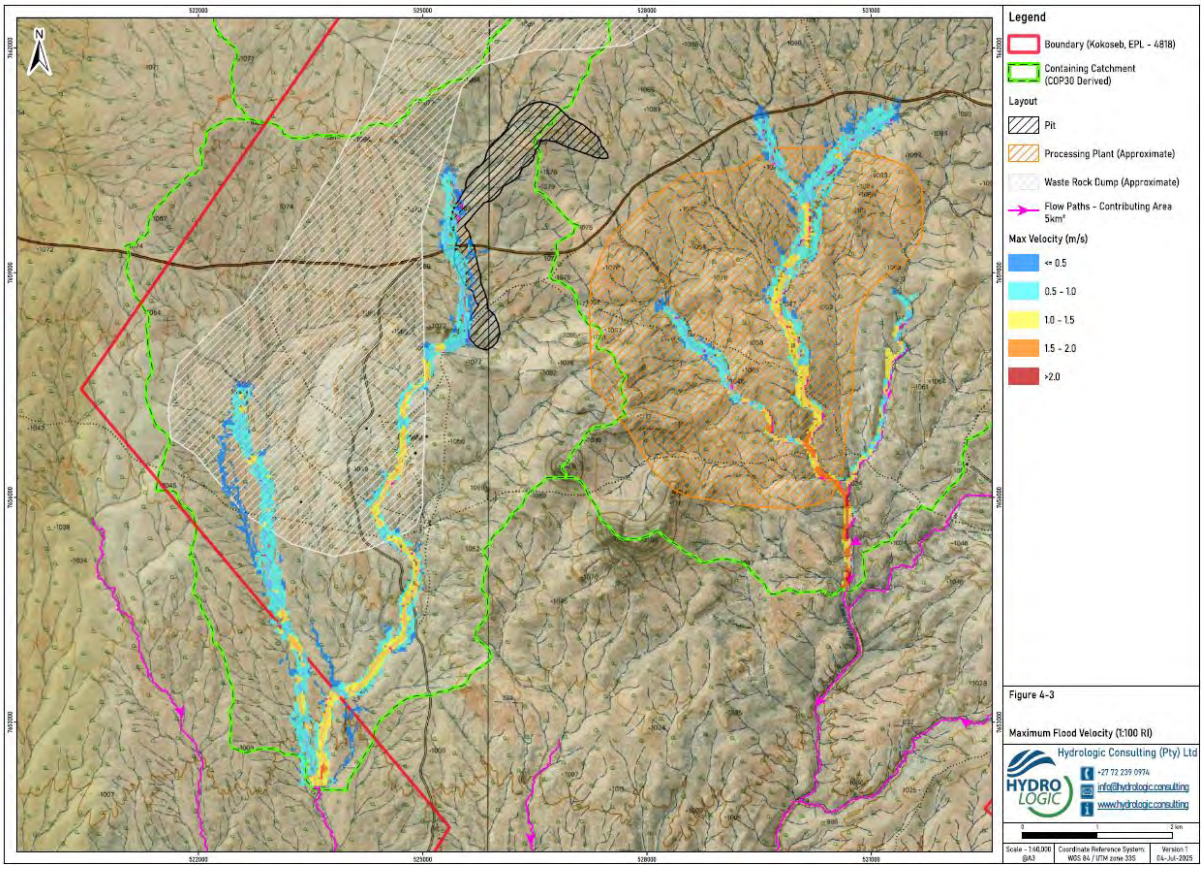


Figure 120 - Maximum flood velocity (Hydrologic, 2025)

7.13.1.1 *Construction phase*

Construction activities will include land clearing, earthworks, road development and installation of mine infrastructure. These activities will modify local drainage patterns and surface characteristics. Containment of run-off during construction is unlikely to be feasible due to the low rainfall experienced in the region, with diversion of any localised flows along roads, tracks and culverts to natural drainage features further downstream. These are anticipated to provide sufficient drainage of the area without flooding or generating high velocity flows and, by comparison to baseline, still sufficiently contribute to downstream requirements. Supported by field observations, the anticipated frequency of runoff being generated from the site is low. This limits the potential for uncontrolled erosion, sediment transport or mobilisation and transport of pollutants, such as from hydrocarbon spills, wastewater effluents or hazardous materials.

The construction-related impacts to surface water are outlined in Figure 121 and Table 53. The figure presents the pre-mitigation impact ratings. A more detailed discussion of the potential impacts on surface water is provided in the following sections.

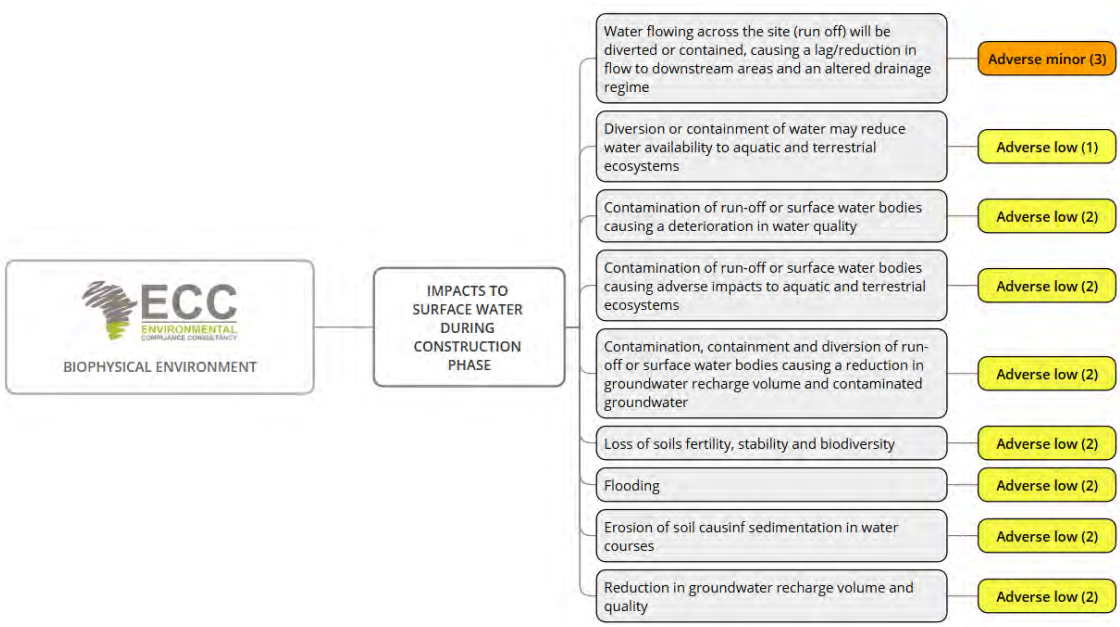


Figure 121 - Potential impacts on surface water during the construction phase

7.13.1.1.1 *Lag/reduction in flow to downstream areas and an altered drainage regime*

During construction, the natural drainage regime will be modified by earthworks, soil compaction, vegetation removal and the development of impermeable or hard-standing surfaces. These changes will alter the timing and routing of surface runoff within the mine footprint. Given the arid climate, the small size and ephemeral nature of local drainage lines,

and the infrequent occurrence of runoff events, any reduction in downstream flow is expected to be negligible.

In some instances, runoff may be conveyed more rapidly via temporary roads, culverts or constructed channels, resulting in minor changes to flow timing rather than a meaningful reduction in volume.

The combined impact is evaluated as adverse, direct, partly reversible, on-site with a definite likelihood of occurring but a low magnitude of change only applicable for the short term (duration of construction). The impact is direct and on-site as flow paths and volumes of water within the mine footprint will be altered from baseline. Not all drainage lines are expected to be altered simultaneously, but rather as construction of various infrastructure progresses. While the impact is partly reversible, the re-establishment of the drainage lines or watercourses altered/removed by construction activities would require an approach that attempts to replicate the pre-development hydrology (soils, vegetation and geomorphology). The sensitivity of the receptor and magnitude of change are both low as the catchment areas and drainage lines are small, only experiencing low, episodic and infrequent flow with no direct downstream users identified. The unmitigated impact is resultantly rated as adverse minor (Table 53).

As mitigation, the minimal extent of flow paths reasonably possible should be disturbed, altered flow paths should be modified to allow upstream areas to route back into the natural downstream area and ideally, the pre-existing or baseline hydrology should be replicated where practicably possible. However, the residual significance of the impact will remain minor due to the definite probability of the impact occurring. These mitigation measures are included in the final ESMP (Appendix A).

7.13.1.1.2 Reduction in surface water availability for water dependent ecosystems (aquatic and terrestrial) due to diversion or containment

Construction activities may result in localised diversion or containment of runoff, which could reduce the availability of surface water to downstream environments and thereby create a potential indirect adverse impact on water-dependent ecosystems. Surface water can play an important role in sustaining ecological function in arid environments, particularly where episodic flows support vegetation or provide short-term habitat. However, baseline conditions at the site are characterised by infrequent rainfall, low runoff volumes and ephemeral drainage features. No established or persistent surface water-dependent ecosystems have been identified downstream of the proposed footprint. These factors substantially reduce both the likelihood and magnitude of any reduction in water availability attributable to construction activities.

As such, the impact is assessed as short term, adverse, indirect, reversible, with a low probability of occurring and limited to on site with a low magnitude of change. Given the low baseline contribution of surface water, the low sensitivity of potential receptors and the limited duration of construction-related disturbance, the unmitigated impact is resultantly rated as adverse low (Table 53).

To further mitigate against a reduction in water availability, altered flow paths should be modified to allow upstream areas to route back into the natural downstream area, where relevant discharge excess water of acceptable quality back into the surface water environment, keep the contained dirty area to a minimum and the pre-existing or baseline hydrology should be replicated where practicably possible. These mitigation measures are included in the final ESMP (Appendix A).

7.13.1.1.3 Contamination of run-off or surface water bodies causing a deterioration in water quality

Wastewater from construction camps, the operation of earthmoving equipment and the maintenance of vehicles during construction, including the storage and handling of fuels and hydrocarbons, present potential sources of contamination to the surface water environment. Accidental spills or leaks could be mobilised during rainfall events and transported via runoff if not appropriately managed.

An emergency response procedure for spills should therefore be implemented, and all areas with contamination potential, such as fuel storage, maintenance areas and laydown areas, should be appropriately bunded and managed to prevent uncontrolled discharge of contaminated runoff.

The arid climate, characterised by low rainfall and infrequent runoff events, reduces the likelihood that contaminants would be mobilised and transported off site. In addition, the absence of perennial rivers or standing surface water bodies in the surrounding area lowers the sensitivity of receiving environments. While the probability of contamination reaching downstream areas is low, it remains possible in the absence of appropriate controls, and the potential spatial extent could extend beyond the immediate construction footprint if a significant spill were to coincide with a runoff event. Taking these factors into account, the impact is assessed as adverse, direct, partly reversible, regional, short term with a moderate magnitude of change from baseline conditions. The unmitigated impact is rated as adverse low (Table 53).

Implementing stormwater controls, ensuring sufficient containment of dirty areas, limiting on-site storage of potential contaminants, provision of spill kits and designated refuelling/maintenance areas will aid in reducing potential extent of contamination and further reduce the already low rated impacted. These mitigation measures are included in the final ESMP (Appendix A).

7.13.1.1.4 Deterioration in surface water quality due to contamination impacting water dependent ecosystems (aquatic and terrestrial)

Construction activities have the potential to cause a deterioration in surface water quality through accidental releases of hydrocarbons, wastewater or other contaminants, which could indirectly affect downstream ecosystems that may rely on episodic surface flows. Adequate surface water quality is important for maintaining ecological function in arid environments; however, baseline conditions at the site are characterised by infrequent runoff, low flow volumes and the absence of established or persistent surface water-dependent ecosystems. These factors reduce the likelihood, magnitude and spatial extent of any indirect ecological impact arising from short-term construction-related contamination. The impact is therefore assessed as adverse and indirect, short term in duration and local in extent, with a low magnitude of change and low probability of occurrence. It is considered partly reversible, as any short-term deterioration in surface water quality would dissipate once construction activities cease and appropriate management measures are implemented. The absence of perennial surface water features and the presence of only low-order ephemeral drainage lines result in low receptor sensitivity. On this basis, the unmitigated impact is rate adverse low (Table 53).

Implementation of appropriate stormwater management controls, minimisation and proper containment of dirty areas, careful storage and handling of fuels and chemicals, provision of spill response equipment and the establishment of designated refuelling and maintenance areas will further reduce the likelihood of contamination and ensure that residual impacts to surface water quality and associated ecosystems remain minor and contained. These mitigation measures are included in the final ESMP (Appendix A).

7.13.1.1.5 Reduction in groundwater recharge volume and quality

Construction activities that alter surface runoff patterns or introduce potential contaminants may indirectly influence groundwater recharge and groundwater quality. Surface runoff can, under certain conditions, infiltrate and contribute to groundwater recharge, and contaminants mobilised in runoff could potentially enter the subsurface. However, baseline conditions at the site are characterised by low rainfall, infrequent runoff events and high evaporation rates, which together result in limited natural recharge. The presence of a relatively thick vadose zone and the generally low permeability of underlying geological units further reduce the likelihood of rapid contaminant migration to groundwater. In addition, no sensitive groundwater users or groundwater-dependent ecosystems have been identified in close proximity to the site.

While the potential for localised impacts on groundwater recharge and quality cannot be entirely excluded, the probability of such impacts occurring during construction is low and any effects would likely be highly localised and slow to develop. The impact is therefore assessed as adverse and indirect, short term in duration and local in extent, with a low magnitude of change and low to medium probability of occurrence in the absence of

mitigation. It is considered partly reversible, as groundwater quality and recharge conditions would stabilise once construction activities cease and appropriate controls are maintained. Given the low sensitivity of receptors and the limited contribution of surface water to recharge under baseline conditions, the unmitigated impact is rated as adverse low (Table 53).

Implementation of standard construction-phase mitigation measures, including effective stormwater management, containment of potential contaminants, spill prevention and appropriate waste handling, will further reduce the likelihood of contaminants entering the subsurface and ensure that any residual effects on groundwater recharge and quality remain minor and localised. These mitigation measures are included in the final ESMP (Appendix A).

7.13.1.1.6 Erosion of soil causing sedimentation in water courses

Erosion of disturbed soils during construction has the potential to generate sediment that may be transported to downstream drainage lines, resulting in an adverse impact on surface watercourses through increased turbidity, localised deposition and possible alteration of flow paths. Construction activities will disturb previously undisturbed ground and expose soils to rainfall and runoff, creating conditions under which erosion could occur. While some erosion potential may persist into the early operational phase, it is expected that disturbed surfaces will stabilise over time, thereby reducing the volume of sediment generated during subsequent rainfall events.

The arid climatic setting, characterised by low rainfall and infrequent runoff, reduces both the likelihood and magnitude of erosion and sediment transport. Drainage lines in the area are generally low order and ephemeral, and there are no perennial rivers within or immediately downstream of the site. As a result, the sensitivity of receiving environments is low and the spatial extent of potential sedimentation impacts is expected to be local. Although the probability of occurrence is low, the impact could extend beyond the immediate footprint if erosion controls are not implemented. Taking these factors into account, the impact is assessed to be adverse, direct, partly reversible, enduring for the short term with local extent, a medium probability of occurrence and a moderate magnitude of impact. The unmitigated impact is rated as adverse low (Table 53).

Mitigation measures will focus on stabilising disturbed areas as early as practicable and implementing erosion control measures where stabilisation cannot be immediately achieved. A site-specific rehabilitation plan should be implemented, including topsoil management and replacement where feasible, and the progressive rehabilitation of disturbed areas to restore pre-disturbance landforms, slopes and surface cover as far as practicable. A re-vegetation strategy appropriate to the arid environment should be applied, prioritising indigenous species and including maintenance and aftercare requirements. Construction activities should, where feasible, be scheduled to minimise exposure of bare soils during periods of higher rainfall potential, with bulk earthworks preferentially undertaken during drier periods. These measures will further reduce the likelihood and extent of sediment transport to

downstream drainage lines. These mitigation measures are included in the final ESMP (Appendix A).

7.13.1.1.7 Erosion of soils due to uncontrolled surface flow

During construction, vegetation clearing, soil compaction and the development of impermeable surfaces will alter surface runoff pathways and increase the potential for localised erosion. Several parts of the proposed mine footprint are intersected by minor flow paths that may convey infrequent runoff events across the site prior to permanent diversion or modification. However, the arid climatic setting, low rainfall frequency and intensity, and the presence of low-order, ephemeral drainage lines indicate that both the frequency and magnitude of runoff events are limited. As a result, the potential for widespread erosion due to uncontrolled surface flow is low.

Where clean water is diverted around or discharged from the site, diversion structures and discharge points should be designed to reduce flow velocities, promote diffusion and minimise erosion potential downstream. The impact is considered adverse and indirect in relation to the receiving environment, as erosion would primarily occur within the construction footprint but could influence downstream areas if unmanaged. It is assessed as partly reversible, local in extent and short term in duration, limited to the construction phase. Given the low rainfall regime and ephemeral drainage network, the magnitude of the impact is low and the probability of occurrence is low. The sensitivity of downstream receptors is also low due to the absence of perennial watercourses and higher order drainage features.
The unmitigated impact is rated as adverse low (Table 53). Implementation of sequential land clearing, appropriate drainage design, erosion control measures and scheduling of bulk earthworks during drier periods will further reduce the likelihood and extent of erosion during construction. These mitigation measures are included in the final ESMP (Appendix A).

7.13.1.1.8 Flooding

Flooding represents primarily a risk to the proposed mine infrastructure rather than to downstream environmental receptors. The principal flood risk is associated with localised surface water runoff prior to its concentration within defined drainage channels. The mine footprint is located predominantly within the headwaters of minor, ephemeral drainage lines, and there is limited upstream catchment area contributing flow across the site. Consequently, the potential for significant flood volumes entering the site is low (Table 53).

With the implementation of stormwater controls and standard industry management measures as set out in the Environmental Management Plan, the likelihood and consequences of flooding are expected to be effectively managed. The arid climate, low rainfall intensity and frequency, and the presence of low-order drainage lines in the vicinity of key infrastructure further reduce the magnitude and frequency of flooding events. The impact is therefore assessed as adverse but indirect in relation to the environment, as it primarily affects mine infrastructure and only secondarily has the potential to influence

downstream conditions if not appropriately managed. It is considered temporary in duration, localised to the mine site, reversible and of moderate magnitude but with a low probability of occurrence. Given the low sensitivity of downstream receptors and the limited contributing catchment areas, the overall significance of the impact is minor, with a low sensitivity. The impact is rated as adverse low and can be further mitigated following the application of standard mitigation measures. These mitigation measures are included in the final ESMP (Appendix A).

7.13.1.1.9 Soil contamination

This indirect adverse impact could occur if surface runoff mobilises and transports contaminants, including hydrocarbons or other hazardous materials associated with laydown areas, vehicle movement, refuelling and material handling, and deposits them within drainage lines or ephemeral watercourses, or results in their adsorption to soils. As with other surface-water-related impacts at the site, the arid climate, low rainfall, episodic flow conditions and small, low-order drainage features reduce the likelihood of significant runoff events and limit the potential for overland flow capable of transporting contaminants over meaningful distances. These factors substantially reduce the probability of contaminant mobilisation and downstream transport.

The implementation of stormwater management measures, including the diversion and containment of potentially contaminated runoff within designated dirty water systems, will further reduce the risk of contaminants being mobilised by surface water.
The impact is therefore assessed as adverse and indirect, short term in duration and local in extent, with a low probability of occurrence and low magnitude. It is considered reversible through remedial action should contamination occur. Given the low sensitivity of potential receptors and the limited likelihood of contaminant transport under baseline climatic conditions, the overall unmitigated significance is rate adverse low (Table 53). Mitigation measures are included in the final ESMP (Appendix A).

Table 53 - Impacts on surface water during the construction phase

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction - water flowing across the site (run off) will be diverted or contained	Surface water	Lag or reduction in flow to downstream areas and an altered	Adverse Direct Short term On site Partly reversible Moderate Definite	Low	Minor	Adverse Minor (3)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
		drainage regime				
Construction - diversion or containment of surface water run-off.	Ecosystem services; (aquatic and terrestrial)	A reduction in surface water availability	Adverse Indirect Short term On site Reversible Low Unlikely	Low	Low	Adverse Low (1)
Construction – spills, leaks and discharges	Surface water	A deterioration in surface water quality due to contamination from spills, leaks or uncontrolled discharges (hydrocarbons, hazardous material and wastewater).	Adverse Direct Short term Local Partly reversible Minor Possible	Low	Moderate	Adverse Low (2)
Construction – spills, leaks and discharges	Ecosystem services; (aquatic and terrestrial)	Pollution of surface water dependent	Adverse Indirect Short term Local Partly reversible	Low	Minor	Adverse Low (2)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
		ecosystems	Minor Unlikely			
Construction – surface water containment, diversion and contamination	Groundwater	Reduction in groundwater recharge volume and deterioration in groundwater quality	Adverse Indirect Short term Local Partly reversible Minor Unlikely	Low	Minor	Adverse Low (2)
Construction – earthworks, soil compaction, vegetation removal and the development of impermeable or hard-standing surfaces	Surface water	Erosion of soil causing sedimentation in water courses	Adverse Direct Short term Local Partly reversible Minor Possible	Low	Minor	Adverse Low (2)
Construction - earthworks, soil compaction, vegetation removal and the development of impermeable or hard-standing surfaces	Soil	Erosion of soil resulting, loss of soil fertility, stability and biodiversity	Adverse Indirect Short term Local Partly reversible Minor Possible	Low	Moderate	Adverse Low (2)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction – spills, leaks and discharges	Soil	Contamination of soil	Adverse Indirect Short term On site Reversible Minor Unlikely	Low	Minor	Adverse Low (2)
Construction - earthworks, soil compaction, vegetation removal and the development of impermeable or hard-standing surfaces	Mine infrastructure	Flooding	Adverse Indirect Temporary On site Reversible Minor Unlikely	Low	Moderate	Adverse Low (2)

7.13.1.2 Operational and decommissioning phase

Key operational activities will include open pit mining, loading and hauling of material, stockpiling, mineral processing and the operation of mine waste facilities, including waste rock dumps and the tailings storage facility. These activities will modify local drainage patterns and surface characteristics to varying degrees and may result in adverse impacts on surface water resources and associated indirect receptors such as soils and ecosystems. The primary mitigation measure for operational surface water impacts will be the implementation of a comprehensive stormwater management plan designed to minimise contact between clean water and potentially contaminated areas and to control runoff generated within the mine footprint. The stormwater management plan should aim to confine dirty water to the smallest practicable area, provide operational guidance in conjunction with the Environmental Management Plan on the handling and storage of hazardous materials and hydrocarbons, and promote the diversion of upstream clean water around disturbed areas. It should also ensure effective separation of clean and dirty water systems and the controlled routing of site-generated runoff.

The low rainfall regime and episodic nature of runoff in the region indicate that diversion of clean, localised flows along roads, tracks and culverts to downstream natural drainage features is likely to provide adequate drainage without generating significant flood risk or high-velocity flows. These diverted flows are expected to remain broadly consistent with baseline contributions to downstream areas. The limited volume of runoff generated under operational conditions also implies that relatively small volumes of dirty water will require containment and management. Wastewater discharges are anticipated to be minimal, as operational water management will prioritise reuse and recycling of water within the process circuit in line with best practice for mining in arid environments.

Field observations support the conclusion that the frequency of runoff generation at the site is low, which in turn limits the potential for uncontrolled erosion, sediment transport and mobilisation of pollutants such as hydrocarbons, wastewater or hazardous materials. Operational phase impacts on surface water are presented in Figure 122 and Table 54, which summarise the pre-mitigation impact ratings. Further detail on the nature and significance of potential surface water impacts during operations is provided in the sections that follow.

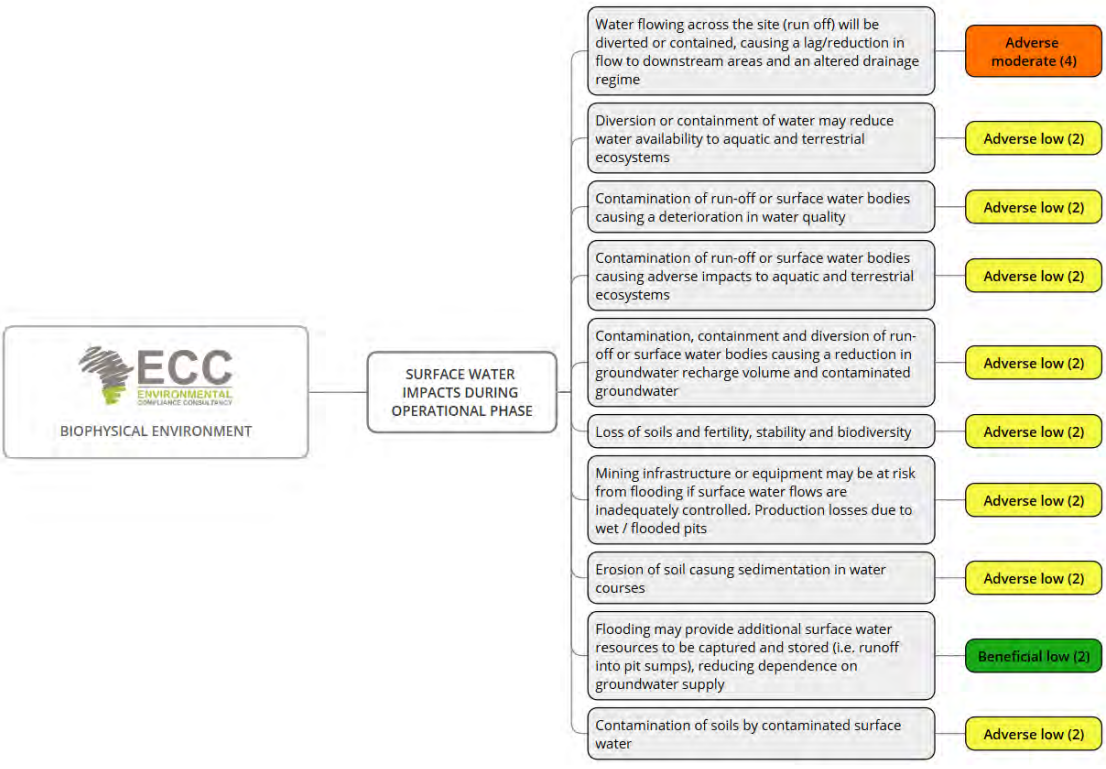


Figure 122 - Potential impacts on surface water during the operations phase

7.13.1.2.1 Lag or reduction in flow to downstream areas and alteration of the drainage regime

During operations, the natural drainage regime will be modified by the presence of the open pit, haul roads, waste rock dumps, processing infrastructure and the tailings storage facility, all of which will alter surface runoff pathways and surface characteristics within the mine

footprint. Ongoing material movement, maintenance of haul roads and continued compaction of operational surfaces will influence the timing and routing of surface runoff across the site. Given the arid climate, the small size and ephemeral nature of local drainage lines and the infrequent occurrence of runoff events, any reduction in downstream flow is expected to remain negligible. In some instances, runoff may be conveyed more rapidly via permanent haul roads, stormwater channels or culverts, resulting in minor changes to flow timing rather than a meaningful reduction in volume.

The impact is therefore assessed as adverse and direct, partly reversible and localised to the operational area, with a definite likelihood of occurring but a moderate magnitude of change. It will however be permanent in duration albeit only relevant during episodic runoff events, it will recur throughout the operational life of the mine. Flow paths and volumes within the footprint will differ from baseline conditions, and while some drainage features will be permanently altered, re-establishment of more natural drainage patterns would be possible through rehabilitation and regrading during closure. The sensitivity of receptors remains low because the affected drainage lines are small, ephemeral and support only infrequent flow, and no direct downstream users have been identified.

The unmitigated impact is therefore rated as moderate adverse (Table 54). Mitigation during operations will focus on minimising disturbance to existing flow paths where practicable, maintaining downstream connectivity through stormwater controls and ensuring that, at closure, recontouring and rehabilitation measures aim to re-establish drainage patterns that approximate pre-mining hydrological conditions. These mitigation measures are included in the final ESMP (Appendix A).

7.13.1.2.2 Reduction in surface water availability for water-dependent ecosystems due to diversion or containment

Operational activities, including the diversion of clean water around, into or away from the pit and waste facilities and the containment of potentially contaminated runoff within stormwater management infrastructure, may result in localised reductions in surface water reaching downstream areas. This could create an indirect adverse impact on ecosystems that rely on episodic surface flows. Surface water can be important for sustaining ecological processes in arid environments; however, baseline conditions at the site are characterised by infrequent rainfall, low runoff volumes and ephemeral drainage features. No established or persistent surface water-dependent ecosystems have been identified downstream of the operational footprint. These factors substantially reduce both the likelihood and magnitude of any reduction in water availability attributable to operational activities.

The impact is assessed as adverse, indirect, short term and partly reversible, with a possible probability and low magnitude, and limited to the local mine site and its immediate downstream area. The unmitigated impact is rated as adverse low (Table 54). Mitigation during operations will include maintaining connectivity of diverted clean water to

downstream drainage lines, discharging excess clean water where appropriate and minimising the spatial extent of contained dirty water areas. During closure, re-establishment of more natural drainage pathways and removal or reconfiguration of diversion structures can be considered to restore downstream surface water contributions where practicable. These mitigation measures have been included in the final ESMP (Appendix A).

7.13.1.2.3 Contamination of runoff or surface water bodies causing deterioration in water quality

During operations potential sources of contamination include the handling and storage of fuels and reagents, vehicle movement and maintenance, operation of the processing plant, and runoff from waste rock dumps and the tailings storage facility. Accidental spills or leaks may be mobilised during rainfall events and transported via runoff if not appropriately contained. An emergency response procedure for spills should be maintained, and all operational areas with contamination potential, including refuelling areas, workshops, reagent storage facilities and waste management areas bunded and managed to prevent uncontrolled discharge of contaminated runoff.

The arid climate, characterised by low rainfall and infrequent runoff events, reduces the likelihood that contaminants would be mobilised and transported off site. The absence of perennial rivers or standing surface water bodies further lowers the sensitivity of receiving environment. While the probability of contamination reaching downstream areas remains low, it is possible if appropriate controls are not maintained, and the spatial extent could extend beyond the mine footprint should a significant spill coincide with a runoff event. The impact is assessed as adverse, direct, partly reversible, regional, short term with a moderate magnitude of change from baseline conditions and is rated as adverse low (Table 54). Ongoing implementation of stormwater controls, containment of dirty areas, spill response capacity and appropriate operational procedures will reduce the extent and likelihood of contamination. At closure, removal of hazardous materials and continued management of contaminated areas will be required to ensure that residual risks to surface water quality remain low. The mitigation measures have been included in the final ESMP (Appendix A).

7.13.1.2.4 Deterioration in surface water quality affecting water-dependent ecosystems

Operational activities have the potential to result in a deterioration in surface water quality through accidental releases of hydrocarbons, process reagents or contaminated runoff, which could indirectly affect downstream ecosystems that may rely on episodic flows. Although adequate water quality is important for maintaining ecological function, baseline conditions are characterised by infrequent runoff and the absence of persistent water-dependent ecosystems. These factors reduce the likelihood and extent of any indirect ecological impact arising from operational contamination events. The impact is assessed as adverse and indirect, short term and localised, with low magnitude and low probability, and is partly reversible. Receptor sensitivity remains low due to the absence of perennial surface

water features. The unmitigated impact is rated as adverse low (Table 54). Implementation of operational stormwater management measures, containment of dirty water, and appropriate handling and storage of fuels and chemicals will ensure that residual impacts remain minor. Closure planning will include removal of contamination sources and ongoing monitoring where required to confirm recovery of surface water quality. The mitigation measures have been included in the final ESMP (Appendix A).

7.13.1.2.5 Reduction in groundwater recharge volume and quality

Operational activities that alter runoff patterns or generate contaminated runoff may indirectly influence groundwater recharge and groundwater quality. Surface runoff may infiltrate locally and contribute to recharge, and contaminants mobilised in runoff could potentially enter the subsurface. However, baseline conditions are characterised by low rainfall, infrequent runoff and high evaporation, resulting in limited natural recharge. The presence of a thick vadose zone and relatively low permeability geological units further reduces the likelihood of rapid contaminant migration. No sensitive groundwater users or groundwater-dependent ecosystems have been identified nearby. While localised impacts cannot be entirely excluded, the probability remains low and any effects would be highly localised and slow to develop.

The impact is assessed as adverse and indirect, short term and localised, with low magnitude and low to medium probability, and partly reversible. The unmitigated impact is rated as adverse low (Table 54). Continued implementation of stormwater management and spill prevention measures during operations will reduce the likelihood of contaminants entering the subsurface. Closure measures will include removal of contamination sources and rehabilitation of disturbed areas to support long-term stabilisation of recharge conditions. The mitigation measures have been included in the final ESMP (Appendix A).

7.13.1.2.6 Erosion of soil causing sedimentation in watercourses

During operations, erosion may occur from exposed surfaces such as waste rock dumps, haul roads, stockpiles and other disturbed areas, with sediment potentially transported to local drainage lines during rainfall events. Over time, many disturbed surfaces will stabilise, reducing sediment generation relative to early operational phases. The arid climate and low frequency of runoff events reduce both the likelihood and magnitude of erosion and sediment transport. Drainage lines are low order and ephemeral, and no perennial rivers occur nearby. Receptor sensitivity is therefore low and the spatial extent of sedimentation impacts is expected to be local. The impact is assessed as adverse, direct, partly reversible, short term and localised, with medium probability and moderate magnitude but low overall significance. The unmitigated impact is rated as adverse low (Table 54). Operational mitigation will include stabilisation of exposed areas, erosion control measures and progressive rehabilitation of disturbed surfaces. At closure, final landform shaping and revegetation will further reduce long-term sediment generation potential. The mitigation measures have been included in the final ESMP (Appendix A).

7.13.1.2.7 Erosion of soils due to uncontrolled surface flow

Operational activities, including maintenance of haul roads, management of waste rock dumps and routing of clean water around disturbed areas, may create conditions where uncontrolled surface flow could result in localised erosion of soils leading to a loss of fertility, stability and biodiversity, if not properly managed. However, the low rainfall regime, episodic runoff and low-order drainage network limit the frequency and magnitude of such events. Diversion channels and discharge points will be designed to reduce flow velocities and minimise downstream erosion. The impact is considered adverse and indirect, partly reversible, local and short term, with low magnitude and low probability. Receptor sensitivity remains low due to the absence of perennial watercourses. The unmitigated impact is rated as adverse low (Table 54). Continued maintenance of drainage infrastructure and erosion control measures during operations will minimise erosion risk, while closure-phase regrading and rehabilitation will further stabilise the land surface. Mitigation measures have been included in the final ESMP (Appendix A).

7.13.1.2.8 Flooding

Flooding during operations represents primarily a risk to mine infrastructure rather than to the receiving environment. Localised surface runoff may accumulate prior to entering defined drainage channels, particularly around the pit, processing plant and waste facilities. The mine footprint lies within the headwaters of minor ephemeral drainage lines with limited upstream catchment contribution, and therefore the potential for significant flood inflows is low. With the implementation of stormwater controls and standard operational management measures, the likelihood and consequences of flooding are expected to remain low. The impact is assessed as adverse but indirect in relation to the environment, temporary, reversible and localised to the mine site, with moderate magnitude but low probability and low receptor sensitivity. The overall significance is minor, and the impact rated as adverse low (Table 54). Closure planning will include regrading and removal or modification of infrastructure to ensure stable post-closure drainage and minimise long-term flood risk. The mitigation measures have been included in the final ESMP (Appendix A).

7.13.1.2.9 Soil contamination

Operational activities involving fuel storage, refuelling, vehicle movement, reagent handling and waste management (WRD and TSF operation, pollution control dams, oil water separators, wash bays etc.) may result in contaminants being mobilised by runoff and deposited in soils or ephemeral drainage lines. The arid climate, low rainfall and episodic flow conditions reduce the likelihood of significant runoff capable of transporting contaminants over long distances. Stormwater management measures, including diversion and containment (pollution control dams) of potentially contaminated runoff within designated systems, will further reduce the risk of contaminant mobilisation. The impact is assessed as adverse and indirect, short term and localised, with low magnitude and low probability, and reversible through remedial action if contamination occurs. Receptor sensitivity remains low

due to the limited likelihood of transport and absence of sensitive surface water receptors. The unmitigated impact is rated as adverse low (Table 54). Ongoing operational controls and remediation where required will ensure that residual impacts remain minor, and closure will include removal of contamination sources and monitoring to confirm recovery of affected soils. The mitigation measures have been included in the final ESMP (Appendix A).

7.13.1.2.10 Flooding

During operations, and once the pit has developed to sufficient depth and capacity, there may be limited opportunities for controlled diversion of runoff or flow within minor drainage lines into pit sumps as part of the site stormwater management system. Such diversion would allow for temporary containment and reuse of additional water on site and could marginally reduce demand on existing water supply sources. Given the low-order nature of the surrounding drainage features, the episodic rainfall regime and the infrequent generation of runoff, the likelihood of this occurring is low and any benefit would be short term and confined to the mine site. The receiving environment is of low sensitivity in this context, and the overall significance of the potential benefit is considered minor. The impact is therefore assessed as a low beneficial impact (Table 54).

Table 54 - Operational phase impacts on surface water

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Operations - water flowing across the site (run off) will be diverted or contained	Surface water	Lag or reduction in flow to downstream areas and an altered drainage regime	Adverse Direct Permanent Local Partly reversible Major Definite	Low	Minor	Adverse Moderate (4)
Operations - diversion or containment of surface water run-off.	Ecosystem services; (aquatic and terrestrial)	A reduction in surface water availability	Adverse Indirect Short term On site Reversible Low Unlikely	Low	Low	Adverse Low (1)
Operations – spills, leaks and discharges	Surface water	A deterioration in surface water quality due to contamination	Adverse Direct Short term Local	Low	Moderate	Adverse Low (2)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
		from spills, leaks or uncontrolled discharges (hydrocarbons, hazardous material and wastewater).	Partly reversible Minor Possible			
Operations – spills, leaks and discharges	Ecosystem services; (aquatic and terrestrial)	Pollution of surface water dependent ecosystems	Adverse Indirect Short term Local Partly reversible Minor Unlikely	Low	Minor	Adverse Low (2)
Operations – surface water containment, diversion and contamination	Groundwater	Reduction in groundwater recharge volume and deterioration in groundwater quality	Adverse Indirect Short term Local Partly reversible Minor Unlikely	Low	Minor	Adverse Low (2)
Operations – earthworks, soil compaction, stock piling and the development of impermeable or hard-standing surfaces	Surface water	Erosion of soil causing sedimentation in water courses	Adverse Direct Short term Local Partly reversible Minor Possible	Low	Minor	Adverse Low (2)
Operations -	Soil	Erosion of soil resulting, loss	Adverse Indirect	Low	Moderate	Adverse Low (2)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
earthworks, soil compaction, stock piling and the development of impermeable or hard-standing surfaces		of soil fertility, stability and biodiversity	Short term Local Partly reversible Minor Possible			
Operations – spills, leaks and discharges	Soil	Contamination of soil	Adverse Indirect Short term On site Reversible Minor Unlikely	Low	Minor	Adverse Low (2)
Operations - earthworks, soil compaction, and the development of impermeable or hard-standing surfaces	Mine infrastructure	Flooding	Adverse Indirect Temporary On site Reversible Minor Unlikely	Low	Moderate	Adverse Low (2)
Operations – divert stormwater to pits or storage	Water	Flooding	Beneficial Direct Temporary On site Reversible Minor Possible	Low	Moderate	Beneficial Low (1)

7.13.2 GROUND WATER IMPACT ASSESSMENT

The hydrogeological assessment (Umvoto, 2024; Umvoto, 2025) incorporated baseline information on topography, rainfall, evaporation, soils, geology, hydrology, groundwater levels and groundwater quality (Appendix M . Data and information were obtained from existing reports and literature, including the 1:250 000 Geological Map Sheet 2114 Omaruru (Geological Survey of Namibia, 1996) and the 1:1 000 000 Hydrogeological Map of Namibia (Department of Water Affairs, Division Geohydrology, 2011), as well as site-specific monitoring records. Field-based investigations undertaken as part of the specialist study included geophysical surveying, borehole drilling for groundwater investigation, test pumping and groundwater quality sampling and analysis. These datasets were used to develop a conceptual hydrogeological model of the site and surrounding area. The conceptual understanding informed the development of a numerical groundwater flow model, which was used to simulate scenarios related to mine dewatering, groundwater abstraction and contaminant transport to evaluate potential impacts on the groundwater system.

Overall, the hydrogeological setting is not considered highly sensitive to potential mining-related impacts, as the project area lies within a region of generally low groundwater potential dominated by fractured hard-rock aquifers with no other bulk users. Groundwater occurrence is controlled predominantly by secondary porosity associated with fractures, joints, faults and weathered zones, with negligible primary porosity in the bedrock.

Localised shallow alluvial sediments may host limited and discontinuous aquifers along ephemeral drainage features; however, these are expected to be transient and only temporarily saturated following significant rainfall events and were not identified within the direct mining footprint.

Recharge to the groundwater system is anticipated to be low, episodic and spatially variable due to the arid climate, low and irregular rainfall, high evaporation rates and limited soil cover. Recharge is most likely to occur during infrequent high-intensity rainfall events via focused infiltration along fracture zones and drainage lines rather than through diffuse infiltration across the landscape. These conditions reduce the likelihood of significant impacts on the regional groundwater system, provided that appropriate monitoring, management and mitigation measures are implemented where necessary as mining progresses beneath the regional water table.

Depths to groundwater are generally moderate to deep, indicating limited interaction between surface water and groundwater under baseline conditions. Baseline groundwater quality reflects predominantly geogenic controls and long residence times typical of fractured hard-rock aquifers in arid environments. Water chemistry is generally characterised by moderate salinity and naturally elevated concentrations of constituents such as fluoride, sodium and magnesium, consistent with prolonged water–rock interaction and evaporative

concentration. There is no evidence of significant anthropogenic influence on groundwater quality under pre-mining conditions.

The ore body will be mined from the Kuiseb Schists, which are generally regarded as an aquitard. Although groundwater may occur locally within fractures or fault zones, the groundwater system within the Kuiseb Schists underlying and surrounding the site is considered to have low yield potential and limited sensitivity as an environmental receptor. Similarly, the granitic units underlying the tailings storage facility and waste rock dumps are characterised by low groundwater potential and are not considered to represent a resource of significant environmental or strategic importance in the regional context. In contrast, the Karibib Marble units demonstrate comparatively higher groundwater potential and may represent a viable water supply source where present. This marble aquifer is however limited in spatial extent and while useful for initial supply, sustainable use from the marbles is anticipated to be limited in comparison to the overall water demand. No major mine waste infrastructure is planned to be underlain by the Karibib Marbles, thereby reducing the likelihood of impacts on a potentially usable groundwater resource.

Groundwater flow and contaminant transport simulations were undertaken using FEFLOW (Finite Element Subsurface Flow System). A steady-state model was developed to characterise baseline hydrogeological conditions prior to mining and to provide a basis for evaluating potential changes associated with mine dewatering, abstraction and contaminant transport from potential sources such as mine waste infrastructure, mineral processing and open pit mining.

The model was used to evaluate three key operational and post-mining scenarios, and forms the scientific basis for the impact assessment undertaken:

1. Full pit dewatering: simulating the mine at its full planned extent, this scenario determined a drawdown cone extending ~6 km south from the pit, with progressively decreasing magnitude, from 60 m drawdown at 2 km to 10 m drawdown at 4 km (Figure 123). The pit acts as a hydraulic sink through the life of mine and into closure. The drawdown cone (and associated impacts) remains contained within the EPL bounds, apart from a western edge, where a drawdown of 20 m is simulated.
2. Mass transport during mining: this scenario evaluates the potential extent of contaminant transport in the event that operational mitigations (e.g., liners, bunding, and containment measures) fail (Figure 124). Contamination plumes remain localised and migrate toward the pit.
3. Post-mining mass transport: this scenario assesses groundwater flow and contaminant transport after mining activities have ceased, with WRD) and the TSF as sources of contamination.

During the operational phase, potential impacts may be associated with pit dewatering and seepage from WRD, TSF or ore stockpiles. Groundwater quality impacts are closely linked to the geochemical behaviour of mine materials. The predominance of Non-Acid Forming (NAF)

material significantly reduces the likelihood of sustained (AMD generation (RGS, 2025). While acid conditions are unlikely, oxidation of sulphides may still result in elevated sulphate concentrations and the mobilisation of certain metals under neutral pH conditions (RGS, 2025). Groundwater alkalinity and the carbonaceous in-situ geology provide natural buffering to changes in pH.

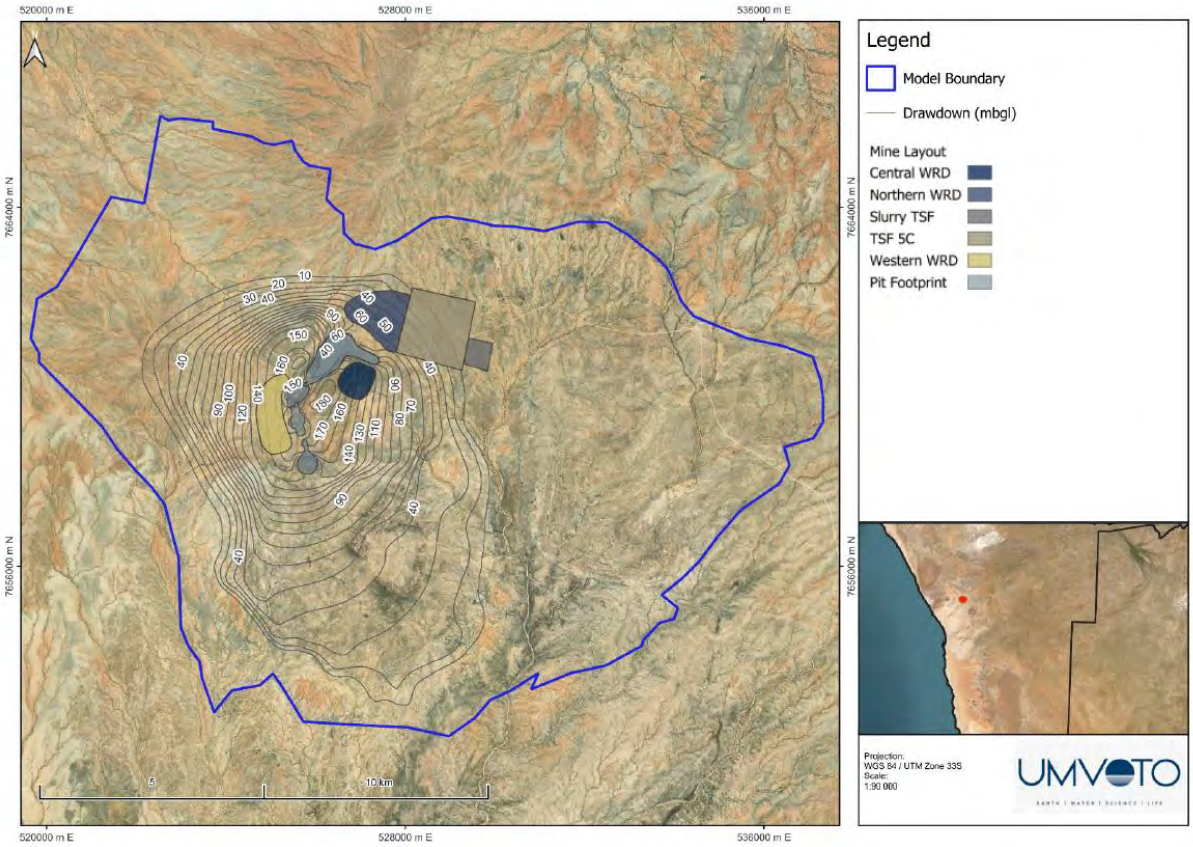


Figure 123 - Drawdown cone due to pit dewatering (Umvoto, 2024; Umvoto, 2025)

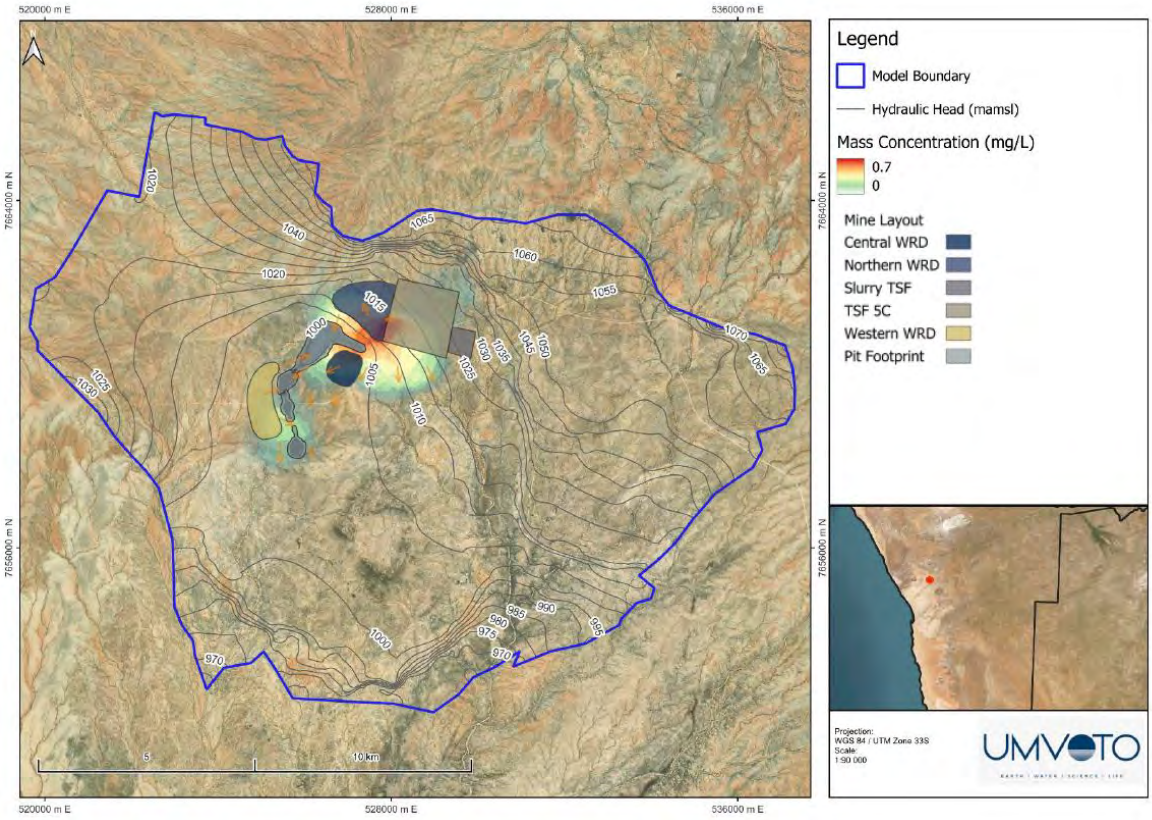


Figure 124 - Extent of potential contaminant plume prior to migrating toward the pit (Umvoto, 2024; Umvoto, 2025)

7.13.2.1 Construction phase

Construction activities will include land clearing, earthworks, road development and installation of mine infrastructure. Groundwater abstraction may be required from local groundwater resources to support construction activities, while bulk water supply is expected to be sourced from an external supply system located some distance from the site. The external supply is not anticipated to have a direct hydraulic connection with groundwater resources underlying the mine footprint. Local groundwater supply is expected to be sourced from the Karibib Marble units, where present, and no existing abstraction by third parties has been identified in the immediate vicinity. Any groundwater abstraction will be subject to a groundwater abstraction licence issued by the relevant regulator, which will specify permitted abstraction volumes and associated monitoring requirements.

The likelihood of infiltration and transport of pollutants to groundwater during construction, for example from hydrocarbon spills, wastewater effluent or other hazardous materials, is considered very low given the arid conditions, limited recharge and the presence of a relatively thick unsaturated zone. The risk can be further reduced through the implementation of standard best-practice measures, including containment of potentially contaminated runoff, appropriate storage of chemicals and hazardous materials, bunding of refuelling and maintenance areas, use of impermeable surfaces where required, and the implementation of spill prevention and response procedures.

The construction-related impacts to groundwater are outlined in Figure 125 and Table 55. The figure presents the pre-mitigation impact ratings. A more detailed discussion of the potential impacts on surface water is provided in the following sections.

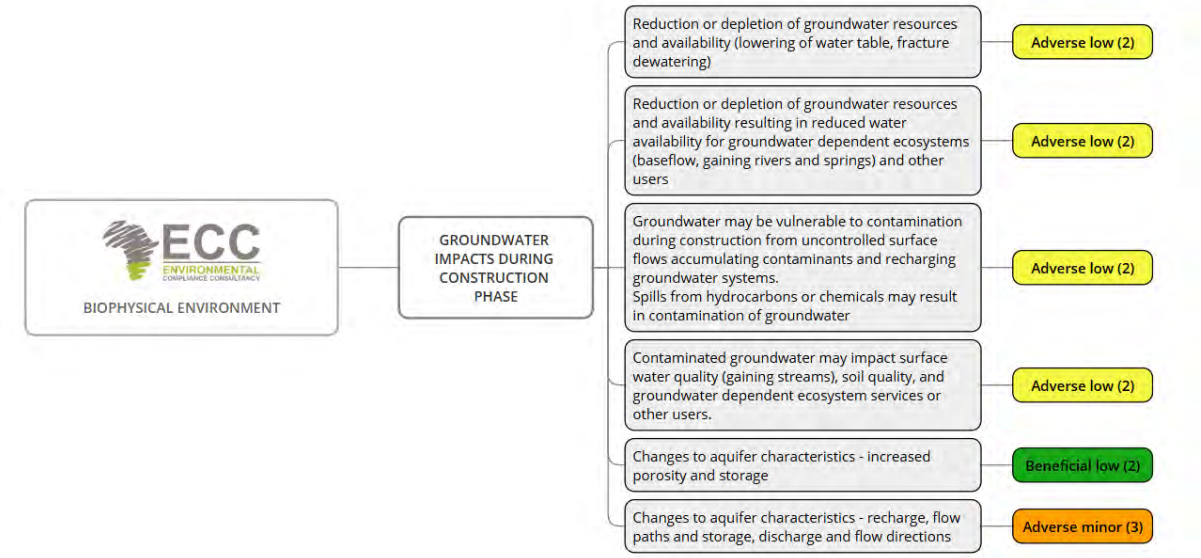


Figure 125 - Potential impacts on groundwater during the construction phase

7.13.2.1.1 Reduction or depletion of groundwater availability

Water supply during construction will likely be sourced from local groundwater resources and supplemented by an external supply. Given the arid climatic conditions, natural recharge to the groundwater system is very low and episodic, and any abstraction-related drawdown may persist for an extended period before recovery occurs. Dewatering of fractures within the bedrock may also result in localised sealing or reduced permeability over time due to mineral precipitation. The underlying geology is dominated by low-yielding units that function largely as aquitards, and while the Karibib Marble units may provide a local water source, they are not considered to represent a resource of sufficient scale for regional bulk supply or to support other users or identified groundwater-dependent ecosystem services in the vicinity.

On this basis, the potential lowering of groundwater levels associated with construction-phase abstraction is assessed as an adverse and direct impact that is largely irreversible over the short to medium term, of minor magnitude, long term in duration and localised to the site. The probability of the impact occurring is reduced by the anticipated use of external water supply to supplement local abstraction. The significance of the impact is minor with an unmitigated adverse low impact rating (Table 55). Mitigation will be achieved through ongoing groundwater investigations, including test pumping to confirm sustainable yield, and through adherence to abstraction limits and monitoring requirements specified in the groundwater abstraction licence issued by the regulator. Mitigation measures have been included in the final ESMP (Appendix A).

7.13.2.1.2 Loss or reduction of groundwater available for ecosystem services and other users

Groundwater in the area is characterised by relatively deep-water levels and long residence times, with negligible interaction between groundwater and surface water under baseline conditions. No springs have been identified in the region, and local drainage features are not reliant on groundwater baseflow. Based on available information, it is unlikely that other users or groundwater-dependent ecosystems in the vicinity rely on the groundwater resources underlying the mine site.

The potential impact is therefore assessed as indirect and adverse, largely irreversible over the long term, but of negligible magnitude and confined to the mine site. The probability of occurrence is considered very low. Taking these factors into account, the significance of the impact is adverse low (Table 55). Mitigation measures have been included in the final ESMP (Appendix A).

7.13.2.1.3 Groundwater contamination

There are limited construction-phase activities that are likely to result in groundwater contamination, either locally or at a broader scale. The probability of such an impact occurring is low and is further reduced by the hydrogeological characteristics of the site, which limit the potential for contaminants to enter the groundwater system. Recharge is low and episodic, and potential migration pathways are largely confined to fractures. Overland flow capable of mobilising contaminants is infrequent due to the arid climate, and the presence of a relatively thick vadose zone promotes attenuation and sorption of contaminants such as hydrocarbons, chemicals or wastewater at or near the surface.

Should any change in groundwater quality occur, it would be detected through the implementation of an appropriate groundwater monitoring network established prior to construction. Standard mitigation measures, including spill prevention and response procedures, proper waste handling and the safe storage of hazardous materials within bunded and impermeable areas, will further reduce the likelihood of contamination. Any contamination that might occur would be adverse relative to baseline conditions but would likely be limited to the immediate site area and partly reversible over the short to medium term. The unmitigated impact is therefore rated as adverse low (Table 55). Mitigation measures have been included in the final ESMP (Appendix A).

7.13.2.1.4 Deterioration in required water quality for eco system services and other users

While a change in water quality for other users or groundwater dependent ecosystems would be an indirect adverse impact the hydrogeological setting indicates the area is characterised by relatively deep-water levels and long residence times, with negligible interaction between groundwater and surface water under baseline conditions. No springs have been identified

in the region, and local drainage features are not reliant on groundwater baseflow. Based on available information, it is unlikely that other users or groundwater-dependent ecosystems in the vicinity rely on the groundwater resources underlying the mine site.

The potential impact is therefore assessed as indirect and adverse, partly irreversible over the long term, but of negligible magnitude and confined to the mine site. The probability of occurrence is considered very low. Taking these factors into account, the significance of the impact is adverse low (Table 55). Mitigation measures have been included in the final ESMP (Appendix A).

7.13.2.1.5 Changes to aquifer characteristics

Construction activities will include land clearing, earthworks, removal of topsoil, establishment of infrastructure foundations, blasting for borrow material and removal of overburden. These activities will locally modify near-surface hydrogeological conditions relative to baseline by disturbing soils, altering preferential flow pathways and compacting or removing portions of the vadose zone. While the magnitude of these changes will be considerably less than those associated with mining of the open pit, local recharge characteristics and shallow subsurface properties within the construction footprint will be altered on a permanent basis.

Given the low regional recharge rates, the substantial thickness of the vadose zone and the limited hydraulic connectivity of the underlying aquifer system, these changes are not expected to be significant at the scale of the aquifer. The impact is therefore considered adverse and definite at a local scale but of negligible magnitude in the broader hydrogeological context. The overall impact is rated as adverse low (Table 55).

This impact may also present a limited potential benefit in that certain construction activities could locally modify aquifer or near-surface characteristics in ways that marginally increase permeability or porosity. Under appropriate management, monitoring and design, there may be isolated opportunities to enhance infiltration or promote localised recharge in areas identified as having relatively higher recharge potential, for example through the controlled diversion of clean surface runoff. However, given the arid climatic conditions, low rainfall and generally low recharge rates across the site, such benefits are considered unlikely and would be of very low magnitude and probability. Any positive effect on groundwater recharge or storage would therefore be minor and localised, with negligible influence at the scale of the broader aquifer system. The mitigation measures have been included in the d final ESMP (Appendix A).

Table 55 - Impacts on groundwater during the construction phase

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Groundwater over abstraction for construction supply	Groundwater	Reduction or depletion of groundwater resources and availability	Adverse Direct Long term On site Irreversible Minor Unlikely	Low	Minor	Adverse Low (2)
Groundwater abstraction or over abstraction for construction supply	Ecosystems, other users and biodiversity	Loss or reduction of groundwater available for ecosystem services and other users	Adverse Indirect Long term On site Irreversible Low Rare	Low	None	Adverse Low (1)
Construction – spills, leaks and discharges	Groundwater	Groundwater contamination	Adverse Direct Short term On site Partly reversible Minor Unlikely	Low	Minor	Adverse Low (2)
Construction – spills, leaks and discharges	Ecosystems, other users and biodiversity	Deterioration in groundwater quality	Adverse Indirect Long term On site Irreversible Low Rare	Low	None	Adverse Low (1)
Construction – land clearing, earthworks, erect infrastructure	Aquifer	Changes to aquifer characteristics	Adverse Direct Permanent Long term On site Partly reversible Moderate Definite	Low	Minor	Adverse Minor (3)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction – land clearing, earthworks, erect infrastructure	Aquifer	Changes to aquifer characteristics	Beneficial Direct Permanent Long term On site Partly reversible Moderate Definite	Low	Minor	Beneficial low (1)

7.13.2.2 Operational and decommissioning phase

The risks to groundwater during operations are greater than those during construction, primarily due to the requirement for ongoing dewatering as the open pit deepens and the increased scale of water and chemical management associated with processing and mine waste facilities. Dewatering will intentionally lower groundwater levels in the vicinity of the pit as part of normal operations, creating a hydraulic sink toward which any contamination will migrate. In addition, the operation of pollution control dams, the tailings storage facility, waste rock dumps and wastewater treatment systems, together with mineral processing infrastructure such as holding tanks, flotation circuits and reagent storage areas, involves the management of significant volumes of water and potentially hazardous materials that could pose a risk to groundwater quality if not properly controlled.

The tailings storage facility is proposed to be lined, which will reduce the likelihood of seepage and leachate generation. Waste rock dumps will not be lined; however, geochemical characterisation indicates a limited likelihood of sustained acid mine drainage generation. Any localised changes in groundwater chemistry, including pH, are expected to be moderated by the natural buffering capacity associated with the geogenic alkalinity of groundwater and the carbonate-rich geology in the region. The use of dry-stacked tailings will further reduce the potential for seepage and the magnitude of any leachate generation or failure-related releases.

As with other operational water management aspects, the implementation of stormwater infrastructure and controls will assist in minimising the mobilisation and transport of contaminants to the subsurface. The underlying hydrogeological setting, characterised by low recharge, a relatively thick vadose zone and generally low-permeability aquitard and aquifer units, will also limit the potential for widespread groundwater contamination. With appropriate design, monitoring and management measures in place, the likelihood and extent of impacts to groundwater quality during operations are expected to remain limited and localised.

Operational phase impacts ground water are presented in Figure 126 and Table 56, which summarise the pre-mitigation impact ratings. Further detail on the nature and significance of potential surface water impacts during operations is provided in the sections that follow.

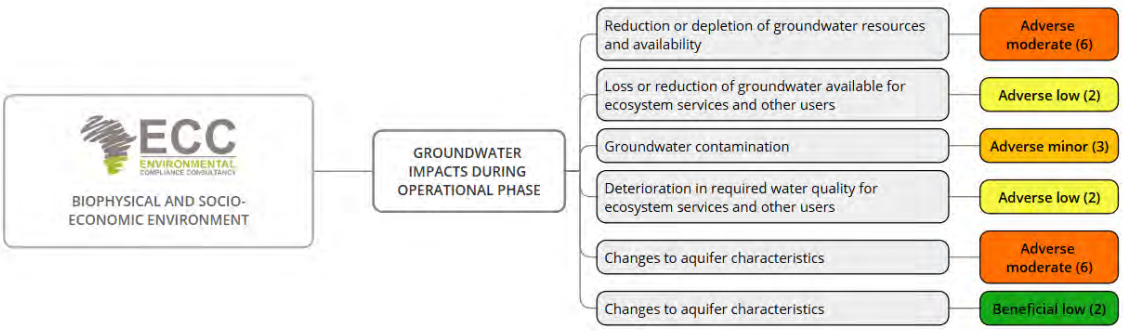


Figure 126 - Potential impacts on groundwater during the operations phase

7.13.2.2.1 Reduction or depletion of groundwater availability

During operations, groundwater abstraction will be required for mine water supply and intentional dewatering of the open pit as mining progresses below the water table. Dewatering will lower groundwater levels in the vicinity of the pit and may reduce groundwater availability locally. Given the arid climatic conditions, natural recharge to the groundwater system is low and episodic, and any abstraction-related drawdown may persist for extended periods before recovery occurs. Dewatering of fractures within the bedrock may also result in localised sealing or reduced permeability over time due to mineral precipitation.

The underlying geology is dominated by low-yielding units that function largely as aquitards, and while the Karibib Marble units may provide a local water source, they are not considered to represent a resource of sufficient scale for regional bulk supply or to support other users or identified groundwater-dependent ecosystem services in the vicinity. Groundwater flow modelling indicates that groundwater and any associated contaminants will preferentially migrate towards the pit, which will act as a hydraulic sink, thereby limiting the spatial extent of drawdown beyond the mine footprint.

On this basis, the potential lowering of groundwater levels associated with operational abstraction and dewatering is assessed as an adverse and direct impact that is largely irreversible over the short to medium term, of minor magnitude, long term in duration and localised to the site. The probability of the impact occurring remains reduced by the anticipated use of external water supply to supplement local abstraction. The significance of the impact is minor with an unmitigated adverse low impact rating. Mitigation will continue through groundwater monitoring, confirmation of sustainable yield and adherence to abstraction limits and licence conditions. During closure, dewatering will cease and groundwater levels are expected to recover gradually toward a new equilibrium influenced by the final pit void, which will continue to function as a hydraulic sink and limit wider regional

impacts. The impact is therefore rated adverse moderate (Table 56). Mitigation measures have been included in the final ESMP (Appendix A).

7.13.2.2.2 Loss or reduction of groundwater available for ecosystem services and other users

Groundwater in the area is characterised by relatively deep-water levels and long residence times, with negligible interaction between groundwater and surface water under baseline and operational conditions. No springs have been identified in the region, and local drainage features are not reliant on groundwater baseflow. Available information indicates that no other users or groundwater-dependent ecosystems in the vicinity rely on the groundwater resources underlying the mine site. Operational dewatering and abstraction will therefore not materially affect external users or ecosystem services.

The potential impact is assessed as indirect and adverse, largely irreversible over the long term, but of negligible magnitude and confined to the mine site. The probability of occurrence remains very low. Taking these factors into account, the is rated adverse low (Table 56). During closure, cessation of abstraction and dewatering will allow groundwater levels to stabilise and recover toward a new equilibrium, further reducing any potential long-term influence beyond the site.

7.13.2.2.3 Groundwater contamination

Operational activities introduce potential sources of groundwater contamination, including the handling and storage of fuels, reagents and process water, operation of the processing plant, and management of mine waste facilities such as the tailings storage facility, pollution control dams and waste rock dumps. However, the likelihood of groundwater contamination remains low. The tailings storage facility will be lined, reducing seepage potential, and waste rock characterisation indicates a low likelihood of sustained acid generation. Dry-stacked tailings and controlled water management will further reduce the potential for leachate generation. Groundwater modelling indicates that seepage or contaminants, if generated, would tend to migrate toward the pit, which will function as a hydraulic sink during operations.

The hydrogeological setting, characterised by low recharge, a relatively thick vadose zone and limited preferential flow pathways, further reduces the likelihood of contaminants reaching the groundwater system. Overland flow capable of transporting contaminants is infrequent due to the arid climate, and natural attenuation processes will promote sorption and degradation near the surface. Should any change in groundwater quality occur, it would be detected through the established monitoring network. Standard mitigation measures, including spill prevention, containment of dirty water and appropriate storage and handling of hazardous materials, will further reduce impacts. Any contamination that might occur would be adverse relative to baseline conditions but would likely remain localised and partly reversible over the short to medium term. The unmitigated impact is rated as adverse minor

(Table 56). During closure, removal of contamination sources and continued containment of residual seepage will further limit long-term groundwater quality impacts. Mitigation measures have been included in the final ESMP (Appendix A).

7.13.2.2.4 Deterioration in required water quality for ecosystem services and other users

Any change in groundwater quality that could affect other users or groundwater-dependent ecosystems would represent an indirect adverse impact. However, the hydrogeological setting indicates relatively deep-water levels, long residence times and negligible interaction between groundwater and surface water. No springs occur in the area, and drainage features are not sustained by groundwater discharge. No other users or groundwater-dependent ecosystems are known to rely on groundwater in the vicinity of the site. Operational groundwater quality changes are therefore unlikely to affect receptors beyond the mine footprint.

The impact is assessed as indirect and adverse, partly reversible over the long term but of negligible magnitude and confined to the mine site. The probability of occurrence remains low, and the impact rating is adverse low (Table 56). During closure, cessation of operations and continued containment of residual contamination sources will support long-term stabilisation of groundwater quality conditions. The mitigation measures have been included in the final ESMP (Appendix A).

7.13.2.2.5 Changes to aquifer characteristics

Operational mining activities, including continued excavation of the open pit, waste rock emplacement, processing infrastructure operation and maintenance of haul roads and hardstanding areas, will continue to modify hydrogeological conditions relative to baseline. These activities will locally alter recharge pathways, preferential flow routes and portions of the vadose zone, and intentional dewatering will alter hydraulic gradients in the vicinity of the pit. While these changes will be more extensive than during construction, they will remain localised to the mine footprint and immediate surroundings.

Given the low regional recharge rates, substantial thickness of the vadose zone and limited hydraulic connectivity of the underlying aquifer system, these modifications are not expected to be significant at the scale of the regional aquifer. The impact is therefore considered adverse and definite at a local scale but of minor magnitude in the broader hydrogeological context. The overall impact is rated as adverse moderate due to the definite and permanent nature of the impact (Table 56).

There is also a limited potential for minor localised benefits where operational stormwater management and controlled infiltration may marginally enhance local recharge in specific areas, although such effects are considered unlikely and of very low magnitude and probability (Table 56). During closure, regrading of landforms, cessation of dewatering and

rehabilitation of disturbed areas will allow aquifer conditions to stabilise, with the final pit likely continuing to act as a local hydraulic sink that limits regional groundwater impacts. Mitigation measures have been included in the final ESMP (Appendix A).

Table 56 - Impacts on groundwater during the operation and decommissioning phase

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Groundwater abstraction and dewatering	Groundwater	Reduction or depletion of groundwater resources and availability	Adverse Direct Long term Local Partly reversible Moderate Likely	Low	Moderate	Adverse Minor (3)
Groundwater abstraction, over abstraction and dewatering	Ecosystems, other users and biodiversity	Loss or reduction of groundwater available for ecosystem services and other users	Adverse Indirect Long term Local Irreversible Low Rare	Low	Moderate	Adverse Low (2)
Operations – spills, leaks, discharges, leachate, AMD	Groundwater	Groundwater contamination	Adverse Direct Long term Local Partly reversible Moderate Possible	Low	Moderate	Adverse Minor (3)
Operations – spills, leaks, discharges, leachate, AMD	Ecosystems, other users and biodiversity	Deterioration in groundwater quality	Adverse Indirect Long term Local Partly reversible Minor Unlikely	Low	Moderate	Adverse Low (2)
Operations – open pit mining	Aquifer	Changes to aquifer characteristics	Adverse Direct Permanent Long terms On site	Low	Minor	Adverse Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
			Irreversible Major Definite			
Operations – open pit mining	Aquifer	Changes to aquifer characteristics	Beneficial Direct Permanent Long term On site Partly reversible Moderate Definite	Low	Minor	Beneficial Low (1)

7.14 BIOPHYSICAL ENVIRONMENT: BIODIVERSITY AND ECOLOGICAL IMPACTS

The biodiversity impact assessment addresses potential Project related impacts on fauna, flora, ecologically sensitive areas and the related ecological functions and ecosystem services within the Project area. Biodiversity impacts generally include issues such as alteration or loss of habitat or ecosystems (unique or other), alteration to behavioural and survival traits of certain species and displacement of species.

As described in chapter 5, the baseline biodiversity study for the Project was undertaken by Peter Cunningham, with field surveys conducted in June 2024 and June 2025, respectively, to capture both "dry" and "wet" season conditions, complemented by a desktop literature review carried out from 19 to 22 November 2024 (Appendix N). The field surveys included important biophysical sites and transects (Figure 65 in section 5.12.9) and were guided by the proposed site layout showing these key biophysical sites (Figure 25). Project activities have the potential to affect biodiversity, and the key impacts are outlined in the following sections below.

7.14.1 CONSTRUCTION PHASE

Mammals, reptiles, amphibians, birds and flora may be significantly affected by land clearing, earthworks and construction activities. Sensitive habitats such as granite domes, drainage lines and micro-ecosystems are particularly vulnerable. Vegetation clearance may cause soil erosion, indirectly reducing shelter availability, food and degrading habitats. Direct impacts may include the mortality and loss of protected species, loss of nesting or breeding sites and irreversible disturbance to micro-ecosystems.

The risk of poaching of animals such as tortoises, black rhinos and various antelope is heightened due to increased human presence and activities. Construction vehicles and equipment may also introduce invasive alien plant species, which can outcompete local native flora and reduce overall biodiversity in the general area. Night driving increases the risk of

collisions with nocturnal species such as nightjars, owls, antelope, predators and small mammals.

The construction-related impacts on biodiversity and ecology within the Project area are outlined in Figure 127 and Table 57, taking into consideration the findings from the biodiversity assessments and respective report (Cunningham, 2025) (Appendix N). The figure presents the pre-mitigation impact ratings and for the significant impacts, the corresponding post-mitigation ratings. A more detailed discussion of the potential impacts on biodiversity and ecology is provided in the following sections.

The construction-phase impacts will also apply to any additional construction or expansion activities carried out within the EPL or future ML boundary during the operational phase.

According to Cunningham (2025), the following impacts have been identified as significant and are discussed comprehensively in the specialist report (Appendix N, pages 70 – 75 (developmental phase) and 77 – 80 (construction phase): faunal and floral disturbance will vary depending on the intensity and scale of development operations and associated earthworks and infrastructure construction. Land clearing for exploration activities, drill sites, access routes and related infrastructure through mechanical methods is expected to result in the eradication or dispersal of numerous protected plant species, as well as the displacement or mortality of vertebrate fauna. Species most at risk include sedentary, slow-moving or ground-nesting animals, cavity dwellers such as bats and reptiles and avifauna (including hornbills, parrots, raptors, and vultures) that depend on old or large trees and ephemeral drainage lines for breeding, roosting, or perching.

Sensitive habitats (e.g., ephemeral drainage lines and associated vegetation) may be destroyed or negatively affected, with consequent losses of biodiversity and ecological function. Land clearing in these areas could also exacerbate soil erosion. In addition, mechanical disturbance of soils during site preparation may create favourable conditions for the establishment of invasive alien plant species, further degrading habitat quality and threatening native biodiversity (Cunningham 2025).

The mitigation measures for the construction phase discussed in the sections below, together with the additional measures outlined in the final ESMP and those from the specialist study (Cunningham, 2025) incorporated into the final ESMP, should be implemented to safeguard local biodiversity and ecological integrity.

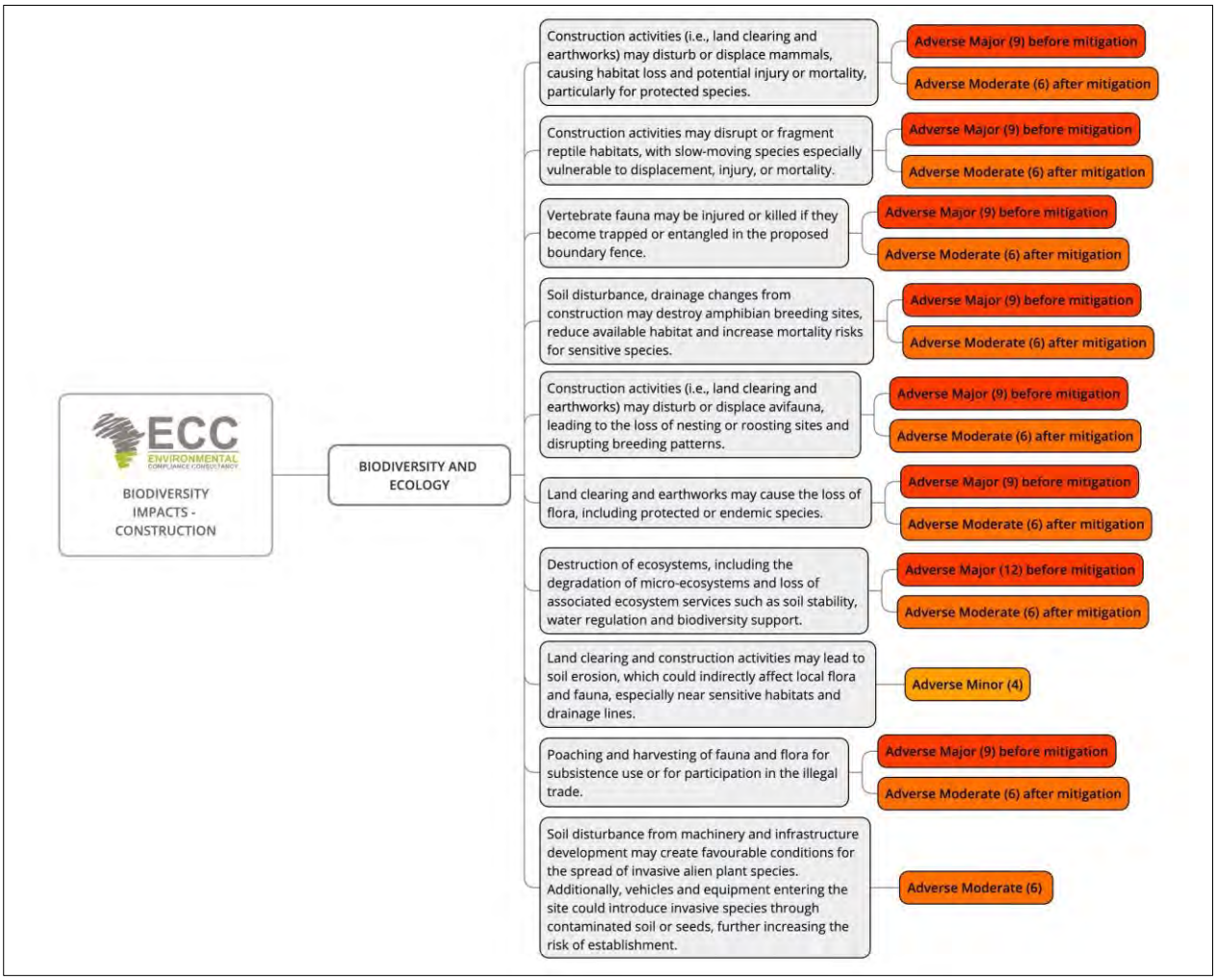


Figure 127 - Potential impacts on biodiversity and ecology during the construction phase

7.14.1.1 Construction activities (i.e., land clearing and earthworks) may disturb or displace mammals, causing habitat loss and potential injury or mortality, particularly for protected species

According to Cunningham (2025), at least 87 mammal species are known or expected to occur in the broader Okombahe area, of which ten (10) species (11.5%) are endemic. Conservation assessments under Namibian legislation indicate that two (2) species are classified as rare, five (5) as vulnerable, three (3) as specially protected game, nine (9) as protected game, five (5) as insufficiently known, four (4) as huntable game and four (4) as problem animals.

Rodents represent the largest group, making up 31% (27 species) of the mammalian fauna, with five endemic species, followed by bats at 27.6% (24 species), including one (1) rare species. A total of 29 species (33.3%) have international conservation status under the International Union for Conservation of Nature (IUCN), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) or Southern African Red Data Book (SARDB). The IUCN lists four (4) species each as vulnerable (cheetah, leopard, Hartmann's mountain zebra, giraffe) and near threatened (African straw-coloured fruit bat, Commerson's roundleaf bat, striped leaf-nosed bat, brown hyena).

The Namibian Red List classifies the cheetah as endangered, the spotted hyena and leopard as vulnerable and the brown hyena as near threatened. Additional species of national concern include the Namibian wing-gland bat and the Southern African hedgehog (both considered rare). The Kaokoland slender (black) mongoose, a unique endemic species, is also known to occur in the region, although not recorded during the survey.

While elephant and black rhino are reported in the wider Tsiseb Communal Conservancy, they are not expected to occur regularly in the immediate Project area. However, evidence of a black rhino rubbing post and a leopard latrine highlight the ecological importance of certain sites within EPL 4818, which should be protected.

Although anthropogenic pressures from subsistence farming, informal mining/prospecting, and existing gravel roads are present, no mammal species are expected to be exclusively associated with the EPL 4818 footprint.

Construction of a mine, including large-scale land clearing, earthworks and vegetation removal, has the potential to displace or disturb mammals, leading to potential habitat loss, injury or mortality (Martins-Oliveira *et al*., 2021). For many species, particularly those with small ranges or specialised habitat requirements, such habitat alteration can result in permanent or long-term declines in the general area (Owusu, Ofori and Attuquayefio, 2018). Once natural habitats are disturbed, removed and replaced with disturbed ground or infrastructure, the ecological conditions required for mammal survival in the site area may not recover naturally, even after decommissioning. This makes the impact effectively irreversible without significant restoration interventions.

The impact is considered adverse, direct, partly reversible, permanent and local, with a definite chance of occurrence in the absence of mitigation. It is direct because mammals will be immediately affected by noise, habitat loss and human disturbance linked to mine development and construction. It is partly reversible and permanent since the excavation, clearing and compaction of land fundamentally removes burrows, vegetation and other habitat structures that mammals rely on for movement, shelter and food (Owusu, Ofori and Attuquayefio, 2018). Even after decommissioning, large-scale land transformation means these habitats cannot return to their original state and fragmentation of remaining habitats may prevent recolonisation or restrict seasonal movements. The effect is local because it is concentrated within the mine footprint and immediate surroundings, although wider-ranging species may also be indirectly affected as their home ranges are disrupted. The impact is expected to persist throughout the Project's lifespan and beyond (>11 years).

Mammals play a vital role in maintaining ecosystem function through seed dispersal, grazing, soil turnover and predation (Davies *et al.,* 2019 & Sinclair 2003). The loss of important mammal species in the general area could therefore negatively affect and disrupt the overall ecological balance of the area.

Sensitivity of the receptor is therefore considered high, as the area may support species of conservation concern, including those classified as rare, endangered or protected under national and international laws (such as IUCN Red List or national laws and regulations). The magnitude of change is assessed as adverse high/major, as the direct loss of habitat and potential mortality of individuals can potentially lead to measurable and lasting impacts at a local scale.

Given the scale of land transformation, the presence of sensitive and protected mammal species and the likelihood of permanent habitat loss, the significance of the impact is rated as adverse major, before mitigation (Table 57).

With the implementation of mitigation measures such as ecological walkdowns prior to clearing to identify and relocate fauna, phased vegetation clearance to allow escape routes, strict enforcement of speed limits to minimise collision risks and restoration of habitat connectivity during rehabilitation, the significance of the impact can be reduced. When combined with additional measures outlined in the final ESMP (Appendix A), the residual impact is expected to decrease to adverse moderate (Figure 127).

7.14.1.2 Construction activities may disrupt or fragment reptile habitats, with slow-moving species especially vulnerable to displacement, injury or mortality

According to Namibian legislation, reptile diversity in the EPL 4818 area includes one (1) rare species (*Afroedura africana africana*), three (3) vulnerable species (*Stigmochelys pardalis*, *Python natalensis*, *Varanus albigularis*), four (4) protected game species, two (2) insufficiently known species and three (3) peripheral species. The IUCN classifies 31 species as least concern, though many local reptiles remain unevaluated. The SARDB lists one (1) species as vulnerable, one (1) as safe-vulnerable and two (2) as peripheral, while CITES affords additional protection, listing five (2) species in Appendix II and one (1) in Appendix III.

Field surveys confirmed 15 reptile species within EPL 4818 across dry and wet seasons, including terrapins, snakes, skinks, plated lizards, agamas and geckos, with additional species such as the marsh terrapin (*Pelomedusa subrufa*) unexpectedly recorded in temporary pools. Incorporating previous surveys, at least 18 species are known from the wider area. Important taxa include the leopard tortoise (*Stigmochelys pardalis*), pythons (*P. anchietae, P. natalensis*), the Namibian wolf snake (*Lycophidion namibianum*), monitor lizards (*Varanus albigularis*) and endemic geckos such as *Pachydactylus spp*. Reptiles face anthropogenic threats, notably persecution of tortoises, snakes and monitors for food or as perceived threats.

Overall, while EPL 4818 shows limited anthropogenic disturbance, the presence of rare, vulnerable and endemic reptile species highlights the ecological importance of the area and the need for careful management and protection.

Construction of a mine, especially excavation, large-scale land clearing and vegetation removal, has the potential to directly impact reptiles through displacement, injury or mortality and habitat destruction. Many reptile species are habitat-specific, relying on burrows, rocky outcrops or sandy soils for breeding and shelter (Stanton-Jones, 2023). The removal of microhabitats and surface cover may result in irreversible or long-term impacts, particularly for endemic species and species with small ranges.

The impact is considered adverse, direct, irreversible, permanent and local, with a definite chance of occurrence if unmitigated. It is direct because excavation, land clearing and the use of heavy machinery will immediately result in the destruction of reptile habitats such as crevices, borrows, rocky outcrops and sandy areas (Stanton-Jones, 2023). The impact is irreversible and permanent and because these microhabitats cannot be completely recreated through rehabilitation and species such as pythons, tortoises and geckos have long lifespans or potential low mobility, making recovery slow. The effect is local, confined to the mine footprint and immediate surroundings; however, species with larger ranges may be indirectly affected if dispersal routes are altered or blocked. Sensitivity is considered high because reptiles regulate small mammal and insect populations and are themselves key prey for higher predators. Furthermore, several species in the area are of conservation concern and are listed under Namibian legislation, IUCN or CITES. The magnitude of change is high, reflecting measurable losses in individuals and habitats, with potential knock-on effects across trophic levels.

Without mitigation, the impact significance is rated as adverse major (Table 57). With mitigation measures such as pre-construction ecological walkdowns, controlled clearance to allow relocation or slow-moving species to evacuate the area, preservation of rocky habitats where possible and post-mining habitat reconstruction and rehabilitation, the residual impact can be reduced to adverse moderate (Figure 127). These mitigation measures are included in the final ESMP (Appendix A).

7.14.1.3 Vertebrate fauna may be injured or killed if they become trapped or entangled in the proposed boundary fence

Boundary fencing and associated infrastructure present a persistent risk to a wide range of fauna, particularly immediately after the construction of the fence, as animals will still be accustomed to open, unobstructed spaces. Reptiles such as tortoises and pythons are highly vulnerable, as they can become trapped beneath or entangled in fencing. Large mammals like kudu risk injury or mortality when attempting to jump fences, while birds such as owls, ostrich and raptors may collide with or become hooked on barbed or security-type fencing (BirdLife South Africa, 2024 & Gadd, 2012).

The impact is assessed as adverse, direct, long-term and local, with a high probability of occurrence. It is long-term because the boundary fence will remain throughout the life of the Project, creating a continuous hazard (>11 years). The impact is direct, as fauna may be injured or killed through entanglement or restricted movement.

The scale is local, concentrated along the mine boundary, but may also affect wider-ranging species that require access across their natural ranges. The probability is high, as medium to large mammals (e.g., kudu), birds (e.g. ostriches) and reptiles (e.g., tortoises and pythons) are known to be injured or killed in fences when seeking food or water.

Sensitivity is considered high given the presence of rare, endangered, endemic and protected species that are vulnerable to habitat fragmentation, as well as risks of injury and mortality. The magnitude is moderate, as fencing can result in direct mortality and contribute to habitat fragmentation. Overall, the impact significance is assessed as adverse major before mitigation (Table 57) but can be reduced to adverse moderate with effective mitigation measures (Figure 127).

Mitigation measures which include wildlife-friendly fence designs (smooth wire, raised lower strands, poles at regular intervals, no use of shiny/reflective fence material, game fencing) and routine inspections and maintenance to quickly release or assist trapped animals. These mitigation measures are included in the Project final ESMP (Appendix A).

7.14.1.4 Soil disturbance, drainage changes from construction may destroy amphibian breeding sites, reduce available habitat and increase mortality risks for sensitive species

According to Cunningham (2025), at least eight (8) amphibian species are known or expected to occur in suitable habitats within the broader Okombahe area. These include two (2) pygmy toads, two (2) sand frogs and one (2) species each of toad, rubber frog, puddle frog and platanna. Notably, four (4) species are endemic (*Poyntonophrynus damaranus*, *P. hoeschi*, *Phrynomantis annectens* and *Tomopterna damarensis*), with two (2) (*P. damaranus* and *T. damarensis*) currently classified as data deficient by the IUCN. This highlights the area's relatively high amphibian conservation value, with 50% of the species considered of conservation concern due to endemism or lack of ecological data.

Field surveys in EPL 4818 recorded only one (1) species, the common platanna (Xenopus laevis), during the wet season, with no amphibians observed in the dry season due to prolonged drought conditions and limited surface water availability. Nevertheless, ephemeral drainage lines and rock depressions provide potential, albeit temporary, amphibian habitat.

While no unique amphibian species are expected to be restricted to EPL 4818, the potential presence of the two (2) data deficient endemics (*P. damaranus* and *T. damarensis*) is

considered important. These habitats should be identified and avoided where possible to safeguard little-known and potentially vulnerable species.

Mining activities, including surface disturbance, vegetation removal and drainage alteration pose significant risks to amphibians. Many amphibians depend on rock depressions, drainage lines and ephemeral pools for breeding. The loss of these important habitats, combined with pollution (e.g., sedimentation, chemical runoff) and compaction, can result in potential significant impacts (Calhoun and Klemens, 2002 & Shanmukha *et al.,* 2024). Amphibians are particularly sensitive to changes in aquatic environments and disturbances may lead to irreversible local changes.

The impact is characterised as adverse, direct, irreversible, permanent and local, with a definite chance of occurrence in the absence of mitigation. It is direct because drainage alteration, soil disturbance and destruction of breeding sites will immediately affect amphibians. It is permanent and irreversible since amphibians rely on drainage lines, seepages and temporary pools that, once destroyed or polluted, cannot be naturally replaced within the Project lifespan. The local scale reflects that amphibians will mainly be impacted in the local area and immediate surroundings. Sensitivity is high because of the potential occurrence of endemic species and amphibians are important biological indicators, with their dual aquatic-terrestrial lifecycle and permeable skin making them especially vulnerable to even small aquatic or environmental changes. The magnitude of change is high, as local populations could face near-complete loss, especially for data-deficient, endemic or protected species.

Unmitigated, the significance of the impact is rated as adverse major (Table 57). With mitigation measures such as avoiding potential amphibian breeding habitats, restricting earthworks during the rainy season as far as reasonably possible, maintaining drainage line connectivity and creating artificial ponds in rehabilitated areas, the significance can be reduced to adverse moderate (Figure 127). These mitigation measures are included in the final ESMP (Appendix A).

7.14.1.5 Construction activities (i.e., land clearing and earthworks) may disturb or displace avifauna, leading to the loss of nesting or roosting sites and disrupting breeding patterns

According to Cunningham (2025), at least 190 bird species are expected to occur in the Project area, including 13 of Namibia's 14 endemics (92.9%). Species of conservation concern include several endangered birds, raptors and storks (e.g., violet wood-hoopoe, Ludwig's bustard, martial eagle, black stork) and those classified by the IUCN as critically endangered (white-backed vulture), endangered (e.g., lappet-faced vulture, secretary bird) and vulnerable or near threatened species such as the tawny eagle and kori bustard. Endemic species of particular importance include the Damara hornbill, bare-cheeked babbler and Herero chat, due to their limited ranges and knowledge gaps (Cunningham, 2025).

Field surveys within EPL 4818 recorded 51 bird species across wet and dry seasons, with variations linked to rainfall influencing seed-eating guilds. Importantly, a large raptor nest was identified in a Vachellia tortilis within a drainage line (Figure 73). Although species identity was uncertain, the presence of a black-chested snake eagle in the area highlights the need to protect and avoid raptor nesting sites, particularly during breeding periods.

While the area shows some anthropogenic influence from farming, exploration and prospecting, no unique bird assemblages are exclusively tied to the site. Nonetheless, given the presence of threatened and endemic species, as well as potential critical nesting habitat, conservation sensitivity is assessed as high (Cunningham, 2025).

Mine construction involving infrastructure development and large-scale vegetation clearance can displace avifauna through disturbance, habitat loss and collision risks. Feeding areas, nesting sites and flight paths may be altered permanently. Ground-nesting and habitat-specialist birds are particularly vulnerable, while larger raptors and migrants face additional risks from disturbance and potential electrocution or collisions with power infrastructure.

The impact is considered adverse, direct, permanent and local, with a definite likelihood of occurrence. It is considered direct because earthworks and vegetation clearance can lead to loss of nests and habitats, bird injury and mortality, displacement, disruption of breeding activities and migrant flight paths (Hockin *et al.,* 1992 & Rock, 2024). The impact is permanent as the loss of nesting or roosting trees and large-scale habitat alteration might not be recoverable during the Projects lifespan and rehabilitation may not be able to recreate equivalent ecological habitats or structures. It is local, focused within the mine footprint, although some migratory or wide-ranging species may be affected across their broader ranges. Sensitivity is high due to the presence of species of conservation concern, including rare, vulnerable, or near-threatened birds listed under Namibian legislation, IUCN and CITES. The magnitude of change is high, as mortality and habitat loss may reduce or strongly influence local populations of key species such as bustards, raptors and vultures.

Without mitigation, the significance of the impact is rated as adverse major (Table 57). With implementation of measures such as pre-construction surveys to identify and buffer nesting/roosting sites, timing clearance outside peak breeding seasons, installing bird flight diverters on powerlines and rehabilitating disturbed areas with native vegetation, the residual impact significance can be reduced to adverse moderate or minor (Figure 127). These mitigation measures are included in the final ESMP (Appendix A).

7.14.1.6 Land clearing and earthworks may cause the loss of flora, including protected or endemic species

According to Cunningham (2025), the areas within EPL 4818 confirmed 39 species of larger trees and shrubs, with at least 56 species known from the wider area when incorporating

earlier records. Species composition varied across habitats: 12 species in rocky ridges, 13 species in gravel plains and 13 species in ephemeral drainage lines.

Rocky habitats were particularly important, supporting a high diversity of endemic, near-endemic and protected species such as *Commiphora virgata*, *Ficus cordata* and *Maerua schinzii*. Drainage lines also hosted large, protected tree species (*Vachellia erioloba*, *Boscia albitrunca*, *Ziziphus mucronata*) which provide key ecological functions, including habitat for raptors, bats, reptiles and birds, as well as stabilisation of riverbanks.

Although many of the protected species recorded are widespread across Namibia, their presence in sensitive habitats highlights the need to minimise disturbance, avoid unnecessary clearance and obtain the necessary permits for removal. Importantly, several species (e.g., *Commiphora* and *Euphorbia spp*.) could be transplanted if disturbance is unavoidable. Overall, while the EPL 4818 area shows limited anthropogenic impacts, habitats such as ephemeral drainage lines and rocky ridges are considered highly sensitive and should be prioritised for conservation (Cunningham, 2025).

Earthworks and land clearing may result in the direct destruction of indigenous vegetation, including species that are of conservation concern, protected or endemic. This leads to fragmentation, habitat loss and a reduction in biodiversity. Once vegetation and soil seed banks are removed, recovery is often slow or incomplete, resulting in long-term ecological change.

The impact is adverse, direct, permanent and local, with a definite likelihood of occurrence. It is direct because vegetation within the Project footprint will be immediately destroyed or removed during earthworks, land clearance and construction activities. The impact is permanent, as the removal of mature vegetation and soil profiles leads to the loss of ecosystem functioning and habitats that are unlikely to recover to their natural state within the Project's lifespan. The impact is local, limited to the mine footprint and associated infrastructure areas, though the consequences extend to fauna and ecological processes dependent on these plant communities.

Sensitivity is considered high due to the potential occurrence of near-endemic, endemic, protected or conservation-sensitive plant species that may be lost during land clearing activities. These species are often restricted to specific habitats or are slow-growing, which increases their sensitivity to disturbance. The magnitude of change is high/major, as measurable biodiversity loss will occur through permanent removal of natural vegetation cover, habitat fragmentation and the reduction of ecosystem services such as carbon storage, soil stabilisation and food provision for wildlife.

Without mitigation, the significance of the impact is rated as adverse major (Table 57). Implementation of pre-construction vegetation surveys, avoidance of areas with high conservation value, translocation of key species and progressive rehabilitation can reduce the

residual significance to adverse moderate (Figure 127). These mitigation measures are included in the final ESMP (Appendix A).

7.14.1.7 Destruction of ecosystems, including the degradation of micro-ecosystems and loss of associated ecosystem services such as soil stability, water regulation and biodiversity support

Mine development has the potential to cause widespread destruction of ecosystems, including ephemeral drainage lines, granite domes and ridges that function as unique ecological refuges.

These ecosystems support specialised and often endemic and protected flora such as *Commiphora virgata*, *Ficus cordata* and *Maerua schinzii* found on granite domes, which provide important soil stability functions. The loss of these habitats would also impact amphibians reliant on temporary aquatic habitats such as rock pools, reptiles dependent on rocky niches and mammals that use these areas for shelter. Birds such as large raptors often use ridges for nesting and their decline could potentially reduce prey regulation. The loss of these micro-ecosystems is effectively irreversible, undermines ecosystem functioning and resilience and results in the loss of ecosystem services such as water regulation, soil stability and biodiversity support in the general area (de Groot *et al.,* 2017 & Shikangalah & Mapani, 2021).

Ephemeral drainage lines are particularly sensitive as they serve as natural channels for water flow, sediment transport and groundwater recharge during seasonal rains (Shikangalah & Mapani, 2021). They support riparian vegetation that filters runoff, stabilises soils and provides foraging resources and shade for a wide range of fauna. Reptiles and amphibians are closely tied to these moist habitats, while mammals and birds use them as movement corridors and water sources in otherwise arid landscapes. Disturbance or destruction of drainage lines not only causes habitat fragmentation but could also potentially disrupt hydrological functioning, leading to reduced water quality, increased erosion and a long-term decline in biodiversity.

In addition, the Kokoseb Project has the potential to significantly affect associated ecosystem services. The clearance of vegetation and soil disturbance during mine construction will reduce soil stability, increasing the risk of erosion and sedimentation into ephemeral drainage lines. Alteration of natural water pathways through road construction, pit excavation and dewatering activities could reduce groundwater recharge, disrupt local water regulation and alter surface runoff patterns. The cumulative loss of species and habitats could potentially also undermine biodiversity support, diminishing the ability of ecosystems to provide essential functions such as seed dispersal, pest control and pollination. These impacts, if not effectively mitigated, could result in long-term and potentially irreversible declines in ecosystem functioning at both on-site and local scales.

The impact is considered adverse, direct, permanent and local, with a definite probability of occurrence. It arises because mine infrastructure development alters landforms and removes vegetation, which immediately reduces the ability of ecosystems and micro-ecosystems to provide essential services such as nutrient cycling, soil stability, biodiversity support and water regulation. The impact is permanent, as once these services are lost through clearance, altered drainage patterns and soil compaction, they often cannot be restored naturally (Tembo *et al.,* 2018). Sensitivity is high, since these functions sustain not only biodiversity (including protected and endemic species) but also surrounding communities that depend on ecosystem services. The magnitude of change is very high, as the loss of ecological functions undermines resilience across the broader landscape. This leads to a significant and lasting reduction in ecosystem services and functioning.

Without mitigation, the significance of the impact is rated as adverse major (Table 57). With mitigation, such as preventing the destruction of sensitive habitats, establishing buffer zones around sensitive ecosystems, collaboration and regular engagement with local communities, implementing restoration programmes and ongoing ecological monitoring, the residual impact may be reduced to adverse moderate (Figure 127). These mitigation measures are included in the final ESMP (Appendix A).

7.14.1.8 Land clearing and construction activities may lead to soil erosion, which could indirectly affect local flora and fauna, especially near sensitive habitats and drainage lines

Land clearing, excavation and construction activities can destabilise soils, increasing erosion potential, particularly near drainage lines and sloped terrains. Accelerated erosion can cause reduced soil fertility, sedimentation of watercourses and degrade habitats, indirectly affecting both fauna and flora (Funk, 2025 & World Wildlife Fund, n.d.). Sensitive habitats such as ephemeral drainage lines are especially vulnerable, as sedimentation can disrupt natural hydrological processes and impact aquatic habitats.

The impact is adverse, indirect, long-term and partly reversible, with a high probability of occurrence. It is indirect, since drainage line changes often result from altered hydrology, runoff or erosion linked to direct clearing and other construction activities. The impact is long-term, as soil erosion and changes to flow patterns can persist for decades and while some recovery is possible, it requires progressive rehabilitation and sustained management. The impact is local, as drainage lines are spatially restricted features, but highly significant as ecological corridors. Sensitivity is medium, due to the ecological importance of drainage lines as refuges for flora and fauna, especially riparian vegetation (Funk, 2025). The magnitude of change is moderate, reflecting measurable impacts on these sensitive habitats, with the potential for knock-on effects across connected ecosystems.

Without mitigation, the significance of the impact is rated as adverse minor (Table 57). Mitigation measures are further described in the final ESMP (Appendix A). This impact will also apply during the operational and decommissioning phases of the Project.

7.14.1.9 Poaching and harvesting of fauna and flora for subsistence use or for participation in illegal trade

Increased human presence during construction and operations may lead to poaching, illegal hunting or harvesting of fauna and flora, either for illegal trade or subsistence use. This can place additional pressure on already vulnerable species, particularly large mammals, reptiles and slow-growing plants (e.g., succulents, medicinal species) (Community Conservation Namibia, 2024).

The impact is adverse, direct, national, permanent and potentially irreversible, with a medium probability of occurrence in the absence of strict controls. It is direct because poaching or intentional targeting of species results in immediate injury, loss or mortality of individuals. It is national in scale, as species such as black rhinos, pythons or other protected mammals are of national conservation importance and losses in one area can impact broader population viability. The impact is permanent and potentially irreversible, since the loss of slow-reproducing species (e.g., rhinos) has long-lasting consequences. Sensitivity is considered high, given the presence of rare and protected species in the general area that are already under national conservation pressure. The magnitude of change is high/major, as poaching could cause measurable population declines in the general area, with cascading effects on ecosystem functioning without the introduction of proper mitigation measures.

Without mitigation, the impact significance is rated as adverse major (Table 57). Through strict enforcement of anti-poaching policies, prohibition of harvesting by workers, awareness campaigns, collaboration with conservation authorities and security protocols, the residual significance can be reduced to an adverse minor (Figure 127). These mitigation measures are included in the final ESMP (Appendix A). This impact will also apply during the operational and decommissioning phases of the Project.

7.14.1.10 Soil disturbance from machinery and infrastructure development may create favourable conditions for the spread of invasive alien plant species. Additionally, vehicles and equipment entering the site could introduce invasive species through contaminated soil or seeds, further increasing the risk of establishment.

Soil disturbance from land clearing, vehicle movement and infrastructure development creates conditions conducive to the establishment of alien invasive species. These species could potentially outcompete indigenous flora, reduce biodiversity, alter habitats and change ecosystem functioning (e.g., fire regimes, water demand).

The impact is adverse, indirect, long-term and on-site, with a high probability of occurrence. It is indirect because invasive alien plants are typically introduced through vehicle movement, equipment and soil disturbance and can indirectly impact native plant species. It is long-term, as once invasives establish, they are extremely difficult to eradicate and may persist for decades. The impact is on-site, potentially concentrated in waste dumps, disturbed soils and road verges/berms, but with potential to spread into surrounding landscapes if not effectively managed. Sensitivity is considered high, as disturbed soils are particularly vulnerable and invasive species can rapidly outcompete local protected and endemic flora, reduce biodiversity and alter community structure on the Project semi-arid site. The magnitude of change is moderate, reflecting the potentially substantial ecological consequences, including loss of native habitats, reduced food sources for fauna and long-term changes to ecosystem functioning.

Without mitigation, the significance of the impact is rated as adverse moderate (Table 57). Implementation of vehicle and equipment hygiene measures and pre-checks, progressive rehabilitation, use of indigenous plants in restoration and ongoing invasive species monitoring and eradication programmes can reduce the residual impact to adverse moderate (Figure 127). These mitigation measures are included in the final ESMP (Appendix A).

This impact will also apply during the operational and decommissioning phases of the Project.

Table 57 - Impacts on biodiversity and ecology during the construction phase

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction activities (i.e., earthworks)	Mammals	Construction activities (i.e., land clearing and earthworks) may disturb or displace mammals, causing habitat loss and potential injury or mortality, particularly for protected species	Adverse Direct Partly reversible Permanent Local Definite	High	High / Major	Adverse Major (9)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction activities (i.e., earthworks)	Reptiles	Construction activities may disrupt or fragment reptile habitats, with slow-moving species especially vulnerable to displacement, injury, or mortality	Adverse Direct Irreversible Permanent Local Definite	High	High / Major	Adverse Major (9)
Construction activities	Vertebrate fauna	Vertebrate fauna may be injured or killed if they become trapped or entangled in the proposed boundary fence	Adverse Direct Partly reversible Long term Local High probability	High	Moderate	Adverse Major (9)
Construction activities (i.e., earthworks)	Amphibians	Soil disturbance, drainage changes from construction may destroy amphibian breeding sites, reduce available	Adverse Direct Irreversible Permanent Local Definite	High	High / Major	Adverse Major (9)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
		habitat and increase mortality risks for sensitive species				
Construction activities (i.e., earthworks)	Avifauna	Construction activities (i.e., land clearing and earthworks) may disturb or displace avifauna, leading to the loss of nesting or roosting sites and disrupting breeding patterns	Adverse Direct Irreversible Permanent Local Definite	High	High / Major	Adverse Major (9)
Construction activities (i.e., earthworks)	Vegetation	Land clearing and earthworks may cause the loss of flora, including protected or endemic species	Adverse Direct Irreversible Permanent Local Definite	High	High / Major	Adverse Major (9)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction activities (i.e., earthworks)	Ecosystems	Destruction of ecosystems, including the degradation of micro-ecosystems and loss of associated ecosystem services such as soil stability, water regulation and biodiversity support	Adverse Direct Irreversible Permanent Local Definite	High	Very High	Adverse Major (12)
Construction activities (i.e., earthworks)	Soil and biodiversity	Land clearing and construction activities may lead to soil erosion, which could indirectly affect local flora and fauna, especially near sensitive habitats and drainage lines	Adverse indirect Partly reversible Long term On-site High probability	Medium	Moderate	Adverse Minor (4)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction activities (i.e., earthworks)	Biodiversity	Poaching and harvesting of fauna and flora for subsistence use or for participation in the illegal trade	Adverse Direct Irreversible Permanent National Medium Probability	High	High / Major	Adverse Major (9)
Construction phase	Vegetation	Soil disturbance from machinery and infrastructure development may create favourable conditions for the spread of invasive alien plant species. Additionally, vehicles and equipment entering the site could introduce invasive species through contaminated soil or	Adverse Indirect Partly reversible Long term On-site High probability	High	Moderate	Adverse Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
		seeds, further increasing the risk of establishment				

7.14.2 OPERATIONAL PHASE

During the operational phase, ongoing activities such as blasting, vehicle movement, ore processing and the general presence of mining personnel will continue to apply pressure on local biodiversity. Habitat fragmentation from established linear infrastructure (fences, roads, powerlines and pipelines) may isolate populations of amphibians, reptiles and mammals, reducing their ability to move freely and sustain local populations. For avifauna, powerlines and other infrastructure increase the risk of collisions and electrocution, while continual vegetation clearance reduces foraging and nesting opportunities.

Artificial water bodies such as the open pits, TSF and ponds may attract wildlife, exposing species to risks of contamination, entrapment or drowning. Mammals, avifauna and reptiles may also become injured or killed through entanglement in infrastructure or collisions with vehicles. Amphibians remain sensitive to changes in hydrological regimes and water quality, which can impact breeding cycles.

Flora is affected by continued land disturbance and soil compaction, limiting natural regeneration and increasing susceptibility to invasive alien plant species introduced via equipment, vehicles or disturbed soils. These invasives may outcompete native vegetation, causing potential long-term reductions in biodiversity and altering ecosystem services and functioning, such as soil stability and water retention.

The operational-related impacts on biodiversity and ecology within the Project area are outlined in Figure 128 and Table 58, taking into consideration the biodiversity assessments findings and report (Cunningham, 2025) (Appendix N). The figure presents the pre-mitigation impact ratings and for the highly rated significant impacts, the corresponding post-mitigation ratings. A more detailed discussion of the potential impacts on biodiversity and ecology is provided in the following sections.

The construction-phase impacts discussed in section 7.14.1 will also apply during the operational phase for any additional construction or expansion activities carried out within the EPL or future ML boundary.

According to Cunningham (2025), the following impacts have been identified and are discussed comprehensively in the specialist report (Appendix N, pages 80 - 81): ongoing exploration, drilling and mining activities are expected to continue exerting pressure on local fauna, with certain species negatively affected by habitat alteration and disturbances. Off-road driving and nocturnal vehicle activity pose a significant risk of increased mortality to nocturnal species such as bats, owls and small carnivores, while artificial lighting may further attract and disorient nocturnal species. In addition, water and food resources created or concentrated by mining operations may draw in opportunistic fauna, such as snakes, geckos, carnivores and ungulates, increasing their exposure to human-wildlife conflict and other hazards.

If not effectively managed, erosion will remain a persistent impact throughout the operational phase, particularly in areas adjacent to ephemeral drainage lines. Soil disturbance from ongoing operations also creates potential favourable conditions for invasive alien plant species to become established and spread, facilitated by unintended seed transport on equipment and vehicles accessing the area. Such invasions may progressively degrade native vegetation communities and reduce habitat quality for local fauna (Cunningham, 2025).

The mitigation measures for the operational phase discussed in the sections below, together with the additional measures outlined in the final ESMP (Appendix A) and those from the specialist study (Cunningham, 2025) incorporated into the final ESMP (Appendix A) should be implemented to safeguard local biodiversity and ecological integrity.

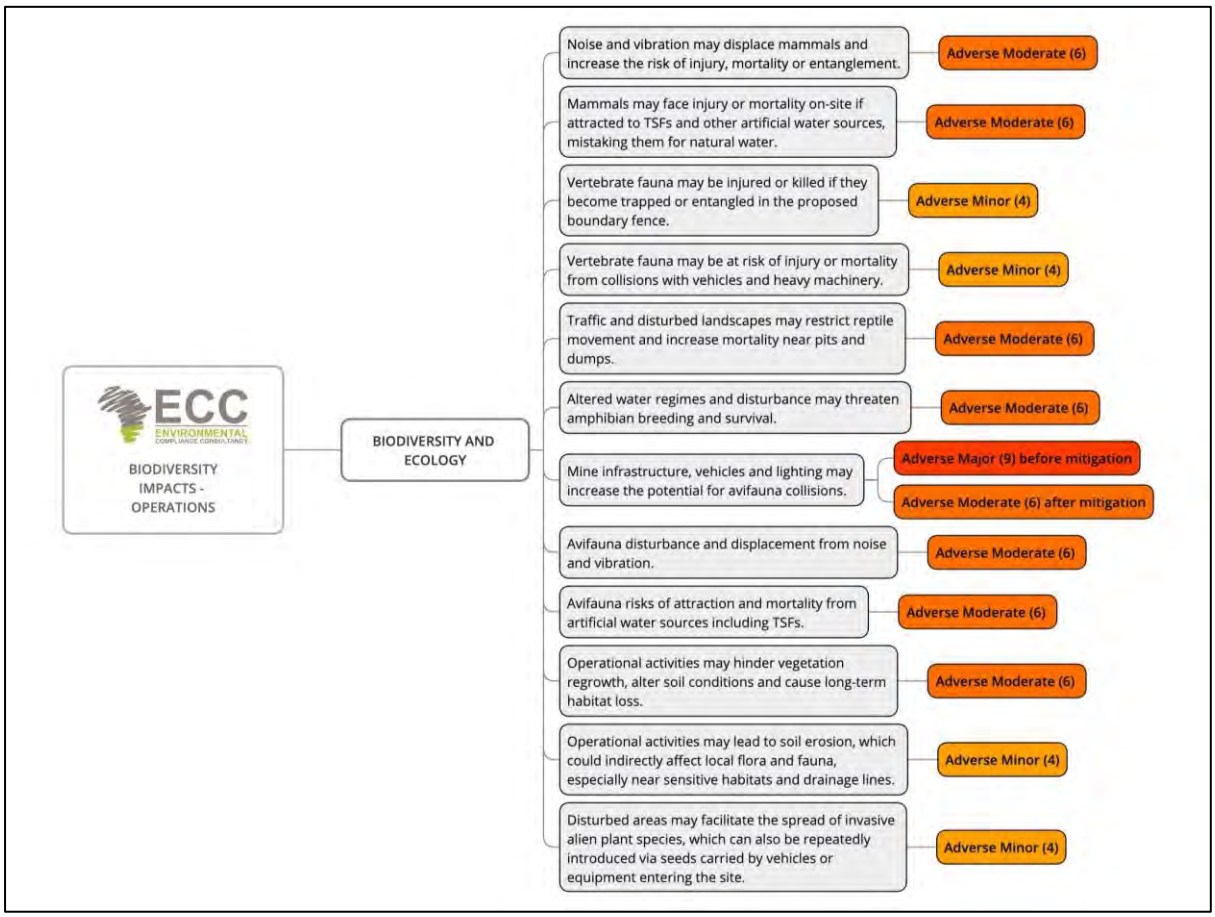


Figure 128 - Potential impacts on biodiversity and ecology during the operational phase

7.14.2.1 Noise and vibration may displace mammals and increase the risk of injury, mortality or entanglement

A detailed account of the mammal findings from Cunningham (2025) is provided in Section 7.14.1.1for the construction phase, with further information available in the specialist report in Appendix N.

During the operational phase, mammals face risks of displacement, disturbance, injury and mortality from vehicle movement, blasting and continuous operations (Erbe *et al.,* 2022 & Mortimer *et al.,* 2021). Noise and vibrations may deter mammals from inhabiting areas near the site, while startled animals searching for water may collide with fences, vehicles or mining infrastructure, potentially leading to injury or mortality. This risk is particularly relevant for medium to large mammals such as kudu, leopards, jackals and hyenas.

The impact is assessed as adverse, direct, long-term and local, with a high probability of occurrence. It is considered long-term because disturbed areas and operational activities will persist throughout the life of the Project (>11 years life of mine), limiting natural habitat recovery. It is direct, as mammals will be directly affected by noise, vibration, collisions and increased human presence. The scale of the impact is local, concentrated within the mine footprint and its immediate surroundings, though indirect impacts may extend into

surrounding areas as animals alter their behaviour and ranges. The probability of occurrence is high, given the continuous activity, the semi-arid conditions that may attract mammals to artificial water sources such as the TSF or ponds and the presence of key habitats, such as drainage lines and nearby hills.

Sensitivity of the receptor is rated as high, as the area supports rare, protected and endemic mammal species that depend on undisturbed habitats. The magnitude of change is moderate, given the likelihood of displacement, disrupted behaviour and breeding and the risk of injury or mortality. Overall, the impact significance is assessed as adverse moderate before mitigation (Table 58), but with effective interventions, it can be reduced to adverse minor (Figure 128).

Mitigation measures which include: introducing vehicle speed limits and restrictions on night driving to reduce collision risks, installation of deterrents or exclusion measures around the TSF and artificial water bodies to prevent fauna access (e.g. fencing, noise cannons) and habitat restoration and connectivity during rehabilitation to support long-term recovery. These mitigation measures are included in the final ESMP (Appendix A).

7.14.2.2 Mammals may face injury or mortality on-site if attracted to the TSF and other artificial water sources, mistaking them for natural water

Due to the semi-arid conditions of the general area, mammals such as kudu, springbok and jackals may be attracted to artificial water sources on-site. This poses a potential risk of injury or mortality, either at these water bodies (e.g., TSF or ponds) or when animals are startled by site activities, become entangled in fences, injured by infrastructure or struck by vehicles.

The impact is assessed as adverse, direct, long-term and local, with a high probability of occurrence. It is considered long-term as the TSF and artificial water sources will remain present and operational throughout the life (>11 years) of the Project and potentially post closure, creating ongoing risks. The impact is direct, as mammals may drown, get injured or otherwise be killed if they attempt to access these artificial water sources.
Another risk is the potential exposure to cyanide-contaminated water from gold mining, which may potentially cause serious health impacts and even mortality, with bats being particularly vulnerable (Donato *et al.,* 2007). The scale of the impact is local, concentrated on-site around the TSF, pits and containment ponds, although wider-ranging species may be affected if these features alter their natural water-seeking behaviour. The probability of occurrence is high due to the scarcity of natural water in the area and the likelihood of animals such as kudu, jackal or zebra being attracted to artificial water bodies.

Sensitivity is considered high, given that the area supports protected and wide-ranging mammal species and potential flight pathways for migrants that are dependent on scarce water resources. The magnitude of change is moderate, as these features may cause direct mortality and alter natural movement and behaviour patterns.

Overall, the impact significance is assessed as adverse moderate before mitigation (Table 58), but with effective management, the risk can be reduced to minor adverse (Figure 128).

With the implementation of the following mitigation measures, the impact can be reduced: installing exclusion fencing or deterrent measures around the TSF and artificial water bodies to restrict wildlife access, regularly monitoring for animal presence or incidents, ensuring progressive rehabilitation to limit long-term exposure to such risks and providing designated, safe alternative water points outside operational areas to reduce attraction to artificial sources (where possible, without creating a poaching hotspot). These mitigation measures are included in the final ESMP (Appendix A).

7.14.2.3 Vertebrate fauna may be injured or killed if they become trapped or entangled in the proposed boundary fence

Boundary fencing and associated infrastructure present persistent risks to a wide range of fauna during the operational phase, particularly when wildlife is attracted to artificial water bodies on-site or when attempting to move through the area.

The impact is assessed as adverse, direct, long-term and local, with a medium probability of occurrence. It is long-term because the boundary fence will remain throughout the life of the Project, creating a continuous hazard (>11 years). The impact is direct, as fauna may be injured or killed through entanglement or restricted movement. The scale is local, concentrated along the mine boundary, but may also affect wider-ranging species that require access across their natural ranges. The probability is medium, as medium to large mammals (e.g., kudu), birds (e.g., Ostriches) and reptiles (e.g., tortoises and pythons) are known to be injured or killed in fences when seeking food or water. The risk of injury and mortality will be higher during the construction phase, as animals will still be accustomed to open, unobstructed spaces. The significance of the impact is, however, expected to decrease over time as animals get accustomed to the presence of man-made infrastructure and disturbances in the general area.

Sensitivity is considered medium given the presence of endangered, rare, protected and endemic species that are vulnerable to habitat fragmentation, as well as risks of injury and mortality. The magnitude is moderate, as fencing can result in direct mortality and contribute to habitat fragmentation. Overall, the impact significance is assessed as moderate adverse before mitigation (Table 58) but can be reduced to minor adverse effects with effective measures (Figure 128).

Mitigation measures include wildlife-friendly fence designs (smooth wire, raised lower strands, poles at regular intervals, game fencing) and routine inspections and maintenance to quickly release or assist trapped animals. These mitigation measures are included in the final ESMP (Appendix A).

7.14.2.4 *Vertebrate fauna may be at risk of injury or mortality from collisions with vehicles and heavy machinery*

During the operational phase, continuous vehicle movement increases the risk of wildlife mortality. Reptiles often use roads for thermoregulation and are vulnerable to being run over during the day (e.g. chameleons). Birds, particularly raptors and insectivorous species, hunt along roads, making them prone to collisions. At night, owls, nightjars and mammals such as leopards, hyenas and smaller mammals, carnivores (e.g. jackals/foxes) and antelope (e.g. springbok) are at risk of collisions when moving across, grazing or resting on or next to roads (WildWeb, 2019).

The impact is assessed as adverse, direct, long-term and local, with a medium probability of occurrence. It is long-term because vehicle traffic will persist for the life of the Project. The impact is direct, as wildlife are immediately affected by collisions. The scale is local, limited to the mine footprint and immediate surroundings. The probability is medium (possible), as species abundance in the semi-arid area is generally low, although artificial water sources on site may increase animal presence and risk.

Sensitivity is medium, as the area may support endangered, rare, protected and endemic species. The magnitude is low, as the site is already disturbed and other operational impacts may discourage vertebrate fauna from frequenting the area. Overall, the impact significance is assessed as adverse minor before mitigation (Table 58), reducible to adverse low with effective measures such as ecological walkdowns, strict vehicle speed enforcement, continuous awareness with visitors and workforce and restoring habitat connectivity during rehabilitation (Figure 128). These mitigation measures are included in the final ESMP (Appendix A).

7.14.2.5 *Traffic and disturbed landscapes may restrict reptile movement and increase mortality near pits and dumps*

A detailed account of the reptile findings from Cunningham (2025) is provided in section 7.14.1.2 for the construction phase, with further information available in the specialist report in Appendix N.

Continuous traffic, blasting and infrastructure presence during operations may disturb or displace reptiles, increasing risks of injury or mortality, particularly for slow-moving species such as tortoises. Habitat fragmentation can restrict movement between suitable areas, isolating populations and preventing recolonisation. As reptiles rely on stable microhabitats for nesting, thermoregulation and protection, disturbance or loss of these habitats is significant (Brizio *et al.,* 2025).

The impact is assessed as adverse, direct, long-term and local, with a medium probability (possible) of occurrence. It is long-term because many reptiles have slow reproductive rates and limited recovery potential, meaning impacts may persist across the Project's life of mine

(>11 years). The impact is direct, as it results from collisions and habitat disturbances. The scale is local, restricted to the mine footprint and surroundings and probability medium due to the constant operational activity.

Sensitivity is high, particularly for range-restricted, endemic or protected species. The magnitude is low, reflecting the already disturbed nature of the site. Overall, the impact significance is assessed as adverse moderate before mitigation (Table 58) but can be reduced to minor adverse with measures such as ecological walkdowns, vehicle speed limits, continuous awareness with visitors and workforce and restoring habitat connectivity during rehabilitation. These mitigation measures are included in the final ESMP (Appendix A).

7.14.2.6 Altered water regimes and disturbance may threaten amphibian breeding and survival

A detailed account of the amphibian findings from Cunningham (2025) is provided in section 7.11.1.3 for the construction phase, with further information available in the specialist report in Appendix N.

Operational activities may degrade or eliminate amphibian habitats, particularly drainage lines, temporary pools and seeps. Alteration of surface hydrology through infrastructure, accidental pollution or dewatering can reduce water availability and quality, directly threatening breeding success and survival. Amphibians are especially sensitive due to their permeable skin and reliance on both aquatic and terrestrial environments across their life stages.

The impact is assessed as adverse, direct, long-term and local, with a medium probability (possible) of occurrence. It is long-term because natural aquatic habitats may take decades to recover once altered or polluted. The impact is direct, as amphibians are immediately affected by contamination or habitat loss. It is local in scale, as populations are typically tied to specific hydrological features, making them highly vulnerable (Blaustein *et al.,* 2011). Probability is medium, reflecting both the extent of land disturbance and potential for water system alteration.

Sensitivity is high, particularly if endemic or protected amphibians occur in the general areas. The magnitude is low, given the likely low abundance of amphibians in this semi-arid area but the significance remains. Overall, the impact significance is assessed as adverse moderate before mitigation (Table 58) but can be reduced to minor adverse with measures such as stormwater and pollution control, preservation of identified sensitive habitats and maintaining habitat connectivity during rehabilitation (Figure 128). These mitigation measures are included in the final ESMP (Appendix A).

7.14.2.7 Mine infrastructure, vehicles and lighting may increase the potential for avifauna collisions

A detailed account of the avifauna findings from Cunningham (2025) is provided in section 7.13.1.1.5 for the construction phase, with additional information in the specialist report in Appendix N.

Avifauna are at risk of collisions with tall infrastructure and overhead lines (e.g., proposed 66 kV powerline from the Omburu substation), which may result in injury or mortality. Artificial lighting that attracts insects can also draw insectivorous birds during early mornings or evenings, increasing collision risks, while nocturnal species such as owls may collide with infrastructure while hunting at night. Migratory birds may also be disoriented or attracted to artificial lighting or reflecting pools on-site, increasing the risk of exhaustion, collisions or disruption of natural migration routes (Fellows, 2023, Adams, *et al.,* 2021 & Ashwin *et al.,* 2023). Several species expected in the area are prone to infrastructure-related collisions, including Kori and Ludwig's bustards, Martial eagle, White-backed vulture and other protected and vulnerable bird species.

The impact is assessed as adverse, direct, long-term and local, with a high probability of occurrence. It is considered long-term as infrastructure will remain in place throughout operations, with recovery only possible after decommissioning and rehabilitation (>11 years). The impact is direct, as bird populations are immediately affected through mortality, especially if an entire flock. Although primarily local, the effect may extend nationally and regionally, as wide-ranging or migratory species (e.g., White-backed vultures, waterbirds during the rainy season) may also be impacted. The probability is high, supported by national datasets such as the Environmental Information Service (EIS) bird–powerline tool and other research confirming the elevated collision risks posed by powerlines and tall infrastructure. Sensitivity is high due to the potential presence of rare, protected and near-endemic species. The magnitude of change is assessed as high due to the introduction of anthropogenic infrastructure into a relatively undisturbed area.

Overall, the impact significance is considered adverse major before mitigation (Table 58) but could be reduced to adverse minor with effective measures Figure 128. Mitigation should include routine monitoring to record and assess collisions and electrocutions, installation of bird deterrent devices (e.g., wire markers, flight diverters and physical barriers like trees, diversion poles or noise barriers) where necessary, avoidance of reflective building materials or ponds and the use of lighting designed to minimise insect attraction (e.g. downward-facing, yellow lighting). These mitigation measures are included in the final ESMP (Appendix A).

7.14.2.8 Avifauna disturbance and displacement from noise and vibration

Avifauna may be disturbed or displaced during operations due to blasting, noise, vibrations and human activity, which can disrupt breeding and foraging behaviour. Disturbance during sensitive breeding periods could potentially lower reproductive success and contribute to local population declines (Erbe *et al.,* 2022).

The impact is adverse, direct, long-term and local, with a medium probability of occurrence. It is considered long-term because avifauna may abandon foraging areas or nesting territories for the duration of operations (>11 years), with recovery only possible post-rehabilitation. The impact is direct, as birds are immediately affected by operational disturbance. It is local in extent, affecting species within the mine footprint and immediate surroundings, though wide-ranging and migratory species may also be temporarily disturbed. The probability is medium (possible), given the constant presence of human activity, vibration and noise. Sensitivity is high due to the occurrence of endangered, rare, near endemic and protected bird species, and the magnitude of change is assessed as moderate since vibration and noise could affect relatively large areas within the Project's footprint.

Overall, the impact significance is assessed as adverse moderate before mitigation (Table 58) but may be reduced to adverse minor with appropriate management (Figure 128). Recommended mitigation measures include limiting blasting and other high-noise activities during peak breeding periods, no blasting at night, early morning or early evenings, identifying and protecting sensitive habitats and applying engineering, administrative, or technological controls to reduce sound and vibration at source (where possible). These mitigation measures are included in the final ESMP (Appendix A).

7.14.2.9 Avifauna risks of attraction and mortality from artificial water sources including the TSF

During the operational phase, avifauna may be at risk of injury or mortality due to collisions or entanglement near on-site water bodies such as the TSF or ponds. Birds may also be at risk of poisoning from cyanide-contaminated water, which could result in serious health impacts or mortality. The semi-arid environment may further increase the likelihood of attracting local bird species, as well as occasional migratory species (e.g., flamingos and other waterbirds).

The impact is adverse, direct, long-term and local, with a medium probability of occurrence. It is considered long-term because the TSF and other artificial water bodies will persist throughout the life of the Project, continually attracting birds that may mistake them for natural water sources. Once drawn to these sites, avifauna face risks of exposure to contaminated water, entrapment or drowning. The impact is direct, as bird populations are immediately affected through injury or mortality, as well as through the reduction of safe foraging and nesting habitats.

The scale of the impact is local, affecting species within the mine footprint and immediate surroundings, although wide-ranging and migratory birds may also be at risk if they are attracted to artificial water bodies. The probability of occurrence is medium (possible), given the semi-arid regional conditions that increase the likelihood of birds seeking water at the TSFs or other water sources. Sensitivity is considered high due to the presence of protected, near endemic and migratory bird species whose survival and breeding success rely on intact and undisturbed habitats. The magnitude of change is moderate, reflecting the potential for both direct mortality and disruption of foraging and breeding behaviour.

Overall, the impact significance is assessed as adverse moderate before mitigation (Table 58) but could be reduced to adverse minor with appropriate management interventions, including netting or covering open water bodies, regular inspections, installing deterrent systems to discourage bird attraction and marking powerlines (Figure 128). These mitigation measures are included in the final ESMP (Appendix A).

7.14.2.10 Operational activities may hinder vegetation regrowth, alter soil conditions, and cause long-term habitat loss.

A detailed account of the vegetation findings from Cunningham (2025) is provided in section 7.14.1.6 for the construction phase, with additional information in the specialist report in Appendix N.

Operational activities, including continuous infrastructure use, frequent disturbance from vehicles and machinery and soil compaction, may limit the natural regeneration of vegetation. Altered soil properties, such as compaction, reduced fertility and changes in drainage, further restrict the recovery of plant communities (Mensah, 2015). Over time, this can result in long-term habitat loss for fauna and flora that rely on intact vegetation for shelter and food.

The impact is adverse, direct, long-term and on-site, with a definite likelihood of occurrence. Although partly reversible, recovery would require active rehabilitation measures such as reseeding with indigenous species, soil improvements and sustained management of restored areas. Sensitivity is considered medium, as the Project footprint may support locally significant species, while the wider landscape is expected to remain relatively intact. The magnitude of change is moderate, representing measurable but localised biodiversity impacts.

Without mitigation, the impact significance is assessed as moderate (Table 58). With effective interventions, such as progressive rehabilitation and soil restoration, the impact can be reduced to an adverse minor (Figure 128). Mitigation measures have been included in the final ESMP (Appendix A).

7.14.2.11 Operational activities may lead to soil erosion, which could indirectly affect local flora and fauna, especially near sensitive habitats and drainage lines

Vehicle movement, land clearing, excavation and earth moving activities can destabilise soils during the operational phase of the Project. This increases the erosion potential, particularly near drainage lines and sloped terrains. Sensitive habitats such as ephemeral drainage lines are especially vulnerable, as sedimentation can disrupt natural hydrological processes and impact aquatic habitats.

The impact is adverse, indirect, long-term and partly reversible, with a high probability of occurrence. It is indirect, since drainage line changes often result from altered hydrology, runoff or erosion linked to direct clearing and other operational activities. The impact is long-term, as soil erosion and changes to flow patterns can persist for decades and while some recovery is possible, it requires progressive rehabilitation and sustained management. The impact is expected to be mainly confined to the mine footprint area, where bare ground is exposed, vegetation is removed and earth-moving activities are present. Sensitivity is medium, due to the ecological importance of soil stability and drainage lines as refuges for flora and fauna, especially riparian vegetation (Funk, 2025). The magnitude of change is moderate, reflecting measurable impacts on these sensitive habitats and potential associated impacts on local fauna and flora.

Without mitigation, the significance of the impact is rated as adverse minor (Table 58). Mitigation measures are further described in the final ESMP (Appendix A).

7.14.2.12 Disturbed areas may facilitate the spread of invasive alien plant species, which can also be repeatedly introduced via seeds carried by vehicles or equipment entering the site

Soil disturbance from land clearing, vehicle movement and other operational activities creates beneficial conditions for the establishment of alien invasive species. These species could potentially outcompete indigenous flora, reduce biodiversity, alter habitats and change ecosystem functioning (e.g., fire regimes, water demand).

The impact is adverse, indirect, short-term and on-site, with a high probability of occurrence. It is indirect because invasive alien plants are typically introduced through vehicle movement, equipment and soil disturbance and can indirectly impact native plant species. The impact is short-term, as the already disturbed areas during the operational phase are expected to be affected. Due to the constantly changing landscape, invasive species may establish in certain disturbed areas on-site; however, these should potentially be easier to eradicate. The impact is on-site, potentially concentrated in waste dumps, disturbed soils and road verges/berms but with potential to spread into surrounding landscapes if not effectively managed. Sensitivity is considered medium, as disturbed soils are particularly vulnerable and invasive

species can rapidly outcompete local protected and endemic flora, reduce biodiversity and alter community structure on the Project semi-arid site.
The magnitude of change is minor due to the already disturbed nature of the area. However, if not managed carefully, there could be substantial ecological consequences, including the loss of native habitats, reduced food sources for fauna and long-term changes to ecosystem functioning.

Without mitigation, the significance of the impact is rated as adverse minor (Table 58). These mitigation measures are included in the final ESMP (Appendix A).

Table 58 - Impacts on biodiversity and ecology during the operational phase

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Mining activities	Mammals	Noise and vibration may displace mammals and increase the risk of injury, mortality or entanglement.	Adverse Direct Partly reversible Long term Local High probability	High	Moderate	Adverse Moderate (6)
Mining activities	Mammals	Mammals may face injury or mortality on-site if attracted to TSFs and other artificial water sources, mistaking them for natural water.	Adverse Direct Partly reversible Long term Local High probability	High	Moderate	Adverse Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Mining activities	Vertebrate fauna	Vertebrate fauna may be injured or killed if they become trapped or entangled in the proposed boundary fence.	Adverse Direct Partly reversible Long term Local Medium probability	Medium	Moderate	Adverse Minor (4)
Mining activities	Vertebrate fauna	Vertebrate fauna may be at risk of injury or mortality from collisions with vehicles and heavy machinery.	Adverse Direct Partly reversible Long term Local Medium probability	Medium	Low / Minor	Adverse Minor (4)
Mining activities	Reptiles	Traffic and disturbed landscapes may restrict reptile movement and increase mortality near pits and dumps.	Adverse Direct Partly reversible Long term Local Medium probability	High	Low / Minor	Adverse Moderate (6)
Mining activities	Amphibians	Altered water regimes and disturbance may threaten amphibian breeding and survival.	Adverse Direct Partly reversible Long term Local Medium probability	High	Low / Minor	Adverse Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Mining activities	Avifauna	Mine infrastructure, vehicles and lighting may increase the potential for avifauna collisions.	Adverse Direct Partly reversible Long term Local High probability	High	High / Major	Adverse Major (9)
Mining activities	Avifauna	Avifauna disturbance and displacement from noise and vibration.	Adverse Direct Partly reversible Long term Local Medium probability	High	Moderate	Adverse Moderate (6)
Mining activities	Avifauna	Avifauna risks of attraction and mortality from artificial water sources including TSFs.	Adverse Direct Partly reversible Long term Local Medium probability	High	Moderate	Adverse Moderate (6)
Mining activities	Vegetation	Operational activities may hinder vegetation regrowth, alter soil conditions, and cause long-term habitat loss.	Adverse Direct Partly reversible Long term On-site Definite	Medium	Moderate	Adverse Moderate (6)
Mining activities	Soil and biodiversity	Operational activities may lead to soil erosion, which could	Adverse indirect Partly reversible Long term	Medium	Moderate	Adverse Minor (4)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
		indirectly affect local flora and fauna, especially near sensitive habitats and drainage lines.	On-site High probability			
Mining activities	Vegetation	Disturbed areas may facilitate the spread of invasive alien plant species, which can also be repeatedly introduced via seeds carried by vehicles or equipment entering the site.	Adverse Indirect Partly reversible Short term On-site High probability	Medium	Minor	Adverse Minor (4)

7.14.3 DECOMMISSIONING PHASE

The decommissioning phase represents a critical period for ensuring the long-term ecological recovery of the site. If rehabilitation is not properly planned and implemented, residual impacts such as displacement of fauna, loss of vegetation and long-term habitat degradation can persist well beyond closure. Progressive rehabilitation during operations is therefore essential to facilitate natural regeneration, minimise disturbance and support the re-establishment of ecological function.

Key considerations include reseeding disturbed areas with indigenous species, restoring soil structure and fertility, implementing erosion and invasive species control measures and maintaining habitat connectivity. Early initiation of rehabilitation during the operational phase significantly increases the chances of successful recovery, reduces closure responsibilities and supports long-term ecosystem resilience.

The decommissioning related impacts on biodiversity and ecology within the Project area are outlined in Figure 129 and Table 59, taking into account the biodiversity assessments and specialist report (Cunningham, 2025) (Appendix N). The figure presents the pre-mitigation impact ratings for the significant impacts. A more detailed discussion of the potential impacts on biodiversity and ecology is provided in the following sections.

According to Cunningham (2025), the following impacts have been identified and are discussed comprehensively in the specialist report (Appendix N, page 82): rehabilitation activities, including the movement of heavy vehicles along access routes for the removal of infrastructure, may result in the direct mortality of vertebrate fauna, particularly slow-moving species unable to avoid machinery. Such operations may also trigger localised soil erosion if disturbed areas are not properly managed and stabilised during the decommissioning process.

As with earlier phases, soil disturbance and vehicle activity create favourable conditions for the establishment and spread of invasive alien plant species. Seeds may be inadvertently transported into or within the Project area on vehicles and equipment, hindering ecological recovery and reducing the success of long-term rehabilitation efforts (Cunningham, 2025).

The mitigation measures for the decommissioning phase discussed in the sections below, together with the additional measures outlined in the Project final ESMP and those from the specialist study (Cunningham, 2025) incorporated into the final ESMP (Appendix A), should be implemented to safeguard local biodiversity and ecological integrity.

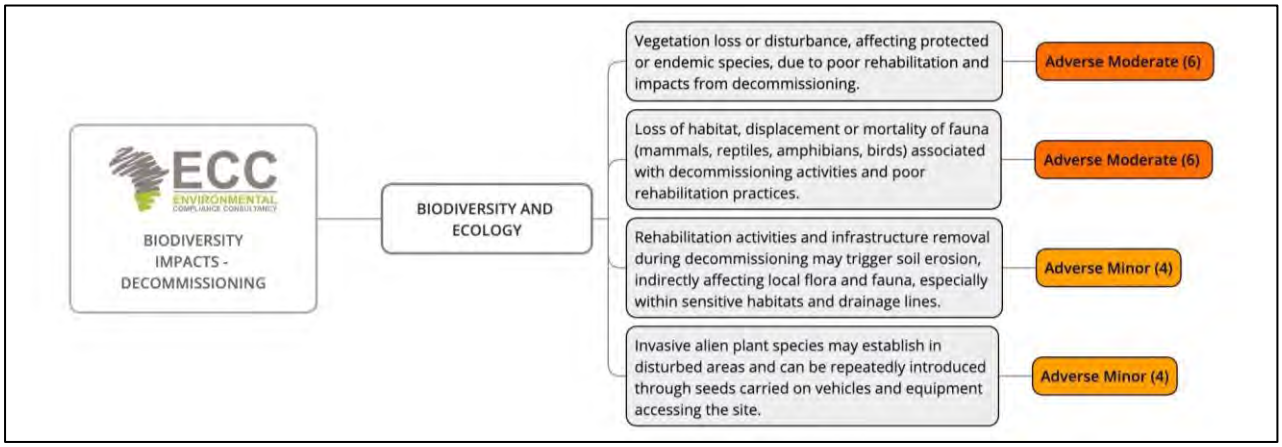


Figure 129 - Potential impacts on biodiversity and ecology during the decommissioning phase

7.14.3.1 Vegetation loss or disturbance, affecting protected or endemic species, due to poor rehabilitation and impacts from decommissioning

Improper or misdirected rehabilitation and restoration during decommissioning may result in the loss or disturbance of vegetation and seedbanks, including protected or endemic plant species.

Soil disturbance and compaction, removal of infrastructure and clearance of vegetation can reduce overall habitat integrity and hinder natural recovery. Over time, this may lead to a permanent decline in plant diversity and loss of ecological function if restoration is not effectively implemented.

The impact is adverse as it reduces biodiversity value and ecosystem function. It is indirect because vegetation loss results from secondary effects of decommissioning and inadequate rehabilitation, such as establishment of invasive plant species, soil disturbance, altered drainage and delayed recovery, rather than from a single immediate action. The impact is long-term since vegetation recovery can take many years and some endemic or protected species may not recover without intervention. It is on-site, confined to the Project footprint where rehabilitation takes place. The likelihood of occurrence is high, as vegetation may be affected directly and indirectly by decommissioning activities. The impact is partly reversible, as active rehabilitation measures such as soil restoration, correct topsoil and seedbank management, progressive habitat management and reseeding with indigenous species can restore ecological function over time.

Sensitivity is considered high, given the potential presence of conservation-important flora within the Project footprint, while the wider landscape is likely to remain functional. The magnitude of change is moderate, reflecting measurable but localised vegetation impacts.

Without mitigation, the impact significance is assessed as adverse moderate (Table 59). With effective rehabilitation based on knowledge of on-site restoration trials and progressive rehabilitation during operations, including soil improvement and re-vegetation, the impact can be reduced to an adverse minor (Figure 129).

The effective control and removal of invasive species during rehabilitation is necessary to allow native plant communities to re-establish successfully and to maintain long-term habitat quality. The mitigation measures are included in the final ESMP (Appendix A).

7.14.3.2 Loss of habitat, displacement, or mortality of fauna (mammals, reptiles, amphibians, birds) associated with decommissioning activities and poor rehabilitation practices

Improper or misdirected rehabilitation during decommissioning can cause displacement or mortality of fauna, including mammals, reptiles, amphibians and birds. Disturbance from machinery movement, exposure of cleared areas and the loss of vegetation cover may reduce

available habitat and food sources, forcing fauna to relocate or increasing their vulnerability to predation and mortality. If habitats are not restored, long-term biodiversity loss and fragmentation of wildlife corridors may result.

The impact is adverse as it negatively affects fauna survival, mobility and habitat availability. It is indirect because effects on fauna result from secondary impacts of decommissioning and inadequate rehabilitation, including habitat loss, vegetation disturbance and reduced connectivity, rather than from direct harm to the animals themselves (though direct impacts are addressed separately in the construction and operational phase impacts). The impact is long-term, since habitat recovery and recolonisation by fauna can take years and populations may not return without successful rehabilitation. It is on-site, limited to areas disturbed by decommissioning, although displaced fauna may be indirectly affected in surrounding habitats. The likelihood of occurrence is high, given the unavoidable presence of fauna within the area and the scale of disturbance. The impact is partly reversible, as effective rehabilitation can restore vegetation cover, re-establish habitat connectivity and enable species persistence over time.

Sensitivity is considered high, as the Project area may support locally significant or protected fauna. The magnitude of change is moderate, representing measurable biodiversity impacts within the footprint.

Without mitigation, the impact significance is assessed as adverse moderate (Table 59). With effective interventions, including progressive rehabilitation, habitat restoration, invasive species control and ecological monitoring, the impact can be reduced to an adverse minor. Mitigation measures have been included in the final ESMP (Appendix A).

7.14.3.3 Rehabilitation activities and infrastructure removal during decommissioning may trigger soil erosion, indirectly affecting local flora and fauna, especially within sensitive habitats and drainage lines

Improper or misdirected rehabilitation during decommissioning can result in destabilised soils. This increases the erosion potential, particularly near drainage lines and sloped terrains. Sensitive habitats such as ephemeral drainage lines are especially vulnerable, as sedimentation can disrupt natural hydrological processes and impact aquatic habitats.

The impact is adverse, indirect, short-term, on-site and partly reversible, with a high probability of occurrence. It is indirect, since drainage line changes often result from altered hydrology, runoff or erosion linked to direct earth moving and other rehabilitation activities. The impact is short-term, as the increased risk of potential soil erosion will mainly be associated with the decommissioning phase. This will require progressive rehabilitation and sustained management. The impact is expected to be mainly confined to the mine footprint area, where bare ground is exposed, vegetation is removed and earth-moving or rehabilitation activities are present. Sensitivity is medium, due to the ecological importance

of soil stability and drainage lines as refuges for flora and fauna, especially riparian vegetation (Funk, 2025). The magnitude of change is moderate, reflecting measurable impacts on these sensitive habitats and potential associated impacts on local fauna and flora.

Without mitigation, the significance of the impact is rated as adverse minor (Table 59). Mitigation measures are further described in the final ESMP (Appendix A).

7.14.3.4 Invasive alien plant species may establish in disturbed areas and can be repeatedly introduced through seeds carried on vehicles and equipment accessing the site

Soil disturbance from improper or misdirected decommissioning activities creates favourable conditions for the establishment of alien invasive species. These species could potentially outcompete indigenous flora, reduce biodiversity, alter habitats and change ecosystem functioning (e.g., fire regimes, water demand).

The impact is adverse, indirect, short term, partly reversible and on-site, with a high probability of occurrence. It is indirect because invasive alien plants are typically introduced through vehicle movement, equipment and soil disturbance and can indirectly impact native plant species. The impact is short-term, as the already disturbed areas during the operational phase are expected to be affected. The impact is on-site; however, if improper or misdirected rehabilitation is conducted, there is the potential for spreading into surrounding landscapes if not effectively managed. Sensitivity is considered medium, as disturbed soils are particularly vulnerable and invasive species can rapidly outcompete local protected and endemic flora, reduce biodiversity and alter community structure on the Project semi-arid site. The magnitude of change is minor due to the already disturbed nature of the area. However, if not managed carefully, there could be substantial ecological consequences, including the loss of native habitats, reduced food sources for fauna and long-term changes to ecosystem functioning.

Without mitigation, the significance of the impact is rated as adverse minor (Table 59). These mitigation measures are included in the final ESMP (Appendix A).

Table 59 - Impacts on biodiversity and ecology during the decommissioning phase

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Decommissioning activities	Flora	Vegetation loss or disturbance, affecting protected or endemic species, due	Adverse Indirect Partly reversible Long term On-site	High	Moderate	Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
		to poor rehabilitation and impacts from decommissioning.	High probability			
Decommissioning activities	Fauna	Loss of habitat, displacement, or mortality of fauna (mammals, reptiles, amphibians, birds) associated with decommissioning activities and poor rehabilitation practices.	Adverse Indirect Partly reversible Long term On-site High probability	High	Moderate	Moderate (6)
Decommissioning activities	Soil and biodiversity	Rehabilitation activities and infrastructure removal during decommissioning may trigger soil erosion, indirectly affecting local flora and fauna, especially within sensitive habitats and	Adverse indirect Partly reversible Short term On-site High probability	Medium	Moderate	Minor (4)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
		drainage lines.				
Decommissioning activities	Vegetation	Invasive alien plant species may establish in disturbed areas and can be repeatedly introduced through seeds carried on vehicles and equipment accessing the site.	Adverse Indirect Partly reversible short term On-site High probability	Medium	Minor	Minor (4)

7.15 BIOPHYSICAL AND SOCIAL ENVIRONMENT: BUILT INFRASTRUCTURE – HELIPAD IMPACTS

7.15.1 CONSTRUCTION PHASE

The construction of the helipad site has the potential to result in impacts such as alteration of the soil profile and structure and the generation of dust and noise. An overview of the potential impacts is shown in Figure 130 before mitigation, unless otherwise indicated, for illustrative purposes only. Each specific impact is discussed in the sections below and the impact assessment ratings are summarised in Table 60.

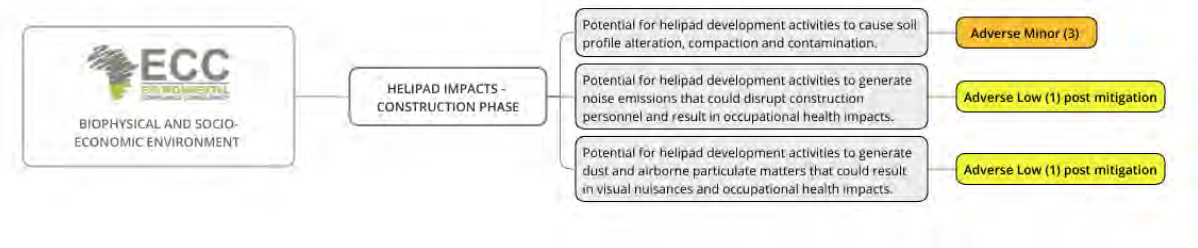


Figure 130 - An overview of the helipad impacts during the construction phase

7.15.1.1 Potential for the helipad development activities to cause soil profile alteration, compaction and contamination

The construction of the helipad has the potential to alter the physical and chemical properties of the soil within the immediate development area. Activities such as site clearing, excavation (soil stripping), grading (bulldozing) and compaction can disturb the natural soil profile and structure. In addition, the use of construction machinery, storage of fuels, lubricants, bitumen, tack coats, asphalt modifiers and other chemicals can present a risk of soil contamination through accidental spills or leaks.

The impact is considered adverse, direct and partly reversible as it is triggered by the construction activities associated with the helipad development. Site clearing, excavation, grading and compaction will disturb the natural profile and alter the physical and chemical properties of the soil within the footprint of the development. The impact is rated partly reversible as certain impacts such as soil compaction can be mitigated or rehabilitated through appropriate remedial measures. However, complete restoration may be unlikely.
The extent of the impact is limited to the Project site (onsite), as the helipad will occupy a relatively small and defined area. It is anticipated that all associated disturbances will be confined to the immediate development footprint. The probability of the impact occurring is considered definite, as the helipad site will require ground preparation and reworking to ensure a stable and level surface suitable for safe operation throughout the LoM (12 years). These activities will inevitably disturb the soil profile. In addition, the use of construction machinery and chemical reagents during site preparation present a risk of accidental spills and leakages. The duration of the impact is considered medium term, as soil compaction within the helipad footprint is expected to persist throughout the LoM (12 years). However, it is expected that any accidental contamination will be addressed and remediated during construction (2 years).

The magnitude of change is considered low as the helipad development footprint is relatively small and any soil disturbances or contamination are expected to be confined to the immediate construction area. Areas beyond the immediate construction area will remain undisturbed. The sensitivity of the receptor is rated low as the impacts are minor and manageable with standard mitigation measures. Overall, the significance of the impact is

rated adverse minor, before mitigation (Table 60). The mitigation measures are provided in the final ESMP (Appendix A).

7.15.1.2 Potential for helipad development activities to generate noise emissions that could (i) disrupt construction personnel and (ii) result in occupational health impacts

Vehicle movements, the operation of earth moving equipment and surface and subgrade compaction works have the potential to generate noise levels that may extend beyond the immediate helipad development area. It is anticipated that the helipad construction activities in isolation will be generated excessive noise that could be disruptive to personnel. This impact is assessed post mitigation, as it is a legislative requirement for a Project of this magnitude and scale to enforce occupational health and safety measures during the construction phase to protect the workforce from exposure to noise, dust and other construction-related risks and hazards.

The nature of this impact is considered adverse, direct and partly reversible. Noise is an adverse impact as it disrupts communication, can cause nuisance to receptors, and, if exposure is prolonged or repeated, may result in hearing impairment. The impact is considered direct as noise is expected to arise from construction-related activities such as vehicle movements, operation of earth moving equipment and surface and subgrade compaction works. The impact is regarded as partly reversible as noise emissions cease once the helipad development is completed, and the environment returns to its baseline acoustic conditions. It is likely expected that the helipad development will be completed within the first year of construction. Therefore, the duration of the impact is assessed as temporary (< 1 year).

Noise emissions from the helipad site during construction are not experienced in isolation, will be localised and not propagate beyond the immediate construction area and adversely impact offsite noise sensitive receptors (NSRs). Therefore, the extent of the impact is considered onsite. The likelihood of the impact occurring is rated low as construction personnel exposure to noise will be managed with proper PPE, operational controls and adherence to other occupational health and safety requirements.

The magnitude of the impact is rated negligible as the helipad developmental activities in isolation are unlikely to generate disruptive noise levels that may cause temporary nuisance to onsite personnel. However, with mitigation measures in place, personnel exposure to these noise levels is unlikely expected to result in occupational health impacts. The sensitivity of the receptor is rated low as personnel are expected to be equipped with appropriate hearing protection equipment and trained in safe work practices. This reduces their vulnerability to noise-related impacts. Overall, the significance of the impact is rated adverse low, post mitigation (Table 60). The mitigation measures are provided in the final ESMP (Appendix A).

7.15.1.3 Potential for helipad development activities to generate dust and airborne particulate matters (PM) that could result in visual nuisances and occupational health impacts

Construction activities associated with the helipad development have the potential to generate dust and particulate matter (i.e. both PM10 and PM2.5). Activities likely to generate dust include land clearing activities, soil stripping, grading, vehicle movements and construction material handling, such as cement mixing and concrete works. This impact is assessed post mitigation, as it is a legislative requirement for a Project of this magnitude and scale to enforce occupational health and safety measures during the construction phase to protect the workforce from exposure to dust and other construction-related risks and hazards.

The nature of this impact is considered adverse, direct and partly reversible. Dust and fine airborne particles generated during the construction of the helipad can reduce visibility and create visual nuisance conditions, particularly within the immediate active work areas. This impact is direct as it results from construction activities such as land clearing, soil stripping and handling of construction materials such as cement and concrete. In addition, the impact is regarded as partly reversible as dust and fine airborne particles disperse naturally over time and ambient air quality returns to baseline conditions once construction activities cease. However, temporary effects such as respiratory irritation experienced by personnel, may persist for the duration of the construction phase (2 years). The extent of the impact is onsite as the primary receptors are the construction personnel engaged in various construction activities at the helipad site. It is not anticipated that dust and fine PM particles generated during construction will form clouds that will disperse beyond the active work areas and impact offsite air quality sensitive receptors (AQSRs).

The duration of the impact is rated temporary as it is expected that construction activities will be completed within the first year of the construction phase. The likelihood of the impact occurring is rated low as construction personnel exposure to dust and airborne PM will be managed with proper PPE, operational controls and adherence to other occupational health and safety requirements.

The magnitude of change is rated negligible as dust and airborne particles generated by the construction activities (in isolation) will unlikely cause visual nuisance and respiratory irritation to onsite personnel. Dust generated will settle in the immediate work areas over time. The sensitivity of the receptor is rated low as personnel are expected to be equipped with appropriate dust protection equipment and trained in safe work practices. This reduces their vulnerability to dust and PM-related impacts. Overall, the significance of the impact is rated adverse low, post mitigation (Table 60). The mitigation measures are provided in the final ESMP (Appendix A).

Table 60 - Helipad impact assessment ratings during the construction phase

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Land clearing, soil stripping and excavation activities.	Soil profile and structure	Potential for the helipad development activities to cause soil profile alteration, compaction and contaminatio n.	Adverse Direct Partly reversible Onsite Medium term Definite	Low	Low	Adverse Minor (3)
Vehicle movement, surface and subgrade compaction works and operation of earth moving equipment.	Occupational health and safety (construction personnel)	Potential for helipad development activities to generate noise emissions that could (i) disrupt construction personnel, and (ii) result in occupational health impacts.	Adverse Direct Partly reversible Onsite Temporary Unlikely	Low	Negligible	Adverse Low (1)[17]
Land clearing, excavation, soil stripping, vehicle movements, cement and concrete mixing.		Potential for helipad development activities to generate dust and airborne PM that could result in visual	Adverse Direct Partly reversible Onsite Temporary Unlikely	Low	Negligible	Adverse Low (1)[18]

[17] Significance of the impact post mitigation.
[18] Significance of the impact post mitigation.

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
		nuisance and occupational health impacts.				

7.15.2 OPERATIONAL PHASE

It is anticipated that during the operational phase, refined gold bars will be flown offsite via an aircraft every second week. Although flight operations will be pre-planned, the operation of the helipad is associated with environmental, social and occupational impacts. This includes aspects such as dust generation during aircraft take-off and landing, occupational health and safety impacts and operational safety risks, noise emissions, potential bird strike risks (avian collision), disturbance to biodiversity, impacts related to fuel handling and storage and increased aviation traffic.

This section assesses the potential environmental, occupational and social impacts associated with the helipad operations during the operational phase, taking into consideration the frequency of flights. An overview of the potential impacts is shown in Figure 131 below, before mitigation unless otherwise specified, for illustrative purposes only. Each specific impact is discussed in detail in the section below. The impact assessment ratings are summarised in Table 61.

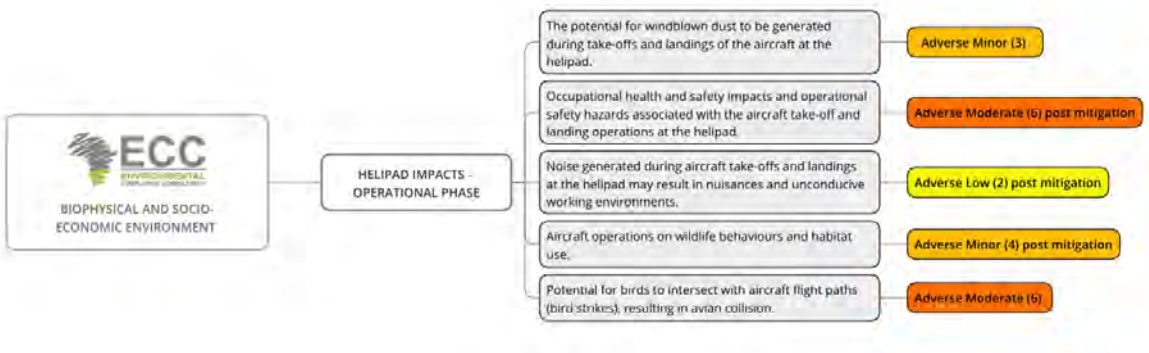


Figure 131 - Helipad impacts during the operational phase

7.15.2.1 The potential for windblown dust to be generated during take-offs and landings of the aircraft at the helipad

Aircraft operations at the helipad will generate windblown dust during take-off and landing as rotor wash lift fine particles from unpaved surfaces. Although, flights are scheduled only every second week, the dust may result in temporary visual nuisance and minor respiratory irritation to onsite personnel, particularly whose work areas are in the vicinity of the helipad.

Over time, the displacement of the topsoil leaves the surfaces increasingly exposed and more susceptible to further erosion.

The nature of this impact is assessed as adverse, direct and partly reversible. Dust results in nuisance, reduced visibility and minor respiratory irritation for onsite personnel. The impact is considered direct as it arises from aircraft operations and is partly reversible, since dust disperses naturally over time and ambient baseline conditions restore between flights. Dust will be generated during take-off and landing events, and repeated biweekly over the LoM (12 years). Therefore, the duration of the impact is assessed as medium term. The likelihood of dust generation and topsoil displacement is considered definite, as it arises directly from rotor wash during aircraft take-off and landing. Dust is expected to remain confined to the immediate vicinity of the helipad and, under normal meteorological conditions, will settle quickly. As a result, the formation of significant dust clouds capable of impacting offsite AQSRs is not anticipated.

The magnitude of changes is rated low, as aircraft take-off and landing events are expected to occur biweekly. In this case, dust generation is limited to this schedule, unless the schedule changes at a certain stage throughout the LoM (12 years). Compared to other daily operational dust generating activities such as vehicle movements on haul roads and processing plant operations, the dust generated at the helipad is expected to be relatively low. The sensitivity of the receptor is rated low as repeated aircraft take-off and landing events will displace soils from the immediate vicinity of the helipad. Under normal meteorological conditions, dust will settle quickly and will likely be manageable though various operational controls and safety procedures. Overall, the significance of the impact is rated adverse low, before mitigation (Table 61). The mitigation measures are provided in the final ESMP (Appendix A).

7.15.2.2 Occupational health and safety impacts and operational safety hazards associated with the aircraft take-off and landing operations at the helipad

Aircraft take-offs and landings at the helipad poses operational and safety risks, primarily due to rotor wash, which is intensified within the immediate helipad area. If precautionary measures are not implemented, potential risks may include injuries to personnel, damage to infrastructure or equipment, foreign object debris incidents and emergency situations arising from mechanical failures or a result of adverse weather conditions. Considering the dynamic nature of the mining environment, it is important that aircraft operations are carefully coordinated to ensure compliance with aviation safety standards.

This impact is assessed post mitigation, as it is a legislative requirement for a Project of this magnitude and scale to ensure appropriate occupational health and safety measures are in place during operations to safeguard personnel from various operational hazards and risks.

The operational safety risk associated with the aircraft take-off and landing at the helipad is considered an adverse impact as it presents a risk of injury to mine personnel, damage to infrastructure or equipment and temporary disruption of mining operations in an event of an incident. The impact is direct as any incident could impact on-site employees or assets within the helipad area, although there is potential for indirect impacts such as operational delays or halt of mine operations (worse-case scenario). The duration of the impact is rated medium term as incidents could occur throughout the LoM (12 years). The impact is rated partly reversible, considering that minor incidents could be remediated through correct action(s) and repairs, whereas serious injuries or fatalities would be irreversible. These incidents are most likely to occur within the immediate helipad footprint and its immediate safety buffer area during aircraft take-off and landing operations, as during these periods, rotor wash effects are strongest and have the greatest force to displace debris. The likelihood of the impact occurring is rated low, provided that precautionary measures are implemented and maintained. Under such conditions, incidents would be expected to arise primarily from unforeseen mechanical failures or during adverse weather conditions (e.g. sudden wind gusts and heavy rainfall). It should also be noted that, although aircraft operations are conducted under strict safety protocols, the likelihood of accidents or emergency situations are often unpredictable and therefore cannot be entirely ruled out.

The magnitude of change is rated moderate post mitigation. Although safety measures reduce the probability of incidents, any occurrence could still result in operational interruptions, require emergency response or repair of critical mine infrastructure. The sensitivity of the receptor is rated high due to the vulnerability of employees to severe injuries and financial implications of accidents. Overall, the significance of the impact is rated adverse moderate, post mitigation (Table 61).

The following mitigation measures are included in the final ESMP (Appendix A):

- The helipad must be properly authorised through the Civil Aviation Directorate at the Namibia Civil Aviation Authority (NCAA);
- A helipad operations manual shall be developed and shall include, but not limited to the following:
    - The helipad facility and the flight paths;
    - Normal operating procedures;
    - Security;
    - Emergency procedures;
    - Staff training program; and
    - Maintenance practices.
- A safety plan will be developed to ensure safety of mine personnel during take-off and landings;
- In an event of accident to mine personnel, the emergency response procedure shall be followed;
- Mine personnel, external auditors and visitors shall be inducted on the helipad as a no-go area (i.e. strict compliance with the helipad safety buffer zone); and

- Landing lights will be used by the aircraft during take-off, climb, descent, approach and landing.

7.15.2.3 Noise generated during aircraft take-offs and landings at the helipad may result in nuisances and unconducive working environments

Noise generated during aircraft take-offs and landings at the helipad may result in nuisance effects and create a disruptive and unconducive working environment for personnel in the surrounding operational areas. The intermittent, high pitched nature of aircraft noise has the potential to interfere with communication, reduce concentration and temporarily disrupt routine mine activities.

This impact is assessed post mitigation, as it is a legislative requirement for a Project of this magnitude and scale to ensure appropriate occupational health and safety measures are in place during operations to safeguard personnel from various operational hazards and risks.

The impact associated with the noised generated during aircraft take-offs and landings at the helipad is assessed as adverse as elevated noise levels can cause nuisance effects, interfere with communication, reduce concentration and temporarily disrupt routine mine activities. The impact is considered direct as noise results directly from aircraft operations. Furthermore, the impact is assessed as partly reversible as noise levels subside once the aircraft has landed or departed and no permanent alterations to the acoustic environment are expected. The extent of the impact is rated onsite as high-pitch noise will likely be confined to the helipad and adjacent operational areas within audible range. The likelihood of the impact occurring is rated medium (possible) as noise generation is a normal aspect of aircraft operations. However, the use of hearing protection by personnel reduces their susceptibility to noise exposure.

In addition, routine work in areas adjacent to the helipad may be temporarily paused during aircraft take-offs and landings, as a precautionary measure, after which operations resume instantly. The duration of the impact is rated medium term as the helipad will remain operational throughout the LoM (12 years).

The magnitude of change is assessed as moderate (post-mitigation). High-pitch noise generated during take-off and landing events is not expected to significantly interfere with most operational activities on the mine, however, routine work in adjacent areas may be temporarily paused as a precaution to ensure personnel safety. The sensitivity of the receptor is rated low as it is not expected that these intermittent noise levels will result in prolonged halt of mine operations. Furthermore, mine employees will likely adapt to the recurring aircraft operations over time. Overall, the significance of the impact is rated adverse low, post mitigation (Table 61). The mitigation measures are provided in the final ESMP (Appendix A).

7.15.2.4 Aircraft operations on wildlife behaviours and habitat use

Aircraft operations at the helipad and along flight paths have the potential to disturb local wildlife, disrupt normal foraging and movement behaviours. The impact is severe when an aircraft is flown at low altitude, as noise, rotor wash and visual disturbances are intensified. This increases the likelihood for wildlife to temporarily avoid or abandon their home ranges. Such disturbances may alter habitat use and impact local ecological dynamics, particularly for sensitive or less mobile species.

The nature of the impact is considered adverse, direct and partly reversible as wildlife may return to affected areas once low-altitude operations cease. However, repeated exposure may result in the permanent displacement of sensitive species. The extent of the impact is regarded regional as species likely to be susceptible to disturbance include those inhabiting the surrounding landscape and along the established aircraft flight paths. The duration of the impact is rated medium term as biweekly flights are anticipated over the LoM (12 years). These recurring flight patterns are likely to deter sensitive wildlife from using areas along the flight paths. The likelihood of the impact occurring is rated low as aircraft operations will only be conducted every second week.

The magnitude of change is rated low. Although repeated low-altitude aircraft operations will be after every second week, disturbance to wildlife behaviours is not expected to significantly deter majority of the wildlife population from their home ranges. The sensitivity of the receptor is rated medium as some species are more vulnerable to disturbance, particularly less mobile species, however, majority of the species will likely adapt to disturbance throughout the LoM (12 years). Overall, the significance of the impact is rated adverse minor, before mitigation (Table 61). The mitigation measures are provided in the final ESMP (Appendix A).

7.15.2.5 Potential for birds to intersect with aircraft flight paths (bird strikes), resulting in avian collisions

Aircraft operations pose a potential risk of bird strikes, where birds may collide with the aircraft during take-offs, low-altitude flights in the surrounding areas or during landing events. Such collisions can result in injury or mortality to birds, may pose safety risks to aircraft operators and damage to critical aircraft component such as windshields or engines.

The bird species most susceptible to aircraft collisions are typically colonial species that move in groups, as flocking behaviours increases the likelihood of multiple species occupying the same airspace. Species with limited manoeuvrability or slow flight speed are also at greater risk, as they may be less able to evade fast-moving aircraft. In addition, behavioural and ecological factors such as foraging activity within or near established flight paths, nesting or roosting sites in proximity to operational areas and seasonal migration movements can further increase the vulnerability of certain species to collision incidents.

The nature of this impact is considered adverse, as bird strikes presents a threat to avian species through injury or mortality, while simultaneously posing safety risks to aircraft operations, crew and passengers. This is a direct impact as it results from direct physical interaction between the aircraft and avian species. Additionally, the impact is regarded irreversible as individual bird mortalities are irreversible.

The extent of the impact is rated regional as the potential for bird strikes is not limited to the helipad footprint, but may occur during take-offs, landing or along designated flight paths within the broader operational airspace. The likelihood of the impact occurring is rated low. This is because bird strikes have not been historically recorded as an issue in the broader airspace and the biweekly aircraft flights frequency present limited opportunities for interaction between birds and aircraft. Flights will be conducted on a biweekly schedule throughout the LoM (12 years); therefore, the duration of the impact is rated medium term.

Both the magnitude of change and the sensitivity of receptor are rated high as bird strikes (should they occur) could result in significant damage to critical aircraft components and pose serious safety risks to aircraft operators. Overall, the significance of the impact is rated adverse moderate, before mitigation (Table 61).

The following mitigation measures are provided in the final ESMP (Appendix A):

- Install visual bird deterrent systems around the helipad;
- Ensure pilots are trained in avian collisions and response protocols;
- If birds are observed within the helipad or surrounding flight area prior to take-off, they must be safely dispersed prior to aircraft take-off;
- Ground personnel should try to scare away birds using frightening devices such as sounds, lights, pyrotechnics and lasers;
- Landing lights should be used during take-offs, climb, descent, approach and landing; and
- Ensure all bird strikes are reported to the NCAA.

Table 61 - Helipad impacts during the operational phase

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Aircraft take-off and landing at the helipad	Air quality	Potential for windblown dust generation and topsoil displacement associated with the aircraft take-off and landing at the helipad.	Adverse Direct Partly reversible Onsite Medium term Definite	Low	Low	Adverse Minor (3)

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
	Occupational health and safety (mine personnel) and mine infrastructure	Occupational health and safety impacts and operational hazards resulting from the take-off and landing failure of the aircraft at the helipad.	Adverse Direct Partly reversible Onsite Medium term Unlikely	High	Moderate	Adverse Moderate (6)[19]
	Occupational health and safety (mine personnel)	Noise generated during the take-offs and landings at the helipad may result in nuisances and unconducive working environments.	Adverse Direct Partly reversible Onsite Medium term Possible	Low	Moderate	Adverse Low (2)[20]
	Biodiversity	Aircraft operations on wildlife behaviours and habitat use.	Adverse Direct Partly reversible Regional Medium term Unlikely	Medium	Minor	Adverse Minor (4)
Avifauna intersecting with aircraft flight paths	Avifauna and occupational health and safety (crew and passengers)	Potential for birds to intersect with aircrafts (bird strikes), resulting in avian collisions.	Adverse Direct Irreversible Regional Medium term Unlikely	High	High	Adverse Moderate (6)

[19] Significance of the impact post mitigation.
[20] Significance of the impact post mitigation.

7.15.3 DECOMMISSIONING PHASE

During the decommissioning phase, the helipad will be rehabilitated and will involve the removal of pavement or compacted surfaces. An overview of the potential impacts, before mitigation, is provided in Figure 132 below, for illustrative purposes only. Each specific impact is discussed in detail in the section below and shown in Table 62.

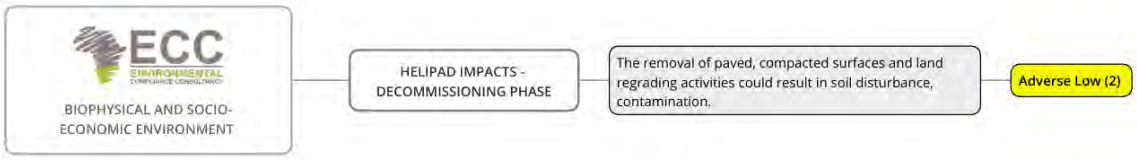


Figure 132 - An overview of the helipad impacts during the decommissioning phase

7.15.3.1 The removal of paved, compacted surfaces and land regrading activities to restore the original landform could result in soil disturbance and contamination

Decommissioning activities that could lead to soil disturbance at the helipad include the removal of paved or compacted surfaces, regrading to restore the original landform and handling of debris. These activities can contaminate the soil, thereby disturbing its profile, structure and increasing its susceptibility to sediment runoff and erosion, especially during rainfall events.

The nature of the impact is considered adverse, as the removal of compacted surfaces, excavation and grading can alter the soil structure and increase its susceptibility to erosion. The impact is direct, as it arises from physical decommissioning activities. The impact is regarded as reversible as soil structure and stability can be restored through continuous monitoring. The likelihood of the impact occurring is rated high as soil disturbance is part of the rehabilitation process. The extent of the impact is onsite as it is anticipated that the helipad rehabilitation activities will be limited to its immediate footprint, while the duration of the impact is rated temporary as the rehabilitation activities will likely be completed within the first year of the Project's rehabilitation program.

Both the magnitude of change and the sensitivity of the receptor are rated negligible and low, respectively. This is because the helipad footprint is relatively small and soil disturbance is expected to the limited to its immediate footprint. Overall, the significance of the impact is rated adverse low, before mitigation (Table 62). The mitigation measures are provided in the final ESMP (Appendix A).

Table 62 - Helipad impacts during the decommissioning phase

Activity	Receptor	Impact	Nature of impact	Value & sensitivity	Magnitude of change	Significance of impact
Removal of paved, compacted surfaces and regrading activities	Soil profile and structure	The removal of paved, compacted surfaces and land regrading activities to restore the original landform could result in soil disturbance.	Adverse Direct Reversible Onsite Temporary Likely	Low	Negligible	Adverse Low (2)

7.16 CUMULATIVE IMPACTS

The EIA Regulations clearly state that cumulative impacts should be considered as part of the ESIA for a proposed Project. Good practice requires that, as a minimum, cumulative impacts are assessed during the ESIA process.

The cumulative impact assessment covers the following:

- Intra-project cumulative impacts: cumulative impacts can arise when a single resource or receptor is affected by more than one impact from the proposed Project; and
- Inter-project cumulative impacts: cumulative impacts may also arise as a result of the combination of two or more projects. A receptor could be impacted by similar types of impact from different developments, or a receptor could be impacted by different types of impact from different developments. This could occur at the same time or at different times.

This section presents the CIA findings, which has been undertaken in line with the methodology summarised in chapter 6. The cumulative impacts that may arise because of the Project are discussed in the sections further below. Figure 133 and Table 63 provide an overview of the intra-project cumulative impacts, before mitigation and Figure 134 and Table 64 provide an overview of the inter-project cumulative impacts, before mitigation.

7.16.1 INTRASPECIFIC CUMULATIVE IMPACTS

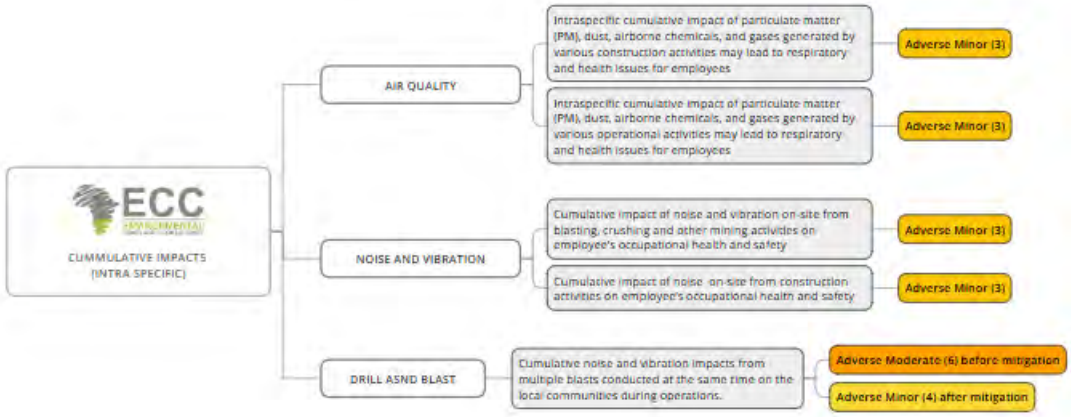


Figure 133 - Intraspecific impacts during construction and operations

Intraspecific cumulative impacts during <u>the construction phase</u>

7.16.1.1 Intraspecific cumulative impact of particulate matter (PM_{10} and $PM_{2.5}$), depositional dust, airborne chemicals and gases generated by various construction activities may lead to respiratory and health issues for employees

The different construction activities such as site clearing, earth works, construction of roads and permanent infrastructure etc. will generate windblown dust, fine particulate matter (PM_{10} and $PM_{2.5}$), quantities of airborne chemicals and exhaust gases from mobile and stationary equipment. These emissions may temporarily degrade on-site air quality and, if exposure to employees is prolonged or repeated, may contribute to respiratory irritation, discomfort or long-term occupational health issues.

The nature of this impact is adverse and cumulative as emissions from multiple sources are anticipated during construction. The impact is considered partly reversible as potential health effects associated with dust and airborne emissions are manageable and are expected to cease once construction ceases. However, some respiratory issues may be long lasting. The duration of the impact is assessed as short term (1 - 5 years), considering the duration of the construction phase (approximately two (2) years). The extent of this impact is on-site, as the construction workforce will be based on-site for the duration of the construction phase.

The magnitude of change is rated low because construction-related dust and emissions are only expected to cause minor, localised and temporary degradation of air quality, resulting in manageable alteration to baseline conditions (without lasting effects). The probability of this impact occurring is likely because dust and emissions are an inevitable result of normal construction activities and equipment operation. The sensitivity of this impact is rated low as the impact is on site and the receptors have the capacity to adapt to the temporary change in

air quality. Overall, the significance of impact is rated adverse minor, before mitigation (Table 63). Mitigation measures are included in the final ESMP (Appendix A).

7.16.1.2 Cumulative impact of noise on-site from construction activities on employee's occupational health and safety

Construction activities (e.g., drilling, blasting, earthmoving, crushing, vehicle movement, generators) generate intermittent and continuous high-decibel noise. When exposure is cumulative (multiple sources operating simultaneously over extended periods), workers may be subjected to noise levels exceeding occupational exposure limits.

The nature of the impact is adverse, cumulative and partly reversible because construction-related noise on employees poses an occupational health and safety risk, particularly where multiple high-decibel activities occur simultaneously over extended periods. Prolonged exposure may result in temporary or permanent hearing loss, stress, fatigue, reduced concentration and an increased risk of accidents due to impaired communication and situational awareness. The duration of the impact is short term (1 - 5 years) as lasting the length of the construction phase of the Project. The magnitude of change is moderate because the noise exposure causes some loss of employee well-being and partial impairment of key functions like hearing and concentration, but it does not fully compromise overall health or safety. The integrity of employee occupational health is largely maintained and with mitigation, the impact can be managed. The extent of the impact is on site and the probability of the impact occurring is possible. Since the impact occurs on site and the receptor's (the employees) health is not fully compromised the sensitivity of the impact is low. Therefore, the significance of the impact has been rated adverse minor (before mitigation) (Table 63). Mitigation measures are included in the final ESMP (Appendix A).

Intraspecific cumulative impacts during <u>the operational phase</u>

7.16.1.3 Cumulative impact of noise and vibration on-site from blasting, crushing and other mining activities on employees' occupational health and safety

Routine mining operations, including blasting, crushing, hauling and processing plant activities will generate elevated noise and vibration levels within the operational area. Prolonged or repeated exposure to these levels may interfere with verbal communication and contribute to increased occupational stress, with potential adverse effects on the health and wellbeing of on-site personnel, if not adequately managed.

The impact is considered adverse because it negatively affects worker health and safety. This is cumulative impact because repeated exposure from multiple sources over time result in stress and related effects to build up. The impact is reversible as noise and vibration levels are directly linked to active mining operations and will naturally reduce or cease when specific activities stop, shift patterns change or operations are completed, allowing the working environment and associated stress effects to return to baseline conditions over time. The

duration of the impact is medium term as noise and vibration levels will be generated regularly the LoM (~ 12 years). The extent of this impact is on-site as only personnel involved in operational activities will be directly affected. The magnitude of change is rated low because noise and vibration increases are predominantly limited to operational areas and occur intermittently. The probability of this impact occurring is rated high (likely) due to the routine nature of continuous operations planned to occur over a 24-hour period throughout the LoM. The sensitivity of receptor is rated low as the impact is on site and the employees are expected to adapt to noise and vibration levels throughout the LoM. Overall, the significance of the impact rated adverse minor, before mitigation (Table 63). Mitigation measures are included in the final ESMP (Appendix A).

7.16.1.4 Cumulative noise and vibration impacts from multiple blasts conducted at the same time on the local communities during operations (intraspecific cumulative impact)

Cumulative impacts from blasting operations can occur if multiple blasts are conducted at the same time. This in-turn has multiplying effects of ground vibration and air blasts on third party receptors, wildlife and mine employee, including visual disturbance from a larger induced dust cloud and the potential for unwanted fly rock or cumulative fly rock impacts. Multiple blasts could also result in errors in the blast design, holes or the required stemming material and the potential for mis fires to occur. In the mining industry, best practice requires a time delay between blasts, to reduce cumulative effects of single blasts being deployed together. This ensures that the blaster can clear the first blast to ensure the blast went off efficiently and there are no mis fires before a second or third blast is deployed. This also reduces visual impacts. Additionally, the harder the rock, the greater the impacts could be if single blasts are not practiced.

The potential cumulative noise and vibration impacts from multiple blasts conducted at the same time on the local communities during operations will be adverse, medium term (life of mine which is >11 years) and partly reversible, as potential cumulative ground vibration, air blast and fly rock impacts could cause structural damage or perceived complaint human perception, especially from the village houses south (S) of the Project, the mine accommodation camp, wildlife activity points or D3714 road north/northwest of the mine, if limits are exceeded. However, this will be for the duration of the blast and structures could be reinstated if damage occurs and wildlife/livestock will return. The scale of the impact is regional, due to the various receptors that will be influenced in and around the greater Project area. The probability of this impact occurring is definite, without mitigation, as it is common practice for open cast mining operations to conduct multiple blasts in one (1) day.

The value of sensitivity is expected to be medium and magnitude of change high/major, as the receptors will need assistance to adjust to these changes from the influence of the cumulative or simultaneous blasting, especially if there is structural damage sustained to structures. The overall significance of the impact is expected to be adverse moderate (Table

63). With mitigation, the impact is reduced to adverse minor. The mitigation measures have been included in the final ESMP (Appendix A).

Table 63 - Intra-Project cumulative impacts of mining operations at the proposed Project site with mitigation measures

Receptor	Impacts	Significance of impact	Impact management
Construction phase			
Air quality	**Activity:** Site clearing, earth works, construction of roads and mine infrastructure etc will generate windblown dust, fine particulate matter (PM_{10} and $PM_{2.5}$) and quantities of airborne chemicals and exhaust gases from mobile and stationary equipment. **Impact:** Increased dust and gaseous emissions in the air reducing the quality of the air in the Project area during the construction phase.	Adverse Minor (3)	– Regular air quality monitoring; – Dust suppression measures (applying chemical suppressants and water spray to roads and stockpiles to minimise dust generation); – Constructing physical barriers like berms or windbreaks to shield sensitive areas from prevailing winds; – Use of PPE; and – Ensure that international air quality standards and best practices are adhered to.
Noise	**Activity:** Construction activities **Impact:** Prolonged construction noise may result in hearing related occupational health and safety impacts	Adverse Minor (3)	– Conduct regular training sessions to educate employees about the risks associated with noise and vibration and promote the use of personal protective equipment (PPE); – Provide and require the use of earplugs or earmuffs for employees working in high noise areas; and – Ensure that all equipment is well-maintained to reduce the likelihood of excessive noise and vibration.
Operational phase			
Air quality	**Activity:** Mining and ore extraction activities, ore handling and processing	Adverse Minor (3)	– Regular air quality monitoring;

Receptor	Impacts	Significance of impact	Impact management
	operations, waste rock and tailings management. **Impact:** Increased dust and gaseous emissions in the air reducing the quality of the air in the Project area during the operational phase.		– Dust suppression measures (applying chemical suppressants and water spray to roads and stockpiles can help to control dust); – Constructing physical barriers like berms or windbreaks to shield sensitive areas from prevailing winds; – The use of PPE; and – Ensure that international air quality standards and best practices are adhered to.
Noise and vibration	**Activity:** Blasting, crushing and overall operations. **Impact:** Blasting, equipment noise and vibration may affect the hearing of employees.	Adverse Minor (3)	– Retrofit or upgrade equipment to reduce noise and vibration emissions; – Conduct regular training sessions to educate employees about the risks associated with noise and vibration and promote the use of personal protective equipment; – Provide and require the use of earplugs or earmuffs for employees working in high noise areas; – Implement a monitoring program to regularly assess noise and vibration levels across the mine site; and – Ensure that all equipment is well-maintained to reduce the likelihood of excessive noise and vibration.
Drill and blast	**Activity:** Multiple blasts occurring during operations **Impact:** Cumulative noise and ground vibration impacts from multiple blasts conducted at the same time on the local communities during operations.	Adverse Moderate (6)	– Multiple blast initiated simultaneously must be avoided; and – Time delay between blasts must be facilitated.

7.16.2 INTERSPECIFIC CUMULATIVE IMPACTS

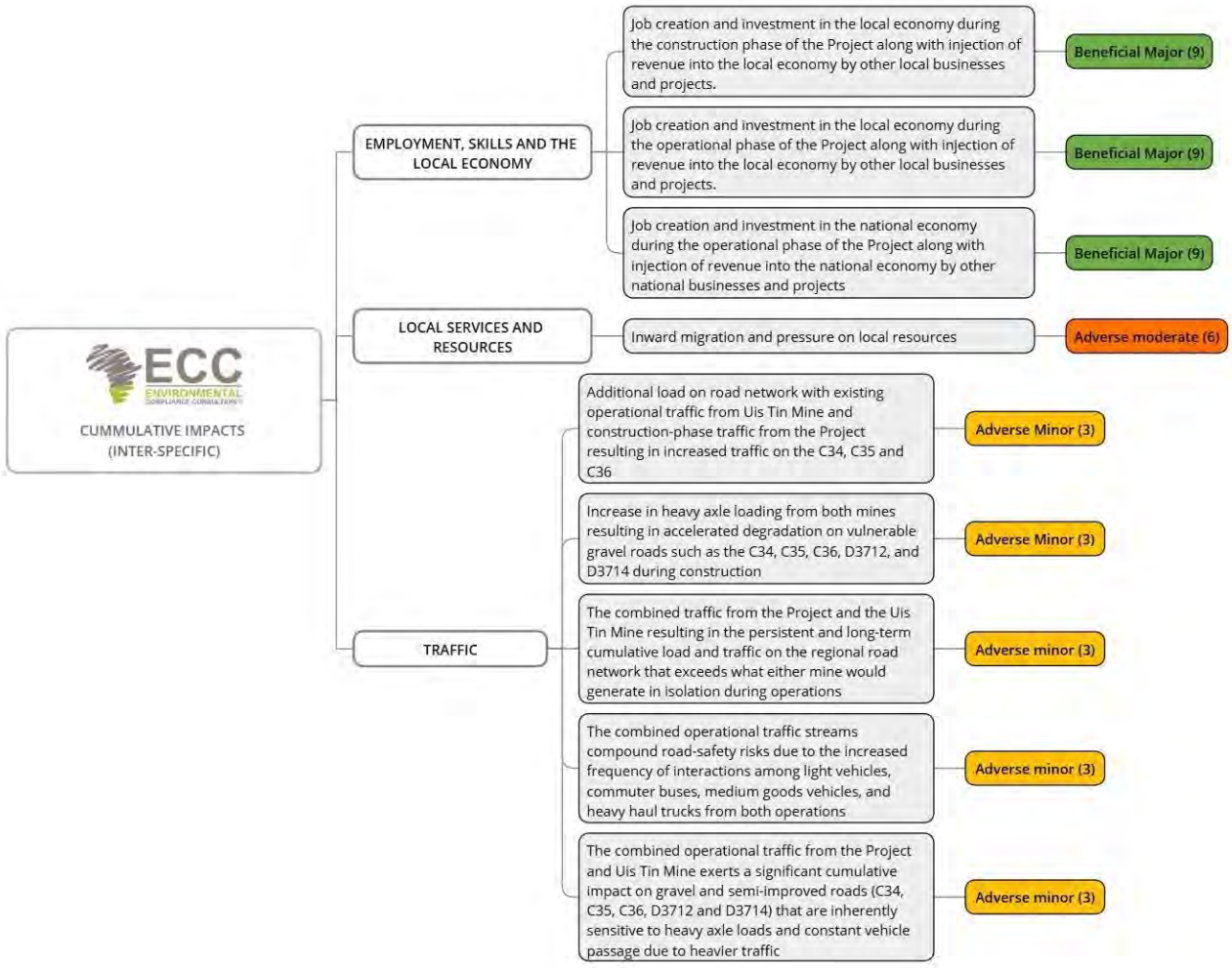


Figure 134 - Interspecific impacts during the construction and operations

Interspecific cumulative impacts during the <u>construction phase</u>

7.16.2.1 Job creation and investment in the local economy during the construction phase of the Project along with injection of revenue into the local economy by other local businesses and projects

The Project's construction phase will contribute cumulatively to regional socio-economic conditions when considered alongside other ongoing and planned developments in the area. Employment opportunities generated by the Project, together with labour demand from concurrent projects and routine activities of local businesses, will collectively increase income flows within the local economy. The different projects will strengthen the local economy by creating jobs and generating demand for goods and services, including materials, accommodation, transport and support services, thereby stimulating business activity and income across multiple sectors. Although each individual project may generate reduced benefits, their combined effect results in a broader and more noticeable stimulation of the local and regional economy during the construction period.

This cumulative effect is particularly relevant in areas where multiple mining activities already exist and operate simultaneously. Overlapping employment and procurement demands can amplify economic circulation, albeit over a temporary timeframe linked to construction schedules.

The nature of this impact is beneficial and cumulative because construction-related employment and expenditure contribute positively to local incomes and business activity and when combined with other ongoing projects in the region, these effects add together to amplify overall economic stimulation during the construction period. The impact is reversible because the economic benefits are temporary and linked to construction activities and will diminish once construction ends and associated employment and expenditure cease. The duration of the impact is short term (1 - 5 years) as these benefits are limited to the length of the construction phase. The extent of the impact is regional because Project-related employment and spending benefit workers and businesses across surrounding towns and districts. The magnitude of change is high as the scale of employment and economic activity generated is expected to result in major, tangible and noticeable improvements in regional economic conditions. The probability of the impact occurring is rated high as construction will certainly generate employment and spending, which will combine with other regional economic activities to produce cumulative socio-economic benefits. The sensitivity of the impact is medium as there will be a regional impact. Overall, the significance of the impact is rated beneficial major (Table 64).

7.16.2.2 Additional load on the road network with existing operational traffic from Uis Tin Mine and construction-phase traffic from the Project will increase road traffic on the C34, C35 and C36 roads

The cumulative traffic impact arising from the addition of construction-phase vehicles from the proposed Project onto the same road corridors (Omaruru to Uis road (C35 and C36 road) and Henties Bay to Uis Road (C34 and C35 road)) used by the operational Uis Tin Mine (UTM) represents an addition of vehicle activity on a rural road network that already accommodates regular heavy-vehicle movements. The operational UTM generates ongoing traffic demand, including concentrating haulage, delivery of reagents, diesel and consumables and contractor traffic. When combined with the Projected construction-phase peak of 52 vehicle trips per hour and daily heavy-truck deliveries to the proposed Project, the cumulative vehicle load will add to baseline traffic conditions. Although individual traffic volumes may not exceed formal capacity thresholds on the C36 road or associated district roads (C34 and C35), the functional performance of these roads may be slightly constrained due to mixed traffic characteristics, narrow gravel road, limited overtaking opportunities and the presence of slow-moving heavy vehicles from both mining operations.

The nature of the impact is adverse as adding construction traffic will add to the rural road network traffic. The impact is cumulative since the traffic generated by the Project adds to the existing traffic from the UTM, resulting in a combined effect that is greater than either source.

The impact is considered reversible as it will cease once construction traffic stops, allowing road conditions and traffic flow to return to normal. The duration of the impact is rated short term (1 – 5 years), considering that the increased traffic will only occur during a short, clearly defined phase of construction (<2 years).

The magnitude of change is rated low as the additional construction traffic is expected to cause minor measurable alterations to road conditions and traffic performance. The extent of the impact is regional since it affects various road networks within the Erongo Region, between Walvis Bay and the Project site. The probability of the impact occurring is considered likely (high) due to the simultaneous and continuous movement of construction and operational vehicles associated with both projects. The sensitivity of the receptor is medium as the affected road network has regional-level importance or value and has limited alternatives or substitutes. Therefore, the significance of the impact has been rated adverse minor (before mitigation), as shown in Table 64. The mitigation measures have been included in Table 64 and the final ESMP (Appendix A).

7.16.2.3 The cumulative increase in heavy axle loading from both mines (Uis Tin Mine and Kokoseb Project) accelerates wear on the C36, C35, C34, D3712 and D3714 gravel roads during construction

The combined traffic volumes can lead to the formation of corrugations, potholes, edge break and rutting, which in turn alter drainage patterns and amplify seasonal erosion impacts. This creates a feedback loop where degraded surfaces generate more dust, reduce visibility and increase the risk of vehicle damage and collisions. The cumulative effect therefore extends beyond mere additive wear, and poor surface quality accelerates further deterioration and elevates maintenance demands.

The nature of the impact is adverse as the combined mining traffic accelerates road deterioration, worsens drainage and erosion, creates a harmful feedback loop of dust and reduced visibility and increases safety risks for all road users. The impact is considered cumulative since it results from the combined traffic of both operations (projects), with effects that build up, interact and intensify over time and resulting in greater road deterioration. The impact is reversible as road damage, drainage issues and dust can all be mitigated through routine maintenance and rehabilitation, meaning the effects do not cause permanent or irreversible harm. The duration of the impact is short term (1 – 5 years) as the high traffic volumes during the construction will cease after completion of the construction phase (<2 years).

The magnitude of change is low as the impact only causes minor, manageable changes to road quality. The extent of the impact is considered regional as it is expected that the degradations of regional roadways will not significantly alter or limit communities from using the same roadways. The probability of the impact occurring is rated high (likely) as both

projects will require traffic movements, delivery of consumables, equipment and machinery, simultaneously.

However, the sensitivity of the receptor is medium as the affected roads are of regional importance. Overall, the significance of the impact has been rated adverse minor (before mitigation), as shown in Table 64. The mitigation measures have been included in Table 64 and the final ESMP (Appendix A).

Interspecific cumulative impacts during the operational phase

7.16.2.4 Job creation and investment in the local economy during the operational phase of the Project along with injection of revenue into the local economy by other local businesses and projects

Throughout the operational phase, the Project will form part of the broader economic activity occurring in the area and will interact cumulatively with other existing projects and emerging developments. Continued employment associated with day-to-day operations and maintenance will incrementally add to regional job availability and provide a stable source of income for workers. Ongoing operational expenditure on services, materials and logistics will contribute to sustained demand for local and regional suppliers. In combination with similar spending patterns from other operational projects, these activities will support longer-term economic circulation, strengthen local business viability and contribute to workforce stability. Although the Project's individual contribution may be limited in scale, its integration into the wider economic landscape results in a cumulative positive effect over the duration of operations.

The nature of this impact is beneficial and cumulative because operational-related employment and expenditure contribute positively to local incomes and business activity, and when combined with other ongoing projects in the region, these effects add together to amplify overall economic stimulation during the operational period. The impact is considered reversible, as the economic benefits are tied to ongoing operations and will decline once these activities, along with related employment and spending, come to an end. The duration of the impact is medium term (5 - 15 years) as it expected that this impact will last throughout the LoM (~12 years). The extent of the impact is regional because Project-related employment and spending benefit workers and businesses across surrounding towns and districts. The magnitude of change is rated high as the scale of employment and economic activity generated is expected to result in major, tangible and noticeable improvements in regional economic conditions. The probability of the impact occurring is likely because operations will certainly generate employment and spending, which will combine with other regional economic activities to produce cumulative socio-economic benefits. The sensitivity of the impact is medium as there will be a regional impact. Overall, the significance of the impact has been rated beneficial major (Table 64).

7.16.2.5 Job creation and investment in the national economy during the operational phase of the Project, along with injection of revenue into the national economy, by other national businesses and projects

During the operational phase, the Project will contribute to employment creation and sustained economic activity at a national scale. Ongoing demand for skilled, semi-skilled and support personnel will generate stable income streams, while long-term operational expenditure on goods, services, maintenance, logistics and specialist inputs will result in continued financial flows within the national economy. These contributions will occur simultaneously and interact with expenditures from other operating projects, industries and nationally active businesses, collectively reinforcing national economic stimulation. The probability of these benefits occurring is definite, as jobs, royalties and taxes from the Project will directly support the national economy. Although the Project represents only one component of broader national economic activity, its integration with concurrent operational investments and employment patterns will cumulatively support economic growth, workforce stability and business continuity over the life of the Project.

The nature of the impact is beneficial and cumulative because long-term employment and operational spending contribute positively to the national economy and when combined with other ongoing projects and industries, collectively reinforce economic activity and growth over the life of the Project. However, the impact is reversible because the economic benefits are tied to various project operations and will decline if operations cease. The magnitude of change is rated high because sustained employment and long-term operational spendings result in significant improvements in national economic activities and resource quality. The duration of the impact is medium term (5 - 15 years) as these benefits are tied to the LoM (~12 years). The extent of the impact is national as the jobs created and money spent benefits the entire national economy. The probability of the impact occurring is definite as jobs and royalties and taxes from the Project will benefit the national economy. The sensitivity of the impact is high as this benefits the entire nation and the government in meeting the nation's economic growth. Overall, the significance of the impact is rated beneficial major (Table 64).

7.16.2.6 Inward migration and pressure on local resources

The operational phase of the Project is expected to attract job seekers and their family members to the surrounding area, resulting in population immigration and increased demand for local services and resources. In addition to the Project, the Uis – Okombahe area hosts other mining developments and exploration projects, including the Uis Tin Mine (UTM), located approximately 36 km southeast (SE) of the Project site, lithium and rare metals prospects and proposed marble mining. Together, these projects could attract workers to the area, increasing inward migration and cumulative pressure on local services, infrastructure and natural resources. This effect may be compounded where another project becomes operational or enters the construction phase within the same area of influence. This will result in additional inward migration over a relatively short time period.

The combined inward migration associated with multiple projects may place cumulative pressure on existing infrastructure and natural resources, including housing availability, water supply, sanitation services, healthcare, education facilities, energy supply, waste management systems and local transport networks. Increased demand for water and land may also intensify pressure on already limited natural resources in the region. If not adequately planned and managed at a regional or municipal level, these cumulative pressures could reduce service reliability, increase competition for resources, contribute to informal settlement expansion and elevate social tensions within host communities. The cumulative impact results from the additive effect of workforce related migration associated with multiple projects operating concurrently in the same region.

The impact is considered adverse as increased inward migration strains local services and resources, potentially affecting community well-being. It is regarded a cumulative impact because multiple projects operating concurrently amplifies this pressure, creating greater effects than a single project alone. The impact is reversible as pressures on services and resources can be reduced over time once the various projects end. The magnitude of change is moderate. Although inward migration increase demand on local resources and services, it does not completely deplete them or compromise their overall functionality. The duration of the impact is long term (>15 years) as most projects have a life span of roughly 15 years or longer. The impact is regional in scope, as it will place pressure on local municipal services and resources, including groundwater. The probability of the impact occurring is possible (medium) as there are other projects and developments may happen in the area. The sensitivity is medium because local municipalities and authorities have some capacity to absorb the influx of workers and their families, but the cumulative pressure from multiple projects could strain services and resources, affecting their ability to accommodate the influx. Overall, the significance of the impact is rated adverse moderate (before mitigation) (Table 64). Mitigation measures are included in the final ESMP (Appendix A).

7.16.2.7 Combined operational traffic from the Project and the UTM will create long-term cumulative traffic loads on the regional road network that exceeds what the mines would generate in isolation

The operational UTM operates a mature logistics chain that includes routine concentrate haulage, ongoing inward transport of diesel, process reagents, equipment, consumables and regular staff commuting. The Project will add its own operational fleet, including daily employee transport, shift-change buses, maintenance vehicles, supervisory light vehicles, reagent supply trucks, fuel deliveries and waste-haul vehicles. The cumulative operational traffic load will be continuous rather than episodic, extending over the LoM for both operations. This sustained overlap results in a long-term elevation of vehicles travelled, peak-hour traffic intensity and heavy-vehicle presence across the C34, and C36 and the B2 corridors. The cumulative effect is an increase in traffic on mine corridor routes and prolonged exposure of communities to mixed traffic characteristic along the mining corridors.

The nature of the impact is adverse as the combined, long-term traffic from both mines and increases heavy-vehicle activity traffic exposes communities to higher traffic dust and safety risks. The impact is cumulative since it results from the combined effect of traffic from both operational mines, rather than from one operation alone. The impact is reversible as increased traffic and associated nuisances will cease once mining operations cease (or if at least one mine ceases operations). The duration of the impact is rated medium term (5 – 15 years) given that it will only last for the Project's operational phase (~12 years) and will end once mining activities and associated traffic cease.

The magnitude of change is rated low as the additional traffic from the Project is expected to only cause minor and measurable changes to current road conditions. While traffic volumes increase, the effect is limited to small alterations in congestion frequency and heavy-vehicle presence. The extent of the impact is regional since it affects the broader transport network, including the C34, C35 and C36 gravel roads that connect the Project sites to the B2 corridor. The probability of the impact occurring is rated high (likely), as it is expected that there will be traffic increases as a consequence of both mines operating simultaneously. The sensitivity of the impact is medium as the affected road network, including the C34, C35 and C36 gravel roads and the B2 corridor functions as important regional transport systems that supports mining, tourism, local communities and commercial activities. Overall, the significance of the impact is rated adverse minor (before mitigation), as shown in Table 64. The mitigation measures have been included in Table 64and the final ESMP (Appendix A).

7.16.2.8 The combined operational traffic streams also compound road-safety risks due to the increased frequency of interactions among light vehicles, commuter buses, medium goods vehicles and heavy haul trucks from both operational mines

The rural road network comprising sealed and gravel sections presents operational constraints that become more pronounced under cumulative loading conditions. Narrow gravel roads without sealed shoulders create limited safe overtaking opportunities, meaning that the increased density of slow-moving heavy trucks from both mines heightens driver frustration and encourages risky manoeuvres. Additionally, operational vehicles from both mines are expected to follow similar scheduling patterns, particularly for shift changes and routine fuel or reagent supply deliveries, increasing the likelihood of overlapping peak traffic periods. Dust reduction in visibility, loose gravel, corrugation and inconsistent road surfacing become more problematic as multiple heavy fleets traverse the same corridors daily. Over time, these conditions elevate the probability of rear-end collisions, hazardous overtaking incidents, loss-of-control events and vehicle-to-pedestrian conflicts, especially near residential or community areas adjacent to Uis.

The nature of the impact is adverse as increased heavy-vehicle traffic from both mines worsens existing road limitations, faster road deterioration, increased risky driver behaviour

and a higher likelihood of accidents. The is considered as cumulative as traffic from both mines adds up and interacts on the same limited road network.

This creates greater congestion, road wear and safety risks. The impact is deemed reversible as once mining traffic decreases or ceases, dust and safety risks reduce, and normal road conditions can be restored through routine maintenance. The duration of the impact is medium term (5 – 15 years) given that increased mining traffic and its related safety risks will continue throughout the expected LoM (~12 years) and will not be permanent.

The magnitude of change is rated high as compromised safety conditions could result in collisions, meaning loss of assets, reduced quality of life or potentially loss of life. The extent of the impact is regional since the impact is spread across the broader regional road network from Walvis Bay to the Project site, extending beyond the immediate Uis–Okombahe area. The probability of the impact occurring is possible given that the impact could occur under the expected operational traffic and road conditions. The sensitivity of the impact is rated medium as the road network is important from a regional perspective and there are few alternative roads. It is expected that the road network will have a moderate capacity to handle increased traffic and accommodate change. Overall, the significance of the impact is rated adverse minor (before mitigation), as shown in Table 64. The mitigation measures are listed in Table 64 and the final ESMP (Appendix A).

7.16.2.9 The combined operational traffic from the Project and UTM exerts a significant cumulative impact on gravel and semi-improved roads (C34, C35, C36 gravel roads) that are inherently sensitive to heavy axle loads and constant vehicle passage

The simultaneous presence of two (2) long-term operational mines will greatly accelerate road surface deterioration, promote deeper rutting and more severe corrugation along gravel segments. The structural lifespan of road sections subjected to repeated braking, acceleration and turning movements particularly around mine access junctions and load-transfer points may be substantially shortened. Furthermore, sealed sections of the C34, C35 and C36 gravel roads are at risk of deformation, if not designed to withstand frequent heavy haulage from two (2) separate mining fleets. As the road condition deteriorates, dust emissions increase and worsening traffic safety risks for all road users.

The nature of the impact is adverse as traffic from both operational mines will reduce road conditions, causing faster surface damage, reduced safety, higher dust levels and increased maintenance demands. The impact is cumulative since the road deterioration results from the combined, additive effects of heavy-haul traffic generated by two (2) separate mining operations over time. The impact is considered reversible as the road degradation, such as rutting, corrugation and dust can be mitigated through road maintenance interventions. The duration of the impact is rated medium term (5 – 15 years) given that the impact will only persist for the duration of LoM (~12 years).

The magnitude of change is rated low as the expected road deterioration represents measurable but limited alterations to certain road characteristics, such as surface roughness, minor rutting or small areas of potholing, without fundamentally compromising the overall functionality of the road. The extent of the impact is regional as the impact affects regional gravel road networks, namely the C34, C35 and C36 gravel roads. The probability of the impact occurring is likely, given that the conditions that cause road deterioration, heavy-haul traffic, repeated braking and turning movements and seasonal erosion, will regularly occur as part of normal mining operations. With two mining fleets using the same road network, increased wear is expected. The sensitivity of the impact is rated medium as the affected road sections are of regional importance and serve the wider community. Overall, the significance of this impact is rated adverse moderate (before mitigation), as shown in Table 64. The mitigation measures are included in Table 64 and the final ESMP (Appendix A).

Table 64 - The inter-cumulative impacts of the proposed Project with management measures

Receptor	Impacts	Significance of impact	Impact management
Construction phase			
Employment, skills, the local and regional economy	**Activity:** Job creation and investment in the local economy during the construction phase. **Impact:** Reducing unemployment, enhancing skills development through on-site training and attracting investments. Spur the formation of new businesses in neighbouring communities, cultivating an entrepreneurial environment and enhancing local economic diversity. The resulting growth in businesses and employment enlarges the local government's tax base, generating extra revenue for crucial public services like education, healthcare and infrastructure. This contributes significantly to the comprehensive development of neighbouring communities. Moreover, the expansion of businesses involves investments in training programs, elevating the skills of the local workforce, boosting competitiveness and attracting additional investments, ultimately fostering innovation.	Beneficial Major (9)	– Introduce focused training initiatives aimed at enhancing the skills of the local workforce, encompassing both technical mining expertise and soft skills; – Invest in community development projects, including, healthcare, and educational facilities to enhance overall quality of life. – Preference to local suppliers for goods and services, thereby fostering the growth of indigenous businesses; – Collaborate with local and regional authorities to enhance infrastructure such as roads, power supply and water facilities in support of mining operations; and – Explore prospects in tourism, agriculture, or other sectors that can flourish in tandem with mining activities.

Receptor	Impacts	Significance of impact	Impact management
Traffic	**Activity:** Additional load on road networks with existing operational traffic from UTM and construction-phase traffic from the Project. **Impact:** Increased road traffic on the C36 road.	Adverse Minor (3)	– Implement a construction traffic management plan (CTMP) that defines designated haul routes, speed limits, overtaking restrictions, driver training requirements, communication protocols (e.g., VHF channels) and contractor compliance measures such as GPS tracking of fleet vehicles; – Maintain community-oriented road-safety communication to inform local road users of high-traffic periods, slow-moving convoys, detours, or road maintenance activities related to cumulative mine traffic; and – Maintain consultation with UTM in the event of abnormal loads during construction.
	Activity: Increase in heavy axle loading from both Projects. **Impact:** Accelerated wear on the C36, D3712 and D3714 gravel roads during construction.		– Implement a coordinated road maintenance agreement between the Proponent and the Roads Authority (RA) to ensure regular grading, compaction, shoulder repair and pothole patching on gravel and district roads experiencing accelerated cumulative wear; – Enforce strict vehicle-loading and speed controls to limit heavy-axle stress on gravel surfaces; require contractor compliance through GPS tracking, calibrated loading equipment and penalties for overloaded trucks; and – Maintain ongoing communication with local communities regarding deteriorating sections, planned maintenance activities, temporary diversions and safe-driving guidance during periods of intensified mining-related traffic.

Receptor	Impacts	Significance of impact	Impact management
Operation phase			
Employment, skills, the local and regional economy	**Activity:** Job creation and investment in the local economy during the operational phase. **Impact:** Injection of revenue into the local economy along with other local businesses and projects.	Beneficial Major (8)	– Introduce focused training initiatives aimed at enhancing the skills of the local workforce, encompassing both technical mining expertise and soft skills; – Invest in community development projects, including, healthcare, and educational facilities to enhance overall quality of life. – Preference to local suppliers for goods and services, thereby fostering the growth of indigenous businesses; – Collaborate with local and regional authorities to enhance infrastructure such as roads, power supply and water facilities in support of mining operations; and – Explore prospects in tourism, agriculture, or other sectors that can flourish in tandem with mining activities.
	Activity: Job creation and investment in the local economy during the operational phase**.** **Impact:** Injection of revenue into the national economy along with other local businesses and projects.	Beneficial Major (12)	
Local services and resources	**Activity:** Influx of jobseekers in neighbouring towns and rural districts. **Impact:** Pressure on local resources.	Adverse Moderate (6)	– Prioritise recruitment of local residents where possible to reduce long-distance inward migration; – Conduct regular community consultations to assess social pressures and adapt mitigation strategies; – Support local economic development initiatives beyond mining (e.g., agriculture, small businesses) to diversify income sources and reduce dependence on Project jobs; and – All recruitment will be conducted in accordance with the official HR policies and recruitment strategies, with no hiring taking place directly on site.

Receptor	Impacts	Significance of impact	Impact management
Traffic	**Activity:** The combined traffic from the Project and the Uis Tin Mine. **Impact:** Persistent and long-term cumulative load and traffic on the regional road network that exceeds what either mine would generate in isolation.	Adverse Minor (3)	– Long-term road maintenance and surface management through collaborative agreements with the Roads Authority (RA) to undertake routine grading, shoulder repair, drainage clearing, and dust suppression on gravel corridors exposed to continuous mining traffic; – Implement continuous fleet monitoring and compliance controls using GPS tracking, telematics, speed alerts, and loading oversight to ensure that operational vehicles adhere to designated routes, do not overload gravel sections and maintain safe driving behaviour under sustained high-traffic conditions; and – Maintain ongoing stakeholder and community communication to provide advance notice of high-traffic periods, long-haul convoys, or planned maintenance, supporting safer travel behaviour and reducing community exposure to unpredictable mining corridor traffic.
	Activity: The combined operational traffic streams **Impact:** Compound road-safety risks due to the increased frequency of interactions among light vehicles, commuter buses, medium goods vehicles, and heavy haul trucks from both operations		– Upgrade and redesign access points to reduce surface shear and edge break, incorporating wider turning radii, robust surfacing, dedicated turning lanes (where feasible) and hardened shoulders to accommodate repeated manoeuvring; and – Maintain transparent communication with local communities and RA on deteriorating sections, scheduled repairs, and temporary

Receptor	Impacts	Significance of impact	Impact management
	Activity: The combined operational traffic from the Project and Uis Tin Mine using the C34, C35, C36 regional road network. **Impact:** Gravel and semi-improved roads that are inherently sensitive to heavy axle loads and constant vehicle passage are more at risk of degradation due to higher traffic.		detours to ensure community mobility is preserved despite the long-term cumulative mining loads.

8 CONCLUSION

A full and comprehensive ESIA has been undertaken for the 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 during the screening and scoping phases 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 final ESMP (Appendix A). Following the public participation process for the review of the final ESIA (this report) and final ESMP (Appendix A), updates or reassessments will be conducted, where a material change is deemed necessary.

The scope of the assessment did not take into account any assessment of the Project overhead powerline and water supply pipelines as these assessments will be covered under separate environmental clearance certificate processes.

Table 65 to Table 68 below shows the overall biophysical, social and cumulative impacts after mitigation. On a scale from 1 to 12, low to high, the beneficial (B) and negative (N) impact significance is stated.

The socio-economic impacts shown in Table 65 are predominantly beneficial, with no residual major negative impacts. The highest positive impact recorded is B12 (Revenue generation for government), while negative impacts are mostly low to moderate (N1–N4). The operational phase delivers the strongest socio-economic benefits, particularly in employment stability, fiscal revenue, and long-term economic strengthening. However, Social risks are mainly related to inclusion, safety, and demographic pressures, but remain manageable post-mitigation. No high residual social impacts remain. The required mitigation measures to ensure effective management have been included in the final ESMP (Appendix A).

Table 65 – Summary of the socio-economic impacts assessed

Socio economic environment: economic		Socio economic environment: social	
Construction phase: creation of temporary jobs in the unskilled, semi-skilled and skilled labour categories (approx. 1000 job opportunities).	B4	Construction phase: land acquisition, physical displacement and resettlement of indigenous and customary landholding communities (PS 5, PS 7).	N4
Downstream jobs: creation of jobs for third parties.	B6	Construction phase: risk of reputational damage to the Project arising from the quality and effectiveness of engagement with affected communities.	N4

Socio economic environment: economic		Socio economic environment: social	
Operational phase: creation of permanent jobs (approx. 600-800 job opportunities).	B8	Operational phase: potential exclusion of vulnerable women and unemployed youth, marginalised groups and indigenous people from employment opportunities and other Project related benefits.	N4
Employment opportunities for women and unskilled young men.	B4	Construction phase: potential influx of jobseekers and their families into the immediate Project areas. This may alter demographic profiles, dynamics of the host communities and may lead to increased strain on existing services	N1
Decommissioning phase: downsize of the workforce as the project transitions into the decommissioning and closure phase.	N2	Operational phase: potential influx of jobseekers and their families into the immediate Project area. This may alter demographic profiles, dynamics of the host communities and may lead to increased strain on existing services.	N2
Support to the local and regional economies (small medium enterprises (SMEs) and reputable trading enterprises and service providers through the procurement of goods, materials and equipment.	B6	Construction phase: potential risk of construction personnel sustaining on-site injuries, partial disabilities, life threatening scenarios or death.	N1
Decommissioning phase: reduction in revenue generated by the local and regional trading enterprises and service providers.	N3	Operational phase: potential risk of operations personnel sustaining on-site injuries, partial disabilities, life threatening scenarios or death.	N2
Revenue generation for the government through the payment of export and import levies, corporate taxes and royalties.	B12	Construction phase: opportunity for the construction workforce to develop skills and work experience that enhance their career development and employability.	B4
		Operation phase: opportunity for the operations workforce to develop skills and work experience that enhance their career development and employability.	B8

Socio economic environment: economic	Socio economic environment: social	
	Operational phase: support and upliftment of the social status quo of the host community and local economy.	B8
	Operational phase: potential spread of communicable diseases among mine personnel.	N2
	Operational phase: potential spread of communicable diseases between mine personnel and local community.	N2

Regarding the social environment, impacts associated with air quality, noise, traffic, heritage resources, blast and vibration and community health and safety are generally low after mitigation (N1-N2). Visual impacts had mostly moderate risks (N3-N4) associated with waste rock dumps, the processing plant and long-term landscape transformation represent moderate residual impacts and will require progressive rehabilitation and closure planning to minimise long-term visual intrusion. Climate-related social impacts, including water scarcity and heat stress, remain moderate but manageable through adaptive management measures shown in Table 66. The required mitigation measures to ensure effective management have been included in the final ESMP (Appendix A).

Table 66 – Summary of the social environment impacts assessed

Social environment: air quality	
Construction activities may potentially generate elevated dust concentrations that could affect local air quality and cause nuisance conditions to the AQSRs in the immediate Project area.	N3
Construction activities may potentially generate airborne particulate matter, windblown dust and combustion emissions from earthmoving equipment and machinery that could affect site operations.	N1
Occupational health and safety issues arising due to deteriorated air quality throughout the construction phase.	N2
The potential for mine operations to generate windblown dust (depositional dust and fallout dust) that could disperse beyond active work areas and affect offsite AQRs, resulting in visual nuisances and complaints.	N1
The potential for mine operational activities to generate airborne PM_{10} concentrations that could disperse beyond active work areas and affect offsite AQSRs, resulting in visual nuisances and complaints.	N1
The potential for mine operational activities to generate airborne $PM_{2.5}$ concentrations that could disperse beyond active work areas and affect offsite AQSRs, resulting in visual nuisances and complaints.	N2

The potential for operational activities to generate gaseous emissions that could disperse beyond active work areas and affect offsite AQSRs, resulting in visual nuisance and complaints.	N2
Occupational health and safety impacts related to mine employees exposed to airborne dust and combustion-related emissions throughout the operational phase.	N4
Occupational health and safety impacts as a result of the operational workforce exposed to emissions from the controlled open burning of explosive material waste.	N3
Community health and safety impacts resulting from exposure to airborne pollutants released from onsite controlled open burning of explosive material waste.	N1
Occupational health and safety impacts associated with employees exposed to airborne dust and combustion related emissions during the decommissioning phase.	N2
Social environment: noise	
Potential for mine construction activities to generate excessive noise leading to discomfort, nuisance and complaints from host and adjacent communities.	N1
Occupational health and safety issues related to noise exposure during the construction phase.	N1
Potential for mine operational activities to generate excessive noise, leading to discomfort, nuisance and complaints from host and adjacent communities.	N1
Occupational health and safety issues related to mine employees exposed to excessive noise levels throughout the LoM.	N1
Occupational health and safety issues associated with employees exposed to excessive noise levels during the decommissioning phase.	N1
Potential for noise from decommissioning activities to cause discomfort, nuisance and complaints from adjacent communities.	N1
Social environment: drill and blast	
Ground vibration exceeding limits and possible damage to local village houses during operations, No. 23 (Katora) and No. 55 – 60.	N4
Ground vibration exceeding limits and possible damage to the built environment during operations, No. 52 – 54.	N1
Ground vibration exceeding limits and possible damage to remainder of local village houses during operations, including future mine village/accommodation camp (No. 39 - 42).	N1
Ground vibration exceeding limits and possible damage to the built environment during operations, this entails tarred and gravel roads, including the D3714 road. Structures for operational purposes are included here (explosives magazine(s), mine buildings and processing plant).	N1

Ground vibration exceeding limits and possible damage to heritage sites during operations on all twelve (12) identified heritage sites, which includes historic water pools, graves, built ruin, historic well, rock art and mine shaft.	N1
Ground vibration exceeding limits and possible damage to local water sources/boreholes during operations.	N1
Air blasts exceeding limits and possible damage to local village houses during operations, houses No. 23 (Katora) and No. 55 – 60.	N4
Air blasts exceeding limits and possible damage to local village houses during operations, houses No. 36 – 40, No. 43 – 45, No. 47 – 50 and No. 52 – 54.	N1
Air blasts exceeding limits and possible damage to local village houses during operations, houses No. 41 – 42.	N1
Air blasts exceeding limits and possible damage to the built environment during operations, this entails tarred and gravel roads, including the D3714 road. Structures for operational purposes are included here (explosives magazine(s), mine buildings and processing plant).	N1
Air blasts exceeding limits and possible damage local heritage sites during operations to sites 01 - 04, 06 - 08 and 12. This includes historic water pools and graves.	N1
Air blasts exceeding limits and possible damage local heritage sites during operations to sites 05 (built ruin), sites 09 – 11 (prehistoric rock, historic mine shaft and built ruins).	N1
Air blasts exceeding limits and possible damage to local water sources/boreholes during operations.	N1
Fly rock exceeding limits and possible damage to local village houses during operations, No. 23 (Katora) and No. 55 – 60.	N2
Fly rock exceeding limits and possible damage to local village houses during operations, No. 52 – 54.	N1
Fly rock exceeding limits and possible damage to local village houses during operations, all other houses of least concern, including accommodation camp (No. 39 – 42).	N1
Fly rock exceeding limits and possible damage to the built environment during operations, No. 51-D3714 Road and mine infrastructure such as No. 67 & 70 - explosives magazines, No. 69 - processing plant, No. 71 & 72 - mine buildings.	N2
Fly rock exceeding limits and possible damage all twelve (12) identified heritage sites, which includes historic water pools, graves, built run, historic well, rock art and mine shaft.	N1
Fly rock exceeding limits and possible damage to local water sources/boreholes during operations.	N1
Noxious fumes generated during i) operational drill and blasting activities, ii) storage and handling of explosives at the explosives magazine(s) and iii) potential fires at the explosives magazine(s) impacting employee's occupational health and safety.	N1

Noxious fumes generated during i) operational drill and blasting activities, ii) storage and handling of explosives at the explosives magazine(s) and iii) potential fires at the explosives magazine(s) impacting the air quality of the local communities and employees staying at the accommodation village.	N1
Social environment: traffic	
Construction vehicle fleets may alter traffic flow and cause major wear on existing road networks.	N2
The introduction of heavy construction traffic will accelerate the degradation of the gravel road network.	N2
Potential road accidents arising from the current gravel surface condition of the C36 road.	N2
Heavy trucks transporting diesel, reagents and supplies will travel between the port of Walvis Bay and the mine, utilising the B2, C33, C36 roads and occasionally the C35/C34 routes resulting in increased degradation of these roads.	N2
Safety risks at the proposed mine access off the C36 road, where insufficient shoulder sight distance (SSD) for single-unit trucks at the existing 100 km/h speed limit could result in collisions or near misses.	N3
Potential impact of increased Project traffic on local traffic flow and safety on major district roads during peak hours (AM hours – 07:15 to 08:15, PM hours 15:00 – 16:00).	N1
Social environment: heritage	
Potential for Project activities to cause structural damage to historic water pools located in proximity to mine infrastructure and planned mine operational areas.	N2
Potential for Project activities to encroach upon: (i) a cemetery, (ii) a Christian burial site and (iii) a historic grave site, located in proximity to the planned mine operational areas.	N2
The potential for Project activities to cause structural instability and collapse of the abandoned ruin building at Aniswept.	N1
Potential for Project activities to encroach upon and disturb cultural and heritage features situated outside EPL 4818: (i) prehistoric rock art paintings (ii) the mine shaft, (iii) abandoned historic settlement and (iv) two (2) Christian graves.	N2
Potential to discover or unearth new heritage objects, artefacts and archaeological remans in the designated development areas and immediate Project site.	B9
Social environment: Visual	
Designing and planning of the mine infrastructure.	N1
Designing and planning lighting on-site.	N1
Designing and planning the mine layout (i.e. WRD, TSFs, pits etc.).	N1
Land clearing, vegetation removal, and earthworks across a large surface area. Progressive changes in the landscape may be visible from the surrounding areas.	N4
Visual disturbance from construction machinery, stockpiles, temporary infrastructure, increase in road traffic and lighting.	N2

Formation of open pits, access roads, and initial waste rock and tailings facilities that alter the natural landscape character.	N4
Degraded visual quality of the site caused by open pits or quarries.	N2
Visual intrusion associated with the waste rock dumps.	N6
Visual intrusion associated with the tailings storage facility.	N3
The plant infrastructure may detract from the visual character of the surrounding landscape.	N6
Alteration of the landscape's appearance due to mining related infrastructure and activities (i.e., linear infrastructure).	N3
Lighting used for night operations may contribute to skyglow and impact nearby receptors.	N2
Potential decrease in tourism in the area due to a diminished sense of place and landscape character.	N2
Removal of plant infrastructure, exposing previously hidden disturbed areas	N3
Potential short-term increase in visual disruption from dismantling activities and vehicle movement.	N3
Long-term visual legacy of disturbed landforms (e.g. residual dumps, tailings, pits, and borrow areas) if not properly rehabilitated.	N6
Social environment: climate change	
Impact of climate change decreasing water availability during long periods of drought in the area may cause clashes between the Project and the community in competition of a scarce and depleting resource being groundwater.	N2
Impact of increased daily temperatures on employees resulting in heat stress, fatigue and dehydration.	N2
Increase in dust storms resulting in reduced visibility may result in the increase in vehicle accidents on site which could result in the injury or death of employees.	N2

The biophysical assessment indicates that biodiversity and ecosystem disturbance during the construction phase constitute one of the more significant residual impacts (N6), primarily due to habitat loss, vegetation clearing and potential effects on protected or sensitive species. However, with the implementation of biodiversity management measures, controlled clearing, rehabilitation planning and invasive species management, these impacts are considered manageable and no high residual social impacts remain (Table 67). Soil, land use, hydrological, groundwater and geochemical impacts; including acid and metalliferous drainage are rated low following mitigation (N1-N2) (Table 67). Climate change impacts associated with GHG emissions for one reporting year are minor but remain within acceptable limits when considered in a regional and national context as shown in Table 67 The required mitigation measures to ensure effective management have been included in the final ESMP (Appendix A).

Table 67 – Summary of the biophysical environment impacts assessed

Biophysical environment: biodiversity	
Construction activities (i.e., land clearing and earthworks) may disturb or displace mammals, causing habitat loss and potential injury or mortality, particularly for protected species.	N6
Construction activities may disrupt or fragment reptile habitats, with slow-moving species especially vulnerable to displacement, injury, or mortality.	N6
Vertebrate fauna may be injured or killed if they become trapped or entangled in the proposed boundary fence.	N6
Soil disturbance, drainage changes from construction may destroy amphibian breeding sites, reduce available habitat and increase mortality risks for sensitive species.	N6
Construction activities (i.e., land clearing and earthworks) may disturb or displace avifauna, leading to the loss of nesting or roosting sites and disrupting breeding patterns.	N6
Land clearing and earthworks may cause the loss of flora, including protected or endemic species.	N6
Destruction of ecosystems, including the degradation of micro-ecosystems and loss of associated ecosystem services such as soil stability, water regulation and biodiversity support.	N6
Land clearing and construction activities may lead to soil erosion, which could indirectly affect local flora and fauna, especially near sensitive habitats and drainage lines.	N6
Poaching and harvesting of fauna and flora for subsistence use or for participation in illegal trade.	N6
Soil disturbance from machinery and infrastructure development may create favourable conditions for the spread of invasive alien plant species. Additionally, vehicles and equipment entering the site could introduce invasive species through contaminated soil or seeds, further increasing the risk of establishment.	N6
Noise and vibration may displace mammals and increase the risk of injury, mortality or entanglement.	N3
Mammals may face injury or mortality on-site if attracted to the TSF and other artificial water sources, mistaking them for natural water.	N3
Vertebrate fauna may be injured or killed if they become trapped or entangled in the proposed boundary fence.	N2
Vertebrate fauna may be at risk of injury or mortality from collisions with vehicles and heavy machinery.	N2
Traffic and disturbed landscapes may restrict reptile movement and increase mortality near pits and dumps.	N3
Altered water regimes and disturbance may threaten amphibian breeding and survival.	N3

Mine infrastructure, vehicles and lighting may increase the potential for avifauna collisions.	N6
Avifauna disturbance and displacement from noise and vibration.	N3
Avifauna risks of attraction and mortality from artificial water sources including the TSF.	N3
Operational activities may hinder vegetation regrowth, alter soil conditions, and cause long-term habitat loss.	N3
Operational activities may lead to soil erosion, which could indirectly affect local flora and fauna, especially near sensitive habitats and drainage lines.	N2
Disturbed areas may facilitate the spread of invasive alien plant species, which can also be repeatedly introduced via seeds carried by vehicles or equipment entering the site.	N2
Vegetation loss or disturbance, affecting protected or endemic species, due to poor rehabilitation and impacts from decommissioning.	N3
Loss of habitat, displacement, or mortality of fauna (mammals, reptiles, amphibians, birds) associated with decommissioning activities and poor rehabilitation practices.	N3
Rehabilitation activities and infrastructure removal during decommissioning may trigger soil erosion, indirectly affecting local flora and fauna, especially within sensitive habitats and drainage lines.	N2
Invasive alien plant species may establish in disturbed areas and can be repeatedly introduced through seeds carried on vehicles and equipment accessing the site.	N2
Biophysical environment: noise	
Construction activities may potentially generate excessive noise that could displace local fauna from their habitats and established home ranges in the immediate Project area.	N2
The potential for Project-induced (operational noise) to trigger deterioration behaviours and cause displacement of wildlife populations from the immediate Project area.	N2
Biophysical environment: drill and blast	
Ground vibration exceeding limits and possible damage to local wildlife grazing points during operations on No. 32 - wildlife animal activity (main hill/ridge habitat 4).	N4
Ground vibration exceeding limits and possible damage to local wildlife grazing points during operations of all other identified wildlife activity points (other ridge habitats, other wildlife activities, granite domes).	N1
Air blasts exceeding limits and possible damage to local wildlife grazing points during operations on No. 31 - wildlife animal activity (main hill/ridge habitat 3) and No. 33 - wildlife animal activity (main hill/ridge habitat 5).	N4
Air blasts exceeding limits and possible damage to local wildlife grazing points during operations on No. 32 - wildlife animal activity (main hill/ridge habitat 4).	N1

Fly rock exceeding limits and possible damage to local wildlife grazing points during operations of points of least concern (No. 24 – 26; 27 – 31 & 33 – 35).	N1
Fly rock exceeding limits and possible damage to local wildlife grazing points during operations on No. 32 -wildlife animal activity (main hill/ridge habitat 4).	N2
Biophysical environment: soil and land use	
Extensive clearing of vegetation for pits, WRDs, TSF, haul roads, access roads, accommodation village and processing plant and other mining infrastructure may lead to physical disturbance and destruction of soil structure.	N3
Excavation for open pits, foundations, pipelines, powerlines and stormwater structures will remove topsoil and subsoil, altering natural profile.	N3
Compaction from the use of heavy machinery during construction will reduce infiltration capacity of soil and increase runoff.	N2
Stripping and stockpiling of topsoil during construction may result in nutrient depletion, reduced microbial activity and organic matter loss, particularly relevant given already low fertility Regosols.	N2
Spills or leaks from hazardous chemicals or hydrocarbons such as fuel storage facilities, refuelling stations, workshops, generator stations and vehicle wash bays during construction may contaminate soils.	N2
Spill of diesel, lubricants and hydrocarbons during transport along the access road during construction presents spill risks resulting in soil contamination.	N2
Improper functioning of chemical toilets, septic tanks and sewage treatment facilities or French drains during construction may lead to nutrient-rich effluent infiltrating and contaminating soils.	N2
Incorrect management of hazardous and hydrocarbon chemicals during temporary storage for the construction phase may seep into soils resulting in soil contamination.	N2
Conversion of land to mining uses during construction may permanently reduce grazing capacity or prevent return to pre-mining land uses if soils are not properly reclaimed.	N6
Long-term stockpiling (100 ha) under dry and windy conditions may cause biological degradation or mixing with subsoil.	N2
Water erosion along disturbed ephemeral drainage channels and unprotected slopes, particularly during storm events, during the operational phase, could accelerate gully formation and sedimentation.	N2
Spills or leaks from hazardous chemicals or hydrocarbons such as fuel storage facilities, refuelling stations, workshops, generator stations and vehicle wash bays during operations may contaminate soils.	N1
Transport of diesel, lubricants and hydrocarbons along the access and haul roads during operations presents spill risks resulting in soil contamination.	N1
Accidental releases of explosives emulsions, ANFO, solvents and other hazardous substances during operations may contaminate soils.	N1

Potential leakage of cyanide-containing solutions from the CIL circuit, ILR system, electrowinning area, TSF or chemical storage zones or pipelines during operations may result in soil contamination.	N1
Improper functioning of the sewage treatment plants, drains, septic tanks and/ or French drains (accommodation village and operational area) during operations may lead to nutrient-rich effluent infiltrating and contaminating soils.	N1
Incorrect management of hazardous, hydrocarbons, laboratory and medical/sanitary waste during temporary storage may result in seepage into soils and contaminating them.	N1
Potential spills of ammonium nitrate solution, ANFO mixtures or emulsion precursors at the explosives magazine or during mixing and loading operations during the operation of the mine may result in soil contamination.	N2
Potential accumulation of salts around the TSF, reclaim water ponds or evaporation-prone areas/ponds during operations affecting the sparse natural vegetation and potentially inhibiting germination, growth and vegetation establishment during rehabilitation.	N2
Dust from blasting, crushing, haul roads, WRDs and the TSF during operations may deposit on surrounding soil, which can alter soil pH, reduce infiltration and change chemical properties through the accumulation of particulates, nitrates or metals.	N2
Biophysical environment: hydrological and geological	
Lag/reduction in flow to downstream areas and an altered drainage regime during construction.	N2
Reduction in surface water availability for water dependent ecosystems (aquatic and terrestrial) due to diversion or containment during construction.	N1
Contamination of run-off or surface water bodies causing a deterioration in water quality during construction.	N1
Deterioration in surface water quality due to contamination impacting water dependent ecosystems (aquatic and terrestrial) during construction.	N1
Reduction in groundwater recharge volume and quality during construction.	N1
Erosion of soil causing sedimentation in water courses during construction.	N1
Erosion of soils due to uncontrolled surface flow.	N1
Flooding during construction.	N1
Soil contamination during construction.	N1
Lag or reduction in flow to downstream areas and alteration of the drainage regime during operations.	N1
Reduction in surface water availability for water-dependent ecosystems due to diversion or containment.	N2
Contamination of runoff or surface water bodies causing deterioration in water quality.	N1
Deterioration in surface water quality affecting water-dependent ecosystems.	N1
Reduction in groundwater recharge volume and quality during operations.	N1
Erosion of soil causing sedimentation in watercourses during operations.	N1

Erosion of soils due to uncontrolled surface flow during operations.	N1
Flooding during operations may provide additional surface water resources to be captured and stored (i.e. runoff into pit sumps) reducing dependence on groundwater supply.	B2
Soil contamination during operations.	N1
Reduction or depletion of groundwater availability during operations.	N1
Loss or reduction of groundwater available for ecosystem services and other users during operations.	N1
Groundwater contamination during operations.	N1
Deterioration in required water quality for eco system services and other users during operations.	N2
Changes to aquifer characteristics during operations.	B1
Biophysical environment: geochemistry	
Acid and metalliferous drainage (AMD) impacts on soils due to leaching from the WRDs, TSF and ore stockpiles.	N1
Acid and metalliferous drainage (AMD) impacts on surface water resources due to the operations of the WRDs, TSF and ore stockpiles.	N1
Acid and metalliferous drainage (AMD) impacts on groundwater resources due to the operations of the WRDs, TSF and ore stockpiles.	N1
Biophysical environment: climate change	
Operational activities for one reporting year may increase direct (scope 1) GHG emissions (2 498 tCO_2eq) thereby contributing to climate change.	N3
Consumption of purchased electricity for one reporting year may indirectly increase (scope 2) GHG emissions (99 514 tCO_2eq) thereby contributing to climate change.	N3

Cumulative impact assessment shown in Table 68 indicates that the Project will not result in significant regional environmental degradation within the Erongo Region. While cumulative traffic loads and intraspecific blasting and air quality impacts were identified, these remain of low to moderate significance. Conversely, cumulative economic impacts are strongly positive, contributing to regional economic growth, employment generation and national revenue.

Table 68 - Summary of the intraspecific and interspecific cumulative impacts

Intraspecific	
Drill and blast	
Cumulative noise and vibration impacts from multiple blasts conducted at the same time on the local communities during operations (intraspecific cumulative impact).	N4
Air quality	
Intraspecific cumulative impact of particulate matter (PM10 and PM2.5), depositional dust, airborne chemicals and gases generated by various	N2

construction activities may lead to respiratory and health issues for employees.	
Intraspecific cumulative impact of particulate matter (PM10 and PM2.5), depositional dust, airborne chemicals and gases generated by various operational activities may lead to respiratory and health issues for employees.	N2
Noise	
Cumulative impact of noise on-site from construction activities on employees' occupational health and safety.	N2
Cumulative impact of noise on-site from operational activities on employees' occupational health and safety.	N2
Interspecific impacts	
Traffic	
Combined operational traffic from the Project and the UTM will create long-term cumulative traffic loads on the regional road network that exceeds what the mines would generate in isolation.	N2
The combined operational traffic streams also compound road-safety risks due to the increased frequency of interactions among light vehicles, commuter buses, medium goods vehicles and heavy haul trucks from both operational mines.	N2
The combined operational traffic from the Project and UTM exerts a significant cumulative impact on gravel and semi-improved roads (C34, C35, C36 gravel roads) that are inherently sensitive to heavy axle loads and constant vehicle passage.	N2
Economic	
Job creation and investment in the local economy during the construction phase of the Project along with injection of revenue into the local economy by other local businesses and projects.	B9
Job creation and investment in the local economy during the operational phase of the Project along with injection of revenue into the local economy by other local businesses and projects.	B9
Job creation and investment in the national economy during the operational phase of the Project, along with injection of revenue into the national economy, by other national businesses and projects..	B9
Inward migration and pressure on local resources.	N3

Importantly, no adverse impacts remain of high (major) significance after mitigation.

In conclusion, the final ESIA report adequately outlines the process of the impact assessment for the proposed Kokoseb Gold Mine Project and lists all the foreseeable outcomes and recommended mitigations to reduce the significance of the potential environmental impacts and social issues. The final ESMP (Appendix A) includes the required mitigation measures and

monitoring requirements throughout all the stages of the Project. All stakeholders and registered interested and affected parties (I&APs) were given the opportunity to provide comments, to ECC during the 14-day public review period of the draft ESIA report and the draft ESMP. Comments received from an I&APs during the draft ESIA and ESMP public review have been consolidated into an addendum (Appendix C).

The final ESIA and ESMP reports are submitted to the competent authority (i.e. MIME) and MEFT for review and record of decision (RoD).

9 BIBLIOGRAPHY

Adams, C.A., Fernández-Juricic, E., Bayne, E.M. *et al*., 2021. Effects of artificial light on bird movement and distribution: a systematic map. Environmental Evidence, 10, 37.

Afrobarometer. (2024). Namibia Round 10 summary of results. Survey Warehouse.

Airshed. (2025). Air Quality Impact assessment for the Kokoseb Gold Mine Project near Uis in Namibia. Airshed Planning Professionals. Pretoria. South Africa.

Airshed. (2025). Environmental Noise Baseline Assessment for the Proposed Kokoseb Gold Mine, Namibia. Airshed Planning Professionals. Pretoria. South Africa.

Ashwin, C.P., Clince, P.J. & Arun, P.R., 2023. Impact of linear infrastructure intrusions on avifauna: A review. Bulletin of the Iraq Natural History Museum, 17(3), pp.481–498.

Atlas of Namibia. (2022). Atlas of Namibia: Its land, water and life. Namibia Nature Foundation. https://atlasofnamibia.online/

Bertelsmann Stiftung, BTI 2024 Country Report — Namibia. (Gütersloh: Bertelsmann Stiftung, 2024).

BirdLife South Africa, 2024. Birds and Fences: Minimising Unintended Impacts - BirdLife South Africa.

Blaustein, A.R., Romansic, J.M., Kiesecker, J.M. & Hatch, A.C., 2011. The complexity of amphibian population declines: understanding the role of cofactors in driving amphibian losses. Annals of the New York Academy of Sciences, 1223(1), pp.108–119.

Brizio, M.V., Cabezas-Cartes, F., Avila, L.J. *et al*., 2025. Habitat conservation enhances the resilience of the lizard Liolaemus cuyumhue to high summer temperatures. Scientific Reports, 15, 3992.

Calhoun, A.J.K. & Klemens, M.W., 2002. Best development practices: Conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States.

Centers for Disease Control and Prevention. (2021). Namibia Violence Against Children and Youth Survey 2019: Final report.

Chamber of Mines of Namibia. (2023). 2022 Annual Review.

Chamber of Mines of Namibia. (2024). 2024 Annual Review (covering 1 Jan – 31 Dec 2024).

Chambers of Mines. (2025). Chambers of Mines: 2024 Annual Review. John Meinert Printers. Pg 25- 30.

Coetzee, M. (2022). Production of a national soil map and soil profile database of Namibia [PowerPoint presentation]. Department of Architecture, Planning and Construction, NUST.

Community Conservation Namibia, 2024. Combatting Wildlife Crime - Community Conservation Namibia. [online] Available at:

Cunningham, P. (2025). Baseline Study: Vertebrate Fauna and Flora Associated with the Kokoseb Gold Mine Project (EPL 4818), Okombahe Area.

Davies, G.T.O., Kirkpatrick, J.B., Cameron, E.Z., Carver, S. & Johnson, C.N., 2019. Ecosystem engineering by digging mammals: effects on soil fertility and condition in Tasmanian temperate woodland. Royal Society Open Science, 6(1)

de Groot, R.S., *et al*., 2017. Mapping the loss of ecosystem services in a region under intensive land use along the southern coast of South Africa. Land, 8(3), 51.

Donato, D.B., Nichols, O., Possingham, H., Moore, M., Ricci, P.F. & Noller, B.N., 2007. A critical review of the effects of gold cyanide-bearing tailings solutions on wildlife. Environment International, 33(7), pp.974–984.

Enviro Dynamics . (2015). Environmental Assessment for the Proposed Subdivision and Establishment of Six Townships within the Karibib Townlands .

Environmental Compliance Consultancy. (2025). EPL 4818 Soil Analysis Baseline Report, Erongo Region, Namibia.

Erbe, C., Thomas, J.A. (eds.), 2022. The Effects of Noise on Animals. In: Exploring Animal Behavior Through Sound: Volume 1. Springer, Cham.

Fellows, V., 2023. Threats to Birds: Collisions - Nighttime Lighting | U.S. Fish & Wildlife Service.

Funk, B., 2025. Eden Green.

Gadd, M., 2012. Barriers, the beef industry and unnatural selection: A review of the impact of veterinary fencing on mammals in Southern Africa.

GeoNames. (n.d.). Uis, Namibia. Retrieved October 20, 2025

Government Gazette of the Republic of Namibia. (2008). Draft Procedures and Guidelines for Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) .

Heinrich Böll Stiftung. (2021). Namibia country profile: Climate change and energy transition. Heinrich Böll Stiftung Southern Africa.

Hockin, D., Ounsted, M., Gorman, M., Hill, D., Keller, V. & Barker, M.A., 1992. Examination of the effects of disturbance of birds with reference to its importance in ecological assessments.

Innovative Transport Solutions. (2025) Transport Impact Assessment; WiaGold Mine Kokoseb Project. South Africa.

International Finance Corporation. (2007). General Environmental, Health and Safety Guidelines.

International Finance Corporation. (2012). IFC Performance Standards on Environmental and Social Sustainability.

Kunz, R. (2004). Daily rainfall data extraction utility. Institute for Commercial Forestry, Pietermaritzburg, South Africa.

Legal Assistance Centre. Seeking Safety: Domestic Violence in Namibia and the Combating of Domestic Violence Act 4 of 2003, (Windhoek: 2012)

Maree, M., Ananias, J., Lightfoot, E., Katondoka, P., & Ashton, D. (2008). Factors leading to drug and alcohol use and abuse by Namdeb employees: A comprehensive mixed-methods investigation. University of Namibia.

Martins-Oliveira, A.T., Loyola, R., Vieira, M.V. & Jordani, M.X., 2021. A global review of the threats of mining on mid-sized and large mammals. Journal for Nature Conservation, 63, 126073.

Mensah, A.K., 2015. Role of revegetation in restoring fertility of degraded mined soils in Ghana: A review. International Journal of Biodiversity and Conservation, 7(2), pp.57–80.

Ministry of Education, Arts and Culture. (2018). EMIS 2018: Annual Education Census. Ministry of Education, Arts and Culture.

Ministry of Health and Social Services (MoHSS) & ICF International. (2014). Namibia Demographic and Health Survey 2013: Final report (DHS Final Report No. FR298). MoHSS & ICF International.

Ministry of Health and Social Services (MoHSS), CDC, & ICAP (2019). Namibia Population-Based HIV Impact Assessment (NAMPHIA) 2017: Final Report. Windhoek, Namibia.

Mo Ibrahim Foundation. (2023). Namibia. Ibrahim Index of African Governance (IIAG) Data Portal.

Mortimer, B., Howard, K., Frazer, R., Whitworth, A. & Vollrath, F., 2021. Noise matters: elephants show risk-avoidance behaviour in response to human-generated seismic cues. Proceedings of the Royal Society B: Biological Sciences, 288(1955), 20210774.

Namibia Press Agency. (2024, December 3). Over 4,000 cases of GBV recorded. The Namibian.

Namibia Statistics Agency. (2012). 2011 Population and Housing Census: Main report. Namibia Statistics Agency. https://www.nsa.org.na/

Namibia Statistics Agency. (2014). Namibia Labour Force Survey 2014. Namibia Statistics Agency.

Namibia Statistics Agency. (2024). Namibia 2023 Population and Housing Census: Main report. Namibia Statistics Agency.

Namibian statisitc Agency. (2011). Namibia Population and Housing Census. Windhoek: NSA

Nankela, A. (2025). Heritage Impact Assessment (HIA) Report for the Proposed Kokoseb Gold Mine Project on EPL 4818, Erongo Region, Namibia.

National Planning Commission. (2021). Targeted review report on youth unemployment. African Peer Review Mechanism.

National Planning Commission. (2025). Namibia's Sixth National Development Plan (NDP6): Fostering economic growth, inclusiveness and resilience for sustainable development (2025/26 – 2030/31). Government of the Republic of Namibia.

OpenAI. (2025). ChatGPT (GPT-5 model, October 2025 version) [Large language model].

Owusu, E.H., Ofori, B.Y. & Attuquayefio, D.K., 2018. The secondary impact of mining on primates and other medium to large mammals in forest reserves in southwestern Ghana.

President's Emergency Plan for AIDS Relief. (2023). Namibia Country Operational Plan (COP) 2023: Strategic Direction Summary. U.S. Department of State.

Republic of Namibia, National Planning Commission. (2025). Namibia's Sixth National Development Plan (NDP6)

Rock, M., 2024. The impact of mining pollution on wildlife and our lives. Coalition to SAVE the Menominee River.

Rossman, L. A. (2008). Storm water management model user's manual (Version 5.0). U.S. Environmental Protection Agency. http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P10011XQ.txt

SANRAL. (2013). Drainage manual (6th ed.). The South African National Roads Agency Limited, Pretoria.

Shanmukha, N.T., Vinayaka, M., Lokeshappa, B. & Nadaf, S., 2024. Biodiversity loss due to mining activities. Government Engineering College, Krishnarajpet & University BDT College of Engineering, Davangere.

Shikangalah, R.N. & Mapani, B., 2021. Ephemeral river systems and their ecosystem provisions to the local populations: A review of the Huab and Ugab Rivers, Namibia.

Sinclair, A.R.E., 2003. The role of mammals as ecosystem landscapers. Centre for Biodiversity Research, University of British Columbia, Vancouver, Canada.

SLR. (2025). Water Supply Investigations and Volume Estimates: Kokoseb Gold Project. Pg 13-14. Windhoek.

Stanton-Jones, W., McIntyre, T. & Alexander, G.J., 2023. Habitat transformation correlates with the decline of Sungazer (Smaug giganteus) subpopulations.

Tembo, B., *et al*., 2018. Progresses in restoration of post-mining landscape in Africa.

Terblanché, N. (2024). Special task force to combat GBV in Erongo. Windhoek Observer.

UNAIDS, UNAIDS DATA 2022, https://www.unaids.org/sites/default/files/media_asset/data-book-2022_en.pdf (Accessed October 2025)

UNFPA, Teenage Mother tells her story, (2020) https://namibia.unfpa.org/en/news/teenage-mother-tells-her-story- (accessed October 2025)

United States Army Corps of Engineers (USACE). (2016a). HEC-RAS river analysis system – 2D modelling user manual. Institute for Water Resources, Davis, California.

United States Army Corps of Engineers (USACE). (2016b). Benchmarking of the HEC-RAS two-dimensional hydraulic modeling capabilities. Davis, California.

United States Army Corps of Engineers (USACE). (2018). HEC-RAS verification and validation tests. Davis, California.

WIA Gold Kokoseb Project Geochemistry Assessment Technical Report (2025). RGS Environmental Consultants (Pty) Ltd.

WIA Gold. (2024, October 23). Kokoseb Gold Project, Namibia.

WiaGold Limited. (2025). Kokoseb Gold Project Scoping Study Report (Rev0).

WildWeb, 2019. Caution – Animals on the road.

Word Bank., (2025) Namibia Overview.

World Health Organization. (2025, July 28). Country snapshot on alcohol and health

World Wildlife Fund, n.d. Soil erosion and degradation.

APPENDIX A – FINAL ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

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APPENDIX C – ADDENDUM REPORT

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