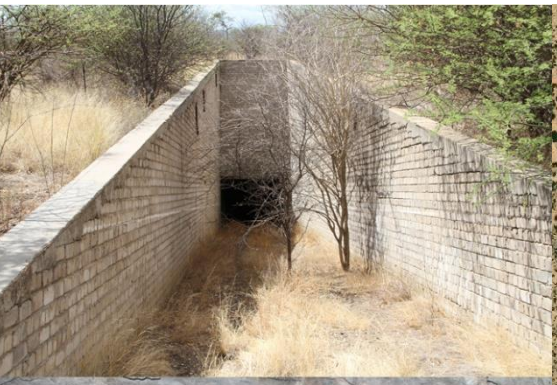
On- Road Investments (Pty) Ltd

ECC Application No: APP-002041

Updated Environmental Management Plan (EMP) Vol. 3 of 3 Report for the Mining License (ML) No. 224, Powerline, Roads and Water Supply and Other Supporting Infrastructures, Okahandja Area, **OTJOZONDJUPA REGION, NAMIBIA**



Updated October 2020

P. O Box 26826
6 Amasoniet Street
WINDHOEK, NAMIBIA

PROPONENT, LISTED ACTIVITIES AND RELATED INFORMATION SUMMARY

TYPE OF AUTHORISATIONS

Amendment of Environmental Clearance Certificate (ECC) to reflect the Mining License (ML) No. 224 on the ECC

NAME OF THE PROPONENT

On-Road Investments (Pty) Ltd

MEFT ECC REFERENCE APPLICATION No.

APP-002041

COMPETENT AUTHORITY

Ministry of Mines and Energy (MME)

ADDRESS OF THE PROPONENT AND CONTACT PERSON

P. O Box 26826
6 Amasoniet Street
WINDHOEK, NAMIBIA

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PROPOSED PROJECT

Elbe Copper-Zinc-(Silver) Mine in the Mining License (ML) No. 224, Okahandja District, Otjozondjupa Region, Central Namibia

PROJECT LOCATION

Okahandja District, Otjozondjupa Region, Central Namibia
Latitude: -22.225198, Longitude: 17.430349
Latitude: 22°13'30.7"S, Longitude: 17°25'49.3"E

ENVIRONMENTAL CONSULTANTS

Risk-Based Solutions (RBS) CC
(Consulting Arm of Foresight Group Namibia (FGN) (Pty) Ltd)
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Tel: +264 - 61- 306058. Fax: +264 - 61- 306059
Mobile: + 264-811413229. Email: smwiya@rbs.com.na
Global Office / URL: www.rbs.com.na

ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Dr. Sindila Mwiya
PhD, PG Cert, MPhil, BEng (Hons), Pr Eng

Summary Profile and Qualification of the Environmental Assessment Practitioner (EAP) / International Consultant Projects Director – Dr Sindila Mwiya

Dr Sindila Mwiya has more than eighteen (18) years of practical field-based technical industry experience in Environmental Assessment (SEA, EIA, EMP, EMS), Energy (Renewable and Non-renewable energy sources), onshore and offshore resources (minerals, oil, gas and water) exploration / prospecting, operation and utilisation, covering general and specialist technical exploration and recovery support, Health, Safety and Environment (HSE) permitting for Geophysical Surveys such as 2D, 3D and 4D Seismic, Gravity and Electromagnetic Surveys for mining and petroleum (oil and gas) operations support, through to engineering planning, layout, designing, logistical support, recovery, production / operations, compliance monitoring, rehabilitation, closure and aftercare projects lifecycles. The great array of highly technical specialist knowledge and field-based practical experiences of Dr Sindila Mwiya has now been extended to supporting the development of Environmentally Sustainable, automated / smart and Climate Change resilient homes, towns and cities.

Through his companies, Risk-Based Solutions (RBS) CC and Foresight Group Namibia (FGN) (Pty) Ltd which he founded, he has undertaken more than 200 projects for Local (Namibian), Continental (Africa) and International (Global) based clients. He has worked and continue to work for Global, Continental and Namibian based reputable resources (petroleum and mining / minerals) and energy companies such as EMGS (UK/ Norway), CGG (UK/ France/Namibia), BW Offshore (Norway/Singapore /Namibia), Shell Namibia B. V. Limited (Namibia/ the Netherlands), Tullow Oil (UK/Namibia), Debmarine (DBMN) (Namibia), Reconnaissance Energy Africa Ltd (ReconAfrica) (UK/Canada/Namibia), Osino Resource Corporation (Canada/Germany/Namibia), Desert Lion Energy Corporation (Canada/ Australia/ Namibia), Petrobras Oil and Gas (Brazil) / BP (UK)/ Namibia, REPSOL (Spain/ Namibia), ACREP (Namibia/Angola), Preview Energy Resources (UK), HRT Africa (Brazil / USA/ Namibia), Chariot Oil and Gas Exploration (UK/ Namibia), NABIRM (USA/ Namibia), Serica Energy (UK/ Namibia), Eco (Atlantic) Oil and Gas (Canada / USA/ Namibia), ION GeoVentures (USA), PGS UK Exploration (UK), TGS-Nopec (UK), Maurel & Prom (France/ Namibia), GeoPartners (UK), PetroSA Equatorial Guinea (South Africa / Equatorial Guinea/ Namibia), Preview Energy Resources (Namibia / UK), Sintezneftegaz Namibia Ltd (Russia/ Namibia), INA Namibia (INA INDUSTRIJA NAFTE d.d) (Croatia/ Namibia), Namibia Underwater Technologies (NUTAM) (South Africa/Namibia), InnoSun Holdings (Pty) Ltd and all its subsidiary renewable energy companies and projects in Namibia (Namibia / France), HopSol (Namibia/Switzerland), Momentous Solar One (Pty) Ltd (Namibia / Canada), OLC Northern Sun Energy (Pty) Ltd (Namibia) and more than 100 local companies. Dr Sindila Mwiya is highly qualified with extensive practical field-based experience in petroleum, mining, renewable energy (Solar, Wind, Biomass, Geothermal and Hydropower), Non Renewable energy (Coal, Petroleum, and Natural Gas), applied environmental assessment, management and monitoring (Scoping, EIA, EMP, EMP, EMS) and overall industry specific HSE, cleaner production programmes, Geoenvironmental, geological and geotechnical engineering specialist fields.

Dr Sindila Mwiya has undertaken and continue to undertake and manage high value projects on behalf of global and local resources and energy companies. Currently, (2020-2023) Dr Sindila Mwiya is responsible for permitting planning through to operational and completion compliance monitoring, HSE and engineering technical support for multiple major upstream onshore and offshore petroleum, minerals and mining projects, Solar and Wind Energy Projects, manufacturing and environmentally sustainable, automated / smart and Climate Change resilient homes developments in different parts of the World including Namibia. Currently, Dr Sindila Mwiya is developing a 16 Ha commercial and residential Mwale Mwiya Park in the Town of Katima Mulilo, Zambezi Region, Namibia as one of first advanced Environmentally Sustainable, automated / smart and Climate Change resilient development in Namibia. He continue to worked as an International Resources Consultant, national Environmental Assessment Practitioner (EAP) / Environmentally Sustainable, automated / smart and Climate Change resilient homes developer, Engineering / Technical Consultant (RBS / FGN), Project Manager, Programme Advisor for the Department of Natural and Applied Sciences, Namibia University of Science and Technology (NUST) and has worked as a Lecturer, University of Namibia (UNAM), External Examiner/ Moderator, NUST, National (Namibia) Technical Advisor (Directorate of Environmental Affairs, Ministry of Environment, Forestry and Tourism (MEFT) / DANIDA – Cleaner Production Component) and Chief Geologist for Engineering and Environment Division, Geological Survey of Namibia, Ministry of Mines and Energy and a Field-Based Geotechnician (Specialised in Magnetics, Seismic, Gravity and Electromagnetics Exploration and Survey Methods) under the Federal Institute for Geoscience and Natural Resources (BGR) German Mineral Exploration Promotion Project to Namibia, Geophysics Division, Geological Survey of Namibia, Ministry of Mines and Energy.

He has supervised and continue to support a number of MScs and PhDs research programmes and has been a reviewer on international, national and regional researches, plans, programmes and projects with the objective to ensure substantial local skills development, pivotal to the national socioeconomic development through the promotion of sustainable natural resources coexistence, management, development, recovery, utilisation and for development policies, plans, programmes and projects financed by governments, private investors and donor organisations. Since 2006 until 2017, he has provided extensive technical support to the Department of Environmental Affairs (DEA), Ministry of Environment, Forestry and Tourism (MEFT) through GIZ in the preparation and amendments of the Namibian Environmental Management Act, 2007, (Act No. 7 of 2007), new Strategic Environmental Assessment (SEA) Regulations, preparation of the updated Environmental Impact Assessment (EIA) Regulations as well as the preparation of the new SEA and EIA Guidelines and Procedures all aimed at promoting effective environmental assessment and management practices in Namibia.

Among his academic achievements, Dr Sindila Mwiya is a holder of a PhD (Engineering Geology/Geotechnical / Geoenvironmental / Environmental Engineering and Artificial Intelligence) – Research Thesis: Development of a Knowledge-Based System Methodology (KBSM) for the Design of Solid Waste Disposal Sites in Arid and Semiarid Environments, MPhil/PG Cert and BEng (Hons) (Engineering Geology and Geotechnics) qualifications from the University of Portsmouth, School of Earth and Environmental Sciences, United Kingdom. During the 2004 Namibia National Science Awards, organised by the Namibian Ministry of Education, and held in Windhoek, Dr Sindila Mwiya was awarded the Geologist of the Year for 2004, in the professional category. Furthermore, as part of his professional career recognition, Dr Sindila Mwiya is a life member of the Geological Society of Namibia, Consulting member of the Hydrogeological Society of Namibia and a Professional Engineer registered with the Engineering Council of Namibia.

Windhoek, Namibia May 2020

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EXECUTIVE SUMMARY

On-Road Investments (Pty) Ltd (the Proponent) has applied for a 7610 Ha area Mining License (ML) No. 224 located in the Okahandja District, Otjozondjupa Region in central Namibia, following the completion of the feasibility study that was undertaken as part of the exploration programme for the Exclusive Prospecting License (EPL) No. 4232.

This Environmental Management Plan (EMP) Report Vol. 3 of 3 provides a detailed plan of actions required in the implementation of the mitigation measures with respect to the likely impacts as identified and defined in the EIA Vol. 2 of 3 Report.

The Environmental Management Plan, described in this report, is based on the findings as outlined in the EIA (Vol. 2 of 3). On-Road Investments (Pty) Ltd must incorporate the EMP in the Environmental Management System (EMS) of the company in line with the Environmental Policy of the company. This EMP Vol. 3 of 3 report incorporates the provisions of the Minerals (Prospecting and Mining) Act (No 33 of 1992), the Environmental Management Act, 2007, (Act No. 7 of 2007) as well as all the key applicable legislative provisions as outlined in the EIA Vol. 2 of 3 Report (Chapter 3) and the Environmental Policy of On-Road Investments (Pty) Ltd.

Based on the assessment of both negative and positive impacts undertaken for the proposed Elbe Copper-Zinc-(Silver) Mine, a number of positive and negative impacts have been identified. Mitigation measures for the negative impacts have been proposed and management strategies are provided in this Environmental Management Plan (EMP Vol. 3 of 3) covering the following development stages:

(i) Preconstruction.

(ii) Construction.

(iii) Operational, and.

(iv) Closure, Decommissioning and Aftercare stages.

The following are the recommended actions to be implemented by the proponent (On-Road Investments (Pty) Ltd) as a part of the management of the impacts through implementations of this EMP Vol. 3 of 3 Report:

(i) Contract an Environmental Control Officer / External Consultant / suitable in-house resources person to lead and further develop, implement and promote environmental culture through awareness raising of the workforce, contractors and sub-contractors in the field during the whole duration of the proposed project.

(ii) Provide with other support, human and financial resources, for the implementation of the proposed mitigations and effective environmental management during the planned mine project life cycle.

(iii) Develop a simplified environmental induction and awareness programme for all the workforce, contractors and sub-contractors.

(iv) Where contracted service providers are likely to cause environmental impacts, these will need to identified and contract agreements need to be developed with costing provisions for environmental liabilities.

(v) Implement internal and external monitoring of the actions and management strategies developed during the project duration and a final Environmental Monitoring report to be prepared by the Environmental Control Officer / External Consultant / suitable in-house resource person and to be submitted to the regulators and to end the proposed mine project, and.

(vi) Develop and implement a monitoring programme that will fit into the overall company's Environmental Management Systems (EMS).

The responsibilities to ensure that all the recommendations contained in this EMP Report are executed accordingly, rest with the proponent **(On-Road Investments (Pty) Ltd).** It's the overall responsibilities of the proponent to ensure that the proposed project activities are in compliance with all the applicable national regulations as well as regional and international treaties / obligations to which Namibia is party (Refer to Vol. 2 of 3 – EIA Report). All applicable and relevant permits / authorisations must be obtained before the implementation of the proposed mine development.

The proponent must provide all appropriate resource required for the implementation of this EMP as well as an independently managed (not directly controlled by the mining company) **funding instrument for final mine Closure, Final Rehabilitation and Aftercare environmental liabilities as detailed in the Mine Closure Plan**. It is the responsibility of the proponent to make sure that all members of the workforce including contractors and subcontractors are aware of this EMP provisions and its objectives.

It is hereby recommended that the proponent take all the necessary steps to implement all the recommendations of this EMP for the successful execution of the preconstruction, construction, operational, closure, decommissioning, and aftercare activities of the proposed Copper-Zinc-(Silver) Mining Project in the ML No. 224, Okahandja Area, Otjozondjupa Region.

1. PROJECT BACKGROUND

1.1 Introduction

On-Road Investments (Pty) Ltd (**the Proponent**) has applied for a Mining License (ML) No. 224 falling within its Exclusive Prospecting License (EPL) 4232 in order to develop the proposed Elbe Copper-Zinc Mine Project following the completion of the feasibility study. The construction of the proposed mine, processing plant and all the supporting infrastructure will only implemented once all the relevant permits have been issued by the various Government regulators including: the ML being granted by the Ministry of Mines and Energy (MME) (**the Competent Authority**), the amended Environmental Clearance Certificate (ECC) issued by the Environmental Commissioner in the Ministry of Environment, Forestry and Tourism (MEFT) and the freshwater and waste water discharge permits issued by the Ministry of Agriculture, Water and Land Reform (MAWLR).

The following is the summary of the proposed mine developmental stages that will be implemented by the proponent: Preconstruction, construction, operation, ongoing monitoring and rehabilitation and closure, decommissioning, and aftercare.

This Environmental Management Plan (EMP) Report covers the entire above proposed project lifecycle.

1.2 Project Location and Land Use

1.2.1 Location

The ML No. 224 is located in the Okahandja District, Otjozondjupa Region, central Namibia (Figs. 1.1 - 1.5). The ML 224 area totalling 7610 Ha cover mainly Farm Elbe 10 and part of Farm Ombujongupa 292 (Fig. 1.3).

1.2.2 Land Use

The general topography is dominated by flat landscape with topographic high area characterised by dendritic ephemeral rivers network. The general land use of the area is mainly dominated by agriculture (cattle farming) and minerals prospecting with game (wildlife) farming, tourism and hospitality as one of the fast-growing lands uses options in the general area.

1.3 Regulatory Requirements

The activities to be undertaken in the ML No. 224 such as mining, minerals processing, ongoing exploration and all the supporting infrastructural developmental activities are listed in the Environmental Impact Assessment (EIA) Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). The proposed project cannot be undertaken without an Environmental Clearance Certificate (ECC) issued by the Environmental Commissioner.

The proponent is required to have had undertaken an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) in order to support the separate application for ECC for the ongoing exploration and proposed mining operations. In fulfilment of this environmental requirements, the proponent appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant for the proposed project and led by Dr Sindila Mwiya as the Environmental Assessment Practitioner (EAP).

The renewed ECC for exploration was obtained on the 18th September 2019 as shown in Fig. 1.6 while the ECC for the proposed mining operations was issued on the 9th April 2018 under the ML 188 (Fig. 1.7) to be mended to ML 224 following the resubmission of the application for ML. This updated EIA report has been prepared in order to support the application for amendment of the ECC shown in Fig. 1.7 to reflect the current ML No. 224.

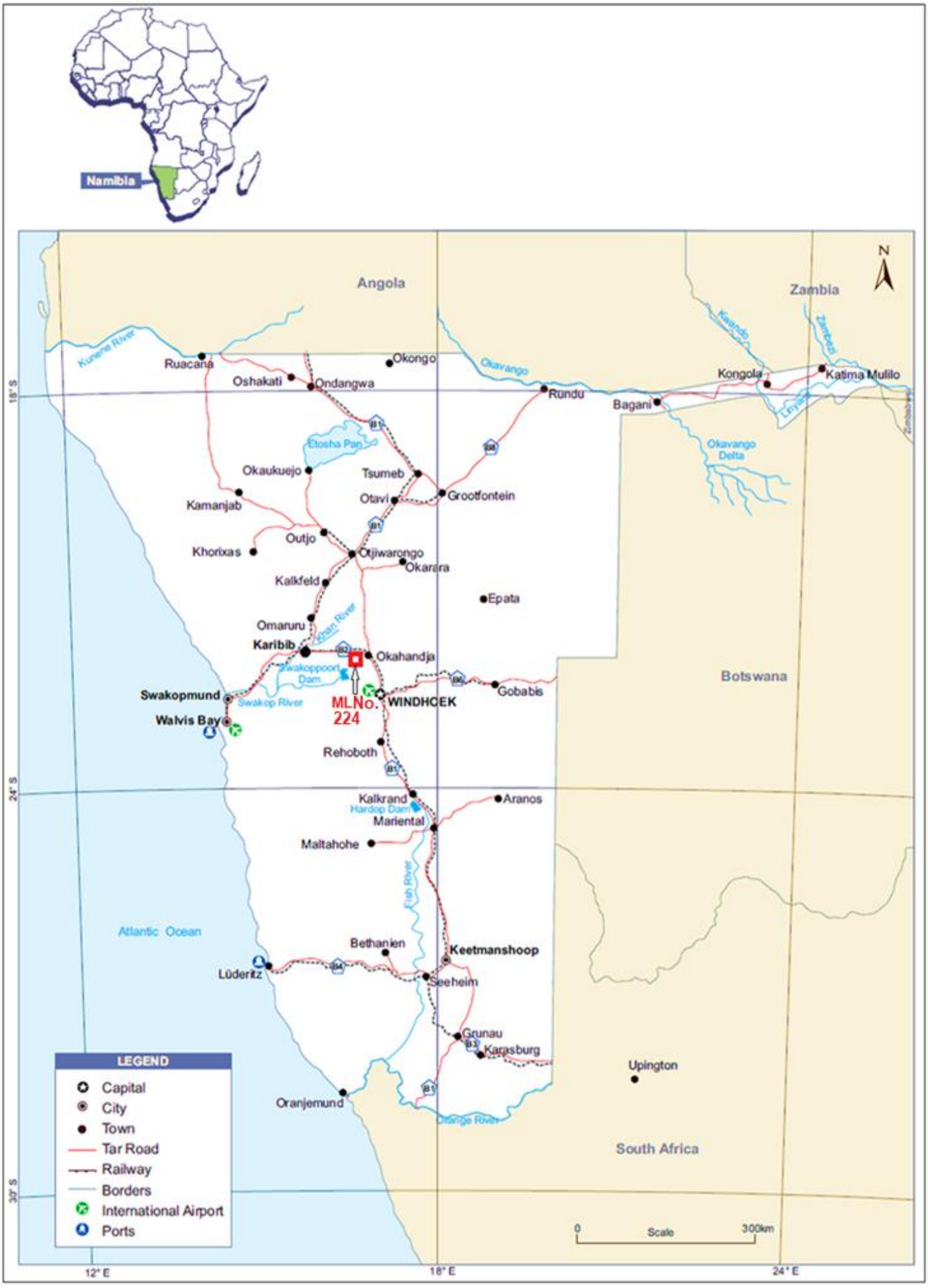


Figure 1.1: Regional location of the ML No. 224.

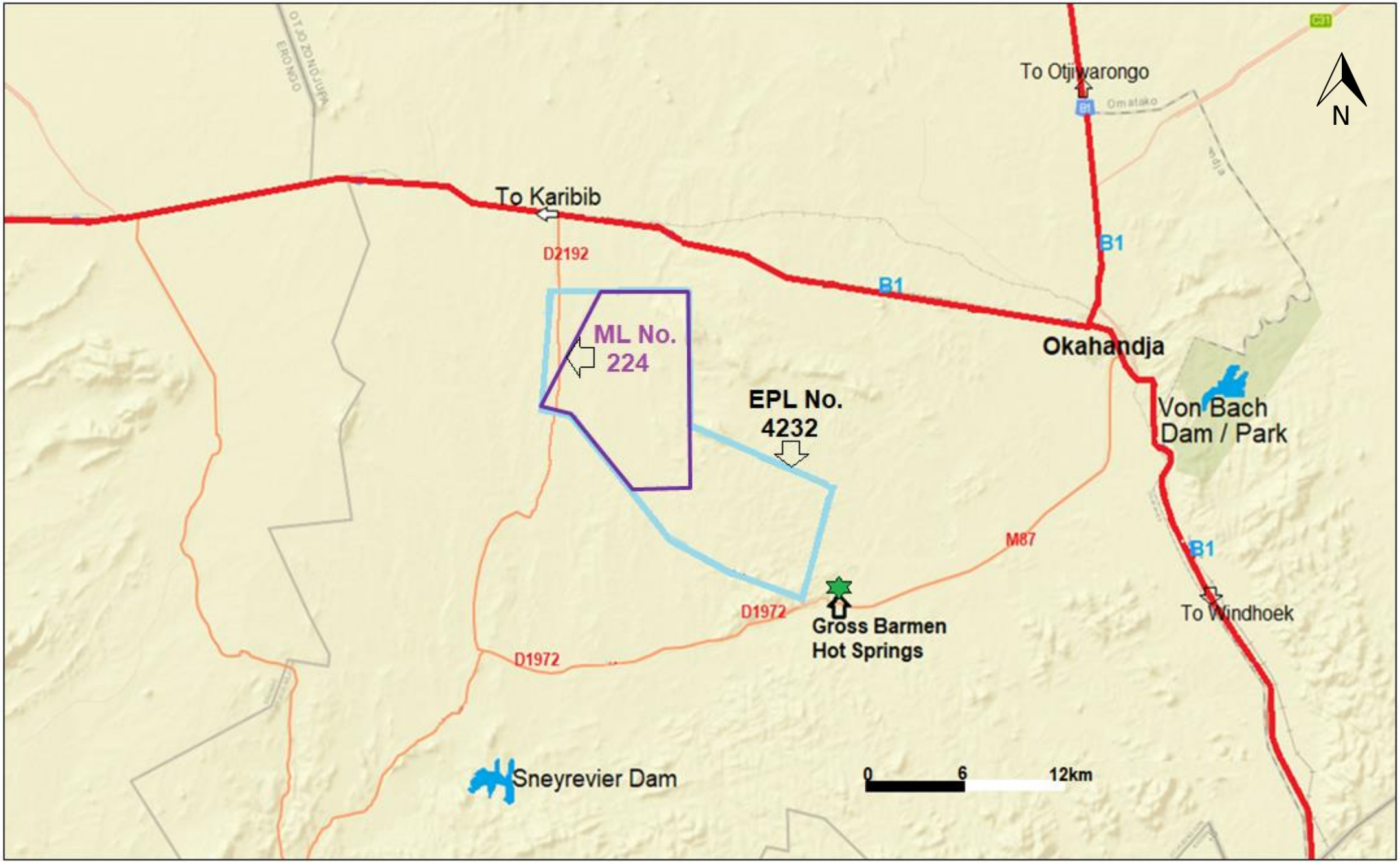


Figure 1.2: Detailed location of the ML No. 224 (Source: //portals.flexicadastre.com/Namibia/).

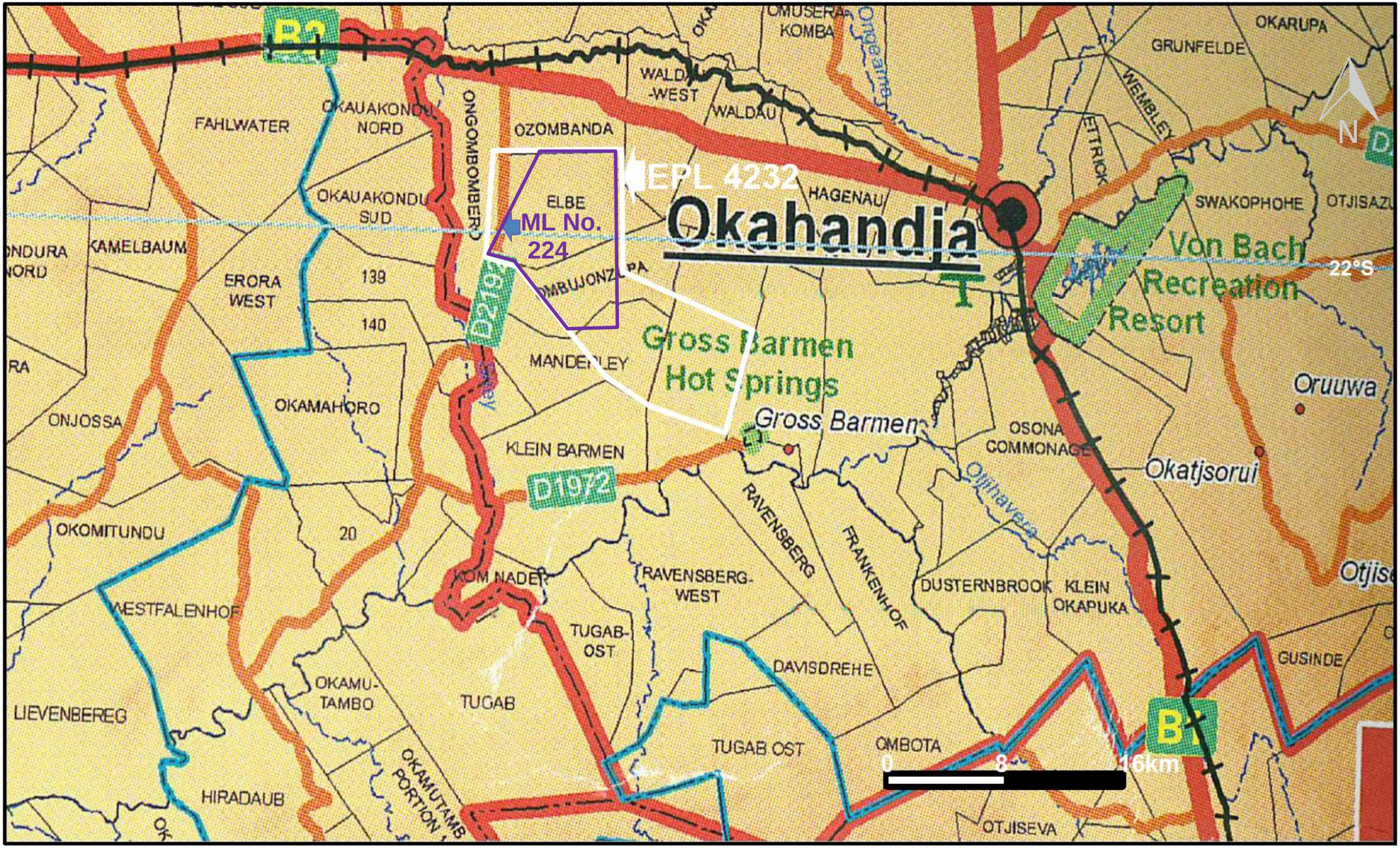
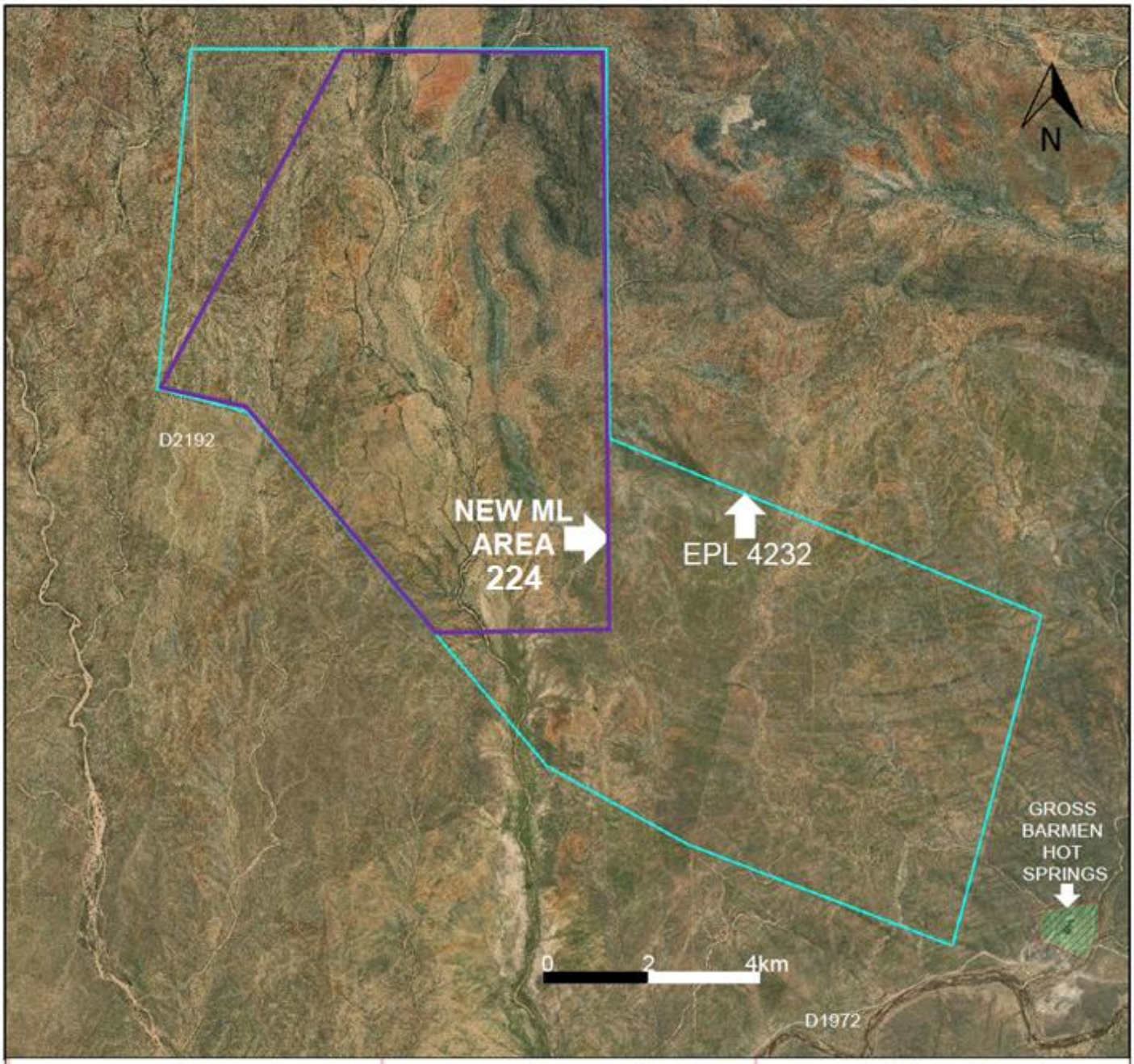


Figure 1.3: Commercial farmland covered by the ML No. 224 (Source: Namibia 1:1000000 Registration Divisions Extract).



UTM		Decimal Degrees (New)		Deg Min Sec (New)	
Easting	Northing	Latitude	Longitude	Latitude	Longitude
671000,00	7560000,00	22,05641	16,65713	22° 3' 23,1"	16° 39' 25,7"
667193,45	7560040,59	22,05642	16,62025	22° 3' 23,1"	16° 37' 12,9"
663899,13	7564464,42	22,01678	16,58789	22° 1' 0,4"	16° 35' 16,4"
662105,77	7564938,17	22,01267	16,57047	22° 0' 45,6"	16° 34' 13,7"
662317,22	7565461,92	22,00792	16,57247	22° 0' 28,5"	16° 34' 20,9"
665960,78	7571802,88	21,95212	16,60713	21° 57' 7,6"	16° 36' 25,7"
671143,50	7571578,93	21,95183	16,65731	21° 57' 6,6"	16° 39' 26,3"
671119,10	7569589,09	21,96981	16,65728	21° 58' 11,3"	16° 39' 26,2"
671120,13	7563861,75	22,02153	16,65789	22° 1' 17,5"	16° 39' 28,4"

Figure 1.4: Detailed location of the ML No. 224 Area within the EPL 4232 (Source: Jankowitz, 2020).

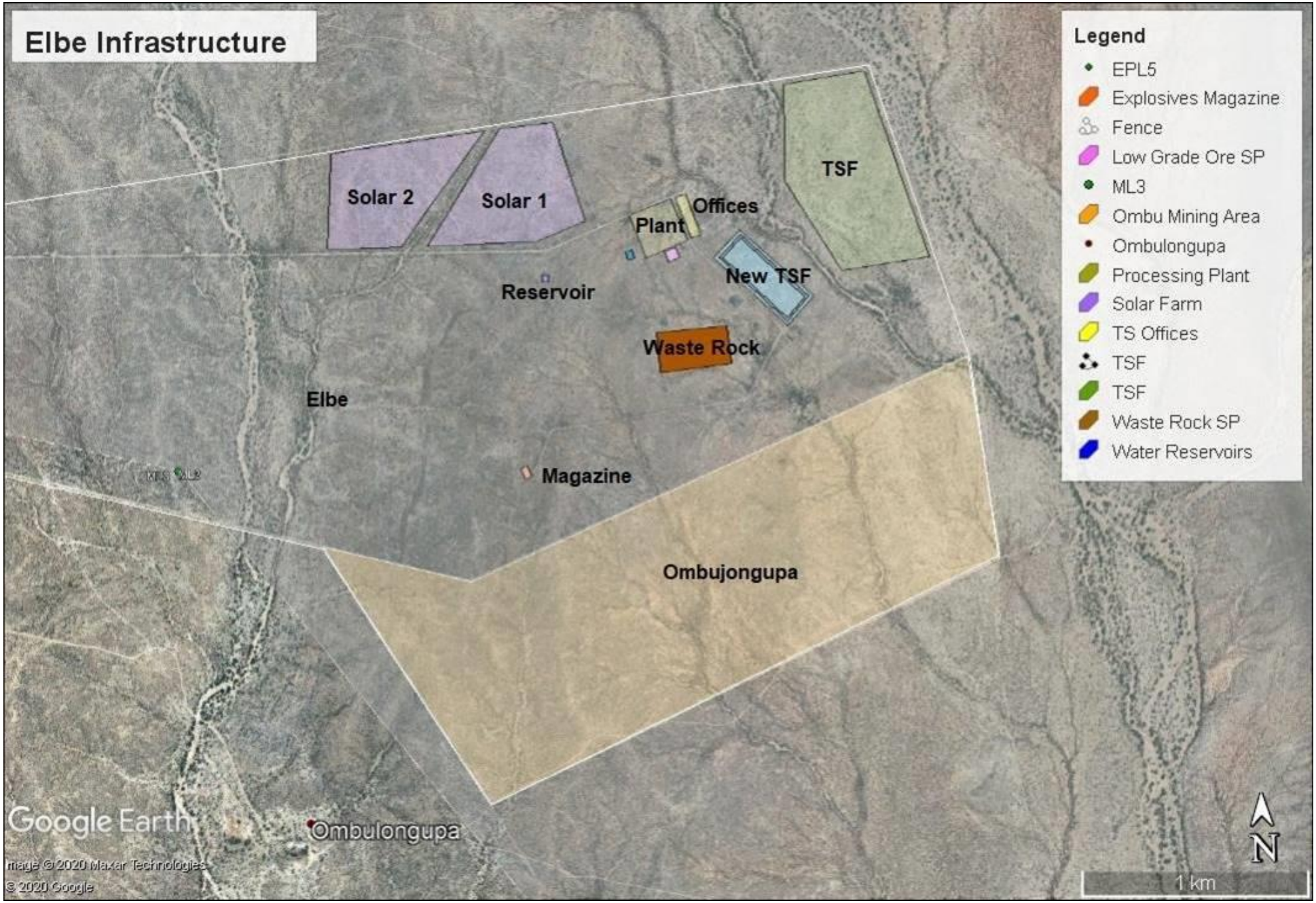


Figure 1.5: Overview of the supporting infrastructure to the proposed ML No. 224 Area within the EPL 4232 (Source: Jankowitz, 2020).

ECC – 00117 Serial No:V6lZg8117

REPUBLIC OF NAMIBIA

MINISTRY OF ENVIRONMENT AND TOURISM

OFFICE OF THE ENVIRONMENTAL COMMISSIONER

ENVIRONMENTAL CLEARANCE CERTIFICATE

ISSUED

In accordance with Section 37(2) of the Environmental Management Act (Act No. 7 of 2007)

TO

On-Road Investments (Pty) Ltd
P O Box 26826, Windhoek Namibia, 6 Amasoniet Street, Eros.

TO UNDERTAKE THE FOLLOWING LISTED ACTIVITY

Proposed Minerals Exploration in The Exclusive Prospecting License (EPL) No. 4232, Situated in Okahandja Area, Otjozondjupa Region.

MINISTRY OF ENVIRONMENT AND TOURISM
P/Bag 13306
Windhoek, Namibia
2019 -09- 18
Office of the
Deputy Environmental Commissioner

DEPUTY ENVIRONMENTAL COMMISSIONER

Issued on the date: 2019-09-18

Expires on this date: 2022-09-18

(See conditions printed over leaf)

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NAMIBIA TRASH BIN DO THE RIGHT THING

This certificate is printed without erasures or alterations

Figure 1.6: Copy of the renewed ECC for exploration in the EPL 4232 obtained on the 18th September 2019.

REPUBLIC OF NAMIBIA

MINISTRY OF ENVIRONMENT AND TOURISM

Tel: (00 26461) 284 2111
Fax: (00 26461) 229 936

E-mail: simon.hangula@met.gov.na

Enquiries: Mr. Simon Hangula

Cnr Robert Mugabe &
Dr Kenneth Kaunda Street
Private Bag 13306
Windhoek
Namibia

04 April 2018

OFFICE OF THE ENVIRONMENTAL COMMISSIONER

The Manager
On-Road Investments (Pty) Ltd
6 Amasoniet Street Eros
Windhoek

Dear Sir/Madam

SUBJECT: ENVIRONMENTAL CLEARANCE CERTIFICATE FOR THE PROPOSED ELBE COPPER-ZINC-SILVER-GOLD MINING PROJECT WITHIN MINING LICENSE (ML) NO.188, POWERLINE, ROADS WATER SUPPLY AND OTHER INFRASTRUCTURES IN THE EXCLUSIVE PROSPECTING LICENSE (EPL) NO. 4232, OKAHANDJA DISTRICT, OTJOZONDJUPA REGION

The Environmental impact assessment and Environmental Management Plan submitted are sufficient as these have made an adequate provision of the environmental management for the proposed activities. From this perspective, regular environmental monitoring and evaluations on environmental performance should be conducted. Targets for improvements should be established and monitored throughout this process.

This Ministry reserves the right to attach further legislative and regulatory conditions during the operational phase of the project.

On the basis of the above, this letter serves as an environmental clearance certificate for the project to commence. However, this clearance letter does not in any way hold the Ministry of Environment and Tourism accountable for misleading information, nor any adverse effects that may arise from this project's activities. Instead, full accountability rests with On-Road Investments (Pty) Ltd and their consultants.

This environmental clearance is valid for a period of (three) 3 years, from the date of issue unless withdrawn by this office.

Yours sincerely,

MINISTRY OF ENVIRONMENT AND TOURISM
P/Bag 13306
Windhoek, Namibia
2018 -04- 09
Environmental Commissioner

Teofilus Nghitila
ENVIRONMENTAL COMMISSIONER

"Stop the poaching of our rhinos"

All official correspondence must be addressed to the Permanent Secretary

Figure 1.7: Copy of the ECC for proposed mining operations issued on the 9th April 2018 under the ML 188 now ML 224. This updated EIA report has been prepared in order to support the application for amendment of this ECC to reflect the current ML No. 224.

1.4 Summary of the Proposed Elbe Mine Project

The following is the summary of the proposed Elbe Mine Project:

1. **Ore Reserve** - According to van Vuuren (2020), the Run of Mine (ROM) reserve is 2,946Mt at an average grade of 1,06 percent Copper, 0,58 percent Zinc and 7,07 grams per ton of Silver. The Reserves are classified as Probable Reserves.

2. **Mining Method** - According to van Vuuren (2020), the underground mining process will utilise the already existing two service declines with an additional ventilation rises providing supplementary airways (Figs. 1.8 -1.12). The nature of the orebody lends itself to mining via sub-level caving. Access to the underground workings will be through 3 declines that have already been partially mined. One of these declines will be used as conveyor decline to be used to transport the ore and waste out of the mine. The other two declines will be used for the transport of men and material.

3. **Minerals Processing** - According to Robertson and Ilunga (2020), the Run of Mine (ROM) will be undertaken at a feed grade of 1.42 % Cu and 1.09 % Zn is fed into the feed bin fitted with a 250 mm static grizzly. From here, the ROM is extracted by a primary vibrating grizzly cutting at 50 mm. The vibrating grizzly oversize is crushed by the primary jaw crusher to a P80 of 50 mm and discharges onto the primary stockpile feed conveyor together with the primary vibrating grizzly undersize. This crushed ore is conveyed to the surface and stored on the primary stockpile with a residence time of 24 hours. The mine ore will go through the primary crusher for sorting and sizing and then feed into the secondary and tertiary crushers (Fig. 1.13). This will be followed by milling and classification for separate lines of copper and zinc conditioning and flotation for copper and zinc concentrate thickening to extract copper and zinc concentrate cakes. The Cu-Zn concentrator is designed to treat 360,000 t/a of ROM at a head grade of 1.42 %Cu and 1.16 % Zn, producing 14,722 t/a of copper concentrate at a grade of 29.7 % Cu and 3,733 t/a of Zinc concentrate at a grade of 53.4 % Zn.

4. **Road** – Access to the EPL area is through the B1 Road to Swakopmund for about 35 km from Okahandja, followed by a left turn-off into the gravel road D2192. The left side main gate to the old mine access road leading to the western boundary Farm Elbe 10 and situated about 12 km south from the B1 turnoff along the gravel road D2192. Alternatively, the EPL area can also be accessed via the M87 Road leading to Gross Barmen Hot Springs linking into the D1972 connecting to the D2192. The main gate leading to the old mine along the 2192 road can be reached via a 12 km north bound trail at Klein Barmen.

5. **Rail** - Rail service is available at a 1.067 m gauge line, is located some 21.0 km away at the Francois siding. This siding is located some 31 km west of Okahandja.

6. **Energy** –Fuel and other related products are available in Okahandja situated about 35 km to the east of the project area. According to Robertson and Ilunga (2020), the total power requirements of the concentrator had been determined as 4,599 kW. There is a 220 kV powerline line that cut across the EPL area over the Farm Elbe 10 towards a NamPower Substation location about 20 km to south of the ML area, and.

7. **Water** –Water for mining and minerals processing would come from the local boreholes.

8. **Services** – Services such as banking, retail as well as related requirements are available in the Town of Okahandja situated 28 km to east of Elbe. Other mine support services such as housing of mine workers will also be provided in Okahandja, hence there is no need to construct a mine settlement on Farm Elbe. A mechanical service workshop will be located onsite.

9. **Job Creation** – The project has good potential for job creation however, the total number of people who could be employed during the construction and operational phases have not yet been established. It's estimated that 2000 indirect and direct job opportunities may be created

during construction and operation phases respectively, although these number will need to be confirmed during the feasibility stage, and.

10. **Economic Assessment:** According to van Vuuren (2020), the Elbe Polymetallic Project at this stage has an IRR of 20 percent and an NPV of NAD 329 million, with a Life-of-Mine of approximately ten years. The Capital spend over the Life-of-Mine is NAD 627 million at an operating cost of NAD 586 per ton of ore produced.

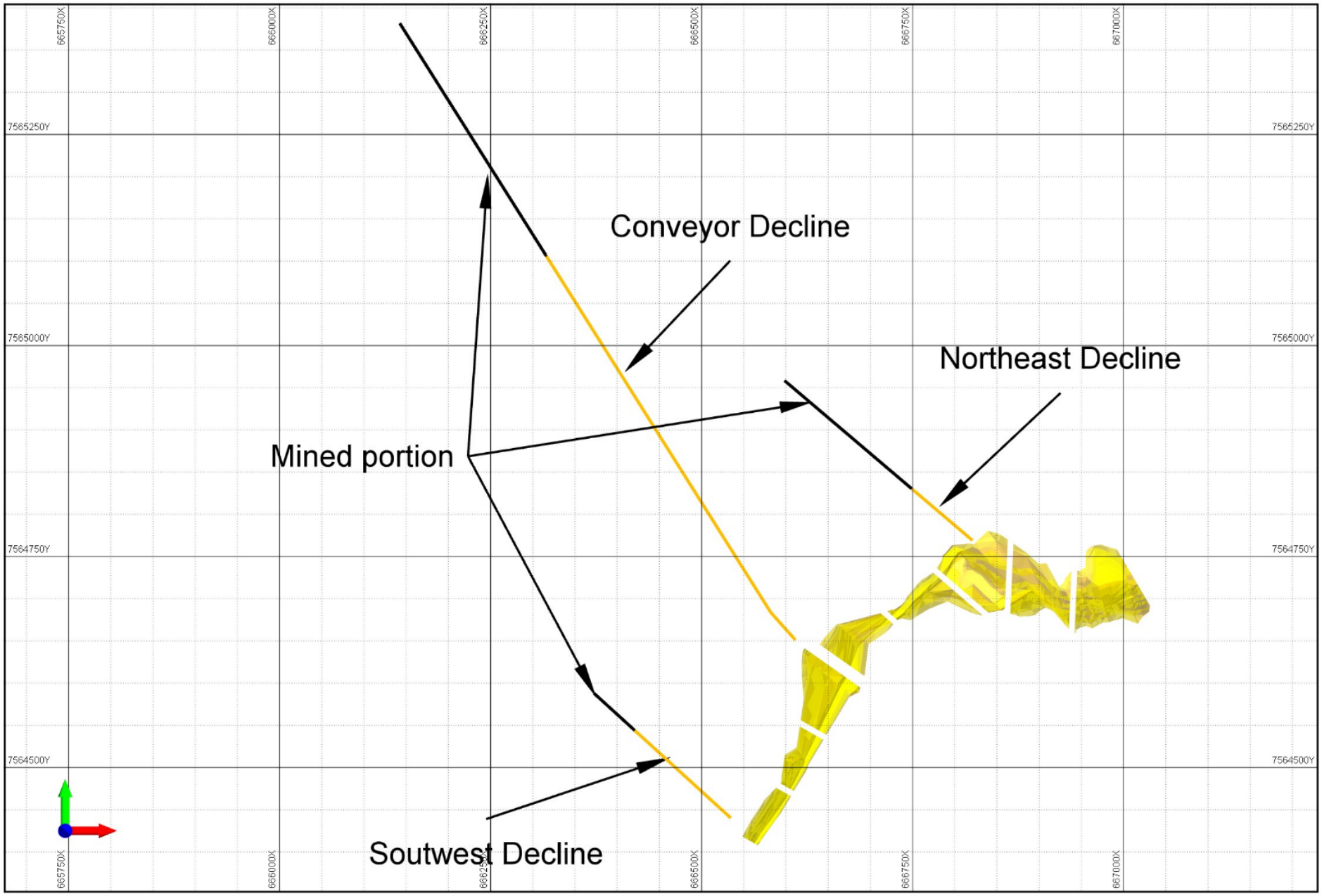

Figure 1.8: Proposed Elbe mine declines with respect to the orebody (Source: van Vuuren, 2020).

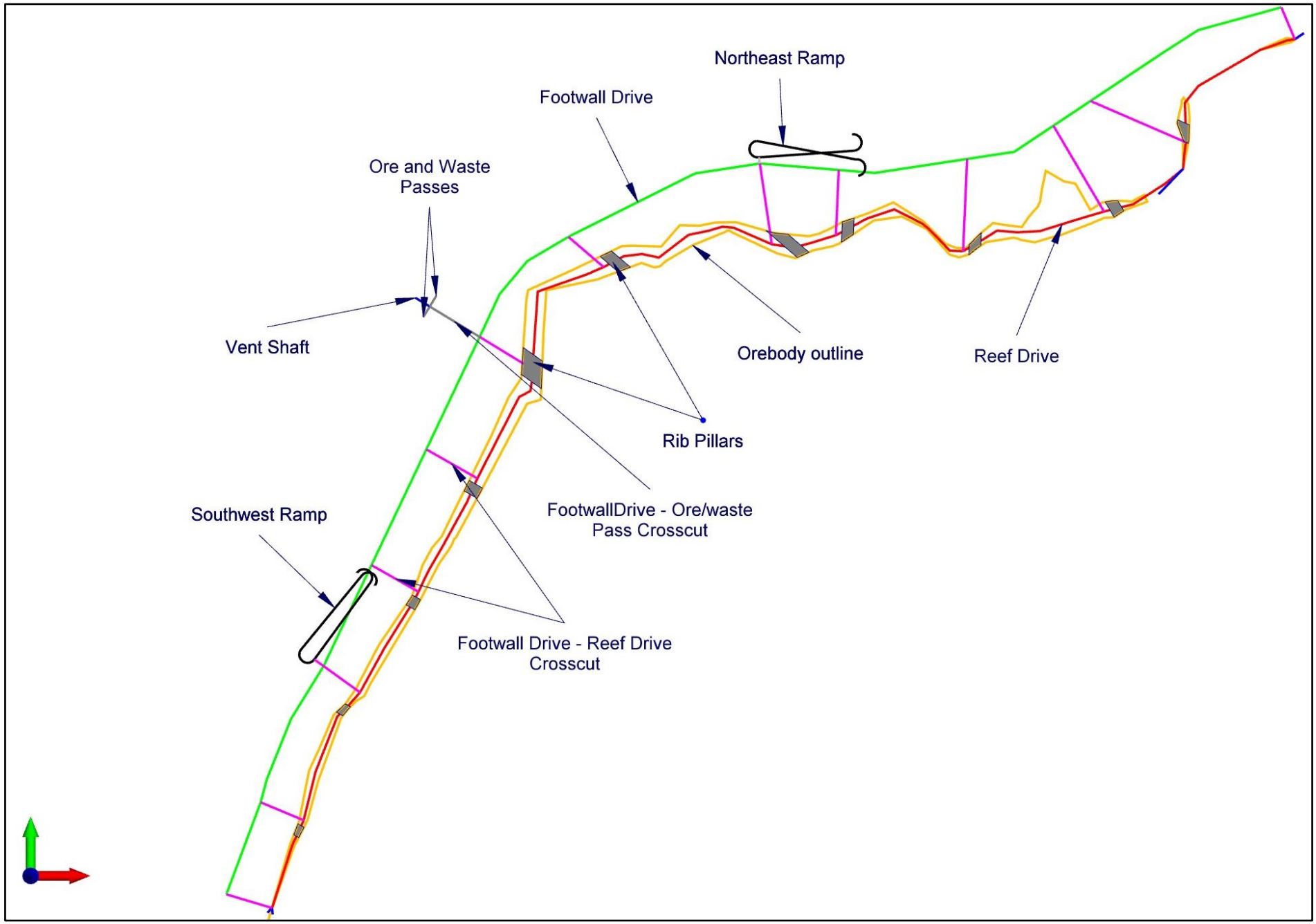

Figure 1.9: Typical Level Layout 1200mamsl (meters above mean sea level) for the proposed Elbe mine (Source: van Vuuren, 2020).

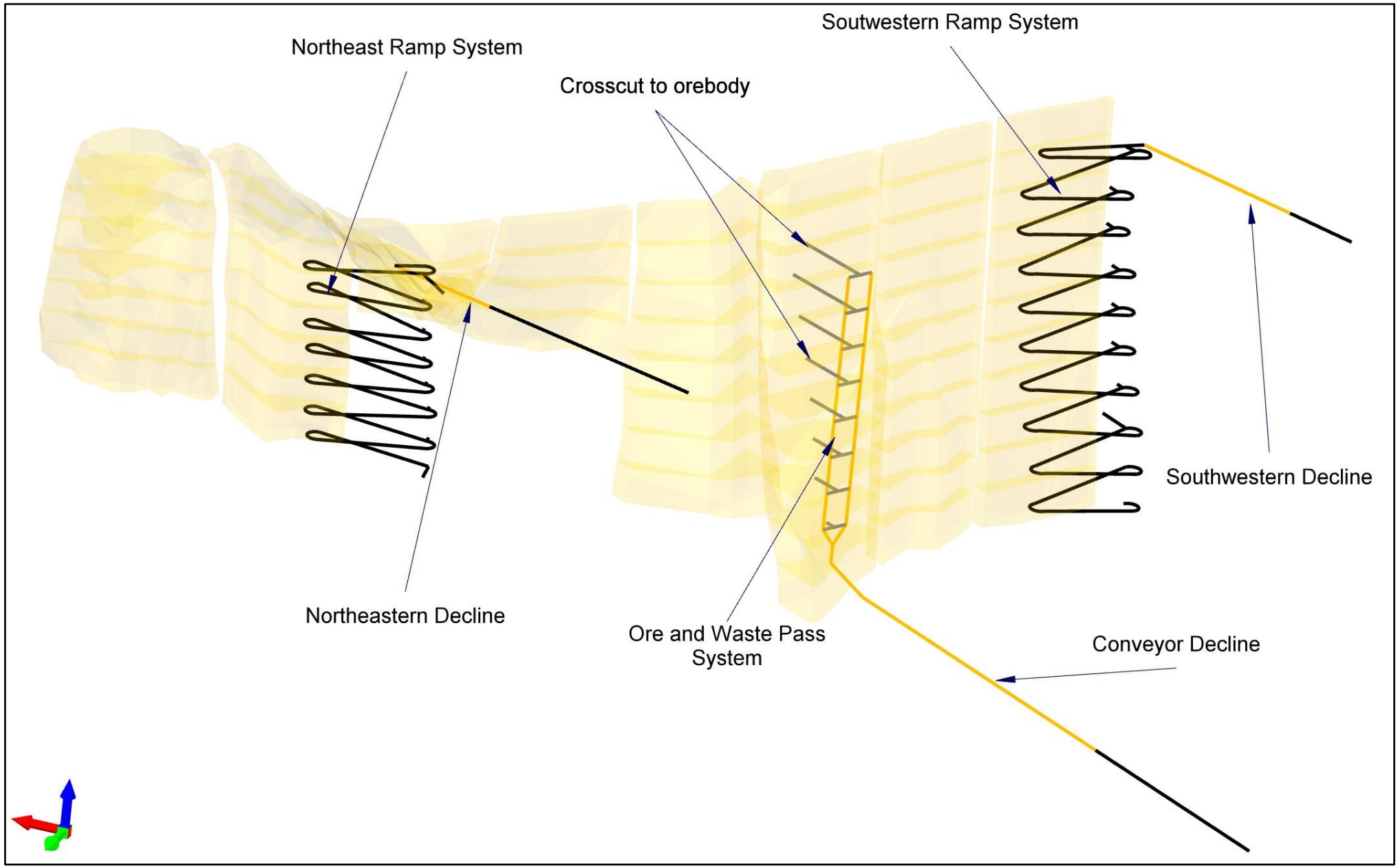

Figure 1.10: Subsurface mine infrastructures for the proposed Elbe mine the proposed Elbe mine (Source: van Vuuren, 2020).

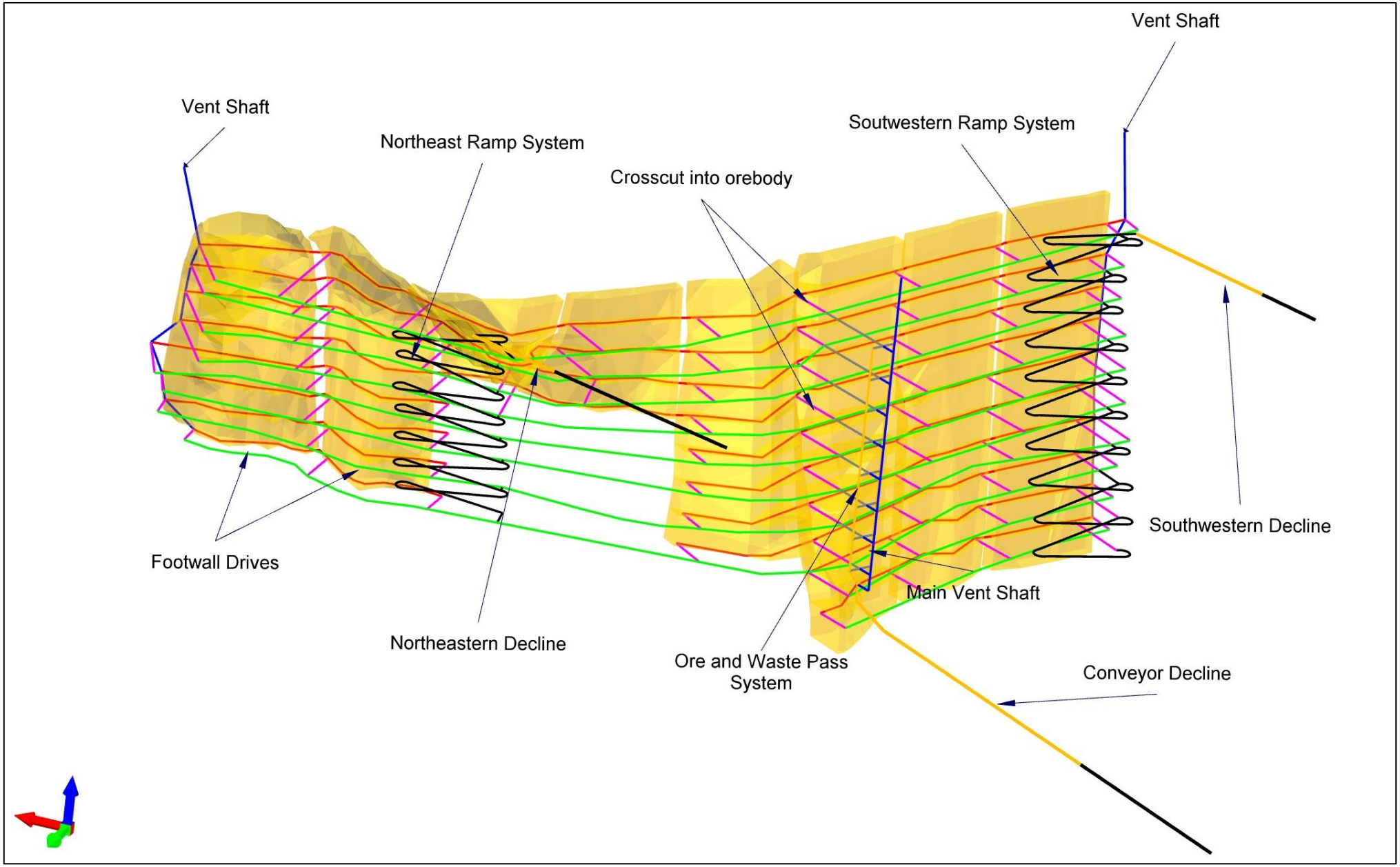

Figure 1.11: 3D representation of the subsurface mine infrastructures for the proposed Elbe mine (Source: van Vuuren, 2020).

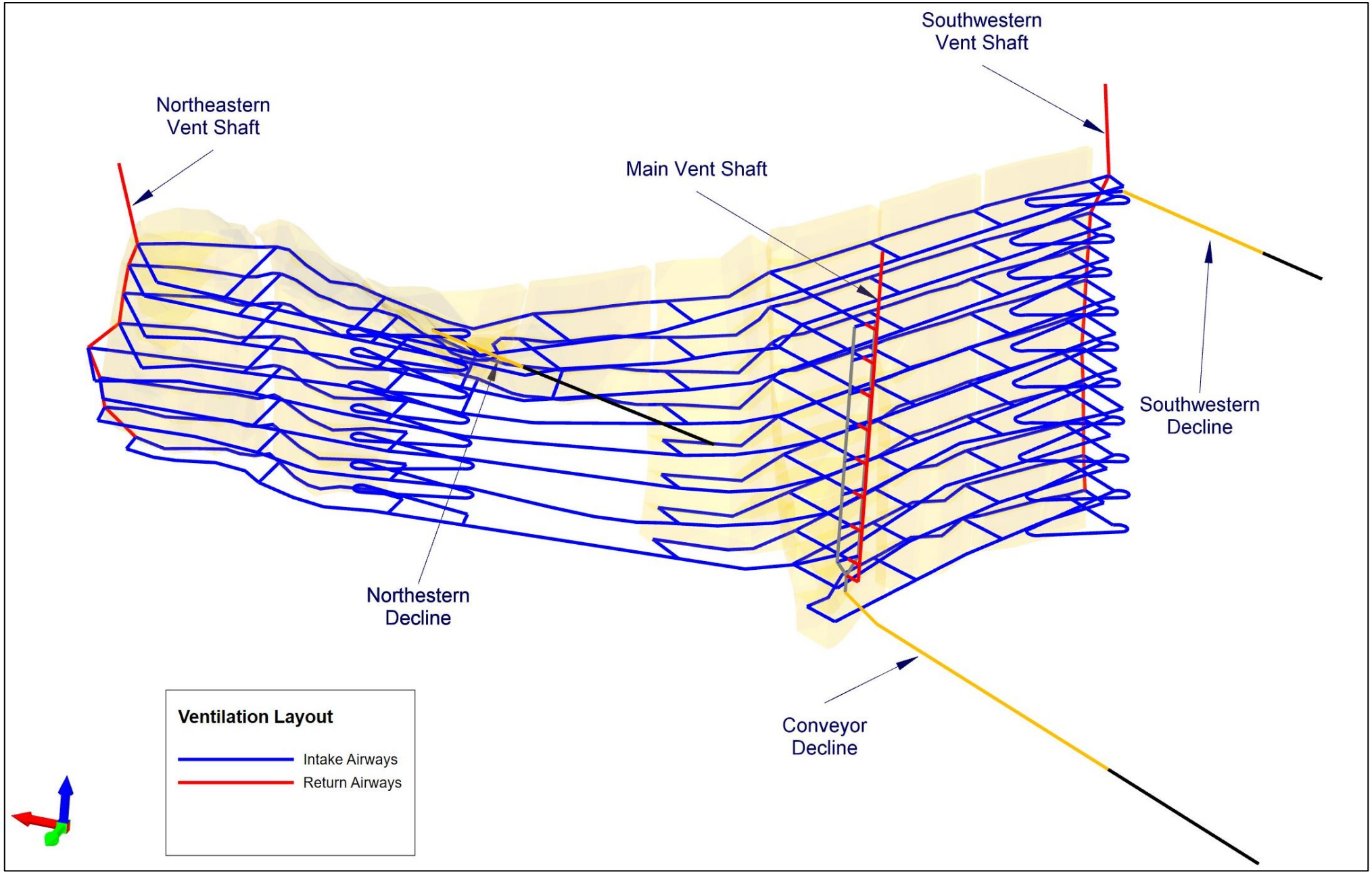

Figure 1.12: Ventilation layout for the proposed Elbe mine (Source: van Vuuren, 2020).

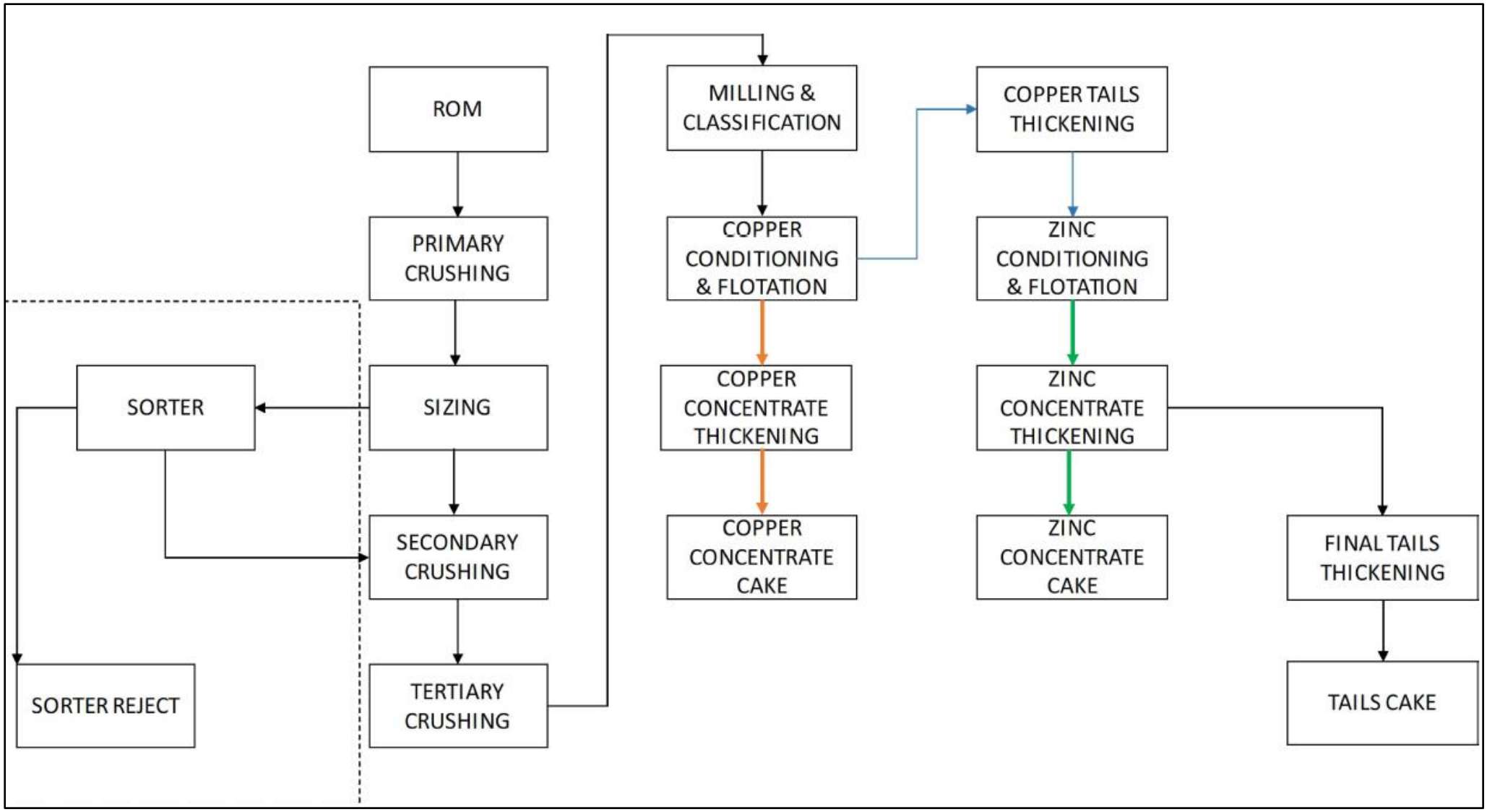

Figure 1.13: Overall minerals processing process is outlined for the proposed Elbe mine (Source: Robertson and Ilunga, 2020).

2. IMPACT ASSESSMENT RESULTS SUMMARY AND THE EMP

2.1. Impact Assessment Results

In order to determine the likely environmental impacts as well as the overall significant impact of individual sources associated with the proposed mine development, an impact identification and assessment process was undertaken as part of the EIA process.

The results of the overall impacts and key issues associated with the proposed activities / sources of potential impacts with respect to the receiving environment that could potentially be affected, resulting in key issues are presented in Table 2.1.

The EIA overall and significant impacts identification and assessment processes focused on the environment interaction approach with respect to the proposed project activities, the pathways and the likely targets or receptor. In this process, components of the project activities that are likely to impact the natural environment (physical, biological and social) were broken down into individual development stages and activities (Table 2.1).

The results of the overall and significant impacts assessments associated with the proposed activities with respect to the receiving environment that could potentially be affected, resulting in key issues are presented in Tables 2.1 and 2.2.

The summary of key potential environmental concerns expected during site preparation are outlined in Table 2.3 while those associated with the proposed mine operations, closure and aftercare stages are outlined in Table 2.4.

Table 2.1: Matrix impact assessment results of the proposed mining project.

SCALE	DESCRIPTION
0	no observable effect
1	low effect
2	tolerable effect
3	medium high effect
4	high effect
5	very high effect (devastation)

SOURCES OF POTENTIAL IMPACT	PROJECT DEVELOPMENT PHASE		ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED: PHYSICAL AND SOCIOECONOMIC ENVIRONMENT – Natural Environment – Air, Noise, Water, Green Space	PHYSICAL AND SOCIOECONOMIC ENVIRONMENT – Built Environment – Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL AND SOCIOECONOMIC ENVIRONMENT – Socioeconomic, Archaeological and Cultural Resources	BIOLOGICAL ENVIRONMENT – Flora	BIOLOGICAL ENVIRONMENT – Fauna	BIOLOGICAL ENVIRONMENT – Habitat	BIOLOGICAL ENVIRONMENT – Ecosystem - Services, function, use values and non-use
	PRE-CONSTRUCTION		1. General site clearing of the mining area, administration block, waste rock, tailings, water and electricity other supporting infrastructure	3 (-)	1 (-)	3 (-)	3 (-)	3 (-)	3 (-)	3 (-)
			2. Access roads clearing / upgrading	3 (-)	1 (-)	3 (-)	3 (-)	3 (-)	3 (-)	3 (-)
			3. Top soil removal and storage for all operations	3 (-)	1 (-)	1 (-)	3 (-)	3 (-)	3 (-)	3 (-)
			4. Development of the temporary construction camp	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)
			5. Installation of campsites, offices, workshops, storage.	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)
	CONSTRUCTION	MINE SUPPORTING INFRASTRUCTURE	1. Transportation facilities, including access roads to the site and on-site roads	3 (-)	1 (-)	1 (-)	3 (-)	3 (-)	3 (-)	3 (-)
			2. Processing plant infrastructure including foundation and the entire structures	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)
			3. New tailing disposal facilities	3 (-)	1 (-)	1 (-)	3 (-)	3 (-)	3 (-)	3 (-)
			4. New waste rock stockpiles	3 (-)	1 (-)	1 (-)	3 (-)	3 (-)	3 (-)	3 (-)
			5. Water supply systems	3 (-)	1 (-)	1 (-)	3 (-)	3 (-)	3 (-)	3 (-)
			6. Powerline and local power infrastructure, including power distribution systems	3 (-)	1 (-)	1 (-)	3 (-)	3 (-)	3 (-)	3 (-)
			7. Administration blocks and warehouses	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)
			8. Fuel supply and storage facilities	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)
			9. Workshop and equipment maintenance	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)
			10. Chemicals and explosives storage facility	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)
			11. Wastewater treatment systems	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)
			12. Solid waste storage / transfer facilities	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)
			13. Storm water management around the plant, waste rock and tailings	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)
			14. Mining and processing facilities	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)
		MINE WORKINGS	1. Excavation, drilling and blasting to create access to the ore body	3 (-)	1 (-)	1 (-)	3 (-)	3 (-)	3 (-)	3 (-)
			2. Underground excavation to access the ore body	3 (-)	1 (-)	1 (-)	3 (-)	3 (-)	3 (-)	3 (-)
			3. Ore production for test mining operations	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)
			4. Test mining process	3 (-)	1 (-)	1 (-)	2(-)	2(-)	2(-)	2(-)

Table 2.1: *Cont.*

SCALE	DESCRIPTION
0	no observable effect
1	low effect
2	tolerable effect
3	medium high effect
4	high effect
5	very high effect (devastation)

SOURCES OF POTENTIAL IMPACT	PROJECT DEVELOPMENT PHASE	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED: PHYSICAL AND SOCIOECONOMIC ENVIRONMENT – Natural Environment – Air, Noise, Water, Green Space	PHYSICAL AND SOCIOECONOMIC ENVIRONMENT – Built Environment – Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL AND SOCIOECONOMIC ENVIRONMENT – Socioeconomic, Archaeological and Cultural Resources	BIOLOGICAL ENVIRONMENT – Flora	BIOLOGICAL ENVIRONMENT – Fauna	BIOLOGICAL ENVIRONMENT – Habitat	BIOLOGICAL ENVIRONMENT – Ecosystem - Services, function, use values and non-use
	OPERATION, ONGOING MONITORING AND REHABILITATION	1. Mining operations (actual mining operations including drilling, blasting etc.)	1. 3(-)	0(-)	3(-)	1(-)	2(-)	1(-)	1(-)
		2. Transportation of the mined materials from mining area to the processing plant (crushers and milling)	3(-)	1(-)	1(-)	1(-)	2(-)	1(-)	1(-)
		3. Minerals (Copper, Zinc, (Silver)) processing crushing and milling	3(-)	1(-)	3(-)	1(-)	2(-)	1(-)	1(-)
		4. Transportation and disposal of waste rock materials	3(-)	0(-)	0(-)	1(-)	2(-)	1(-)	1(-)
		5. Transportation and disposal of tailings materials	3(-)	0(-)	0(-)	1(-)	2(-)	1(-)	1(-)
		6. Expansion of the tailing	2(-)	0(-)	0(-)	1(-)	2(-)	1(-)	1(-)
		7. Expansion of the waste rock	2(-)	0(-)	0(-)	1(-)	2(-)	1(-)	1(-)
		8. Management of industrial and domestic waste water	1(-)	0(-)	0(-)	1(-)	2(-)	1(-)	1(-)
		9. Storage and management of hazardous materials	1(-)	0(-)	0(-)	1(-)	2(-)	1(-)	1(-)
		10. Storage and management of recovered minerals concentrates (Copper, Zinc, (Silver) at the production plant	1(-)	0(-)	0(-)	1(-)	2(-)	1(-)	1(-)
		11. Ongoing exploration support	1(-)	0(-)	0(-)	1(-)	2(-)	1(-)	1(-)
	DECOMMISSIONING CLOSURE AND AFTERCARE	1. Implementation of sustainable socioeconomic plan	0(-)	0(-)	4 (+)	2(-)	2(-)	2(-)	2(-)
		2. Closure of open mining area / shafts	3(-)	0(-)	3 (+)	2(-)	2(-)	2(-)	2(-)
		3. Closure of solid waste piles	3(-)	0(-)	3 (+)	2(-)	2(-)	2(-)	2(-)
		4. Backfill waste dump sites	3(-)	0(-)	3 (+)	2(-)	2(-)	2(-)	2(-)
		5. Closure of storage sites	2(-)	0(-)	3 (+)	2(-)	2(-)	2(-)	2(-)
		6. Decommissioning of water and electricity infrastructure	2(-)	0(-)	3 (+)	2(-)	2(-)	2(-)	2(-)
		7. Overall land reclamation	2(+)	0(-)	3 (+)	2(-)	2(-)	2(-)	2(-)
		8. Restoration of internal roads	2(-)	0(-)	3 (+)	2(-)	2(-)	2(-)	2(-)
		9. Revegetation and aftercare as may be required	1(+)	0(-)	3 (+)	2(-)	2(-)	2(-)	2(-)

Table 2.2: Significant matrix impact assessment results of the proposed mining project.

IMPACT SEVERITY	IMPACT LIKELIHOOD: Extremely Unlikely [0]	Unlikely [1]	Low Likelihood [2]	Medium Likelihood [3]	High Likelihood [4]
Slight [A]	[A0]	[A1]	[A2]	[A3]	[A4]
Low [B]	[B0]	[B1]	[B2]	[B3]	[B4]
Medium [C]	[C0]	[C1]	[C2]	[C3]	[C4]
High [D]	[D0]	[D1]	[D2]	[D3]	[D4]

SOURCES OF POTENTIAL IMPACT	PROJECT DEVELOPMENT PHASE		ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED: PHYSICAL AND SOCIOECONOMIC ENVIRONMENT: Natural Environment – Air, Noise, Water, Green Space	Built Environment – Houses, Roads, Transport Systems, Buildings, Infrastructure	Socioeconomic, Archaeological and Cultural Resources	BIOLOGICAL ENVIRONMENT: Flora	Fauna	Habitat	Ecosystem - Services, function, use values and non-use
	PRE-CONSTRUCTION		1. General site clearing of the mining area, administration block, waste rock, tailings, water and electricity other supporting infrastructure	B4 (-)	A1(-)	D4 (+)	B3(-)	B3(-)	B3(-)	B3(-)
			2. Access roads clearing / upgrading	B4 (-)	A1(-)	D4 (+)	B3(-)	B3(-)	B3(-)	B3(-)
			3. Top soil removal and storage for all operations	B4 (-)	A1(-)	A1(-)	B3(-)	B3(-)	B3(-)	B3(-)
			4. Development of the temporary construction camp	B4 (-)	A1(-)	A1(-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
			5. Installation of campsites, offices, workshops, storage.	B4 (-)	A1(-)	A1(-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
	CONSTRUCTION	MINE SUPPORTING INFRASTRUCTURE	1. Transportation facilities, including access roads to the site and on-site roads	B4 (-)	A1(-)	A1(-)	B3(-)	B3(-)	B3(-)	B3(-)
			2. Processing plant infrastructure including foundation and the entire structures	B4 (-)	A1(-)	A1(-)	B3(-)	B3(-)	B3(-)	B3(-)
			3. New tailing disposal facilities	B4 (-)	A1(-)	A1(-)	B3(-)	B3(-)	B3(-)	B3(-)
			4. New waste rock stockpiles	B4 (-)	A1(-)	A1(-)	B3(-)	B3(-)	B3(-)	B3(-)
			5. Water supply systems	B4 (-)	A1(-)	A1(-)	B3(-)	B3(-)	B3(-)	B3(-)
			6. Powerline and local power infrastructure, including power distribution systems	B4 (-)	A1(-)	A1(-)	B4 (-)	B4 (-)	B4 (-)	B4 (-)
			7. Administration blocks and warehouses	B4 (-)	A1(-)	A1(-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
			8. Fuel supply and storage facilities	B4 (-)	A1(-)	A1(-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
			9. Workshop and equipment maintenance	B4 (-)	A1(-)	A1(-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
			10. Chemicals and explosives storage facility	B4 (-)	A1(-)	A1(-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
			11. Wastewater treatment systems	B4 (-)	A1(-)	A1(-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
			12. Solid waste storage / transfer facilities	B4 (-)	A1(-)	A1(-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
			13. Storm water management around the plant, waste rock and tailings	B4 (-)	A1(-)	A1(-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
			14. Testing the mining and processing facilities	B4 (-)	A1	A1(-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
		MINE WORKINGS	1. Excavation, drilling and blasting to create access to the ore body	B4 (-)	A1(-)	A1(-)	B3(-)	B3(-)	B3(-)	B3(-)
			2. Underground excavation to access the ore body	B4 (-)	A1(-)	A1(-)	B3(-)	B3(-)	B3(-)	B3(-)
			3. Ore production for test mining operations	B4 (-)	A1(-)	A1(-)	B3(-)	B3(-)	B3(-)	B3(-)
			4. Test mining process	B4 (-)	A1(-)	A1(-)	B3(-)	B3(-)	B3(-)	B3(-)
			5. Excavation, drilling and blasting to create access to the ore body	B4 (-)	A1(-)	A1(-)	B3(-)	B3(-)	B3(-)	B3(-)

Table 2.2: *Cont.*

IMPACT SEVERITY	IMPACT LIKELIHOOD				
	Extremely Unlikely [0]	Unlikely [1]	Low Likelihood [2]	Medium Likelihood [3]	High Likelihood [4]
Slight [A]	[A0]	[A1]	[A2]	[A3]	[A4]
Low [B]	[B0]	[B1]	[B2]	[B3]	[B4]
Medium [C]	[C0]	[C1]	[C2]	[C3]	[C4]
High [D]	[D0]	[D1]	[D2]	[D3]	[D4]

SOURCES OF POTENTIAL IMPACT	PROJECT DEVELOPMENT PHASE	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED						
			PHYSICAL AND SOCIOECONOMIC ENVIRONMENT			BIOLOGICAL ENVIRONMENT			
			Natural Environment – Air, Noise, Water, Green Space	Built Environment – Houses, Roads, Transport Systems, Buildings, Infrastructure	Socioeconomic, Archaeological and Cultural Resources	Flora	Fauna	Habitat	Ecosystem - Services, function, use values and non-use
	OPERATION, ONGOING MONITORING AND REHABILITATION	1. Mining operations (actual mining operations including drilling, blasting etc.)	C3(-)	A1(-)	D4 (+)	A1(-)	B4 (-)	A1(-)	A1(-)
		2. Transportation of the mined materials from mining area to the processing plant (crushers and milling)	C3(-)	A1(-)	A1(-)	A1(-)	B4 (-)	A1(-)	A1(-)
		3. Minerals (Copper, Zinc, (Silver)) processing crushing and milling	C3(-)	A1(-)	D4 (+)	A1(-)	B4 (-)	A1(-)	A1(-)
		4. Transportation and disposal of waste rock materials	C3(-)	A1(-)	A1(-)	A1(-)	B4 (-)	A1(-)	A1(-)
		5. Transportation and disposal of tailings materials	C3(-)	A1(-)	A1(-)	A1(-)	B4 (-)	A1(-)	A1(-)
		6. Expansion of the tailing	B2 (-)	A1(-)	A1(-)	A1(-)	B4 (-)	A1(-)	A1(-)
		7. Expansion of the waste rock	B2 (-)	A1(-)	A1(-)	A1(-)	B2 (-)	A1(-)	A1(-)
		8. Management of industrial and domestic waste water	A1(-)	A1(-)	A1(-)	A1(-)	B2 (-)	A1(-)	A1(-)
		9. Storage and management of hazardous materials	A1(-)	A1(-)	A1(-)	A1(-)	B2 (-)	A1(-)	A1(-)
		10. Storage and management of recovered minerals concentrates (Copper, Zinc, (Silver)) at the production plant	A1(-)	A1(-)	A1(-)	A1(-)	B2 (-)	A1(-)	A1(-)
		11. Ongoing exploration support	A1(-)	A1(-)	A1(-)	A1(-)	B2 (-)	A1(-)	A1(-)
	CLOSURE AND AFTERCARE	1. Implementation of sustainable socioeconomic plan	A1(-)	A1(-)	D4 (+)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
		2. Closure of open mining area / shafts	C3(-)	A1(-)	B4 (-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
		3. Closure of solid waste piles	C3(-)	A1(-)	B4 (-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
		4. Backfill waste dump sites	C3(-)	A1(-)	B4 (-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
		5. Closure of storage sites	B4 (-)	A1(-)	B4 (-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
		6. Decommissioning of water and electricity infrastructure	B4 (-)	A1(-)	B4 (-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
		7. Overall land reclamation	B4 (-)	A1(-)	B4 (-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
		8. Restoration of internal roads	B4 (-)	A1(-)	B4 (-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)
		9. Revegetation and aftercare as may be required	A1(-)	A1(-)	B4 (-)	B2 (-)	B2 (-)	B2 (-)	B2 (-)

Table 2.3: Summary of key potential environmental concerns during site preparation and the construction of mine infrastructures including test mining operations.

POTENTIAL SOURCES OF CONCERN	NATURE OF POTENTIAL CONCERN	ASSESSMENT	SIGNIFICANCE
Air Quality			
1. Operation and maintenance of vehicles and any on-site power generation facilities	• Potential releases of particulate matter, carbon monoxide, oxides of nitrogen, sulphur dioxide, and volatile organic compound	Negative Impacts	Localised
2. Fuel and chemical transportation, handling and storage	• Potential releases of volatile organic compounds and other harmful substances		
3. Site preparation and construction activities	• Potential releases of particulate matter		
Surface and Ground Water Vulnerability			
1. Operation and maintenance of vehicles and any on-site power generation facilities	• Potential releases of substances such as suspended solids, trace metals, oil, degreasers, and detergents and other harmful substances that could affect water quality and aquatic ecosystems	Negative Impacts	Localised
2. Fuel and chemical transportation, handling and storage	• In the event of spills, potential releases of petroleum products or chemicals that could affect surface waters or groundwater as well as aquatic ecosystems		
3. Site preparation and construction activities	• Potential release of sediments, increasing concentrations of total suspended solids in receiving waters		
4. Sewage and wastewater disposal	• Potential releases of nutrients and other contaminants		
5. Construction of site access roads and power lines	• Potential release of sediments along the routes, increasing total suspended solids in receiving waters • Potential for acidic drainage if sulphide-bearing minerals are exposed during construction • Stream crossings for access roads may affect ephemeral habitats and related ecosystems. • Increased road access in the area may lead to increased illegal hunting and poaching of wildlife, harvesting of firewood and grass as well as plant species.		

Table 2.3: *Cont.*

POTENTIAL SOURCES OF CONCERN	NATURE OF POTENTIAL CONCERN	ASSESSMENT	SIGNIFICANCE
Soil Quality and Terrestrial Ecosystems			
2. Fuel and chemical transportation, handling and storage	• In the event of spills, potential releases of petroleum products or chemicals that could affect soils, vegetation and wildlife	Negative Impacts	Localised
3. Operation of vehicles	• Vehicle operations may result in collisions with wildlife • Low altitude aircraft operations could disrupt wildlife		
4. Site preparation and construction activities	• Clearing of vegetation on site may have impacts on biodiversity, particularly if any rare, threatened or keystone species are present • Activities on site may disrupt and dislocate local wildlife and any migratory wildlife in the area • Some animals may be drawn to the site as a result of improper waste disposal or kitchen odours, which could lead to potential hazards for both workers and the animals		
5. Construction of site access roads and power lines	• Construction activities may disrupt and dislocate wildlife and any migratory wildlife in the area • Increased road access in remote areas may lead to increased hunting, stressing wildlife populations • Vehicle operations may result in collisions with wildlife		
Noise			
1. Noise from construction activities, including vehicle operations, drilling, and blasting	• Noise may affect local wildlife populations, and well as people living in communities near the exploration activity	Negative Impacts	Localised

Table 2.4: Summary of key potential environmental concerns during mine operations, closure, rehabilitation and aftercare stages.

POTENTIAL SOURCES OF CONCERN	NATURE OF POTENTIAL CONCERN	ASSESSMENT	SIGNIFICANCE
All others Impacts			
Land Disturbance	Relatively large area	Negative Impacts	Localised
Waste Rock Disposal	Can require large area. involves trucking, runoff and leachate management, dusting and aesthetic considerations		
Tailings	Tailings volumes generally larger due to large volume of ore processed		
Acid Drainage	May be associated with both mine and waste rock areas		
Reclamation	Both mine and waste rock area can represent major concerns due to the extent of the waste rock and mining area		
Slope Instability / Rock falls	Underground, tailings and rock waste slope stability and potential failures are major challenges		
Traffic and processing plant Noise	Traffic and mill can be a serious noise problem		
Vent Fan Noise	Not a concern (Underground)		
Drilling and Blasting Effects	Noise and vibration can be a concern requiring careful management		
Dust	Can be a concern due to minerals processing operations, haulage roads and waste rock piles		
Mine Water	Mine water volume influenced by precipitation, surface and groundwater ingress. Elevated ammonium levels from blasting can be a concern. High sediment loadings are common. Mine water may contain metals and may have a low pH.		

2.2 Summary of EIA Conclusions

The EIA study presented in this Vol. 2 of 3 report for the proposed Elbe Mine Project mine development has been undertaken in accordance with the Terms of Reference (ToR), provisions of the Environmental Management Act, 2007, (Act No. 7 of 2007). All key specialist studies with respect to the proposed development have been undertaken with the findings and recommendations incorporated and presented in this EIA Vol. 2 of 3 report. The development could have the following potential impacts on the existing and surrounding land uses especially around Farms Elbe 10 and Ombujongupa 292:

- Disturbance of sense of place and tranquillity due to light pollution, noise pollution, increased traffic, earth tremors caused by drilling and blasting.
- Disturbance of visual views impacting negatively on the attractiveness of the area for hunters, tourists and the enjoyment of nature. This could contribute to a potential loss of income by surrounding lodges and hunting farms.
- Loss of income due to change of land use from grazing to mining.
- Dust dispersion from the operations at the mine as well as transport of ore along dirt roads and dust deposition on surrounding grazing land may render the land less suitable for livestock farming and cause loss of income.
- Potential increase in poaching and stock theft could contribute to loss of income.
- Potential increase of trespassing and increase in crime.

It's also important to note that the development of the proposed mine will also address the current environmental damages created by the previous incomplete mine development operation that left open inclined shafts, scarp metals and decaying buildings around some portions of Farm Elbe 10. Furthermore, the proposed Elbe Project would have the following socioeconomic effects on Town of Okahandja:

(i) **Positive Impact**

- Alternative employment opportunities would be created as currently employment opportunities are limited and dependent on the tourism and agriculture industries as well as commercial activities in Okahandja.
- The urban locality is highly dependent on wages and salaries as the main source of income for the majority of residents and the employment of local residents would contribute to their livelihoods.
- Potential employees may obtain the opportunities to improve or develop employable skills.
- The local economy would be boosted and diversified with the increased availability of money and the utilization of local services and products.
- Potential of community upliftment projects once the mine becomes operational and profitable as part of the mine's social responsibility programme.
- Contribution to Namibia's Development Goals and Vision 2030 through the provision of employment and the improvement of the quality of life.

(ii) **Negative Impacts:**

- Land use changes from agriculture and tourism to mining and exploration.
- Large construction developments could cause sudden in-flux of jobseekers to Okahandja, increasing the already large informal populations with resultant higher HIV/Aids risks, crime rates, poaching incidences, demands on state health services.
- An increase in workforce will result in an increase in the need for housing, school placements, infrastructure and health services in Okahandja.
- Increased demand for water and the wise use of water needs to be promoted, and.
- Increased traffic, especially heavy vehicles using public roads and road safety concerns.

It's hereby recommended that a detailed EMP Vol. 3 of 3 Report be prepared to address all the identified impacts.

2.3 Summary of EIA Recommendations

The EIA study presented in this Vol. 2 of 3 report for the proposed Elbe Mine Project development has been undertaken in accordance with the requirements of the national applicable regulations. All key specialist studies with respect to the proposed development have been undertaken with the findings and recommendations incorporated and presented in this EIA Vol. 2 of 3 report. The proposed mine project development poses localised high negative impacts on the receiving environment with great offset /trade-offs/ benefits in form of socioeconomic and environmental reclamation of the currently abandoned mine sites on Farm Elbe.

It is hereby recommended that the proposed mine development shall go ahead and be issued with the Environmental Clearance Certificate (ECC). It's hereby recommended that a detailed EMP Vol. 3 of 3

Report be prepared to address all the identified significant impacts including the already existing negative impacts from previous exploration and incomplete mine development activities. Mitigation measures that will enhance the positive impacts and minimise the negative impacts have been developed and management strategies are provided in the Environmental Management Plan (EMP) Vol. 3 of 3 Report for implementation by the proponent.

The proponent shall:

(i) Negotiate an Access Agreements with the land owner/s.

(ii) Pay a fair and negotiate compensation to the affected land owners where the proposed mining operations will be situated. The proposed mine will negatively affect the wellbeing and socioeconomic asserts of the land owners.

(iii) The Proponent shall adhere to all the provisions of the EMP and conditions of the Access Agreement to be entered between the proponent and the land owner/s in line with all applicable national regulations, and.

(iv) Before entering any private property such as a private farm, the proponent must give advance notices and obtain permission to access private properties at all times.

2.4 The EMP Framework

2.4.1 Summary of the EMP Objectives

The Environmental Management Plan (EMP) provides a detailed plan of actions required in the implementation of the mitigation measures for minimising and maximising the identified negative and positive impacts respectively. The EMP also provides the management actions with roles and responsibilities requirements for the successful implementation of environmental management strategies by the On-Road Investments (Pty) Ltd.

2.4.2 EMP Management Linkages

The Environmental Management Plan, described in this Report, is based on the findings as outlined in the Environmental Impact Assessment (EIA) Report Vol. 2 of 3. The EMP must be continuously updated during the implementation of the proposed project. Within the framework of the existing Environmental Policy of On-Road Investments (Pty) Ltd, the EMP is to be incorporated in the Environmental Management System (EMS) of the company covering mining development, operational, closure, rehabilitation and aftercare stages.

2.5 Roles and Responsibilities

2.3.1 Organisational Structure

An Environmental Management Plan (EMP) is one of the most important outputs of the environmental assessment process and is the synthesis of all the proposed mitigation and monitoring actions, set to a timeline and with specific assigned responsibilities. The aim of the EMP is to assist On-Road Investments (Pty) Ltd (the Proponent), Contractors and Subcontractor to ensure that the day-to-day operations are carried out in an environmentally responsible manner, thereby preventing or minimizing the negative effects and maximizing the positive effects of the proposed project-related activities on the natural environment.

It's highly imperative that there is an effective and response organisational structure of On-Road Investments (Pty) Ltd that defines the roles, responsibilities and authority to implement the provisions of this EMP. The generic summary of such a structure is shown in Fig. 2.1. Provision has also been made, on an ongoing basis, for sufficient management support and human and financial resources.

The EMPs are presented as comprehensive matrices: for each **Activity/Process** and related **Aspects** (defined by the International Organization for Standardization ISO 14001:2004 as *element of an organization's activities or products or services that can interact with the environment*. environment is defined as *surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation*) and **Impacts** (*any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects*), **Management Actions** required to address the impacts arising directly and indirectly from the various aspects of the proposed mining project, with **Responsible Persons** and **Timing** for each, are listed.

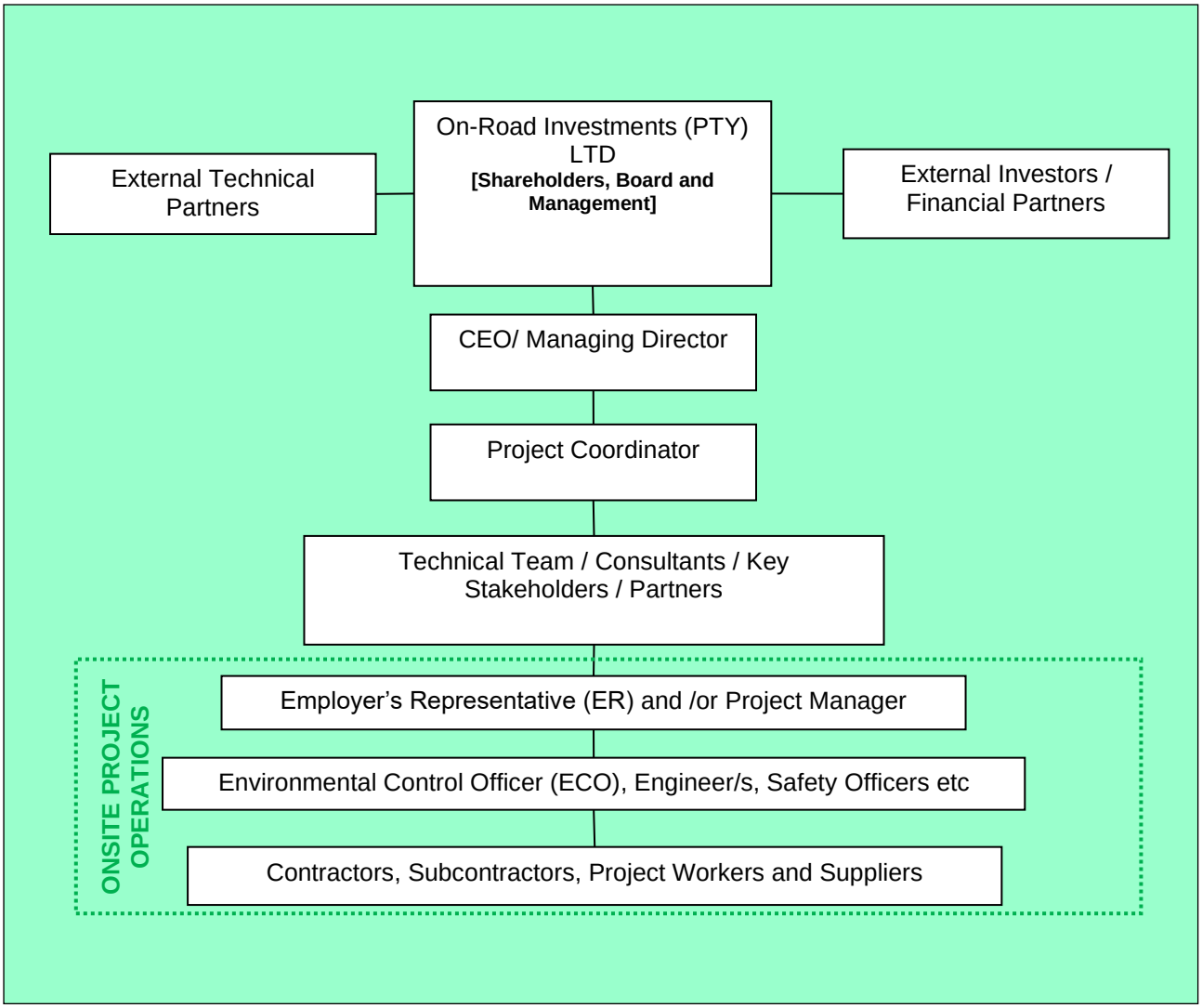

Figure 2.1: On-Road Investments (Pty) Ltd generic organisational structure for the proposed Elbe mine project development with respect to roles and responsibilities for the implementation of the EMP.

2.6 Roles and Responsibilities

2.6.1 Employer's Representative (ER) / Project Manager

On-Road Investments (Pty) Ltd is to appoint an **Employer's Representative (ER)** with the following responsibilities covering mining development, operational, closure, rehabilitation and aftercare stages:

- Act as the Employer's (On-Road Investments (Pty) Ltd) on-site project manager and implementing agent.

- ❖ Ensure that the Employer's responsibilities are executed in compliance with the relevant legislation and the EMP.
- ❖ Ensure that all the necessary environmental authorisations and permits have been obtained.
- ❖ Assist the Contractor in finding environmentally responsible solutions to challenges that may arise (with input from the ECO).
- ❖ Should the ER be of the opinion that a serious threat to, or negative impact on the environment, he/she may stop work. the Employer must be informed of the reasons for the stoppage as soon as possible.
- ❖ The ER has the authority to issue fines for transgressions of basic conduct rules and/or contravention of the EMP.
- ❖ Should the Contractor or his/her employees fail to show adequate consideration for the environmental aspects related to the EMP, the ER can have person(s) and/or equipment removed from the site or work suspended until the matter is remedied.
- ❖ Report to the Employer on the implementation of this EMP on site (with input from the ECO and/or independent environmental auditor).
- ❖ Maintain open and direct lines of communication between the Employer, ECO, Contractor and Interested and Affected Parties (I&APs) with regards to environmental matters. and
- ❖ Attend regular site meetings and inspections.

2.4.2 Environmental Control Officer (ECO)

The **Environmental Control Officer (ECO)** has the following responsibilities:

- ❖ Assist the ER in ensuring that the necessary environmental authorisations and permits have been obtained.
- ❖ Assist the ER and Contractor in finding environmentally responsible solutions to challenges that may arise.
- ❖ Conduct environmental monitoring as per EMP requirements.
- ❖ Recommend on the issuing of fines for transgressions of basic conduct rules and/or contraventions of the EMP to the ER.
- ❖ Advise the ER on the removal of person(s) and/or equipment not complying with the specifications of the EMP.
- ❖ Carry out regular site inspections (on average once per week) of all construction areas with regards to compliance with the EMP. report any non-compliance(s) to the ER as soon as possible.
- ❖ Organise for an independent internal audit on the implementation of and compliance to the EMP to be carried out half way through the construction period. audit reports to be submitted to the ER.
- ❖ Organise for an independent post-construction environmental audit to be carried out.
- ❖ Continuously review the EMP and recommend additions and/or changes to the EMP document.

- ❖ Monitor the Contractor's environmental awareness training for all new personnel coming onto site.

- ❖ Keep records of all activities related to environmental control and monitoring. the latter to include a photographic record of the preconstruction and environmental control and rehabilitation process, and a register of all major incidents. and

- ❖ Attend regular site meetings.

2.4.3 Contractors and Subcontractors

The responsibilities of the **Contractors (CONT) and Subcontractors (SUCCONT)** include:

- ❖ Comply with the relevant legislation and the EMP for the preconstruction activities.

- ❖ Preparation and submission to On-Road Investments (Pty) Ltd of the following Management Plans:

    - o Environmental Awareness Training and Inductions.

    - o Emergency Preparedness and Response
    - o Waste Management. and.

    - o Health and Safety.

- ❖ Ensure adequate environmental awareness training for senior site personnel.

- ❖ Environmental awareness presentations (inductions) to be given to all site personnel prior to work commencement. the ECO is to provide the course content and the following topics, at least but not limited to, should be covered:

    - o The importance of complying with the relevant Namibian, International and Best Practice Legislation.

    - o Roles and Responsibilities, including emergency preparedness.

    - o Basic Rules of Conduct (Do's and Don'ts).

    - o EMP: aspects, impacts and mitigation.

    - o Fines for Failure to Adhere to the EMP.

    - o Health and Safety Requirements.

- ❖ Record keeping of all environmental awareness training and induction presentations. and

- ❖ Attend regular site meetings and environmental inspections.

3. SPECIFIC MITIGATION MEASURES

3.1 Overview

The following is the summary of the proposed Elbe mine developmental stages linked to specific activities that have been assessed in the environmental assessment process covering the Scoping Vol. 1 of 3, EIA Vol. 2 of 3 and the development of this EMP Vol. 3 of 3: Preconstruction, construction, operation, closure, final rehabilitation and aftercare and monitoring. The detailed outline of all the activities associated with each of the above project developmental stages and associated specific activities assessed as sources of potential environmental impacts in the EIA Vol. 2 of 3 report are outlined in Table 3.1. Mitigation measures have been developed for key issues and are detailed in this section of this EMP Vol. 3 of 3 Report.

Table 3.1: Outline of proposed project developmental stages and all the associated activities assessed as sources of potential environmental impacts in the EIA Vol. 2 of 3 Report.

PROJECT DEVELOPMENT PHASE	ACTIVITIES	
PRECONSTRUCTION	1. General site clearing of the mining area, administration block, waste rock, tailings, supporting infrastructure (water and electricity etc.)	
	2. Access roads clearing	
	3. Top soil removal and storage	
	4. Development of the temporary construction camp	
	5. Installation of campsites, offices, workshops, storage facilities.	
CONSTRUCTION	MINE SUPPORTING INFRASTRUCTURE	1. Transportation facilities, including access roads to the site and on-site roads
		2. Production plant and ore handling infrastructure including foundation and the entire structures
		3. Tailing disposal facilities
		4. Waste rock stockpiles
		5. Water supply systems
		6. Power infrastructure, including power distribution systems
		7. Administration blocks and warehouses
		8. Fuel supply and storage
		9. Workshop and equipment maintenance facilities
		10. Explosives storage facility / bunker
		11. Wastewater treatment systems
		12. Solid waste disposal
		13. Storm water management around the plant, waste rock and tailings
		14. Testing the ore handling and processing facilities
	MINE WORKINGS	1. Drilling to create direct access to the ore body
		2. Blasting to create direct access to the ore body
		3. Underground infrastructure such as shafts and stoppings to create direct access to the ore body
		4. Ore production for test mining operations
		5. Test mining
OPERATION	1. Mining operations (actual mining operations including drilling, blasting etc.)	
	2. Transportation of the mined materials from mining area to the processing plant (crushers and milling)	
	3. Minerals (Copper, Zinc, (Silver)) processing crushing and milling	
	4. Transportation and disposal of waste rock materials	
	5. Transportation and disposal of tailings materials	
	6. Expansion of the tailing	
	7. Expansion of the waste rock	
	8. Management of industrial and domestic waste water	
	9. Storage and management of hazardous materials	
	10. Storage and management of recovered minerals concentrates (Copper, Zinc, (Silver)) at the production plant	
	11. Ongoing exploration support	
CLOSURE AND AFTERCARE	1. Closure and rehabilitation of all underground operations	
	2. Closure of solid waste piles	
	3. Backfill waste dump sites	
	4. Closure of storage sites	
	5. Closure of water and electricity sources	
	6. Overall land reclamation	
	7. Restoration of internal roads	
	8. Revegetation as may be required	

3.2 Air Quality

3.2.1 Assessment Summary

Air quality impacts from mining are mainly associated with the releases of airborne particulate matter. Operation of vehicles and generators can also lead to releases of greenhouse gases and various air contaminants, including Sulphur oxides, nitrogen oxides, carbon monoxide and particulate matter. Releases of airborne particulate matter can result from various activities, including blasting, crushing, loading, hauling, and transferring by conveyor.

Open excavations, waste rock piles, tailings management facilities, and stockpiles are potential sources of wind-blown particulate matter.

Climatic components have a direct linkage to the air quality. Within the general area and surround environments and based on the regional climatic data it is likely that a significant proportion of windblown dust will be generated during the various developmental stages of the proposed project. This is likely to occur when the threshold wind speed of 4.5 m/s is exceeded.

The threshold wind speed is dependent on the erosion potential of the exposed surface, which is expressed in terms of availability of erodible material per unit area. Any factor that binds the erodible material will significantly reduce the availability of erodible material on the surface, thus reducing the erosion potential of the surface.

3.2.2 Air Quality Mitigation Measures

Overall, the proposed project activities will have significant but localised impacts on the air quality mainly associated with the surface based infrastructural support operations. The actual mining operations will take place underground.

Table 3.2 details the overall mitigation measures that must be implemented by the proponent.

Table 3.2: Impact assessment summary with mitigation measures for management of air quality throughout the proposed project lifecycle.

Description	The influence of the proposed development on the air quality at local, regional, national and global levels will be high, low and negligible respectively. Locally, the overall contribution of the vehicles and machinery to overall emission levels around the local area will be high. However, during windy events dust will be a major problem in all areas with fine material exposed such as tailings, gravels roads as well as silty and fine sandy areas without any vegetation cover.
Extent	The extent of impact be localised and will be as follows: • More than 10 km = 1 (v. low) • 10 km – 5 km = 1 (v. low) • 5 km – 1 km = 1 (v. high) • Less than 1 km = 2 (high) (OHS or windy events but Temporal).
Duration	The duration of the likely impacts will be throughout the lifecycle of the proposed project
Intensity	The level of impacts on the surrounding environment including the associated infrastructure would be affected minimally. This would include very little contribution to dust, noise and other associated disturbances in the area mainly during dry season (May – October) strong windy events.
Mitigation	Application of Cleaner Production (CP) and Pollution Prevention (P2) and the adoption of Cleaner Technologies right from the beginning including covered containers, and maintenance of structures and equipments as well as the use of filters on all critical material transfer points and the use protective clothing at all times around the mine site will reduce the impact to medium. Erection of wind barriers in key critical areas as well as the use of vegetation screen and upward coarse graded covers on the fine tailings are all very important mitigation measure that must be implemented. Cleaner production methods to minimize releases of airborne particulate matter include: 1. Spraying used water to maintain sufficient surface moisture. 2. Using environmentally acceptable chemical sprays to stabilize the surface. 3. Revegetating / not cutting / clearing all the bushes during site preparation could form as effective wind barriers around the mine site. 4. Controlling dumping or transfer rates of materials. 5. Covering dump trucks or rail cars to minimize releases during the transportation of material. 6. Establishing speed limits on unpaved surfaces that are low enough to minimize dust from vehicle operations, considering local weather conditions. 7. Storing ore or concentrate in storage bins, hoppers or other buildings to eliminate dusting concerns and position the material for loading or transfer. 8. Covering or enclosing conveyor lines. 9. Using baghouses or precipitators for point sources of releases such as stacks from ore concentrate driers. 10. Covering stockpiles or other material that may be a source of releases, and. 11. Temporarily ceasing operations if weather conditions are such that the risks of significant releases of airborne particulate matter are unacceptably high.
Frequency of occurrence	Climatic pattern and in particular wind speed and direction as well as operational and management practices will influence the frequency of occurrence during the construction and operational phases.
Probability	Overall probability of influence is as follows: • More than 10 km = 1 (v. low = 0.3) • 10 km – 5 km = 1 (v. low = 0.3) • 5 km – 1 km = 1 (v. low = 0.3) • Less than 1 km = 4 (high) (Occupational Health and Safety - OHS and windy events = 0.6 but temporal).
Significance	Before or without mitigation: **Medium to High,** After mitigation: **Very Low to Low**
Status of the impact	Negative Localise and mainly OHS and windy events influences on the air quality that may lead to health impacts but will be temporal and localised.
Legal requirements	Labour Act. Namibia does not have air quality standard but South African standard could be adopted as part of the best practices and air quality monitoring
Degree of confidence in predictions	90% because the planned activities during are clear and air quality issues will definitely occur

3.3 Flora

3.3.1 Assessment Summary

All the activities associated with the proposed mine preconstruction, construction, operation, closure, rehabilitation and aftercare stages can have significant local effects on resident plant communities (EIA Vol. 2 of 3 Report). These communities also represent wildlife habitat, and destroying habitat can lead to the loss of local breeding grounds and wildlife movement corridors or other locally important features. Mining activity may also contaminate terrestrial plants.

Metals may be transported into terrestrial ecosystems adjacent to mine sites as a result of releases of airborne particulate matter and seepage of groundwater or surface water. In some cases, the uptake of contaminants from the soil in mining areas can lead to stressed vegetation. In such cases, the vegetation could be stunted or dwarfed. Overall, the proposed mining project will have flora disturbance that will be localised.

3.3.2 Flora Mitigation Measures

Floral disturbance as a result of the proposed mine preconstruction, construction, operation, closure, rehabilitation and aftercare stages would be localised (EIA Vol. 2 of 3 Report). Table 3.3 indicates the mitigation measures associated with the potential /envisaged impacts expected regarding floral disturbance which is obviously closely linked to habitat destruction.

Detailed information about the type of flora found in and around the proposed mining area and the protection status are available in the Specialist Study Report (EIA Vol. 2 of 3 Report).

Table 3.3: Impact assessment summary with mitigation measures to prevent habitat destruction.

Description	Floral disturbance will vary depending on the scale/intensity of the development operation and associated and inevitable infrastructure.
Extent	**1.** Access routes - Localised disruption/destruction of the habitat and thus consequently flora associated directly with the actual routes. This however, would be a relatively small area with localised implications. **2.** Mining sites - Localised disruption/destruction of the habitat and thus consequently flora associated directly with the actual sites. This however, would be a relatively small area – depending on scale of operations – with localised implications. **3.** Infrastructure - Localised disruption/destruction of the habitat and thus consequently flora associated directly with the actual sites. This however, would be a relatively small area – especially if the existing (albeit ruins) infrastructure areas are used rather than affecting new sites – with localised implications.
Duration	**1.** Access route(s) - The duration of the impact is expected to be permanent along the route(s). This however, would be a relatively small area(s) with localised implications. **2.** Mining sites - The duration of the impact is expected to be permanent at the site. This however, would be a relatively small area with localised implications. **3.** Infrastructure - The duration of the impact is expected to be permanent at the site(s). This however, would be a relatively small area(s) with localised implications.
Intensity	**1.** Access route(s) - The actual sites where construction of the route(s) would be located would be permanently altered. This however, would be a relatively small area(s) with localised implications. **2.** Mining - The actual mining site would be permanently altered. This however, would be a relatively small area with localised implications. **3.** Infrastructure - The actual construction sites associated with the various mining infrastructures would be permanently altered. This however, would be a relatively small area(s) with localised implications. The areas adjacent the mining site and other associated infrastructure should not be significantly affected. This however, would depend on control over the contractors during the road building, construction phase(s) & mining phase, but should be limited to localised implications. Areas not directly affected by the mining and associated infrastructure although within the immediate area would be affected minimally. This would include dust & other associated disturbances in the area, but be limited to the mining & construction periods.
Mitigation	**1.** Limit the development (underground versus opencast mining) and avoid affecting the rocky outcrops and ephemeral drainage lines throughout the entire area. **2.** Avoid development & associated infrastructure in sensitive areas – e.g. rocky outcrops and main ephemeral drainage lines – e.g. Ombuyangupa & Löwenrivier – in the area, etc. This would minimise the negative effect on the local environment especially unique features serving as habitat to various flora species. **3.** Avoid placing access routes (roads & tracks) trough sensitive areas – e.g. over rocky outcrops/ridges and along drainage lines. This would minimise the effect on localised potentially sensitive habitats in the area. **4.** Avoid driving randomly through the area (i.e. "track discipline"), but rather stick to permanently placed roads/tracks – especially during the construction phase. This would minimise the effect on localised potentially sensitive habitats in the area. **5.** Stick to speed limits of maximum 30km/h as this would result in less dust pollution which could affect certain flora – e.g. lichen species. Speed humps could also be used to ensure the speed limit. **6.** Remove unique and sensitive flora (e.g. all *Aloe* sp.) before commencing with the development activities and relocate to a less sensitive/disturbed sites in the immediate area.

Table 3.2: *Cont.*

	7. Prevent and discourage the collecting of firewood as dead wood has an important ecological role – especially during the development phase(s). Such collecting of firewood, especially for economic reasons, often leads to abuses – e.g. chopping down of live and/or protected tree species such as *Acacia erioloba* which is a good quality wood. **8.** Attempt to avoid the removal of bigger trees during the development phase(s) – especially with the development of access routes – as these serve as habitat for a myriad of fauna. Avoid the destruction of larger trees associated with the ephemeral drainage lines. **9.** Prevent and discourage fires – especially during the development phase(s) – as this could easily cause runaway veld fires causing problems (e.g. loss of grazing & domestic stock mortalities, etc.) for the neighbouring farmers. **10.** Rehabilitation of the disturbed areas – i.e. initial development access route "scars" and associated tracks as well as associated mining infrastructures. Preferably workers should be transported in/out to the construction sites on a daily basis to avoid excess damage to the local environment (e.g. fires, wood collection, poaching, etc.). Such rehabilitation would not only confirm the company's environmental integrity, but also show true local commitment to the environment. **11.** Implement erosion control. The area(s) towards & adjacent the drainage line(s) are easily eroded and further development may exacerbate this problem. Avoid construction within 20m of the main drainage line(s) to minimise erosion problems as well as preserving the riparian associated flora & fauna. **12.** Prevent the planting of potentially invasive alien plant species (e.g. *Tecoma stans*, *Pennisetum setaceum*, etc.) for ornamental purposes as part of the landscaping – e.g. office buildings, etc. Alien species often "escape" and become invasive causing further ecological damage. **13.** Incorporate indigenous vegetation – especially the protected species e.g. *Acacia erioloba*, *Albizia anthelmintica*, etc. – into the overall landscaping. Indigenous species require less water and overall maintenance. **14.** Avoid "overnighting" at the construction sites during the construction phase as this could lead to problems such as the fires/firewood collection/plant collection.
Frequency of occurrence	Expected to be a "once off" issue affecting the selected site(s). Further prospecting & associated road construction (should this become necessary/evident during the mining operations) throughout the area would however increase the frequency of occurrence.
Probability	Definite (100%) negative impact on flora is expected in the actual mining area as well as the access route(s) and infrastructure development sites. This however, would be much localised and cover only a small area and should avoid sensitive areas. Precautionary principle (e.g. avoid unique habitat features as well as adhering to the proposed mitigating measures would minimise this) would decrease the significance of these potential impacts. Highly Probable (75%) negative impact on flora is expected in the general areas especially with large scale extraction of groundwater for prospecting/mining activities. Probable (50%) negative impact on flora is expected from the infrastructure (roads/tracks/buildings, etc.). Precautionary principle (e.g. avoid unique habitat features as well as adhering to the proposed mitigating measures would minimise this) would decrease the significance of these potential impacts.
Significance	Before mitigation: **High** and After mitigation: **Medium** to **Low**
Status of the impact	**Negative:** Localised unique habitats (e.g. rocky outcrops & drainage lines) with associated flora would bear the brunt of this proposed development, but be limited in extent and only permanent at the actual mining site and access routes and infrastructure sites.
Degree of confidence in predictions	As an ecologist I am sure of the above-mentioned predictions made and would suggest that the mitigation measures be implemented to minimise potentially negative aspects regarding the local flora in the area.

3.4 Fauna

3.4.1 Assessment Summary

All the activities associated with the proposed mine preconstruction, construction, operation, closure, rehabilitation and aftercare activities can affect fauna as a result of habitat loss and habitat degradation. For example, mining activity may affect migration routes, breeding grounds, or nesting areas.

Conversely, some wildlife species may be attracted to mine sites, particularly if food wastes and other wastes that may attract wildlife are not properly managed. Food sources for animals may become contaminated, and some contaminants, particularly metals, can magnify up the food chain.

3.4.2 Faunal Mitigation Measures

Faunal disturbance as a result of the proposed mine preconstruction, construction, operation, closure, rehabilitation and aftercare related activities would be localised (EIA Vol. 2 of 3 Report). Table 3.4 indicates the mitigation measures associated with the potential / envisaged impacts expected regarding faunal disturbance which is obviously closely linked to habitat destruction.

Detailed information about the type of fauna found in and around the proposed mining area and the protection status are available in the Specialist Study Report (EIA Vol. 2 of 3 Report).

Table 3.4: Impact assessment summary with mitigation measures to prevent faunal destruction.

Description	Faunal disturbance will vary depending on the scale/intensity of the development operation and associated and inevitable infrastructure.
Extent	**1.** Access routes - Localised disruption/destruction of the habitat and thus consequently fauna associated directly with the actual routes. This however, would be a relatively small area with localised implications. **2.** Mining sites - Localised disruption/destruction of the habitat and thus consequently fauna associated directly with the actual sites. This however, would be a relatively small area – depending on scale of operations – with localised implications. **3.** Infrastructure - Localised disruption/destruction of the habitat and thus consequently fauna associated directly with the actual sites. This however, would be a relatively small area – especially if the existing (albeit ruins) infrastructures areas are used rather than affecting new sites – with localised implications.
Duration	**1.** Access route(s) - The duration of the impact is expected to be permanent along the route(s). This however, would be a relatively small area(s) with localised implications. **2.** Mining sites - The duration of the impact is expected to be permanent at the site. This however, would be a relatively small area with localised implications. **3.** Infrastructure - The duration of the impact is expected to be permanent at the site(s). This however, would be a relatively small area(s) with localised implications.
Intensity	**1.** Access route(s) - The actual sites where construction of the route(s) would be located would be permanently altered. This however, would be a relatively small area(s) with localised implications. **2.** Mining - The actual mining site would be permanently altered. This however, would be a relatively small area with localised implications. **3.** Infrastructure - The actual construction sites associated with the various mining infrastructures would be permanently altered. This however, would be a relatively small area(s) with localised implications. The areas adjacent the mining site and other associated infrastructure should not be significantly affected. This however, would depend on control over the contractors during the road building, construction phase(s) & mining phase, but should be limited to localised implications. Areas not directly affected by the mining and associated infrastructure although within the immediate area would be affected minimally. This would include dust, noise, light & other associated disturbances in the area, but be limited to the mining & construction periods.
Mitigation	**1.** Limit the development (underground versus opencast mining) and avoid affecting the rocky outcrops and ephemeral drainage lines throughout the entire area. **2.** Avoid development & associated infrastructure (this would include overburden and slimes dam areas) in sensitive areas – e.g. in/close to drainage lines and rocky outcrops in the immediate area. This would minimise the negative effect on the local environment especially unique features serving as habitat to various vertebrate fauna species. **3.** Avoid placing access routes (roads & tracks) trough sensitive areas – e.g. over rocky outcrops/ridges and along drainage lines. This would minimise the effect on localised potentially sensitive habitats in the area. **4.** Avoid driving randomly through the area (i.e. “track discipline”), but rather stick to permanently placed roads/tracks – especially during the construction phase. This would minimise the effect on localised potentially sensitive habitats in the area. **5.** Stick to speed limits of maximum 30km/h as this would result in fewer faunal road mortalities. Speed humps could also be used to ensure the speed limit. Lower speeds would also minimise dust pollution. **6.** Remove (e.g. capture) unique fauna and sensitive fauna before commencing with the development activities and/or species serendipitously located during this period and relocate to a less sensitive/disturbed sites in the immediate area.

Table 3.4: *Cont.*

	7. Prevent and discourage the setting of snares (poaching), illegal collecting of veld foods (e.g. tortoises, etc.), indiscriminate killing of perceived dangerous species (e.g. snakes, etc.) and collecting of wood as this would diminish and negatively affect the local fauna – especially during the development phase(s). **8.** Attempt to avoid the removal of bigger trees during the development phase(s) – especially with the development of access routes – as these serve as habitat for a myriad of fauna. **9.** Prevent and discourage fires – especially during the development phase(s) – as this could easily cause runaway veld fires affecting the local fauna, but also causing problems (e.g. loss of grazing & domestic stock mortalities, etc.) for the neighbouring farmers. **10.** Rehabilitation of the disturbed areas – i.e. initial development access route "scars" and associated tracks as well as associated mining infrastructures. Preferably workers should be transported in/out to the construction sites on a daily basis to avoid excess damage to the local environment (e.g. fires, wood collection, poaching, etc.). Such rehabilitation would not only confirm the company's environmental integrity, but also show true local commitment to the environment. **11.** Implement erosion control. The area(s) towards & adjacent the drainage line(s) are easily eroded and further development may exacerbate this problem. Avoid construction within 20m of the main drainage line(s) to minimise erosion problems as well as preserving the riparian associated flora and fauna. **12.** Prevent domestic pets – e.g. cats & dogs – accompanying the workers during the construction phase as cats decimate the local fauna and interbreed & transmit diseases to the indigenous African Wildcat found in the area. Dogs often cause problems when bonding on hunting expeditions thus negatively affecting the local fauna. The indiscriminate and wanton killing of the local fauna by such pets should be avoided at all costs. **13.** Avoid "overnighting" at the construction sites during the construction phase as this could lead to problems such as the killing/poaching/collection of local fauna. **14.** Fence off the mining area with a game proof fence. This would minimise the interaction between humans and wildlife in the area. **15.** Initiate a suitable waste removal system (i.e. remove to Okahandja and not store on site) as this often attracts wildlife – e.g. Baboons & Black-backed Jackal, etc. – which may result in human-wildlife conflict issues.
Frequency of occurrence	Expected to be a "once off" issue affecting the selected site(s). Further prospecting & associated road construction (should this become necessary/evident during the mining operations) throughout the area would however increase the frequency of occurrence.
Probability	Definite (100%) negative impact on fauna is expected in the actual mining areas as well as the access route(s) and infrastructure development sites. This however, would be much localised and cover only a small area and should avoid sensitive areas. Highly Probable (75%) negative impact on fauna is expected in the general areas especially during the construction and mining phase(s) as a result of noise, increased activities, etc. Probable (50%) negative impact on fauna is expected from the infrastructure (roads/tracks/buildings, etc.). Precautionary principle (e.g. avoid unique habitat features as well as adhering to the proposed mitigating measures would minimise this) would decrease the significance of these potential impacts.
Significance	Before mitigation: **High** and After mitigation: **Medium** to **Low**
Status of the impact	**Negative**: Localised unique habitats (e.g. rocky outcrops & drainage lines) with associated fauna would bear the brunt of this proposed development, but be limited in extent and only permanent at the actual mining site and access routes and infrastructure sites.
Degree of confidence in predictions	As an ecologist I am sure of the above-mentioned predictions made and would suggest that the mitigation measures be implemented to minimise potentially negative aspects regarding the local fauna in the area.

3.5 Health and Safety Considerations

3.5.1 Assessment Summary

The proposed mining license area over Elbe Farm 10, has been subject to different land uses including previous incomplete mine development, drilling and exploration activities, that has left three (3) service declines, open trenches, gullies, scrap metals and uneven excavated areas as well as old housing / office blocks infrastructures.

These may pose localised potential impacts to the safety of workers during the proposed mine development. Emissions from the mine preconstruction and construction related activities are likely to have occupational health and safety impacts to the work place as well as to the immediate environment.

3.5.2 Mitigation Measures

Table 3.5 summarises the mitigation measures that the proponent must implement in order to address the identified health and safety impacts for the proposed mine preconstruction, construction, operation, closure, rehabilitation and aftercare related activities.

Table 3.5: Health and safety impact assessment summary with mitigation measures.

Description	Health and safety issues cover all previous land use scars as well as unstable slopes in topographically very high mountainous areas (Zone 1). Intermediate adulating landscape (Zone 2) and Topographically low-lying areas dominated by ephemeral river channels (Zone 3).
Extent	Would be a relatively limited and localised within the specific zones.
Duration	The duration of the impact is expected to be permanent in the actual areas likely to be affected.
Intensity	The actual site would be permanently altered. This however, would be a relatively limited to the actual zone where specific activities such as mining and mine infrastructure support will take place. The adjacent zones associated with the existing infrastructure would be affected moderately.
Mitigation	**1**. Develop and adapt an Environmental Management System for the entire the mining project taking into considerations health and safety issues during and after the proposed mining and ongoing exploration project. **2.** Avoid placing dumping sites, overburden/storage sites and associated infrastructure in unstable areas of specific zones **3.** Adapt cleaner production principles that reduce the health and safety impacts of the proposed project. 4. All other areas outside the key mining operation must be identified and fenced off
Frequency of occurrence	Expected to be permanent from construction and operational phase and reduce minimal after closure and rehabilitation.
Probability	Probable (100%) negative impacts are expected on the actual mining areas (the open cast area) and about 50% chance for negative impacts within the infrastructure (roads/tracks/ site usage) mining support Zone 3. Less than 20% is likely to occur in Zone 1. Precautionary principle (e.g. adhering to the proposed mitigating measures would minimise and decrease the likely significance of these potential impacts.
Significance	Before mitigation: **High and** After mitigation: **Medium to Low**
Status of the impact	Negative
Legal requirements	Minerals Act and the Labour Act
Degree of confidence in predictions	The specialist consultant is sure that the above-mentioned predictions proposed will minimise potentially negative aspects regarding the local habitats.

3.6 Socioeconomic

3.6.1 Assessment Summary

Socioeconomic impacts of the proposed mine development are likely to occur considering that the local communities in the area are very reserved to their cultural heritage. One of the major possible conflict of the proposed mine project may be unrealistic expectations about the development of a mine.

It is important for regional authorities and local communities to bear in mind that mine development takes sometime before full production and economic benefits can be realised. Detailed information on key socioeconomic issues associated with the proposed Elbe Mine Project are available in the Specialist Study Report (EIA Vol. 2 of 3 Report).

3.6.2 Mitigation Measures

Table 3.6 summarises the mitigation measures that the proponent must implement in order to address the identified socioeconomic positive and negative impacts of the proposed mine preconstruction, construction, operation, closure, rehabilitation and aftercare related activities.

Table 3.6: Socioeconomic impact assessment summary with mitigation measures.

Description	The influence of the development on the local, regional and national socioeconomic setting includes positive and negative impacts
Extent	• Positive impacts will be felt at local (Farms Area and Okahandja Town), regional (Otjozondjupa) and national (Namibia) levels • Negative impacts will mainly affect the local Farms Elbe No. 10 and Ombujongupa 292
Duration	The duration of the likely impacts (positive and negative) will be permanent and will go beyond the duration of the proposed project activities.
Intensity	The levels of positive socioeconomic impacts will be high at all levels (local, regional and national)
Mitigation	The following are key mitigation measures with respect to the socioeconomic effects of the proposed project on Okahandja Town: • Employment opportunities to be created must focus on employing the local people in order to positively contribute to their livelihoods and the economy of the local town with the increased availability of money • Potential employees must be provided with additional opportunities to improve or develop employable skills • The developer must as far as its possible utilize local services and products in order to boosted and diversified the local economy • The developer to work with the local authority with respect to possible increased need for housing, school placements, infrastructure and health services • The developer to work with NamPower in mitigating the likley increase demand for power and alternative sources of power would need to be investigated and utilized, especially when developing new housing units • The developer to work with NamWater in mitigating the likley increase demand Increased demand for water and the wise use of water needs to be promoted • On-Road Investment must develop alternative transport system in order to minimise the likely increased traffic, especially heavy vehicles using public roads and road safety concerns • The developer must invest in local community upliftment projects once the mine becomes operational and profitable as part of the mine's social responsibility programme • Contribution to Namibia's Development Goals and Vision 2030 through the provision of employment and the improvement of the quality of life The following are key mitigation measures with respect to the socioeconomic effects of the proposed project on the local farmland: • Negotiate with the land owners for compensation with respect to the disturbance the proposed project development will cause including the loss of sense of place and tranquility due to light pollution, noise pollution, increased traffic, earth tremors caused by the various proposed mining activities • Negotiate with the land owners for compensation with respect to potential loss of income as a result of the change of land use from grazing to mining • Dust dispersion from the operations at the mine as well as transport of ore along dirt roads and dust deposition on surrounding grazing land may render the land less suitable for livestock farming and cause loss of income • The developer to fence off the entire proposed mining license area and provide additional security in order to control any likely potential increase in poaching and stock theft, trespassing and increase in crime around the local farm area

Table 3.6: *Cont.*

Frequency of occurrence	Throughout the proposed project life cycle and beyond for both positive and negative impacts.	
Probability	The likelihood of positive and negative impacts accruing is high as long as the proposed project becomes a reality. Negative impacts will be localised and high at local farm areas	
Significance	Before for the negative impacts mitigation: **High** After mitigation: **Low**	Before for the positive impacts mitigation: **High** After mitigation: **Very High**
Status of the impact	Positive and Negatives	
Degree of confidence in predictions	The specialist consultant is sure that the assessment and the recommended mitigation measures, once implemented will minimise the potentially negative impacts and maximise the positive ones.	

3.7 Ground Components

3.7.1 Assessment Summary

The ground components include the regional and local geology, geomorphology, surface water and groundwater assessments. Of all the ground components covered in the EIA Vol. 2 of 3 Report, the groundwater is likely to be locally negatively impacted because of the proposed project (Table 3.7).

Detailed information on key water issues associated with the proposed Elbe Mine Project are available in the Specialist Study Report (EIA Vol. 2 of 3 Report).

Table 3.7: Summary screening for environmental groundwater impact.

	Item	Description	Value	Mitigations
Social Environment	Economic Activities	Loss of production base (land, etc.) and change in economic structure	B	Should groundwater be considered as a water supply option, over-abstraction could cause other boreholes to dry up
	Public Health Condition	Health and sanitary conditions deteriorate on account of increased waste generation and infestation of harmful insects	C	Standard sanitation principles to be applied by personnel on site
	Waste	Generation of mining and construction waste, surplus soils, sludge, domestic waste, etc.	B	All waste disposal sites must be located on areas of lowest groundwater pollution vulnerability
Natural Environment	Groundwater	Lowering of the groundwater table due to over abstraction and turbid water caused by construction work	B	Proper groundwater abstraction management and monitoring necessary
	Fauna and Flora	Interruption of reproduction or extinction of species due to change of habitat conditions	C	Proper placing of waste dump sites and poaching control necessary
Pollution	Water Pollution	Deterioration of the groundwater quality of the aquifers	B	Groundwater quality monitoring essential
	Off-road Tracks	Unsightly tracks that cause damage to sensitive flora	B	Potential impact that needs proper control measures
Values: A – Serious Impact, **B** – Small Impact, **C** – Very Small Impact, **D** – No Impact				

3.7.2 Mitigation Measures

Table 3.8 summarises the mitigation measures that the proponent must implement in order to address the identified ground components negative impacts especially on water as a result of the proposed mine preconstruction, construction, operation, closure, rehabilitation and aftercare related activities.

Table 3.8: Ground components impact assessment summary with mitigation measures.

Description	The influences and impacts of the proposed project development on the ground components including geology, land, water and construction materials.
Extent	The extent of the likely negative impacts as a result of the proposed development on the ground components will be localised and in particular will affect the immediate ground components of the natural environment.
Duration	The duration of the likely impacts will be permanent and beyond the duration of the proposed project.
Intensity	The level of impacts is likely to be high within the immediate environment and low in the surrounding areas.
Mitigation	1. Prevention, detection, and cleanup of released waste, cleanup equipment. the location and availability of suitable alternative equipment. and a plan of operations need to be put in place to be headed by the Environmental Coordinator from construction to rehabilitation. 2. All solid and liquid wastes generated as a result of the proposed project activities shall be reduced, reused, or recycled to the maximum extent practicable. 3. Burial of waste anywhere either on state or private property is not allowed and all waste must be disposed on approved waste disposal sites. 4. No littering in the site area including access roads must be always clean. 5. Pin flags, survey stakes and flagging, trail markers, powder boxes, oil cans, and all other forms of litter must be removed. 6. Trash may not be burned or buried, except at approved sites under controlled conditions in accordance with the regulations. 7. Disposal of wastewater into any public stream is prohibited. 8. Should groundwater be considered as a water supply option, over-abstraction could cause other boreholes to dry up 9. Standard sanitation principles to be applied by personnel on site 10. All waste disposal sites must be located on areas of lowest groundwater pollution vulnerability 11. Boreholes for groundwater quality monitoring must be drilled around the mining licence area
Frequency of occurrence	The likely impacts are likely to occur throughout the proposed project lifecycle and in particularly during the actual mine and supporting infrastructures preconstruction, construction, operation, rehabilitation and aftercare stage.
Probability	Positive (0.5)
Significance	Before for the negative impacts mitigation: **Medium to High,** After mitigation: **Medium to Low**
Status of the impact	Negative
Degree of confidence in predictions	The hydrogeologist, geological and geotechnical specialists who undertook the studies and contribution to the above assessment are sure of the recommendations. Confidence level 80%.

3.8 Progressive and Final Mine Closure Plan

3.8.1 Assessment Summary

Large areas of land may be disturbed through ore extraction and other mining activities within the proposed Mining License (ML) area. Disturbed areas that are not stabilized can be susceptible to erosion caused by both wind and water. erosion can lead to problems with dust as well as water quality problems related to sedimentation. During the mine operations phase, it's important for the operator to start with ongoing landscape rehabilitation which may include the reshaping and restructuring of the landscape and erosion control measures as detailed in the Elbe Mine Closure Plan. In addition to reshaping or recontouring, landscape restructuring activities can include the use of stockpiled soils to reconstruct soil structure in preparation for revegetation.

3.8.2 Final Mine Closure Plan Migratory Activities

The objectives of final mine closure as detailed in the Elbe Mine Closure Plan are to:

- ❖ Ensure public and wildlife safety and preventing inadvertent access to mine openings and other infrastructure.
- ❖ Provide for the stable, long-term storage of waste rock and tailings.
- ❖ Ensure that the site is self-sustaining and to prevent or minimize environmental impacts, and.
- ❖ Rehabilitate disturbed areas for a specified land use (e.g., return of disturbed areas to a natural state or other acceptable land use).

The final cover of the tailings dump must have a graded layers coarsing upwards (Fig. 3.1). This means that coarse material must be placed on top in order to protect the fines below from wind and water erosion. Furthermore, the coarse-grained material below will also help in retaining moisture for good vegetation growth over the tailings. No municipal or hazardous site shall be developed in the mining license area. All municipal / industrial / hazardous waste must be stored in suitable containers / skips onsite and once full must be transported to Okahandja municipal waste disposal site.

The Okahandja Municipal Waste Disposal Site is not well engineered and organised to handle hazardous waste. The mining company is highly encouraged to assist the Okahandja Municipality in developing a suitable waste disposal site, which will not only be utilised by the mining company but also the community of Okahandja. The support to the development of suitable waste disposal site for the Town of Okahandja by the mining company will be within the expected social responsibility of the mining company to the local community. Table 3.9 provided a summary of components to be addressed in the ongoing and final mine closure phase. Table 3.10 summarises the initial estimated cost provisions for final rehabilitation, closure and aftercare environmental liabilities for the proposed Elbe Project for the first year of operation. During the entire project life cycle, the environmental liability for final rehabilitation, closure and aftercare must be validated, revised annually and capitalized accordingly in order to avoid major final shortfall during mine closure.

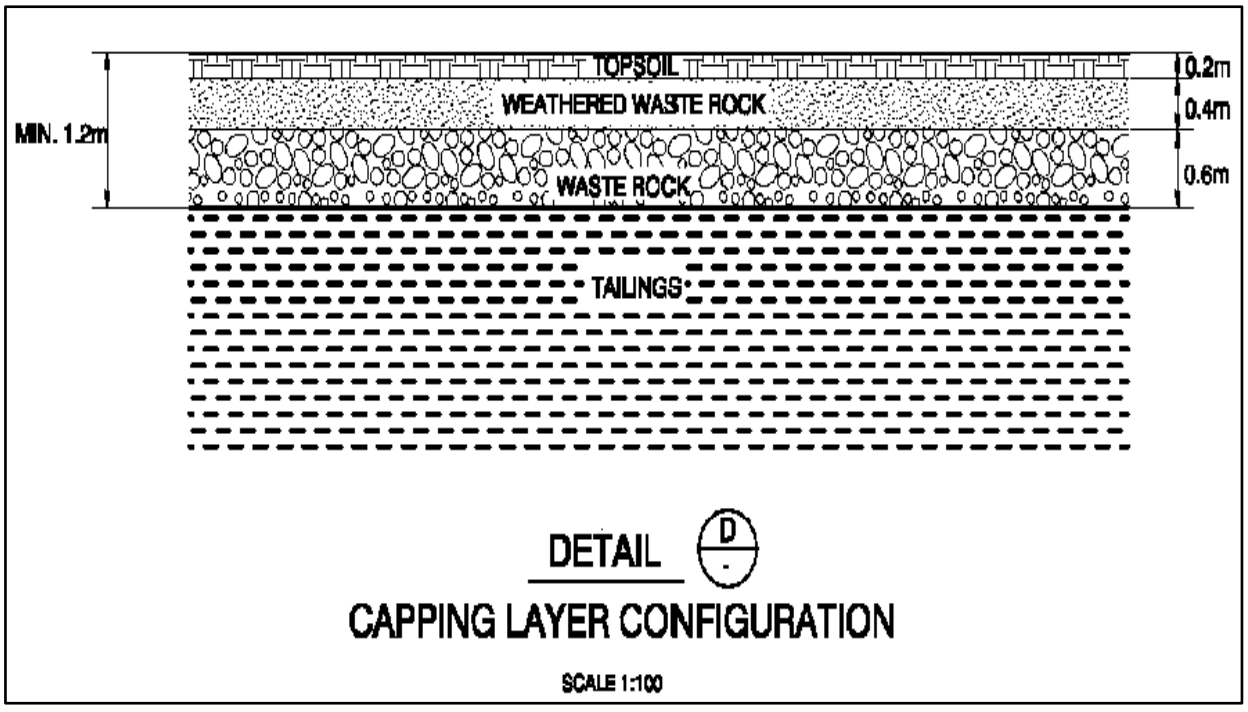

Figure 3.1: Section view through the proposed tailing damp showing the final top graded cover layer to be capped during the mine closure stage in order to prevent water and wind erosion over time.

Table 3.9: Mitigatory measures that will address ongoing and final mine Closure Plan.

Components	Aspects to be Addressed
Underground Workings	○ Underground workings stability ○ Groundwater and rainwater management ○ Security and unauthorized access ○ Public and wildlife entrapment ○ Effects of drainage into and from the underground workings
Ore Processing Facilities	○ Removal of buildings and foundations ○ Clean-up of workshops, fuel and reagent ○ Disposal of scrap and waste materials ○ Re-profiling and revegetation of site
Waste Rock Piles	○ Slope stability ○ Effects of leaching and seepage on surface and groundwater ○ Dust generation ○ Visual impact ○ Special considerations for some types of mines such as uranium mines
Tailings Management Facilities	○ Dam stability ○ Changes in tailings geochemistry ○ Effects of seepage past the dam and from the base of the facility ○ Surface water management and discharge ○ Dust generation ○ Access and security ○ Wildlife entrapment ○ Special considerations for some types of mines such as uranium mines
Water Management Facilities	○ Restoration or removal of dams, reservoirs, settling ponds, culverts, pipelines, spillways or culverts which are no longer needed ○ Surface drainage of the site and discharge of drainage waters ○ Maintenance of water management facilities
Landfill / Waste Disposal Facilities	○ Disposal or removal from site of hazardous wastes ○ Disposal and stability of treatment sludge ○ Removal of sewage treatment plant ○ Prevention of groundwater contamination ○ Prevention of illegal dumping ○ Security and unauthorized access
Infrastructure	○ Removal of power and water supply ○ Removal of haul and access roads ○ Reuse of transportation and supply depots

3.9 Elbe Mine Closure Plan

3.9.1 Estimate of the Final Rehabilitation, Closure and Aftercare Costs

This Elbe Mine closure plan and the estimated final mine rehabilitation, closure and aftercare costs are based on a number of technical reports for the development of the Elbe mine prepared by various consultants. No feasibility or preferability report was provided by On-Road Investments (Pty) Ltd with respect to the preparation of this mine closure plan. The final mine rehabilitation, closure and aftercare aspects considered in the cost estimate covers the following components as detailed in Table 3.10:

(i) Stakeholder engagement.

(ii) Employees costs and social development.

(iii) Demolition, removal and rehabilitation, and.

(iv) Aftercare maintenance and environmental monitoring.

Without taking into consideration the cost ongoing rehabilitation that will be undertaken in the first twelve (12) months of the mine operations, it is hereby estimated that the total cost for the Elbe mine final rehabilitation, closure and aftercare costs covering the first twelve (12) month of mine operations is Seven Million Four Hundred Thousand Namibia Dollar (**N$7, 400, 000.00**) (Table 3.10).

On-Road Investments (Pty) Ltd commits that each year the Company will review the mine closure plan and cost and make annual contributions to the fund to in order to provide for a complete final Elbe mine rehabilitation, closure and aftercare costs.

Table 3.10: Elbe mine final rehabilitation, closure and aftercare components and associated costs covering the first twelve (12) months operation, that means if mine closure occurs after twelve months of operation.

	Activity	Costs to Be Validated Annually (Namibian$)
FINAL REHABILITATION AND MINE CLOSURE ACTIVITIES	**A. STAKEHOLDER ENGAGEMENT**	
	1. Consultants support	200,000.00
	2. Stakeholder engagement (land owners, employees, authorities, unions and special interest group forum) and advertisements	300, 000.00
	SUBTOTAL	**500, 000.00**
	B. EMPLOYEES COSTS AND SOCIAL DEVELOPMENT	
	1. Retrenchment and long service	2, 000,000.00
	2. Training for re-skilling	1, 000,000.00
	3. Health Continuation programme	1, 000,000.00
	SUBTOTAL	**4, 000,000.00**
	C. DEMOLITION, REMOVAL AND REHABILITATION	
	1. Removal of the processing plant and related infrastructure	100,000.00
	2. Cleaning equipment to enable sale	50,000.00
	3. Tailings dump closure	200,000.00
	4. Waste rock dump	50,000.00
	5. Final rehabilitation of shafts and surface excavations	300,000.00
	6. Removal of offices, administration facilities, support areas	20,000.00
	7. Water infrastructure	10,000.00
	8. Exploration mining area and other excavations	200,000.00
	9. Running costs for the mine site during closure activities	500,000.00
	10. Access roads	20,000.00
	11. Clean-up of the areas contaminated and preparation for other land use options	50,000.00
	12. General clean-up of area including removal of all scrap metal etc	100,000.00
SUBTOTAL		**1, 600, 000.00**
AFTERCARE ACTIVITIES	**D. ENVIRONMENTAL MANAGEMENT**	
	1. Professional consulting support	300,000.00
	2. Maintenance of site including any failures of the Tailings Storage Facility (TSF), Waste Rock Facility (WRF), concrete walls around the shafts \ declines and general site erosion	500,000.00
	SUBTOTAL	**800, 000.00**
	E. ENVIRONMENTAL MONITORING	
	3. Air quality (Dust)	100,000.00
	4. Surface water monitoring	100 000.00
	5. Groundwater monitoring	200, 000.00
	6. Erosion control and management	100,000.00
	SUBTOTAL	**700, 000.00**
GRAND TOTAL ENVIRONMENTAL LIABILITY (FINAL REHABILITATION, CLOSURE AND AFTER CARE STAGES)		**7, 400, 000.00**

3.9.2 Funding Mechanisms for Final Rehabilitation, Closure and Aftercare Costs

On-Road Investments (Pty) Ltd will establish the Elbe Mine Environmental Rehabilitation Fund, which will provide for expenditures associated with Elbe Mine final rehabilitation, closure and aftercare costs.

The establishment of the Elbe Mine Environmental Rehabilitation Fund shall comply with statutory obligations and stipulated requirements of both the Ministry of Mines and Energy and the Ministry of Environment, Forestry and Tourism (MEFT). In addition to the fixed terms cash deposits and in order to diversity this fund, portions of the Elbe Mine Environmental Rehabilitation Fund funds shall be invested in some of the following mechanisms or instruments:

(i) Bond.

(ii) Insurance, or

(iii) Other short and long-term investments instruments.

The Elbe Mine Environmental Rehabilitation Fund and associated investments instruments of the fund will be administered by On-Road Investments (Pty) Ltd, the Government of the Republic of Namibia (MME and MEFT), representatives of the land owners and employees in order to make sure that the fund is fully capitalised and covers all the aspects of the envisaged environmental liabilities at mine closure.

It is expected that no post mine closure residual liability once all rehabilitation has been completed. However, if any residual liability is identified then the transfer of such liability is to be negotiated between On-Road Investments (Pty) Ltd and the landowner or third-party service provider. Residual liability would include ongoing maintenance or monitoring. In the event of the On-Road Investment (Pty) Ltd being insolvent, then any residual liability would be negotiated between the administrator and the landowner or third-party service provider, notwithstanding the fact that the Namibian Government and stakeholders will hold the rights to the Elbe Mine Environmental Rehabilitation Fund that should cover the complete costs for final rehabilitation, closure and aftercare activities including monitoring.

3.9.3 Monitoring and Reporting

Environmental monitoring with respect to the implementation of the Elbe Mine Closure Plan will be undertaken in order to measure the achievement of outcomes for both the ongoing rehabilitation and final mine closure and aftercare activities. Both the ongoing rehabilitation and final mine closure and aftercare monitoring activities will cover the following components:

(i) Air quality and dust emissions.

(ii) Stability of the following engineered structures:

  (a) Tailings Storage Facility (TSF).

  (b) Waste Rock Facility (WRF).

  (c) Waste disposal site.

  (d) Surface and subsurface excavated areas.

  (e) Drainage systems, and.

  (f) Pollution Control Dam (PCD).

(iii) Surface and groundwater quality, and.

(iv) Fauna and flora recovery in ongoing and final rehabilitated areas.

On-Road Investments (Pty) Ltd will report on the technical and financial monitoring performances of the Elbe Mine Closure Plan and this will be provided to all the key stakeholders. The monitoring report will also be made available to the public on the website of On-Road Investments (Pty) Ltd. The following performance indicators will be measured against the Elbe Mine Closure Plan implementation and monitoring of the ongoing rehabilitation and final mine closure and aftercare activities:

(i) Compliance to the national regulations.

(ii) Compliance to the conditions of the ML, ECC, freshwater abstraction and wastewater discharge permits as well as all other granted statutory permits \ authorisations\ consents.

(iii) Compliance to the key Agreements \ contracts with key stakeholders such as the land owners \ unions \ employees, and.

(iv) Compliance with this Elbe Mine Closure Plan, as indicated by internal and statutory reporting.

On-Road Investments (Pty) Ltd will strive to continually improve on the mine's environmental performance by applying the precautionary principles as enshrined in the Environmental Management Act, 2007, Act No. 7 of 2007 and the principles of best practice to mining operations, including where cost-effective and practicable, the adoption of new best practice technologies and improved ongoing rehabilitation and final mine closure and aftercare control measures.

3.9.4 Annual Reviews of the Elbe Mine Closure Plan

This Elbe Mine Closure Plan will be reviewed, and if necessary revised, to the satisfaction of all the stakeholders and in consultation with stakeholders, in accordance with the requirements of the Environmental Management Act, 2007, Act No. 7 of 2007 with respect to the review, update and approval of environmental reporting. Technical reviews will be undertaken annually and or as a result of the following:

- Following changes to project approval or licence conditions relating to mine closure management or monitoring.
- Following any significant mine closure related incident.
- When a relevant/significant improvement has been identified.
- For necessary or any unforeseen changes to mine closure domains.
- Where a risk assessment identifies the requirement to alter the Plan, and.
- Annually.

Closure cost estimates should be reviewed regularly to reflect changing circumstances that may be linked to the technical review. On-Road Investments (Pty) Ltd must annually review the cost estimates contained in this Elbe Mine Closure Plan and must account for the following:

(i) Inflation and escalation.

(ii) Changes in legislation.

(iii) Changes in available technology to better address ongoing rehabilitation and final closure and aftercare risks.

(iv) Changes in the 'Life of Mine' plan (for instance, expansions, changes in process or new activities), and.

(v) Changes in stakeholder and \ or public expectations.

4. ENVIRONMENTAL PERFORMANCE MONITORING

4.1 Overview

The monitoring process of the EMP performances for the proposed mine development is divided into two parts and these are:

(i) Monitoring activities and effects to be undertaken by the Environmental Control Officer (ECO).

(ii) Preparation of an Environmental Monitoring Report covering all activities related to the Environmental Management Plan during and at closure of the proposed mine development to be undertaken by the Environmental Control Officer (ECO).

On-Road Investments (Pty) Ltd will be required to report regularly (at least twice in a year) to the Ministry of Environment and Tourism, the environmental performances as part of the ongoing environmental monitoring programme.

Environmental monitoring programme is part of the EMP performances assessments and will need to be compiled and submitted as determined by the regulators. The process of undertaking appropriate monitoring as per specific topic as shown in Tables 4.1 – 4.9 and tracking performances against the objectives and documenting all environmental activities is part of internal and external auditing to be coordinated by the Environmental Control Officer/ Consultant / Suitable qualified in-house resource person.

Tables 4.1 – 4.9 outline the type of information that shall need to be recorded on a regular by the Environmental Control Officer as part of the monitoring process of the activities and the effects.

The second part of the monitoring of the EMP performance will require a report outlining all the activities related to effectiveness of the EMP at the end of the proposed Elbe Mine to be undertaken by the Environmental Control Officer (ECO). The types of the data sets to be used in the preparation of such a report are outlined in Tables 4.1 – 4.9.

The objective will be to ensure that corrective actions are reviewed and steps are taken to ensure compliance. The report shall outline the status of the environment and any likely environmental liability after completion of the proposed project.

The report shall be submitted to the Ministry of Environment, Forestry and Tourism and will represent the final closure and fulfilment of the Environmental Contract conditions as provided for the Environmental Clearance Certificate.

Table 4.1: Monitoring of environmental performance implementation / environmental awareness training.

Mitigation	Compliance	Follow-up Action Required	By Whom	By When	Completed
Is there an Environmental awareness training programme?					
How many people have been given environmental awareness training?					
Is a copy of the EMP on site?					
How effective is the awareness training? Do people understand the contents of the EMP? Where are the weaknesses? Ask 3 people at random various questions about the EMP.					

Table 4.2: Monitoring of environmental performance for the settlement.

Mitigation	Compliance	Follow-up Action Required	By Whom	By When	Completed
Are all mining and related supporting infrastructures positioned to avoid sensitive zones, such as Ephemeral river channels and potential habitats?					
Has new infrastructure been created? If so, what, and how well planned / built with respect to environment?					
Have effective waste management systems been provided? Where are they situated?					
Do receptacles for waste have scavenging animal proof lids?					
What litter is there – who is littering?					
Are there facilities for the disposal of oils / etc and how often is it removed to an approved disposal site?					
Is there evidence of oil / diesel spills? Bunding or not?					
What fuel source is being provided for mining, mineral processing and all related activities?					
Housekeeping					

Table 4.3: Environmental data collection.

Mitigation	Compliance	Follow-up Action Required	By Whom	By When	Completed
Are records being kept?					
Have archaeological sites been found / disturbed / described?					
Habitats being preserved?					
Have key important / protected flora being transplanted / relocated					

Table 4.4: Health, Safety and Environment (HSE).

Mitigation	Compliance	Follow-up Action Required	By Whom	By When	Completed
Is there First Aid Kit containing anti-histamines etc?					
Are dangerous areas clearly marked off?					
Do vehicles appear to maintain the recommended speed limits?					
Do vehicles drive with headlights on along the gravel roads at all times?					
Does the operator have an Emergency Response Plan (ERP)? How often are drills undertaken?					

Table 4.5: Recruitment of labour (Socioeconomic impacts).

Mitigation	Compliance	Follow-up Action Required	By Whom	By When	Completed
What labour source is used?					
How has the recruitment practice been done?					
Does the operator have a Corporate Social Responsibility (CSR) programme					

Table 4.6: Management of the natural habitat and surficial materials management.

Mitigation	Compliance	Follow-up Action Required	By Whom	By When	Completed
Has there been mine infrastructure development on or very close sensitive areas?					
Has anyone been caught with plants or animals in their possession?					
Has there been wilful or malicious damage to the environment?					
Has topsoil / seed bank layer been removed from development areas and appropriately stored for rehabilitation / restoration programme?					

Table 4.7: Tracks and off-road driving.

Mitigation	Compliance	Follow-up Action Required	By Whom	By When	Completed
Are existing tracks used and maintained?					
What new tracks have been developed and are they planned?					
What evidence is there of off-road driving? Who appears to be responsible?					
Are corners being cut, what type of turning circle are there? Three-point turns vs U turns?					
Have unnecessary tracks been rehabilitated and how well?					

Table 4.8: Management of surface and groundwater.

Mitigation	Compliance	Follow-up Action Required	By Whom	By When	Completed
How is potable water supplied and how often? Position of tanks?					
Is water being wasted?					
Is there any leakage from pipes or taps?					
Has casing been left when boreholes hit water and have any records of water strikes been kept? Were water samples taken and RWL measured?					

Table 4.9: Public relations / ongoing stakeholders engagements.

Mitigation	Compliance	Follow-up Action Required	By Whom	By When	Completed
Have any complaints been made about the mining operations / activities by stakeholders / general public / land owners? If so, what, and how was the issue resolved?					
Are ongoing stakeholders engagements being undertaken? By who and how often?					

4.2 Environmental Awareness and Training Materials

4.2.1 Environmental Awareness Guidance

The following is the summary of the general environmental awareness guidance that must be implemented throughout the lifecycle of the proposed Elbe Mine Project:

- The Environmental Rules apply to EVERYBODY. This includes all permanent, contract, or temporary workers as well as any other person who visits the mine site. Any person who visits the mine site will be required to adhere to the company Environmental Code of Conduct.

- The Site Manager will issue warnings and will discipline ANY PERSON who breaks anyone of the Environmental Rules and Procedures. Repeated and continued breaking of the Rules and Procedures will result in a disciplinary hearing and which may result in that person being asked to leave the site permanently.

- The ENVIRONMENT means the whole surroundings around us. The environment is made-up of the soil, water, air, plants and animals. and those characteristics of the soil, water, air, plant and animal life that influence human health and wellbeing, and.

- If any member of the WORK FORCE does not understand, or does not know how to keep any of Environmental Rule or Procedure, that PERSON must seek advice from the ENVIRONMENTAL CONTROL OFFICER (ECO), SITE MANAGER or CONTRACTOR. The PERSON that does not understand must keep asking until she/he is able to keep to the all the Environmental Rules and Procedures.

4.2.2 Natural Environmental Management Guidance

- Never feed, tease or play with, hunt, kill, destroy or set devices to trap any wild animal (including birds, reptiles and mammals), livestock or pets. Do not bring any wild animal or pet to the mine site.

- Do not pick any plant or take any animal out of the mine site area EVER. You will be prosecuted and asked to leave the project area.

- Never leave rubbish and food scraps or bones where it will attract animals, birds or insects. Rubbish must be thrown into the correct rubbish bins or bags provided.

- Protect the surface material by not driving over it unnecessarily.

- Do not drive over, build upon, or camp on any sensitive habitats for plants and animals.

- Do not cut down any part of living trees / bushes for firewood, and.

- Do not destroy bird nest, dens, burrow mining area, termite hills etc or any other natural objects in the area.

4.2.3 Vehicle Use and Access Guidance

- Never drive any vehicle without a valid licence for that particular vehicle and do not drive any vehicle that appears not to be road-worthy.

- Never drive any vehicle when under the influence of alcohol or drugs.

- DO NOT make any new roads without permission. Stay within demarcated areas.

- ❖ Avoid U-Turns and large turning circles. 3-point turns are encouraged. Do not ever drive on rocky slopes or vegetated dune areas.
- ❖ Stay on the road, do not make a second set of tracks and do not cut corners.
- ❖ DO NOT SPEED - keep to less than 60 km per hour on the tracks and site roads.
- ❖ No off-road driving is allowed.
- ❖ Vehicles may only drive on demarcated roads, and.
- ❖ Adhere to speed limits and drive with headlights switched on along any gravel road.

4.2.4 Control of Dust Guidance

- ❖ Do not make new roads or clear any vegetation unless instructed to do so by your Contractor or the Environmental Control Officer / Site Manager, and.
- ❖ Try to disturb the surface of the natural landscape as little as possible.

4.2.5 Health and Safety Guidance

- ❖ Drink lots of water every day, but only from the fresh water supplies.
- ❖ Take the necessary precautions to avoid contracting the HIV/AIDS virus.
- ❖ Only enter or exit the mine at the demarcated gates / or road.
- ❖ Always keep the access area as you found them.
- ❖ Any damage to any existing infrastructure in the area must be report to the Environmental Control Officer / Project Manager who will then inform the owner of any damage with all the repairs done to the satisfaction of the owner or Environmental Control Officer.
- ❖ Never enter any area that is out of bounds, or demarcated as dangerous or wander off without informing or permission of team leader.
- ❖ Report to your Contractor or the Site Manager if you see a stranger or unauthorised person in the mine site.
- ❖ Do not remove any vehicle, machinery, equipment or any other object from the mine site without permission of your Contractor or the Site Manager.
- ❖ Wear protective clothing and equipment required and according to instructions from your Contractor or the Site Manager.
- ❖ Never enter or work in the mine when under the influence of alcohol or drugs.

4.2.6 Preventing Pollution and Dangerous Working Conditions Guidance

- ❖ Never throw any hazardous substance such as fuel, oil, solvents, etc. into streams or onto the ground.
- ❖ Never allow any hazardous substance to soak into the soil.

- ❖ Immediately tell your Contractor or Environmental Control Officer / Site Manager when you spill, or notice any hazardous substance being spilled anywhere in the mine.
- ❖ Report to your Contractor or Environmental Control Officer / Site Manager when you notice any container, which may hold a hazardous substance, overflow, leak or drip.
- ❖ Immediately report to your Contractor or Environmental Control Officer / Site Manager when you notice overflowing problems or unhygienic conditions at the ablution facilities.
- ❖ Vehicles, equipment and machinery, containers and other surfaces shall be washed at areas designated by the Contractor or Environmental Control Officer/ Site Manager, and.
- ❖ If you are not sure how to transport, use, store or dispose any hazardous substance - ASK your Contractor or Environmental Control Officer / Site Manager for advice.

4.2.7 Saving Water Guidance

- ❖ Always use as little water as possible. Reduce, reuse and re-cycle water where possible.
- ❖ Report any dripping or leaking taps and pipes to your Contractor or Environmental Control Officer or Site Manager, and.
- ❖ Never leave taps running. Close taps after you have finished using them.

4.2.8 Disposal of Waste Guidance

- ❖ Learn to know the difference between the two main types of waste, namely:
  - ✓ General Waste. and
  - ✓ Hazardous Waste.
- ❖ Learn how to identify the containers, bins, drums or bags for the different types of wastes. Never dispose of hazardous waste in the bins or skips intended for general waste or construction rubble.
- ❖ Never burn or bury any waste within mining license area.
- ❖ Never overfill any waste container, drum, bin or bag. Inform your Contractor or the Environmental Control Officer / Site Manager if the containers, drums, bins or skips are nearly full.
- ❖ Never litter or throwaway any waste on the site, in the field or along any road. No illegal dumping, and.
- ❖ Littering is prohibited.

4.2.9 Religious, Cultural, Historical and Archaeological Objects Guidance

- ❖ If you find any suspected religious, cultural, historical or archeologically object or site around the mine, you must immediately notify your Contractor or Environmental Control Officer / Site Manager.
- ❖ Never remove, destroy, interfere with or disturb any religious, cultural, historical or archaeological object or site around the mine site.

4.2.10 Dealing with Environmental Complaints Guidance

- ❖ If you have any complaint about dangerous working conditions or potential pollution to the environment, immediately report this to your Contractor or the Environmental Control Officer **/** Site Manager, and.

- ❖ If any person complains to you about noise, lights, littering, pollution, or any other harmful or dangerous condition, immediately report this to your Contractor or the Environmental Control Officer / the Site Manager.

4.3 Environmental Personnel Register

Table 4.10 shows the Environmental Personnel Register to be signed by each and every person who receives or attends the Environmental Awareness Training or who has the training material explained to him or her or in possession of the training material.

Table 4.10: Environmental personnel register.

Date	Name	Company	Signature

5. CONCLUSION AND RECOMMENDATION

5.1 Summary of Conclusions

Mitigation measures for both positive and negative impacts have been proposed and management strategies are provided in this Environmental Management Plan (EMP Vol. 3 of 3) for the following development stages:

(i) Preconstruction.

(ii) Construction.

(iii) Operational and Ongoing rehabilitation.

(iv) Closure, Final Rehabilitation and Aftercare Stages.

Based on the extent, duration, intensity and likely negative and positive impacts of the proposed development, this Environmental Management Plan (EMP) Report Vol. 3 of 3 incorporating all the relevant mitigation measures with respect to likely impacts and recommendations to be implemented by the developer / operator. This EMP implementation and monitoring activities covers all the stages of the proposed mine project life cycle and is inclusive of the preconstruction, construction, operation and ongoing rehabilitation and closure, final rehabilitation and aftercare stages.

5.2 Recommendations

It's hereby recommended that the On-Road Investments (Pty) Ltd takes all the necessary steps to implement all the recommendations of the EMP for the successful implementation and completion of the proposed mine project activities from construction to final closure and aftercare stages. The following are the recommended actions to be implemented by the proponent (On-Road Investments (Pty) Ltd) as a part of the management of the impacts through implementations of this EMP Vol. 3 of 3 Report:

(i) Contract an Environmental Control Officer / External Consultant / suitable in-house resources person to lead and further develop, implement and promote environmental culture through awareness raising of the workforce, contractors and sub-contractors in the field during the whole duration of the proposed project.

(ii) Provide with other support, human and financial resources, for the implementation of the proposed mitigations and effective environmental management during the planned mine project life cycle.

(iii) Develop a simplified environmental induction and awareness programme for all the workforce, contractors and subcontractors.

(iv) Where contracted service providers are likely to cause environmental impacts, these will need to identified and contract agreements need to be developed with costing provisions for environmental liabilities.

(v) Implement internal and external monitoring of the actions and management strategies developed during the project duration and a final Environmental Monitoring report to be prepared by the Environmental Control Officer / External Consultant / suitable in-house resource person and to be submitted to the regulators and to end the proposed mine project.

(vi) Develop and implement a monitoring programme that will fit into the overall company's Environmental Management Systems (EMS).

The responsibilities to ensure that all the recommendations contained in this EMP Report are executed accordingly, rest with the proponent **(On-Road Investments (Pty) Ltd).** It's the overall responsibilities of the proponent to ensure that the proposed project activities are in compliance with all the applicable national regulations as well as regional and international treaties / obligations to which Namibia is party (Refer to Vol. 2 of 3 – EIA Report). All applicable and relevant permits / authorisations must be obtained before the implementation of the proposed mine development.

The proponent must provide all appropriate resource required for the implementation of this EMP as well as an independently managed (not directly controlled by the mining company) **funding instrument for mine Closure, Final Rehabilitation and Aftercare environmental liabilities**. It is the responsibility of the proponent to make sure that all members of the workforce including contractors and subcontractors are aware of this EMP provisions and its objectives.

It is hereby recommended that the proponent take all the necessary steps to implement all the recommendations of this EMP for the successful execution of the preconstruction, construction, operational, decommissioning, closure and aftercare activities of the proposed Copper-Zinc-(Silver) Mining Project in the ML No. 224, Okahandja Area, Otjozondjupa Region.

END

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