

MINING RIGHT APPLICATION FOR COPPER AND TUNGSTEN ON PORTION OF PORTION 13, A PORTION OF PORTION 14, AND A PORTION OF PORTION 21 OF THE FARM NABABEEP 134

NAMA KHOI LOCAL MUNICIPALITY, NAMAKA DISTRICT MUNICIPALITY, NORTHERN CAPE

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT (DEIR)

DMR REF: NC 30/5/1/2/2/10150MR

Date: 5 August 2019

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FOR THE APPLICANT BY:	*Green Direction Sustainability Consulting (Pty) Ltd*

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH MINING RIGHT AND/OR BULK SAMPLING ACTIVITIES INCLUDING TRENCHING IN CASES OF ALLUVIAL DIAMOND PROSPECTING.

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

NAME OF APPLICANT:	**Southern African Tantalum Mining (Pty) Ltd (SAFTA)**
TEL NO:	**011 - 782 7215**
FAX NO:	**011 - 782 4095**
POSTAL ADDRESS:	**32 Joseph Avenue; Northcliff; Johannesburg; Gauteng**
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DMR REFERENCE NUMBER: NC 30/5/1/2/2/10150MR

IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1) (c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE SCOPING PROCESS

1) The objective of the scoping process is to, through a consultative process—

a) identify the relevant policies and legislation relevant to the activity;
b) motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
c) identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
d) identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
e) identify the key issues to be addressed in the assessment phase;
f) agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
g) identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

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Statement of Independence

Green Direction Sustainability Consulting (Pty) Ltd (GDSC) has no interest in the outcome of this Report, nor does this company have any interest that could be reasonably regarded as being capable of affecting its independence.

Disclaimer

The opinions expressed in this report have been based on the information supplied to GDSC by the Applicant. GDSC has exercised all due care in reviewing the supplied information, with conclusions from the review being reliant on the accuracy and completeness of the supplied data.

GDSC does not accept responsibility for any errors or omissions in the information provided and does not accept any consequential liability arising from commercial decisions or actions resulting from them.

Professional environmental opinions presented in this report apply to the site conditions and features as they existed at the time of GDSC's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which GDSC had no prior knowledge nor had the opportunity to evaluate.

DEFINITIONS

Alternatives - In relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to –
i. The property on which or location where it is proposed to undertake the activity;
ii. The type of activity to be undertaken;
iii. The design or layout of the activity;
iv. The technology to be used in the activity, and;
v. The operational aspects of the activity.

Baseline - Information gathered at the beginning of a study which describes the environment prior to development of a project and against which predicted changes (impacts) are measured.

Basic Assessment Process – This is the environmental assessment applied to activities listed in Government Notice No. R 983 (Listing 1) as amended by GNR 327 (dated 7/04/2017) and No. R985 (Listing 3) as amended by GNR 324 (dated 7/04/2017)**.** These are typically smaller scale activities of which the impacts are generally known and can be easily managed. Generally, these activities are considered less likely to have significant environmental impacts and, therefore, do not require a full-blown and detailed Environmental Impact Assessment (see below).

Biodiversity - The diversity, or variety, of plants, animals and other living things in a particular area or region. It encompasses habitat diversity, species diversity and genetic diversity.

Borehole - Includes a well, excavation, or any other artificially constructed or improved groundwater cavity which can be used for the purpose of intercepting, collecting or storing water from an aquifer; observing or collecting data and information on water in an aquifer; or recharging an aquifer.

Community - Those people who may be impacted upon by the construction and operation of the project. This includes neighbouring landowners, local communities and other occasional users of the area.

Construction Phase - The stage of project development comprising site preparation as well as all construction activities associated with the development.

Consultation - A process for the exchange of views, concerns and proposals about a project through meaningful discussions and the open sharing of information.

Critical Biodiversity Area - Areas of the landscape that must be conserved in a natural or near-natural state in order for the continued existence and functioning of species and ecosystems and the delivery of ecosystem services.

Cumulative Impacts - Direct and indirect impacts that act together with current or future potential impacts of other activities or proposed activities in the area/region that affect the same resources and/or receptors.

Environment - The surroundings within which humans exist and that are made up of
i. The land, water and atmosphere of the earth;
ii. Micro-organisms, plant and animal life;
iii. Any Part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Authorisation (EA) – The authorisation by a competent authority of a listed activity.

Environmental Assessment Practitioner (EAP) – The person responsible for planning, management and co-ordination of environmental impact assessment, strategic environmental assessments, environmental management plans or any other appropriate environmental instrument introduced through regulations.

Environmental Impact Assessment (EIA) – In relation to an application to which scoping must be applied, means the process of collecting, organizing, analysing, interpreting and communicating information that is relevant to the consideration of that application. This process necessitates the compilation of an Environmental Impact Report, which describes the process of examining the environmental effects of a proposed development, the anticipated impacts and proposed mitigatory measures.

Environmental Impact Report (EIR) - A report assessing the potential significant impacts as identified during the Scoping phase.

Environmental Management Programme (EMPr) - A management programme designed specifically to introduce the mitigation measures proposed in the Reports and contained in the Conditions of Approval in the Environmental Authorisation.

Gross Domestic Product (GDP) by region - represents the value of all goods and services produced within a region, over a period of one year, plus taxes minus subsidies.

Hydrocarbons – Oils used in machinery as lubricants, including diesel and petrol used as fuel.

Impact - A change to the existing environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities.

Interested and Affected Party (I&AP) – Any individual, group, organization or associations which are interested in or affected by an activity as well as any organ of state that may have jurisdiction over any aspect of the activity.

Municipality –

(a) Means a metropolitan, district or local municipality established in terms of the Local Government: Municipal Structures Act, 1998 (Act No. 117 of 1998); or

(b) In relation to the implementation of a provision of this Act in an area which falls within both a local municipality and a district municipality, means

  (i) The district municipality, or

  (ii) The local municipality, if the district municipality, by agreement with the local municipality, has assigned the implementation of that provision in that area to the local municipality.

NEMA EIA Regulations - The EIA Regulations means the regulations made under section 24(5) of the National Environmental Management Act (Act 107 of 1998) (Government Notice No. R 982, R 983, R984 and R 985 in the Government Gazette of 4 December 2014 refer as amended by GNR 324, 325, 326 and 327 of 7 April 2017.

No-Go Alternative – The option of not proceeding with the activity, implying a continuation of the current situation / status quo

Public Participation Process (PPP) - A process in which potential Interested and Affected Parties are given an opportunity to comment on, or raise issues relevant to, specific matters.

Registered Interested and Affected Party – All persons who, as a consequence of the Public Participation Process conducted in respect of an application, have submitted written comments or attended meeting with the applicant or environmental assessment practitioner (EAP); all persons who have requested the applicant or the EAP in writing, for their names to be placed on the register and all organs of state which have jurisdiction in respect of the activity to which the application relates.

Scoping process - A procedure for determining the extent of and approach to an EIA, used to focus the EIA to ensure that only the significant issues and reasonable alternatives are examined in detail

Scoping Report – The report describing the issues identified during the scoping process.

Significant impact – Means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Spatial Development Framework (SDF) - A document required by legislation and essential in providing conservation and development guidelines for an urban area, which is situated in an environmentally sensitive area and for which major expansion is expected in the foreseeable future.

Specialist study - A study into a particular aspect of the environment, undertaken by an expert in that discipline.

Stakeholders - All parties affected by and/or able to influence a project, often those in a position of authority and/or representing others.

Sustainable development - Sustainable development is generally defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. NEMA defines sustainable development as the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

Visibility - The area from which the project components would actually be visible and depends upon topography, vegetation cover, built structures and distance.

Visual Character - The elements that make up the landscape including geology, vegetation and land-use of the area.

Visual Quality - The experience of the environment with its particular natural and cultural attributes.

Visual Receptors - Individuals, groups or communities who are subject to the visual influence of a particular project.

ACRONYMS AND ABBREVIATIONS

amsl	Above mean sea level
BPEO	Best Practicable Environmental Option
mbgl	Metres below ground level
CBA	Critical Biodiversity Area
Cu	Copper
DM	District Municipality
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
DSR	Draft Scoping Report
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
ESA	Ecological Support Area
EStA	Early Stone Age
FME	Flat Mine East
FMN	Flat Mine North
FMS	Flat Mine South
FoT	"Free on Truck" means there is no processing and that it's a raw product.
FSR	Final Scoping Report
GA	General Authorisation
GDP	Gross Domestic Product
GDPR	Regional Gross Domestic Product
GGP	Gross Geographic Product
GNR	Government Notice Reference
ha	Hectares
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
km	Kilometres
km^2	Square kilometres
LED	Local Economic Development
LM	Local Municipality
LoM	Life of Mine
LN	Listing Notice
L/s	Litres per second
LSA	Late Stone Age
m^3	Metres cubed
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential Evaporation
MASMS	Mean Annual Soil Moisture Stress (% days when evaporation demand was more than double the soil moisture supply)
MFD	Mean Frost Days
MRDSF	Mine Residue Disposal Storage Facility
MPRDA	Mineral and Petroleum Resources Development Act 28 of 2002
MSA	Middle Stone Age
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act 107 of 1998 as amended
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004
NEM:WA	National Environmental Management: Waste Act 59 of 1998
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act 25 of 1999
NWA	National Water Act 36 of 1998
PES	Present Ecological State
RoM	Run of Mine
S&EIR	Scoping and Environmental Impact Reporting
SAHRA	South African National Heritage Resources Agency
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SLP	Social and Labour Plan
StatsSA	Statistics South Africa
W	Tungsten
WMA	Water Management Area
WML	Waste Management License
WUL	Water Use License

CONTENTS

1 CONTACT PERSON & CORRESPONDENCE ADDRESS

1.1 Details of the EAP

Name of The Practitioner: Jennifer Barnard (Green Direction Sustainability Consulting (Pty) Ltd)
Tel No.: 082 4444364
Fax No. : N/A
e-mail address: jenny@greendirection.co.za

1.2 Expertise of the EAP

The qualifications of the Environmental Assessment Practioner (EAP)

- Masters in Environmental Science: University of KwaZulu-Natal, Durban
- SACNASP: Pr. Nat. Sci. (Professional Natural Scientist)
- EAPASA: Registered with Interim Certification Board of Assessment Practioners in South Africa

Refer to **Appendix A** for CV of EAP.

2 LOCATION OF THE ACTIVITY

Table 1: Location Information

Farm Name:	1. Portion of Portion 3 of the Farm Nababeep No. 134 2. Portion of Portion 13 of the Farm Nababeep No. 134 3. Portion of Portion 14 of the Farm Nababeep No. 134 4. Portion of Portion 21 of the Farm Nababeep No. 134
Application area (Ha)	1214 Ha
Magisterial district:	Namakwaland
Distance and direction from nearest town	Nababeep is located approximately 7km in a south-easterly direction
21-digit Surveyor General Code for each farm portion	1. C05300000000013400003 2. C05300000000013400013 3. C05300000000013400014 4. C05300000000013400021

2.1 Location

Springbok is located approximately 550km north of Cape Town in the Northern Cape Province, and is one of the major towns in the region. Springbok is also located approximately 350km west of Upington. The Flat Mine deposits are located approximately 5km north of Nababeep at 29° 33' S and 17° 48' E, approximately 17km by road northwest of the town of Springbok.

Refer to the locality plan attached at **Diagram 1.**

Diagram 2 shows the properties and co-ordinates as detailed in Table 1 above.

Diagram 1: Locality Plan of Project Site

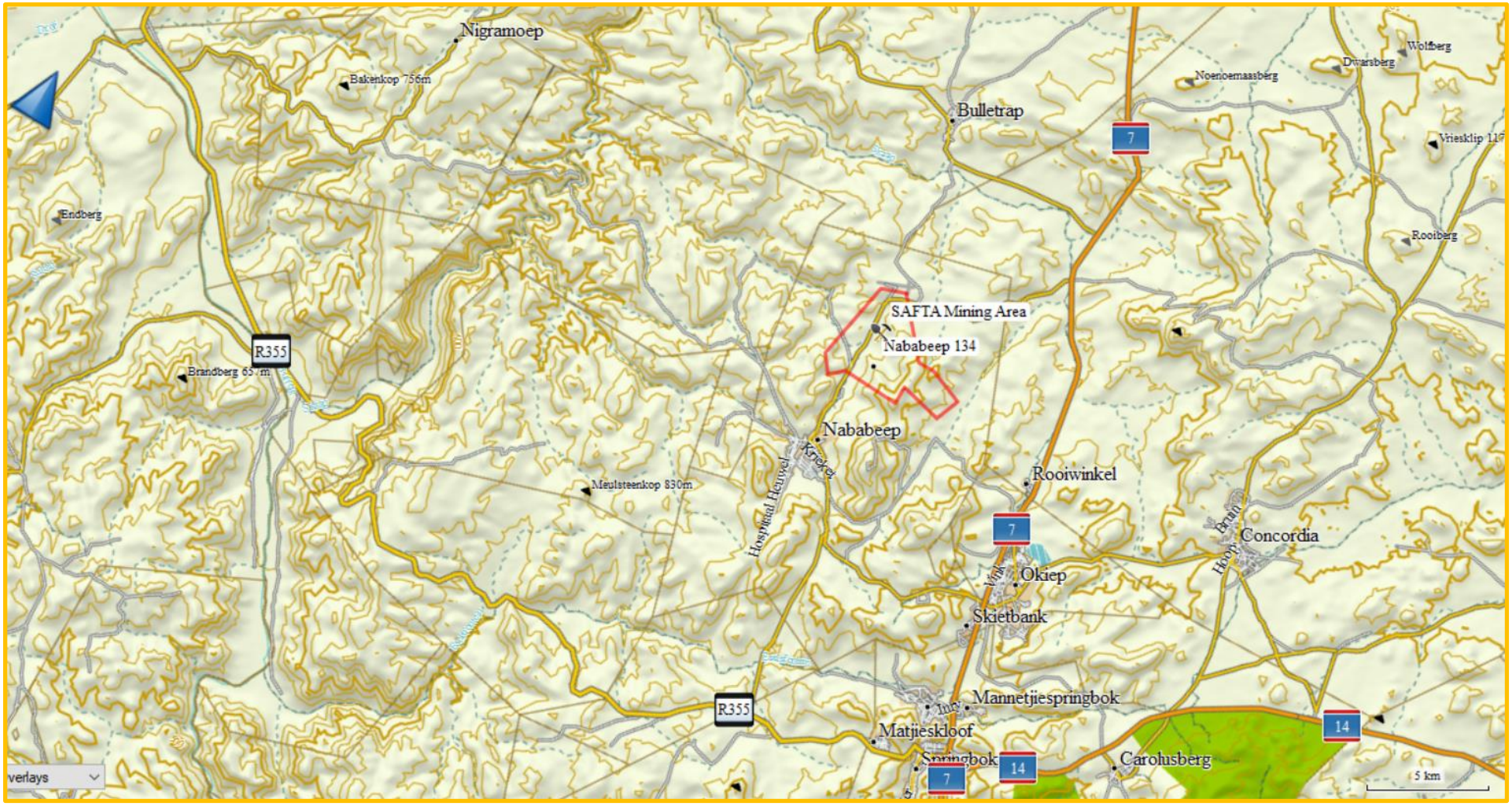
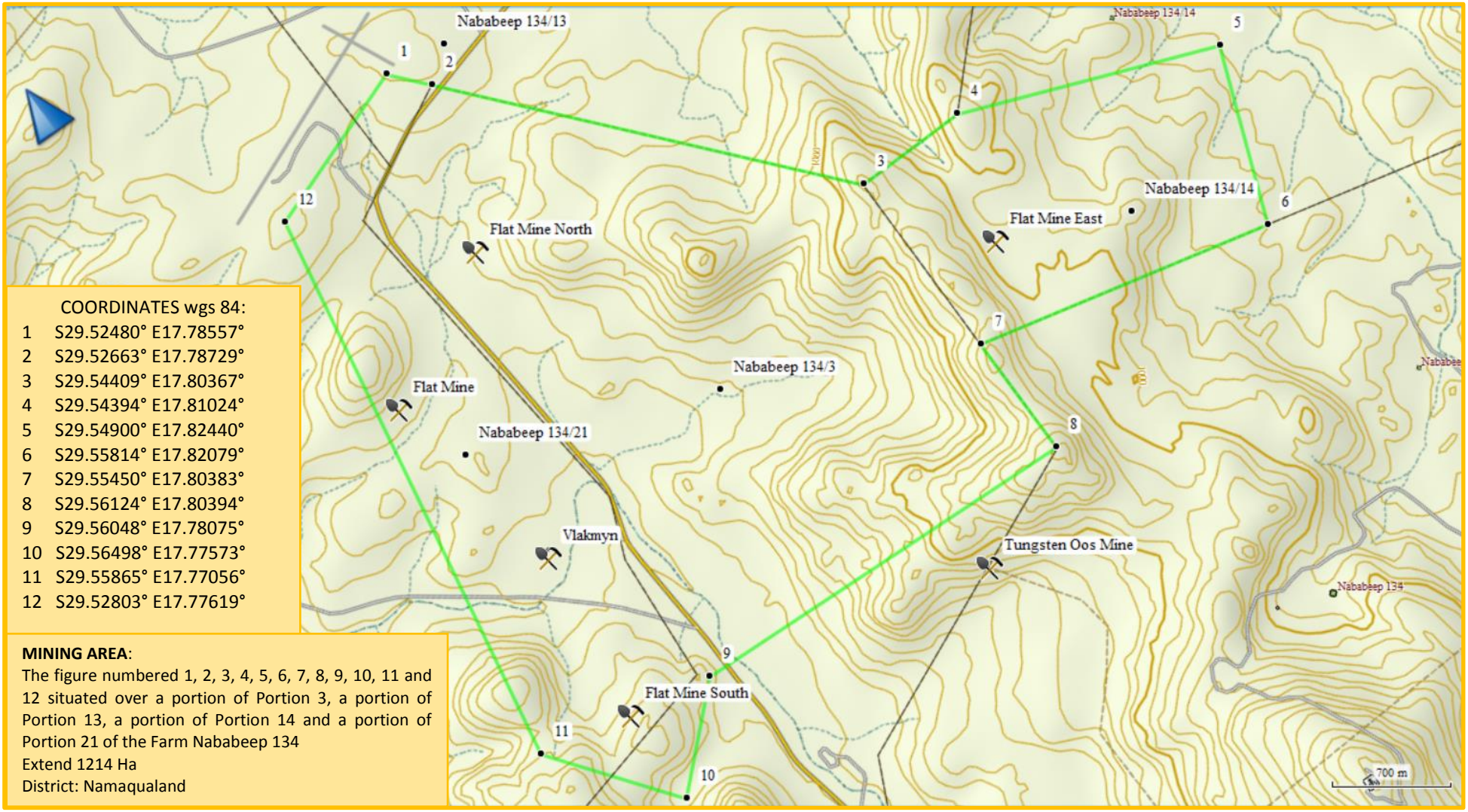


Diagram 2: Locality Plan of Project Site showing Farm Boundaries and Co-ordinates



COORDINATES wgs 84:

1	S29.52480° E17.78557°
2	S29.52663° E17.78729°
3	S29.54409° E17.80367°
4	S29.54394° E17.81024°
5	S29.54900° E17.82440°
6	S29.55814° E17.82079°
7	S29.55450° E17.80383°
8	S29.56124° E17.80394°
9	S29.56048° E17.78075°
10	S29.56498° E17.77573°
11	S29.55865° E17.77056°
12	S29.52803° E17.77619°

MINING AREA:
The figure numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 situated over a portion of Portion 3, a portion of Portion 13, a portion of Portion 14 and a portion of Portion 21 of the Farm Nababeep 134
Extend 1214 Ha
District: Namaqualand

3 DESCRIPTION OF THE PROPOSED ACTIVITIES

3.1 Introduction and Background

The Applicant, Southern African Tantalum Mining (Pty) Ltd has undertaken extensive prospecting since 12 February 2014 under cover of Prospecting Right NC30/5/1/1/2/10114 PR for Copper ore and Tungsten ore. The prospecting right covered a certain portion of Portion 3, Portion 13, Portion 14, Portion 21 and a portion of Portion 15 of the farm Nababeep No. 134 situated in the Magisterial/Administrative District of Namaqualand and measuring 5265.1741 hectares in extent. According to clause 7.2 of the Prospecting Right issued under Protocol 1454/2014 prospecting operations in the prospecting area must be conducted in accordance with the Prospecting Work Programme (PWP) and the approved Environmental Management Plan (EMP) and any amendment thereof.

An application for the Ministers approval in terms of section 102 was lodged in 2015 under application ID 409 to amend the PWP and EA together with an application in terms of section 20 to remove minerals. The amended PWP together with a local EMP addressed the bulk sampling to be implemented at the existing Wheal Flat Mine. This application for the Ministers approval in terms of section 102 was also to include additional base metals Lead, Silver, Zinc, Bismuth, Cadmium, Cobalt, Mag component, Gold and Uranium. As part of the local EMP to deal with the bulk sampling financial provision required in terms of the NEMA Financial regulations 2015 was furnished to DMR.

An application for the renewal of the prospecting right was submitted under file reference NC30/5/1/1/2/11893 PR. The Minister granted the renewal of the prospecting right including the PWP that included the amendments referred to in the previous paragraph. The renewal was executed on the 12th day of February in the year 2014, under Protocol 1454/2014, registered at the Mineral and Petroleum Titles Registration Office under 39/2014 (PR). The prospecting right was renewed for a further period of three (3) years, commencing on 16th October 2017 and, unless cancelled or suspended in terms of section 47 of the Act, it will end on 15th October 2020.

With regard to the resource statement the information supplied in terms of regulation 11(1)(d) was sourced and is supported by the exploration results obtained during the extensive exploration program.

The Mining Right area is situated 6k north of the town of Nababeep, and lies close to the old mines at OKiep and Nababeep. Copper operations in this district date back over 150 years and hence the general geology is known as is the general style and form of the copper mineralization. Generally copper ore in this district is contained in a series of steep structures. Potentially economic concentrations of ores occur in clusters of pods as grade distribution is erratic and irregular. Only a small percentage of each structure carries reasonable grade ore and the rest is normally low grade.

3.2 The Scope of the Proposed Activities

3.2.1 Mineral Resource particulars

Generally copper ore in this district is contained in a series of steep structures. Potentially economic concentrations of ores occur in clusters of pods as grade distribution is erratic and irregular. Only a small percentage of each structure carries reasonable grade ore and the rest is normally low grade. Hence the resources are a function of the cut-off grade and the current costs of mining and extraction. Refer to the section on the geology of the area in Section 8.1.3.

Table 2: Details of the Mineral Resources

ITEM	DETAIL
Type of mineral	Copper (Cu) and Tungsten (W)
Extent of application area	1214 Ha
Extent of the area required for mining	Mining takes place underground and portals included in infrastructure areas (Refer Diagram 5.1.1 and 5.1.2). ±2.8Ha surface are required for Waste Rock Dump and ±25.5Ha for Fine Residue Dam (Refer Diagram 5.5.1 and 5.5.2)
Extent of the area required for infrastructure, roads, servitudes, etc.	±113Ha including mining portals and ROM stockpiles (Refer to Diagram 5.1.1 and 5.1.2)
Depth of the mineral below surface	The Flat Mine North (FMN) orebody extends between 24m and 240m below surface. The Flat Mine South (FMS) and Flat Mine East (FME) orebodies both extend approximately from surface to 800 m below surface.
Geological formation	The Project is located in the Okiep Copper District which occurs in the Proterozoic Namaqualand Metamorphic Complex.

	The dip of the Flat Mine North zones ranges from horizontal to 16°. The dip of the Flat Mine South orebody dips at 74° to the north. Flat Mine East dips at approximately 60° to the north west. The Okiep orebody complex consists of numerous individuals, steeply dipping, high grade copper sulphide ore bodies. The Flat mine area covers a N-S trending valley with the Flat Mine fault running approximately along the centre of the valley. A broad anticlinal structure is displaced by the Flat Mine fault. The anticlinal axis trends NNE, and coincides with the general strike of the felspathic quartzite outcrops in the SW corner of the area. The downthrown side of the Flat Mine fault is on the western side and a displacement of more than 300m. The ore-bearing phase is a diorite and contains disseminated bornite, chalcopyrite and subordinate chalcocite. The diorite has intruded the hinge of an open (limbs dip some 15º) east-west trending anticline that plunges slightly to the west. The major Flat Mine Shear strikes northwards some 500m to the west of the orebody. Several smaller faults also run through the area, striking northwest-southeast The FMN orebody is a pipe-like structure 180m long and 40m wide varying from 15 to 50m in vertical thickness. It strikes N 25° W and plunges steeply (45º) for the first 60m from surface and then flattens out to become horizontal for the remaining 120m, attaining a maximum depth of 100m.

3.2.2 Mineral Resource Map

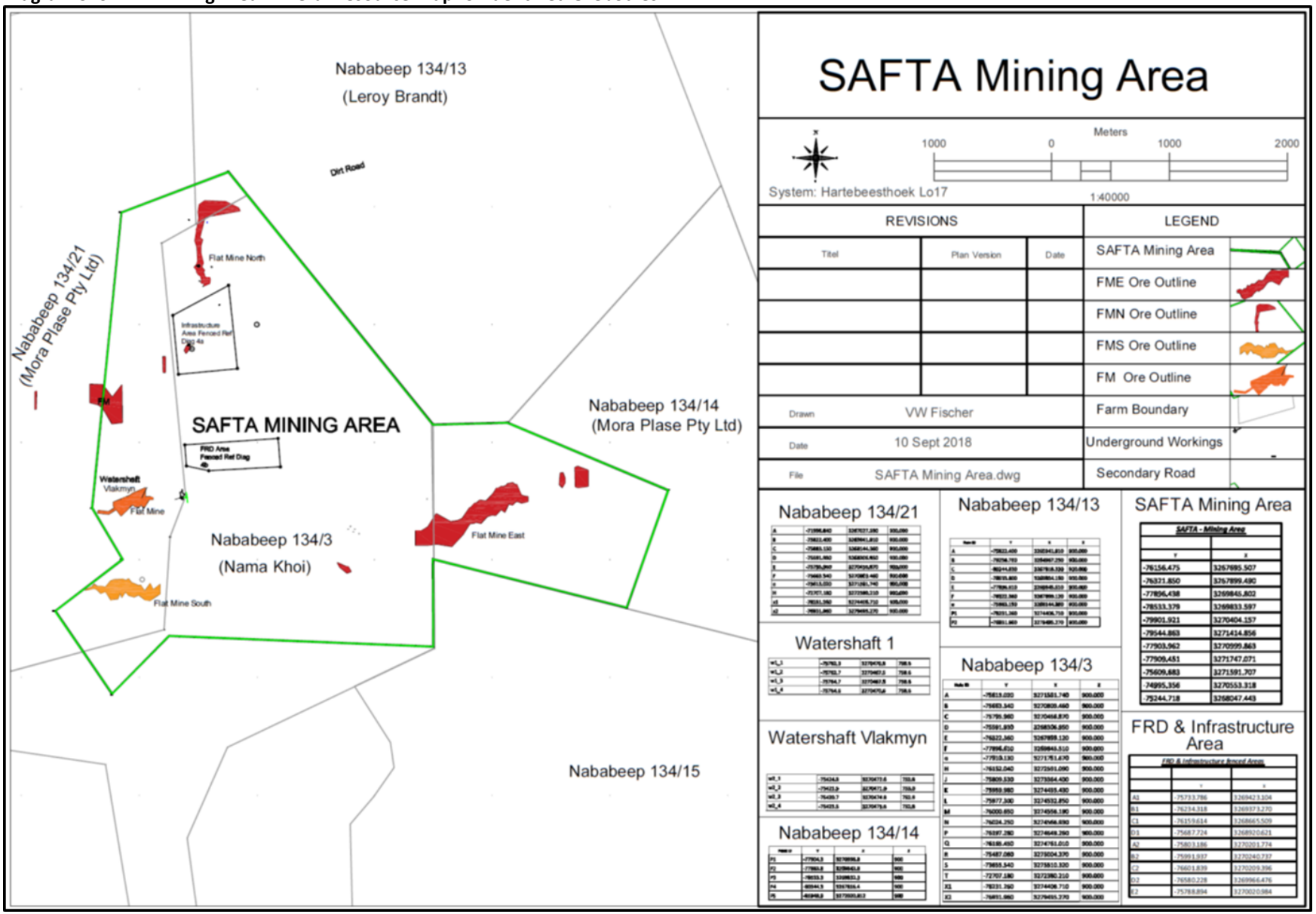
The mineral resource map for the identified orebodies is provided in **Diagram 4** below.

The drilling data and the 3D geological models received from OCC were compiled into a single database and a series of work items were completed to understand mineralization controls and the associated Copper (Cu) grade distributions. Using the 0.7% Cu cut-off orebody for the Flat Mine North (FMN) and Flat Mine South (FMS) the following aspects were examined amongst others:

- The relationship between grade and rock type to determine any preferential mineralization in association with rock type.
- A boundary analysis was done to determine whether mineralization is associated with specific geological entities such as rock type, shear zones, faults, intrusions etc. or whether the grade is distributed throughout the host rock as is typical of a Cu porphyry deposit.
- By constructing 3D models from point cloud data of the underground development as well as the stope, the associated models were depleted by the volume and tonnage attributed to these
- Finally, using the outcomes of the above and independent mineral resource estimate was completed using Ordinary Kriging.

The test results indicated that a 25% copper concentrate can be produced with a mass pull of 10% and copper recovery of 90%. The product specification is a 25% Cu concentrate at a moisture content of 8% to 10%. The intention is to secure an off-take agreement with a copper smelter who will purchase the copper concentrate at the mine gate (ex-works) as included in Section 5.2 below.

Diagram 3: SAFTA Mining Area Mineral Resource Map for Identified Orebodies



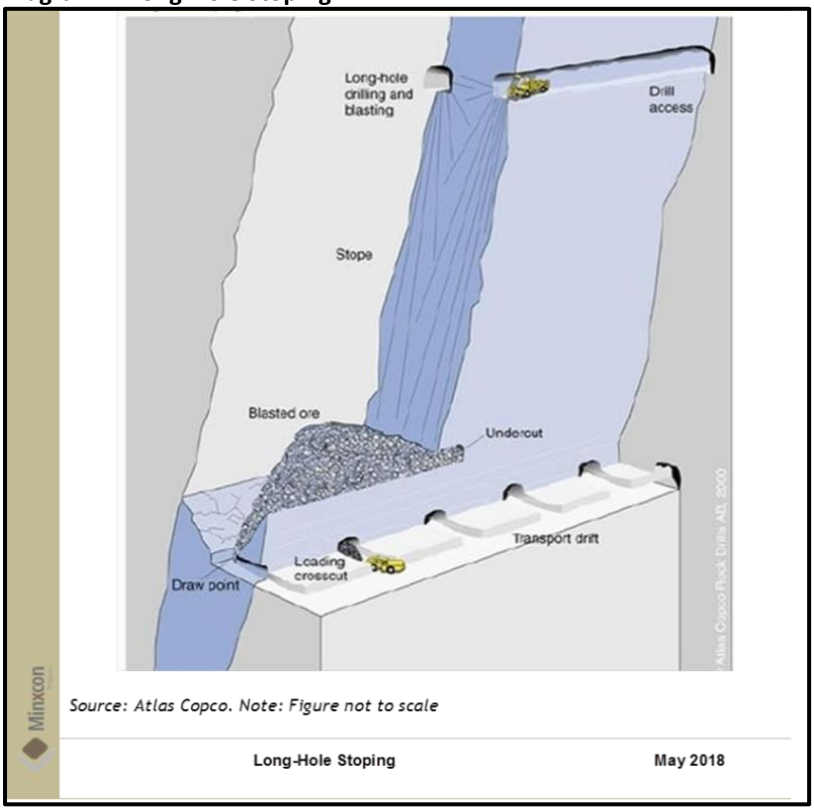
3.2.3 Basic overview of the Mining Method

The long-hole stoping method is a bulk mining method that provides good ore recovery and minimal dilution. It is an overhand, vertical stoping, utilising long-hole drilling (LHD) and blasting carried out from sublevels to break the ore. Although the stopes are supported by long anchors, pillars are usually left between stopes and occasionally within stopes. The ore flows through the stope by gravity. Ore will then be extracted from the stope via the lower extraction drift using LHDs. The LHDs will then move the rock to either an orepass tipping point or into a re-muck bay and re-handle the material into a truck when one is available. The trucks will transport the ore to surface via the decline.

Long-hole open stoping is a highly mechanised mining method utilising a wide range of equipment for drilling and mucking. Typically production drilling is carried out by high-efficiency column and arm long-hole drills or down-the-hole ("DTH") drill rigs. These systems use electric drive instead of hydraulic and have high pressure pneumatic DTH hammers or rotary percussion drilling systems. It is with recent gains in drilling technology that these systems have revolutionised long-hole stoping operations.

In the long-hole open stoping method access onto a level, from the decline, will be via an access cross cut. From the access cross cut ore access drives will be developed into the orebody from the footwall to the hangingwall. The mining block will be split into stopes with a horizontal span of 20 m and a vertical span of 30 m. The strike will be the length of the orebody width from the hangingwall to the footwall. Diagram 3 shows a schematic of the proposed mining method. Only one level will be in production at a time.

Diagram 4: Long-Hole Stoping



3.2.4 Timeframes and Life of Mine

Production at Nababeep can only commence after the completion of all required surface and underground infrastructure. Minimal development will be required to access the first orebody, FMN. As such the new plant will be constructed within 63 weeks at which point production can commence.

Mining operations will start at FMN at 150 ktpa building up to 420 ktpa at full production. FME commences production at 330 ktpa in year 5 building up to 840 ktpa at full production. Once FME has been depleted, FMS commences production at 550 ktpa building up to 840 ktpa at full production.

Table 3: Life of Mine Forecast

Life of Mine Year	Total Production	FMN		FME		FMS	
		Mined	Reserve	Mined	Reserve	Mined	Reserve
			1 548 000		4 750 000		3 890 000
1	-	-	1 548 000	-	4 750 000	-	3 890 000
2	150 000	150 000	1 398 000	-	4 750 000	-	3 890 000
3	420 000	420 000	978 000	-	4 750 000	-	3 890 000
4	420 000	420 000	558 000	-	4 750 000	-	3 890 000
5	700 000	370 000	188 000	330 000	4 420 000	-	3 890 000
6	840 000		188 000	840 000	3 580 000	-	3 890 000
7	840 000		188 000	840 000	2 740 000	-	3 890 000
8	840 000		188 000	840 000	1 900 000	-	3 890 000
9	840 000		188 000	840 000	1 060 000	-	3 890 000
10	840 000		188 000	840 000	220 000	-	3 890 000
11	770 000		188 000	220 000	-	550 000	3 340 000
12	840 000		188 000		-	840 000	2 500 000
13	840 000		188 000		-	840 000	1 660 000
14	840 000		188 000		-	840 000	820 000
15	820 000		188 000		-	820 000	-

3.3 Project Description

The Mine Layout showing all the development areas and services is included in the Diagram 5.1.1 (2018 layout) and 5.1.2 (2019 layout). Both the original (2018) and the revised (2019) layouts have been included as some infrastructure is shown on the original layout only (for example).

Site Plans overlaid on Google Earth™ are provided for:

- Diagram 5.2.1 and 5.2.2: Flat Mine North
- Diagram 5.3.1 and 5.3.2: Flat Mine South (5.3.2 needs to be corrected to locate FMS to the west of the river)
- Diagram 5.4.1 and 5.4.2: Flat Mine East
- Diagram 5.5.1 and 5.5.2.: Centralised Fine Residue Dam

Plans and process flow diagrams are provided for the mine logistics, processing and associated infrastructure where relevant:

- Diagram 6: Electricity Supply
- Diagram 7: Mining Infrastructure located at FMN
- Diagram 8: Sewage Treatment Plant
- Diagram 9: Perimeter Fencing
- Diagram 10: Access Control
- Diagram 11: Explosives Delivery Bay
- Diagram 12: Mine Logistics
- Diagram 13: Crushing and Screening
- Diagram 14.1: Milling Circuit and 14.2 Diagrammatic Representation of the Process Milling Circuit
- Diagram 15: Reagent Make-Up and Conditioning
- Diagram 16: Flotation Circuit
- Diagram 17: Product Handling
- Diagram 18: Water Supply
- Diagram 19: Services

The Mine Process Flow Diagram is included as Diagram 20.

3.3.1 Access, Roads and Routes

The Project Area will be accessed by a 3.42Km gravel road leading from the town of Nababeep in a northern direction and this road is will have to be upgraded to accommodate heavy equipment (Diagram 5.1.1). A portion of the road will from time to time be carrying loaded haul trucks and, for this reason, the road should be constructed to accommodate two-way traffic. The portion of the access road from FMS will be upgraded to serve as main surface haul road (2.81Km).

This haul road will be constructed to minimize travel of locals into the mining area and inadvertent contact with large earth moving vehicles. The access/haul road length will be 6.23km long with an 8.9 m width to accommodate two-way traffic should allow for a trench and berm on each side of the road. Construction will be conducted by debushing, topsoil removal, scraping and compacting of the area adjacent to the existing road. Compaction should be to 98% Modified American Association of State Highway and Transportation Officials with California Bearing Ration of 15% ("98% MOD AASHTO with CBR of 15%").
A new haul road will be constructed between the waste rock dump and the main surface haul road (0.5Km) and another from between FME and the main surface haul road (1.54Km).

3.3.2 Security and access control

A site perimeter fence around the development area and haul road will be required for safety and security purposes. The fence should be able to restrict access of life stock and other animals as well as perturb persons from any unauthorised access. The fence should have a total height of 2.4m. The fully galvanised wire mesh fence should be 2.1 m high with a razor mesh topping of 0.3 m and spacing between stay and intermediate posts of 3 m. The total perimeter fence length has been measured at 5.21 km.
Access to the area will be gained through two dedicated sliding vehicle gates and a single pedestrian gate. A security house will be located at the main entrance to the mining site area. Access to the complex by outside service providers will be strictly controlled, and where possible, limited to delivery at the main stores located at the plant.

3.3.3 Power supply

Currently no power supply exists to the Project Area. In order to establish power to the project site a number of off-site installations will be required, which will include:

- Construction of 1 x 66(132) kV line bay at Nababeep Town (132KV) Substation (refer to Diagram 6); and,
- Construction of a 1 x 5.6 km 11 kV squirrel line from Nababeep Town Substation (110/66KV) to SAFTA Project Intake Yard.

Substation ancillary services, control room building, protection equipment, metering equipment, and power network control and communication systems for the substations will be required.
In addition, back-up generators will be required.
The off-site power supply infrastructure designs have been prepared on a maximum demand of 4.54 MVA to the Project Area during the 35 ktpm option, which will increased to 6.4 MVA once production increases to 70 ktpm as determined by a load summary.

The load summary is listed in Table 4 and Table 5 respectively.

Table 4: Project Power Supply Load Summary for 35 ktpm option

Area Description	Unit	Maximum Demand
Process Plant	kVA	3,033
Tailings Storage Facility	kVA	66
Mine Site	kVA	1,436
Total	**kVA**	**4,536**

Table 5: Project Power Supply Load Summary for 70 ktpm option

Area Description	Unit	Maximum Demand
Process Plant	kVA	4,334
Tailings Storage Facility	kVA	132
Mine Site	kVA	1,956
Total	**kVA**	**6,422**

3.3.4 Water Supply and Management

Water supply and management is an essential service as various steps in the mining and particularly the processing processes are heavily reliant on the usage of water. Apart from the mining and process requirements, water will also be required for use as potable water.

Mining activities often pose significant water pollution risk, it is of utmost importance to properly manage water usage and disposal on a mining operation. For this reason, all dirty rainfall run-off, process plant discharge, treated sewage and grey water will be collected, stored, treated and recycled as far as possible. Should an excess of water exist on the operation, all effluent from the site will be suitably treated and tested to ensure compliance to acceptable standards before being released into the environment. All clean rainfall run-off is to be diverted from dirty and contaminated areas to minimise the risk of environmental and water pollution. Trenches are to be constructed to divert clean run-off, collect dirty run-off and

route dirty water to suitable storage dams. A surface collection dam will be constructed to store all dirty water from the mining area and a series of dams will also be constructed within the plant to store run-off and discharged process water.

Refer to the **Water Infrastructure Report** attached as **Appendix H**, which shows the location of the water pipeline from the Nababeep shaft (NEM-MS) to the mining area following the servitude of the 11 kV powerline. The updated diagrams have been included in the Diagram 5 series, showing the original layout (2018) and the revised layout (2019) to provide a holistic overview. The FMS revised layout (2019 in Appendix H) needs to be corrected and the final layouts included in the FEIR.

3.3.4.1 Hydrogeological Report

Refer to the Specialist Hydrogeological Report prepared to inform the EIA Phase, included as Appendix 2 to the MRDSF Report attached as **Appendix E**:

"SAFTA indicated the water demand to be as follows:

- Water for construction period – 130 KL/day (KL/d) for 12 months;
- Potable water 200 employees x 150 l/person/day – 30 KL/d for 15 year LoM;
- Process water for mine site and dust suppression – 20 KL/d for 35 kt/m option;
- Process water for mine site and dust suppression – 40 KL/d for 70 kt/m option;
- Process water for processing plant – 559 KL/d for 35 kt/m option; and
- Process water for processing plant – 1 151 KL/d for 70 kt/m option.

Therefore, the 35 kt/m option requires a total of 609 KL/d of water, whilst the 70 kt/m option requires 1 221 KL/d. These equates to c.25.4 KL/h (c.7.1 L/s) and c.51.0 KL/h (c.14.2 L/s), respectively. The annual water demand over the LoM is likely to be as follows:

- Year 1 (Construction): 47 500 KL/a
- Year 2 (Production 150 000 kt): 79 600 KL/a
- Years 3 & 4 (Production 420 000 kt/a): 223 000 KL/a
- Year 5 (Production 700 000 kt/a): 371 400 KL/a
- Years 6-10 (Production 840 000 kt/a): 445 700 KL/a
- Years 11-15 (Production 840 000 kt/a): 445 700 KL/a

SAFTA proposes sourcing their water supplies from groundwater abstracted from the old Nababeep East Mine's main shaft (NEM-MS) augmented by dewatering of the new underground mines."

A referenced from the Hydrogeological Report (Appendix 2 in **Appendix E**) confirming a sustainable water supply:

"Based on the test results, analysis and assumptions mentioned above, it can be concluded that, over 15 years LoM, shaft FMS-VS1 should produce c.60 KL of water per day at a pumping rate 0.7 L/s (2.5 KL/h). Similarly, shaft NEM-MS should over 15 years LoM produce 1 363 KL/d at a pumping rate of 16 L/s (56.8 KL/h). Numerical flow modelling (subsection 7) confirmed these pumping rates, therefore, it can be concluded that these sources should be capable of sustainably supplying the demand during construction, operations and closure of the proposed mining operations."

3.3.4.2 Mass and Water Balance in MRDSF Report

PLANT OPERATION

The initial plant design capacity is 35kt/m with a 90% availability resulting in the plant operating for 27 days each month at an hourly throughput of 54 t/h.

WATER REQUIREMENT

The calculated water recovery from the TSF, the concentrate filter and the tailings thickener totals 116.6 m3/hr representing 80% of the total water requirement. The remaining 20% (30 m^3/hr) make up water required will be pumped from the water shaft near FMS.

The make-up water is split between the plant operation (27.5 m^3/hr) the additional water required by the laboratory, offices, ablutions and showers (2.5 m^3/hr).

Historical operational records indicate that the ratio of the RoM plant feed to make-up raw water was 1:1, that is, 1m^3 of water was required per tonne of ore treated. The raw water requirement for the plant would therefore be 54 m^3/hr. Until the requirement calculated in the mass and water balance can be definitively proven the historical water figure will be used.

CONCENTRATE AND TAILINGS MASS

Roughly 10% of mass of the plant feed will be collected as flotation concentrate with the remaining 90% reporting to the tailings. This represents an actual mass of 5.4 t/h for the concentrate and 48.6 t/hr for the tailings.

The moisture in the concentrate from the pressure filter will be around 12% whilst the percent solids in the tailings will be around 60%. The concentrate will further be sun dried in bunkers before being packed into bags for export. The key mass and water figures are listed in Table 4-1 in **Appendix E**.

3.3.5 Mine logistics

The mine logistics will be the area from where the mining contractor and relevant technical services personnel will manage the mine. The site will cover an area of 20,800 m² (130 m x 160 m) (Refer to Diagram 5 series and Photograph Compilation 1). The mine site will be enclosed by a security fence. Access to the site will be controlled by security personnel posted at the access gates to the site.

The mine site will include offices, change houses, control room, first aid station, stores, waste handling area, explosive delivery area, earth moving vehicle and engineering workshops as well as an earth moving vehicle parking area, fuel storage facility and a wash bay. This area will be mainly constructed and established by the appointed mining contractor but services like water supply, power supply, water management and other services will be constructed by contractors appointed for the construction of the balance of infrastructure areas.

Sewage treatment will be managed on site via a Biozone-type Purifier as shown in Diagram 8 below, and will require management of the filters and additives.

3.3.6 Processing plant site

The processing plant site will include the processing plant, a metallurgical and assay laboratory, offices, reagent storage facility and a workshop. The site will be 130 m x 200 m and will be located adjacent to the Mine site.

Refer to Diagram 5 series, Photograph Compilation 1 and Figures 13 – 18 for Process Flow Diagrams of each component, and Figure 20 for the project summary Process Flow Diagram (Plant Flowsheet).

Photograph Compilation 1: View north-east towards FMN on the left and the area earmarked for the processing plant, mine logistics, water reservoir, settling dam and RoM stockpile as shown on Diagram 5.2.1 and 5.2.2.

3.3.6.1 Basic Plant design

Refer to **Appendix E**, Section 4.2 that provides a more detailed process description of the following:

- Ore receiving
- Crushing
- Milling
- Flotation
- Concentrate handling
- Tailings disposal
- Reagent make-up and addition

The Plant Process Flow (Diagram 20) incorporates a conventional two stage crushing circuit with a primary jaw crusher followed by a secondary cone crusher in closed circuit with a vibrating screen. The primary mill discharge is pumped through a cyclone with the underflow passing through a flash flotation cell before gravitating to the secondary milling circuit.

The cyclone overflow streams from the primary and secondary milling circuits form the feed to the flotation circuit (as shown in Diagram 14.2). The flotation circuit comprises rougher, cleaner and re-cleaner tank flotation cells. The rougher concentrate is pumped to the cleaner cells with that concentrate progressing to the re-cleaner stage.

The cyclone overflow from the milling circuit is first conditioned with reagents before entering the rougher flotation cell. The rougher concentrate will be cleaned in a cleaner stage and its concentrate will be further upgraded in a recleaner stage. The recleaner concentrate will be the final flotation concentrate. The grade of the flash flotation concentrate will determine whether it is fed to the recleaner or joins the recleaner concentrate to form the final concentrate.

The recleaner tails will be returned to the cleaner feed stream with the cleaner tailings returned to the rougher feed stream. The rougher tailings will pass through a scavenger flotation cell before being discarded as final flotation tailings. The scavenger concentrate will either be pumped to the rougher feed or the feed to the cleaner flotation stage. There will be an option to bypass the scavenger cell should the copper grade of the tailings be very low, and depending on the mineralogy/mode of the copper losses.

The flotation reagent suite will comprise a frother, a collector and lime for pH adjustment. The lime will require a slaking plant and a holding tank. The frother, which will be in liquid form, and delivered in drums, will require a make-up and an addition tank. The collector will be delivered in powder form in bags and will also require a make-up tank and an addition tank. All the tanks will be agitated. Peristaltic type reagent pumps will be used as dosing pumps to the various reagent addition points. All the reagents will be introduced to the conditioning tank prior to the rougher flotation circuit as well as to various points within the flotation circuit as required.

The tailings from each stage are returned to the previous stage with the rougher tailings passing through a scavenger stage. The re-cleaner concentrate is the final concentrate which is filtered to and stored prior to export. The scavenger tailings will be thickened to 60% solids before being pumped to the Tailings Storage Facility (TSF). After the solids have settled the excess water will be returned to the plant as process water. The concentrate, equating to 10% of the original plant feed mass, will be sold at the mine gate.

For the 35,000 t/m operation the feed to the plant will be a nominal 54t/h with a 1:1 water requirement, i.e. 1m³ of water required per tonne of ore treated.

The design philosophy is that the processing plant would initially be designed to treat 35,000 t/m. This is referred to as Phase 1. At the beginning of Year 4, a parallel stream (Phase 2), treating a further 35kt/m will be commissioned bringing the total design throughput to 70kt/m. The life of the project, based on the current resource, is planned to be 10 years. The plant should have a 90% availability and operate on a 24 hour/day basis with 3 operational shifts and a relief shift. The plant will not be fully automated but there will be sufficient instrumentation to ensure a stable operation and allow for reliable metallurgical accounting.

3.3.6.2 Efficiency of the process

The copper will be upgraded by means of flotation with the final flotation concentrate representing 10% of the original mass of the plant feed. 90% of the copper will be contained in this fraction. This will be the final product. It will be filtered (dewatered), bagged, and sold at the mine gate. The reclaimed water will be returned to the process water circuit.
The remaining 90% of the original plant feed will be discarded as flotation tailings. This product, grading at 75% passing 106 microns, will be pumped to the Tailings Storage Facility (TSF). Water will be recovered and returned to the plant for re-use, thereby reducing the raw water requirement.

3.3.7 Stockpiles

The RoM stockpile will be sized to ensure sufficient supply to the plant for a minimum of 1 month. With a 35 ktpm production profile this will amount to 1.52 kt per day. The stockpile thus needs to be a minimum size of 35,000 t as shown in Table 6 below.
During the second phase of the project production will be increased to 70 ktpm requiring the stockpile size to double as shown in Table 7 below.
The stockpiles will have the following dimensions:

Table 6: RoM Stockpile – 35 ktpm Design Parameters

Description	Unit	Value
Height	m	5
Length	m	85
Width	m	50
Wall Gradient	h:v (x:1)	1.33
Stockpile Volume	m³	12,996
Footprint Area	m²	4,250
RoM stockpile tonnage	**t**	**35,000**

Table 7: RoM Stockpile – 70 ktpm Design Parameters

Description	Unit	Value
Height	m	6
Length	m	120
Width	m	60
Wall Gradient	h:v (x:1)	1.33
Stockpile Volume	m^3	26,422
Footprint Area	m^2	7,200
RoM stockpile tonnage	**t**	**71,336**

3.3.8 Mine Residue Disposal Storage Facility (MRDSF)

Refer to the Conceptual Design of the Mine Residue Disposal Storage Facility Report (MRDSF) (attached at **Appendix E**). Further details specific to the design and management of the MRDSF are included in this Report attached as **Appendix E**.

The MRDSF will consist of:

- A Tailings Storage Facility (TSF) with sufficient storage capacity to contain 4.5 million dry tonnes of tailings over a 10 year LoM;
- A Return Water Dam (RWD);
- A Storm Water Dam (SWD);
- The associated infrastructure for the MRDF (i.e. perimeter slurry deposition pipeline, storm water diversion trenches, perimeter access road etc.)

During a site investigation with representatives from Uhuru and Epoch a single site was identified as a potential suitable location based on the following:

- Location overlies an existing environmentally disturbed location as shown in the Photograph Compilation 2;
- The site is positioned over a wide valley in which it is possible to establish a large depositional basin reducing the volume requirement for a starter embankment; and
- The location does not encroach on nearby settlements.
- It is centrally located within the mining right area, approximately 1.5 km south-east of the processing plant.

Photograph Compilation 2: View north-east of the disturbed area earmarked for the Residue Disposal Facility

A volumetric analysis was conducted of the selected site to confirm that the tailings stream could be contained within the available footprint. Diagram 5.5.1 and 5.5.2 provides an illustration of the selected site location with the LoM tailings footprint area.

In order to optimise the capacity of the selected site a conventional upstream self-raised facility was chosen based on the restricted available footprint area and anticipated lack of available in-situ borrow material and/or waste rock.

MRDF Design:

The Conceptual Design General Arrangement of the proposed MRDF is illustrated in **Diagram 5.5.2** (referenced from Drawing Number 000-224-900, included in Appendix 5 of **Appendix E)**.

The **Tailings Storage Facility (TSF)** will have the following features:

- The starter embankment will be constructed to elevation 777 m.a.m.s.l. to correlate with the safe Rate of Rise of <2.5m/annum and provide the required minimum freeboard;
- Deposition will comprise of tailings deposited behind the starter embankment until the Rate of Rise decreases to <2.5 m/annum and then self-raised to a final elevation of 792 m.a.m.s.l. with a terminal Rate of Rise of 1.64 m/annum;

- The TSF has a total footprint area of 32.81 Ha, with a maximum height of 32m;
  - A slurry spigot pipeline along the crest of the TSF starter embankment;
  - An elevated and a natural ground level (NGL) toe drain and associated drain outlets;
  - A blanket drain and associated outlets;
  - A solution trench;
  - Run-off catchment paddocks;
  - A penstock decant system with an intermediate intake and a final intake;
  - An energy dissipator and a dual chamber silt trap with associated outfall trench;
  - An access road;
  - A perimeter fence; and
  - Storm water diversion trenches and berms.
  - **A class C liner typically comprising of:**
    - A 100 mm sand protection layer, or geosynthetic replacement of equivalent performance;
    - A 1.5 mm HDPE geomembrane;
    - A 300 mm clay liner, or geosynthetic replacement of equivalent performance;
    - A leakage detection and collection system.

The **Return Water Dam (RWD)** will have the following features:

- Compacted earth containment wall raised to elevation 762 m.a.m.s.l.;
- A lined basin with 1.5 mm HDPE with an associated geotextile protection layer;
- A return water collection manhole;
- A storage capacity of 6 000m³ providing approximately 5 days of slurry water; and
- A spillway at elevation 761 m.a.m.s.l.

The **Storm Water Dam (SWD)** will have the following features:

- A compacted earth containment wall raised to elevation 762 m.a.m.s.l.;
- A lined basin with 1.5 mm HDPE with an associated geotextile protection layer;
- A return water collection manhole;
- A storage capacity of 41 000m³ providing adequate storage to prevent spillage of dirty water more than once in a 50 year period;
- An emergency spillway at elevation 761.2 m.a.m.s.l.; and
- A spillway diversion trench and berm.

In summary therefore (and as per the conclusions in Section 17 of Appendix E), the Conceptual Design of the SAFTA MRDF has been undertaken, and the following was concluded:

- A site has been identified within the available survey capable of containing the tailings stream over the 10 year LoM;
- The TSF conceptual design was undertaken on the basis that the geochemical classification of the tailings were determined as a Type 3 waste product and that a Class C liner is required in accordance with South African legislation;
- A hydrogeological study undertaken by SRK indicated a low to very low risk of further contamination of the groundwater reserves in the project location;
- A RWD was sized to contain 5 days of slurry water, or 6 000 m³;
- A SWD was sized to contain the volume of water that would resulting from a 7 day 1:50 year return period flood over the entire MRDF footprint, or 41000m³;
- A high level seepage and stability assessment indicate that the TSF will achieve a Factor of Safety (FoS) of 1.5 with a toe drain and blanket drain in place to provide redundancy under static conditions;
- The TSF was assessed under pseudo-static conditions and found to achieve a FoS of 1.1 with active drains;
- A high level water balance yielded returns of:
  - Between 20% – 40% for an unlined facility; and
  - Between 40% - 60% for a lined facility.

3.3.9 Project Services

Owing to the remote nature of the Project Area a number of services will have to be supplied by personnel and infrastructure on site. These services will include the treatment of potable water, the treatment of sewage, basic medical and firefighting services, and waste handling and removal as well as information and communication services.

A potable water treatment plant will be installed to treat water abstracted from the water raise to ensure it is suitable for human consumption. Sewage will be collected in septic tanks across the operation and fed to a sewage treatment plant for treatment. Water from this plant will be recycled and utilised as service and process make up water.
A first aid station will be available at the mine site for first response to any medical emergency on the mine. This facility will be equipped for the treatment of minor to medium severity medical emergency and will serve as a first response / stabilisation facility from major medical emergencies. Patients will be transported from here to the nearest hospital for further treatment should it be required.

A firefighting truck will form part of the project services vehicles and will be utilised to respond to fires on the Project Area.
A waste handling and dispatch facility will also from part of the mine site and will allow for the collection of all types of waste generated by the operation and transported to suitable disposal facilities in the area.
Lastly, Information Technology (IT) and communication infrastructure will be installed at the mine site to allow for the effective capture and management of relevant information and ensure clear and effective communication across the Project site and externally off-site.

3.3.10 Rehabilitation, decommissioning and Mine Closure

The final Rehabilitation, Decommissioning and Closure Plan to be developed in the EIA Phase, will address the following measures:

- Removal of all structures and infrastructure not to be retained by the landowner in terms of section 44 of the MPRDA.
- All fixed assets that can be profitably removed will be removed for salvage or resale.
- Any item that has no salvage value to the mine, but could be of value to individuals, will be sold and the remaining treated as waste and removed from site.
- All structures will be demolished and terracing and foundations removed to the lesser of 500 mm below the original ground level.
- Inert waste, which is more than 500 mm underground, such as pipes, will be left in place
- A hazardous disposal site will not be constructed and all hazardous waste will be removed from site and transported to the nearest licensed facility.
- All services related to the mining operation, water supply lines and storage on site will be demolished.
- Existing tracks will be used and no new roads will be developed.
- The MRDF and development areas will not exceed the planned footprint. Recommendations for the decommissioning, closure and rehabilitation of the residue stockpile are to be provided in the Specialist Report to be prepared in accordance with the "Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation" in GNR 632 of 24 July 2015 (in GG No. 39020)
- It is assumed that the post-mining pit stability and waste dump profile will be addressed as part of the operation and necessary remedial actions implemented prior to closure.
- Diversion of drainage channels due to historic waste dumps or agricultural practices will not be reinstated but mitigation to prevent damming of water will be implemented as part of annual rehabilitation.

Diagram 5.1.1: Original Mine Layout showing development areas and services (2018)

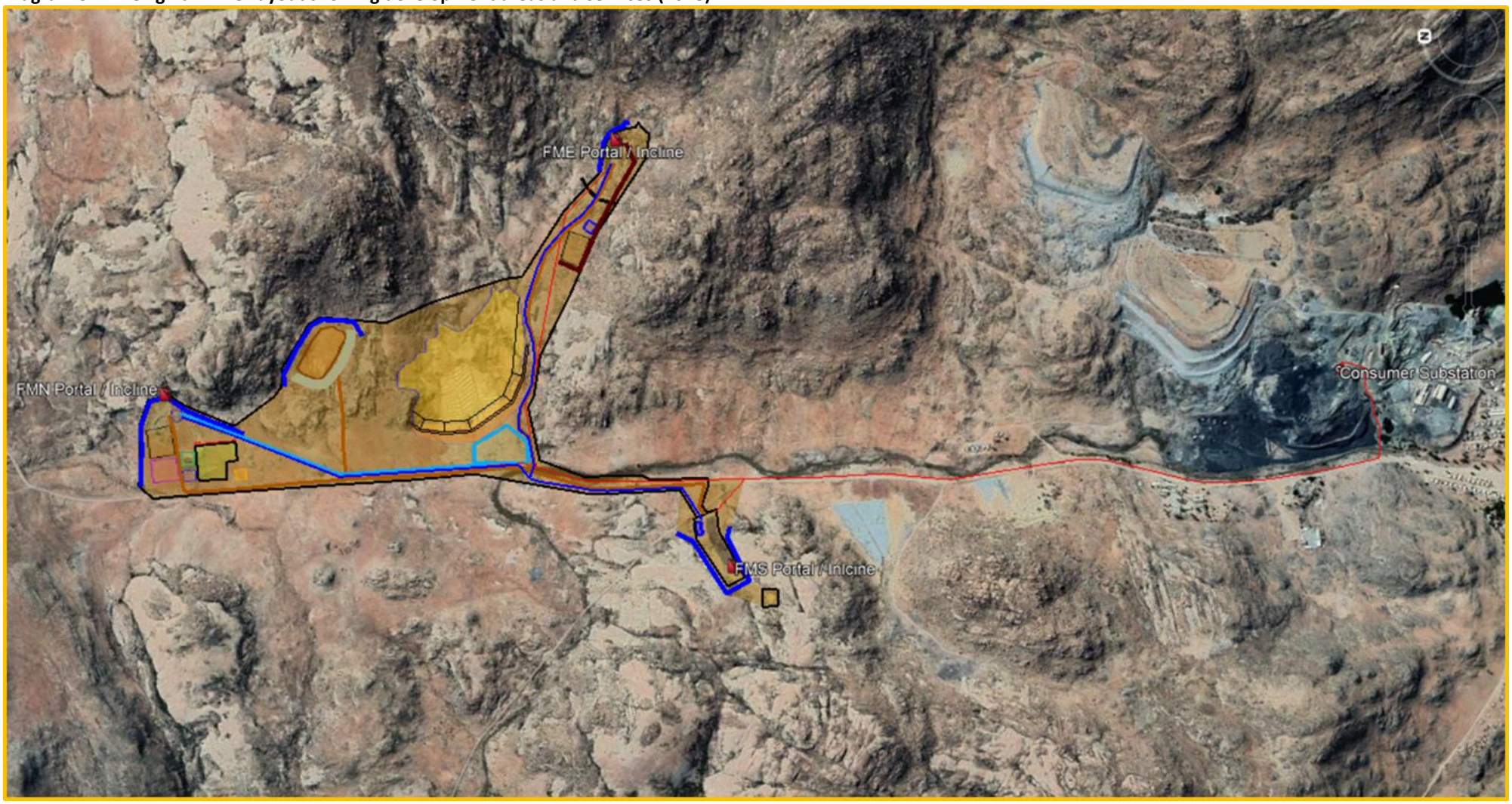


Diagram 5.1.2: Mine Layout showing development areas and services (UPDATED WITH WATER INFRASTRUCTURE 2019 - Refer to Appendix H) ***NOTE: FMS location is to be corrected***

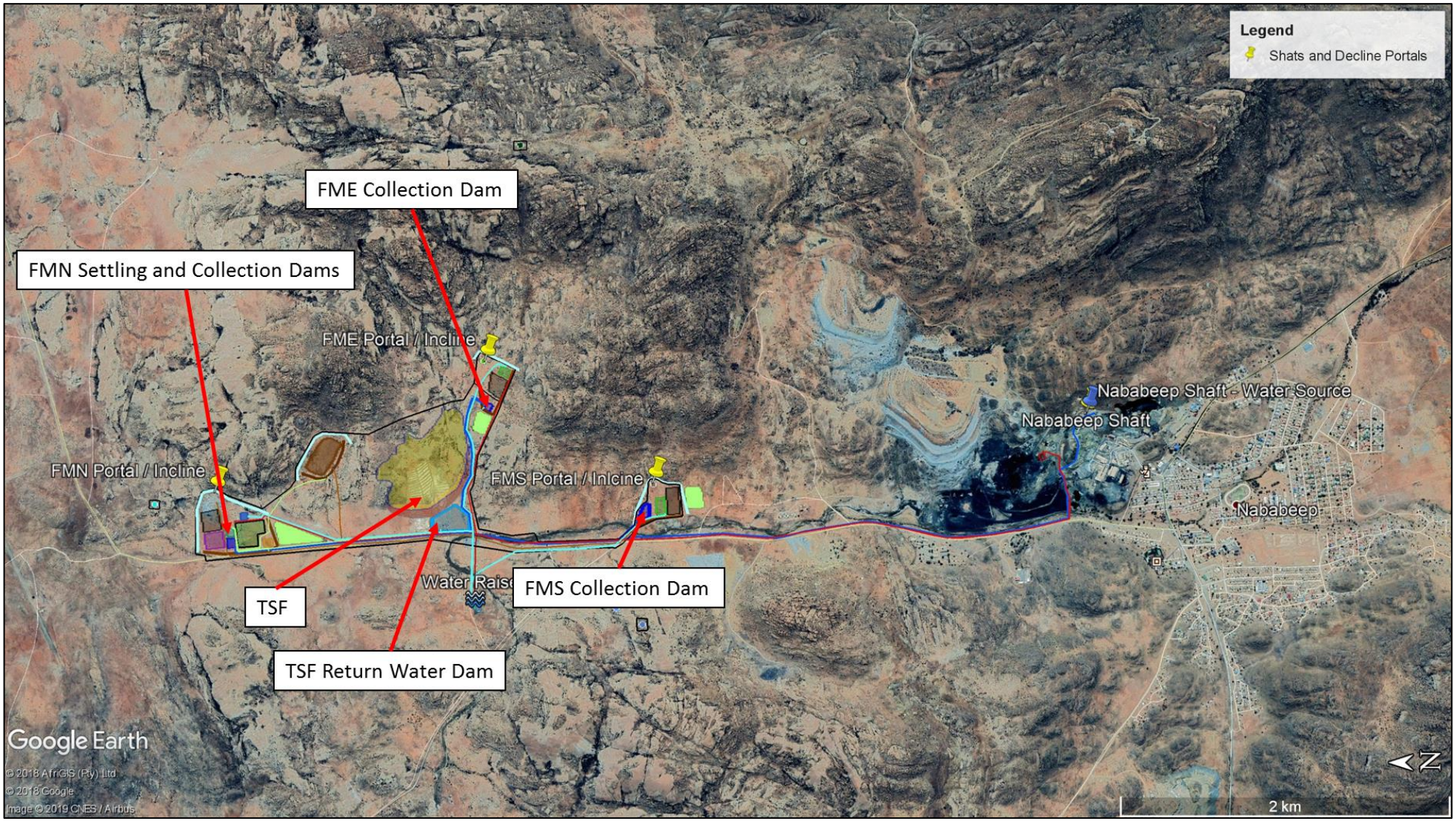


Diagram 5.2.1: Site Plan Flat Mine North (FMN) Original Layout – Waste Rock Dump layout remains unchanged (2018)

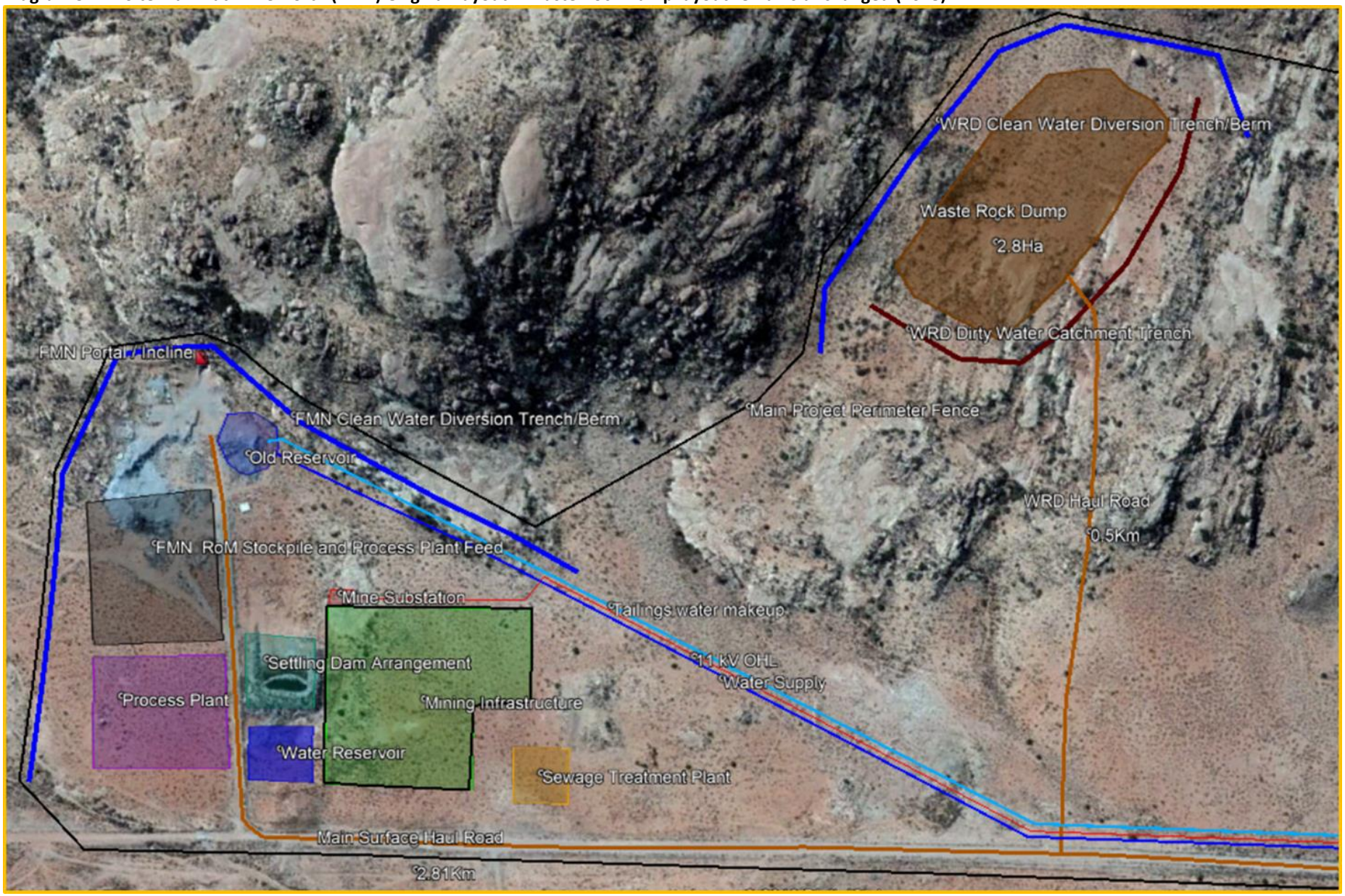


Diagram 5.2.2: Site Plan Flat Mine North (FMN) Revised Layout with updated water infrastructure (2019)

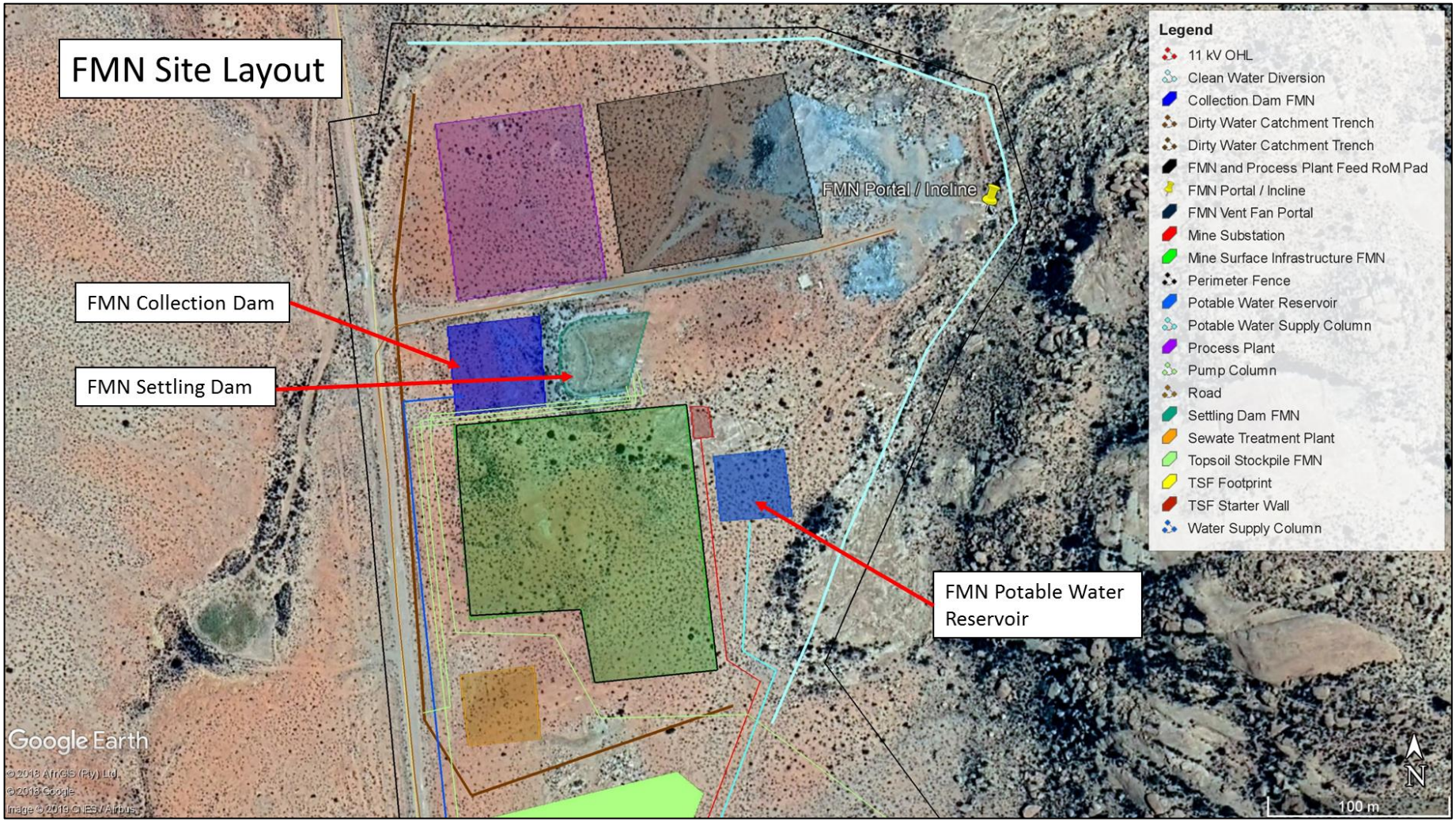


Diagram 5.3.1: Site Plan Flat Mine South (FMS) Original Layout correctly positioned to west of river (2018)

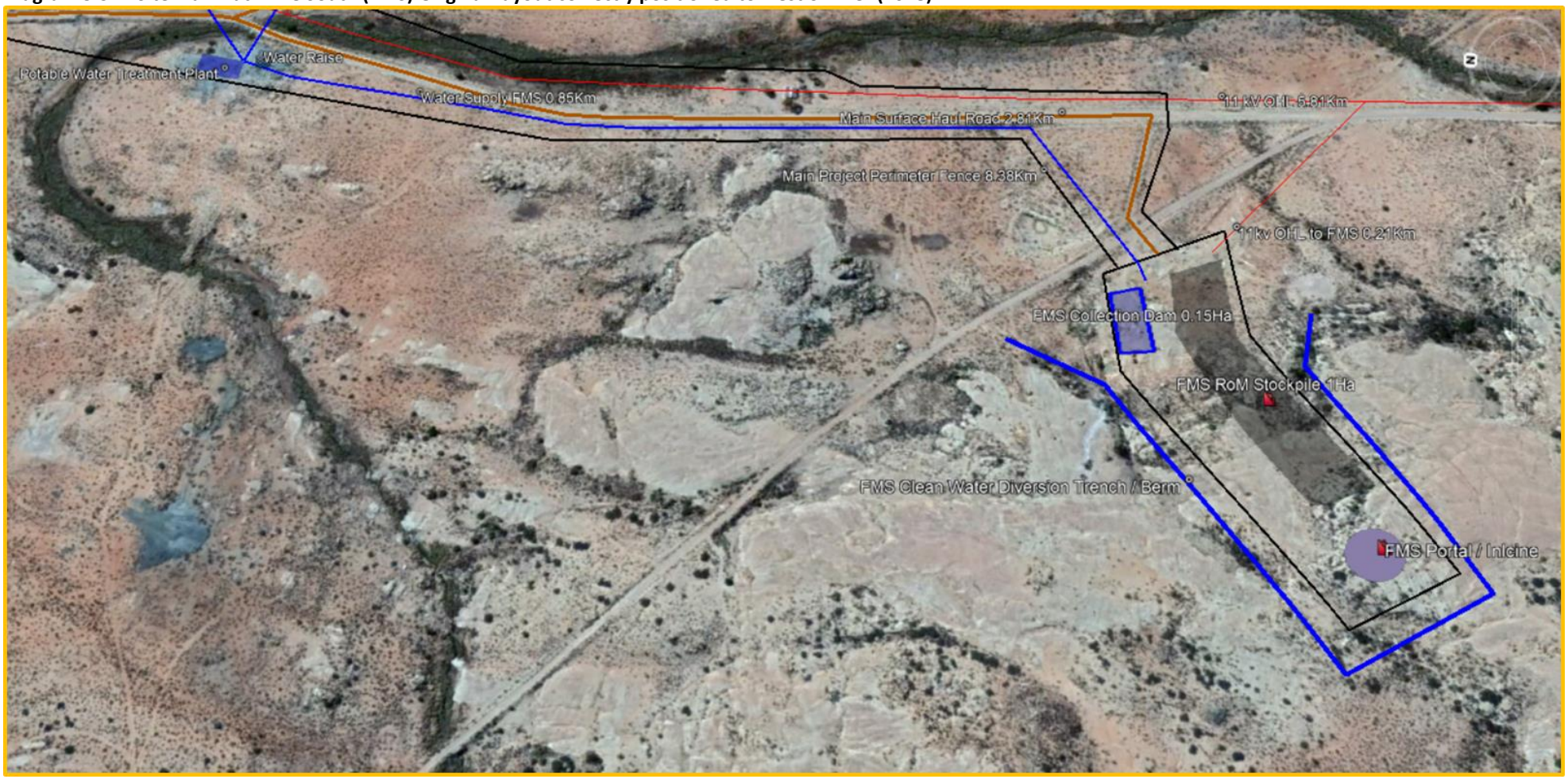


Diagram 5.3.2: Site Plan Flat Mine South (FMS) revised layout with updated water infrastructure (2019) INCORRECTLY LOCATED TO EAST OF RVER – TO BE CORRECTED IN FEIR

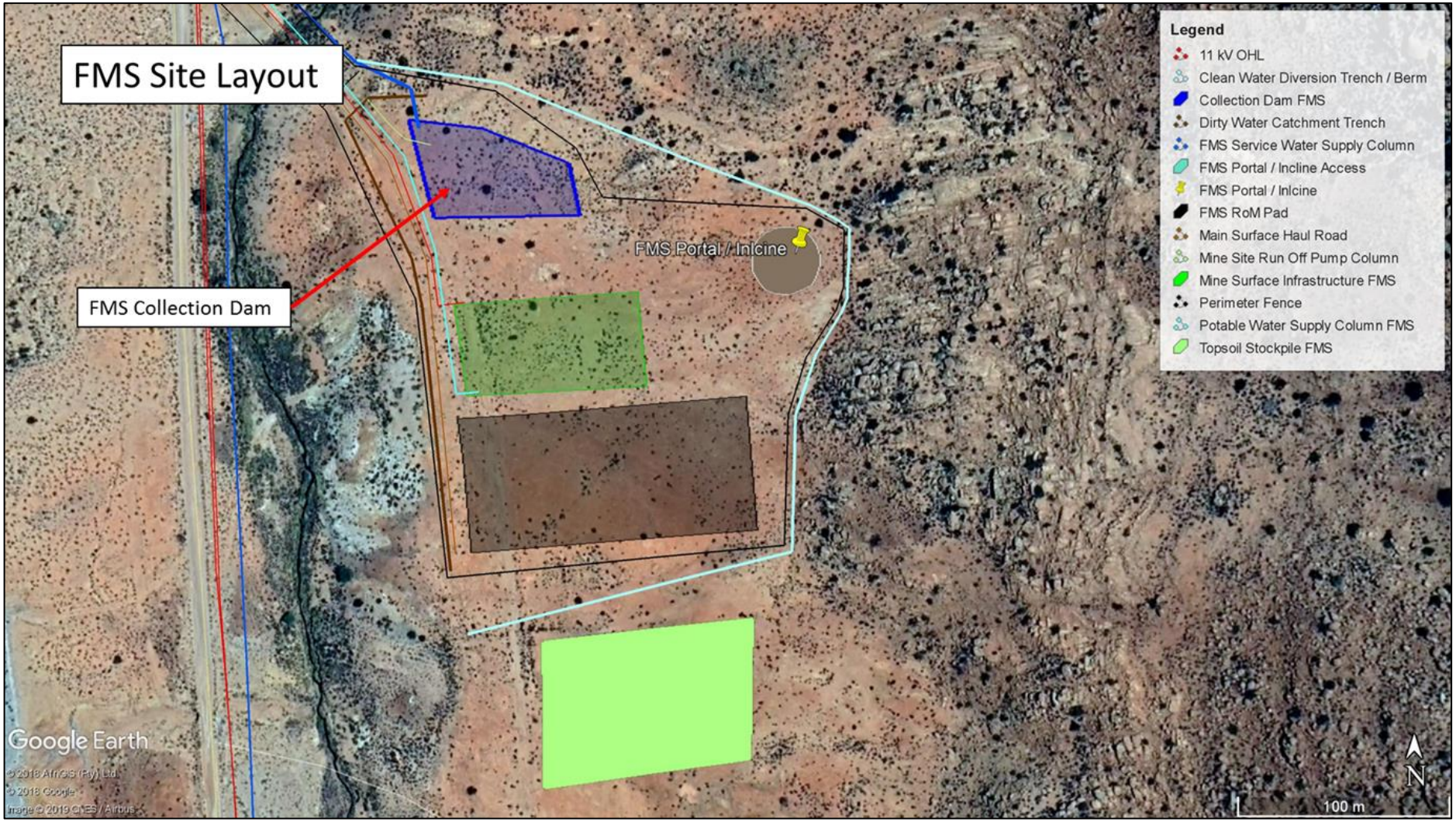


Diagram 5.4.1: Site Plan Flat Mine East (FME) Original Layout (2018)

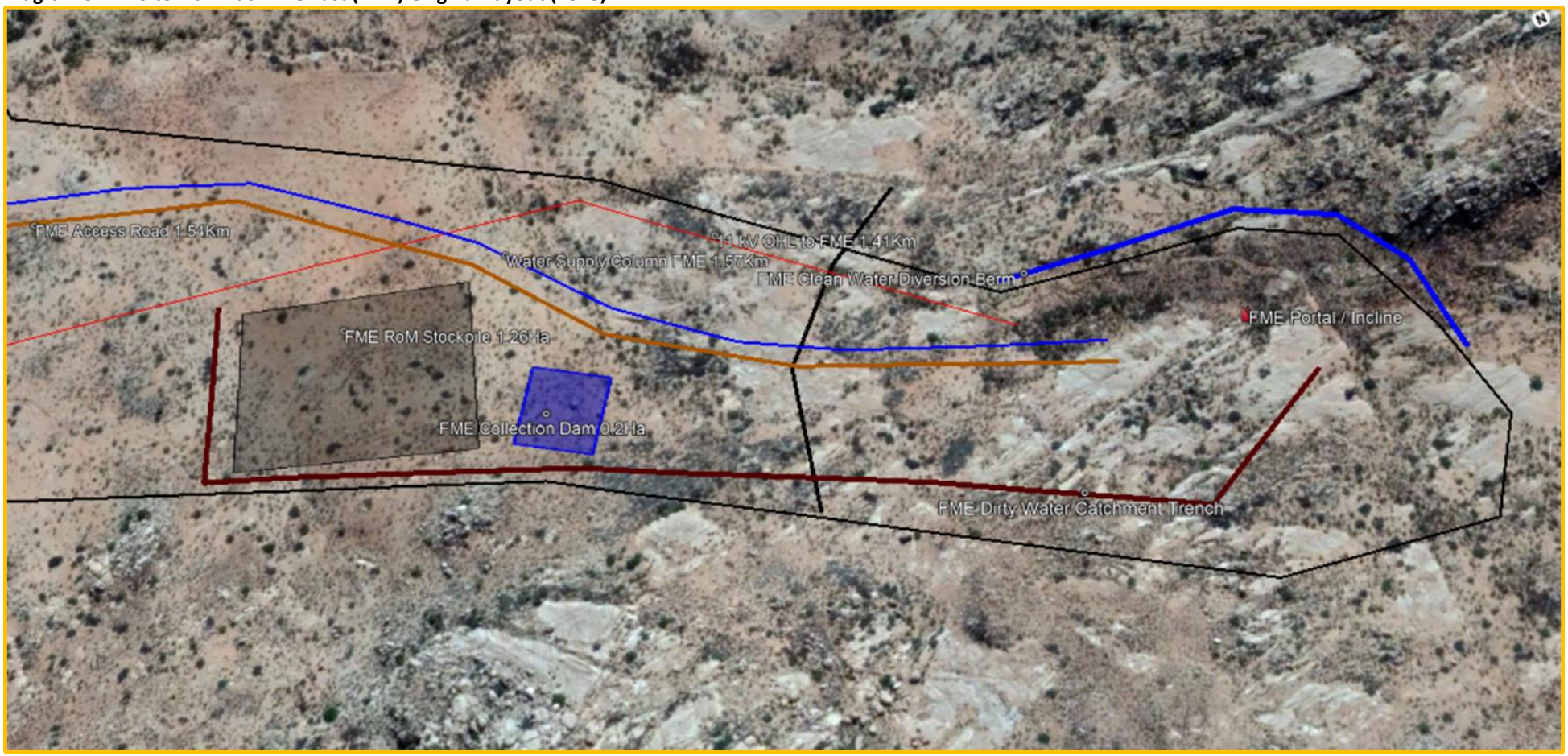


Diagram 5.4.2: Site Plan Flat Mine East (FME) Updated Layout (2019)

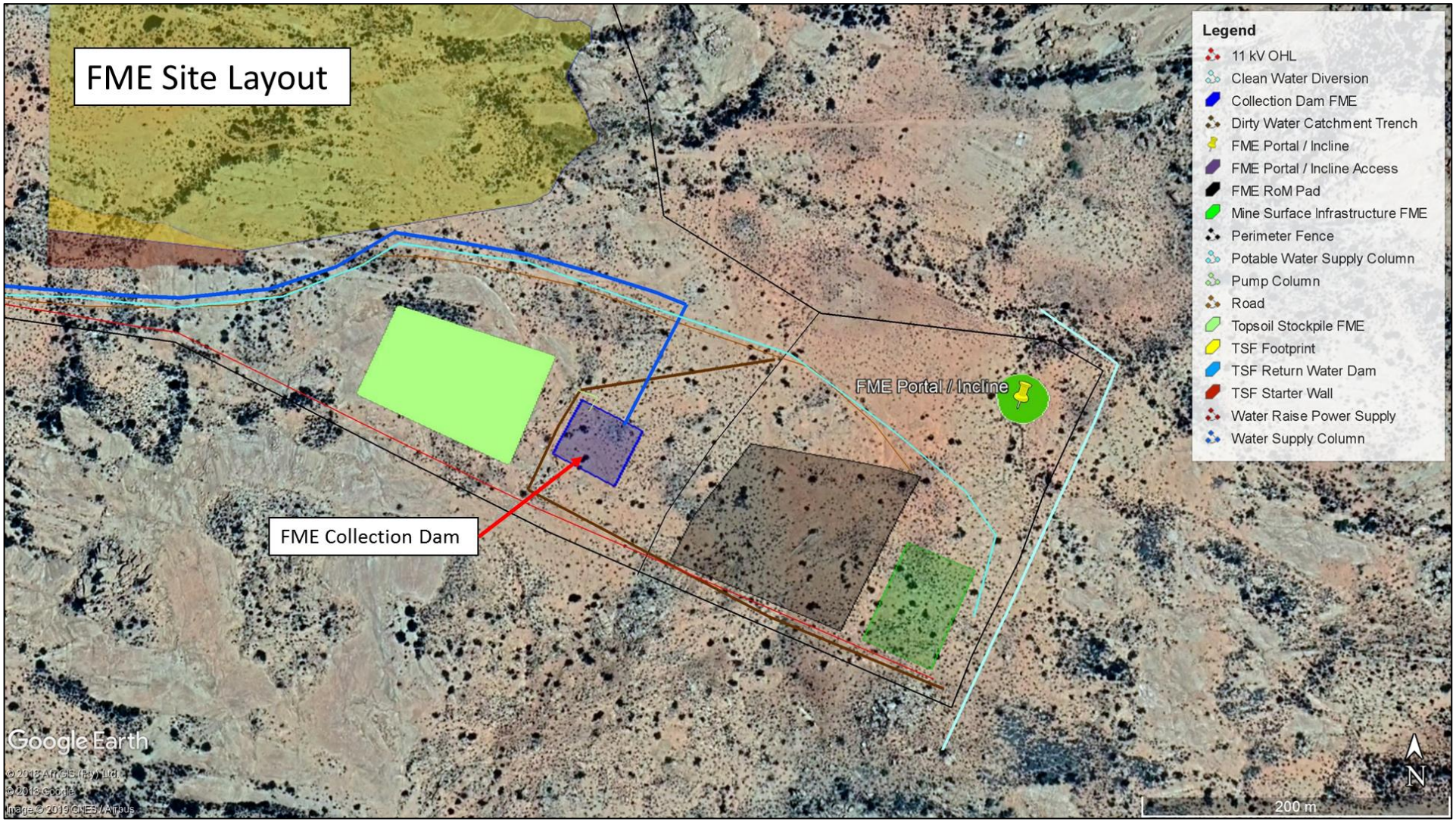


Diagram 5.5.1 : Site Plan Centralised Fine Residue Dam 2018 (prior to Conceptual Design)

Diagram 5.5.2: Conceptual Design - General Arrangement of TSF (Referenced from "Drawing 000-224-900" included in Appendix E) 2019

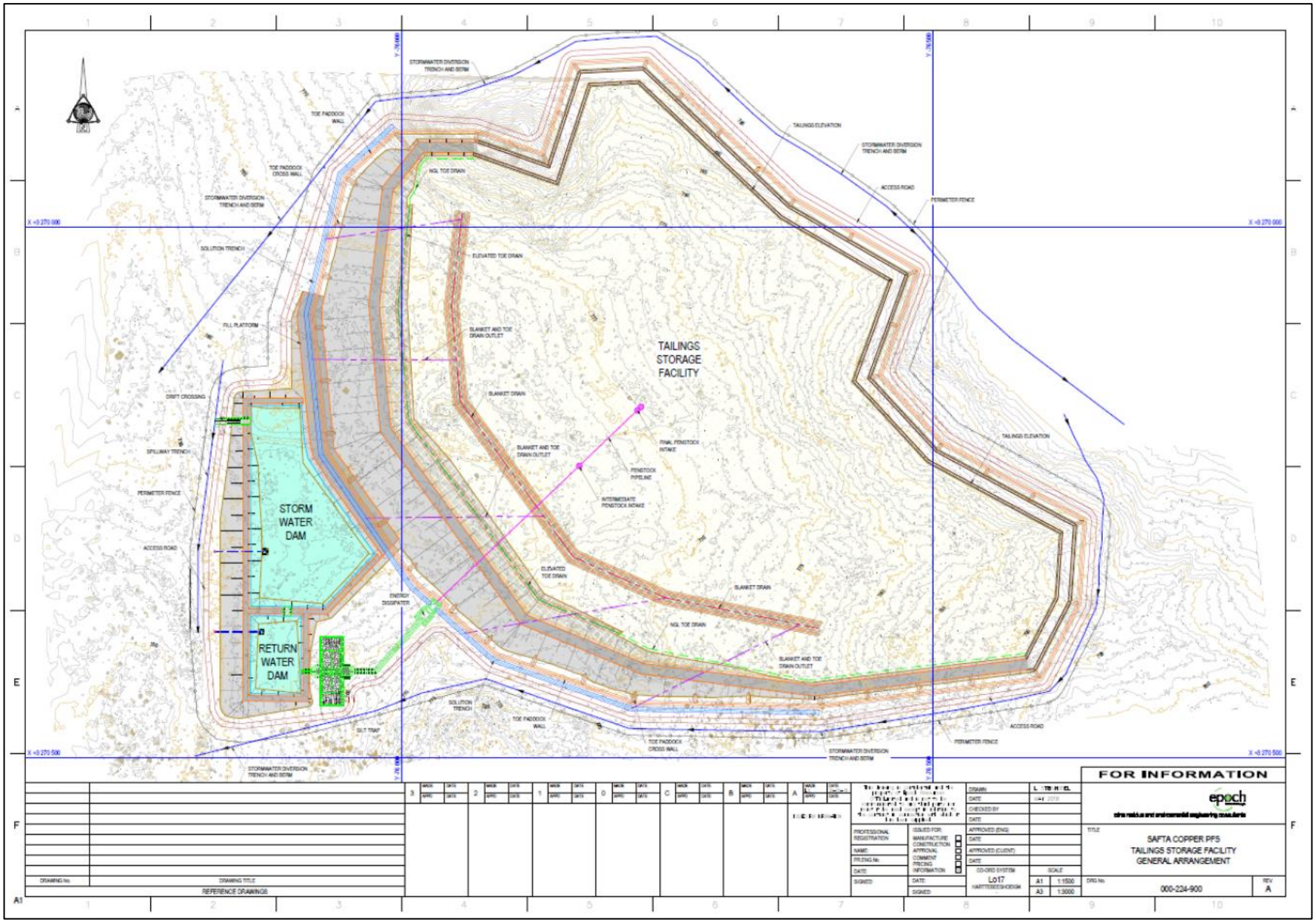


Diagram 6: Electricity Supply

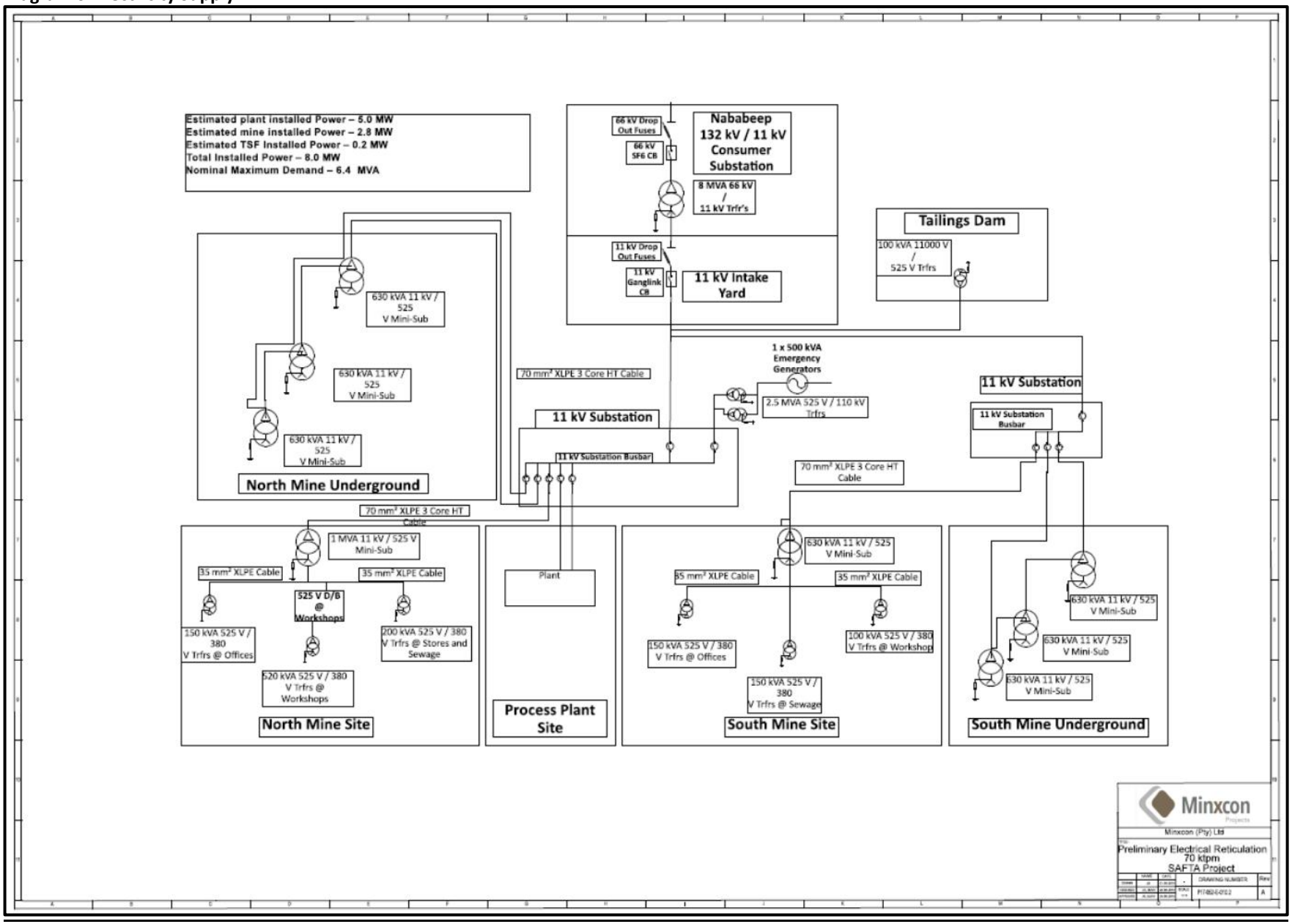


Diagram 7: Mining Infrastructure located at FMN

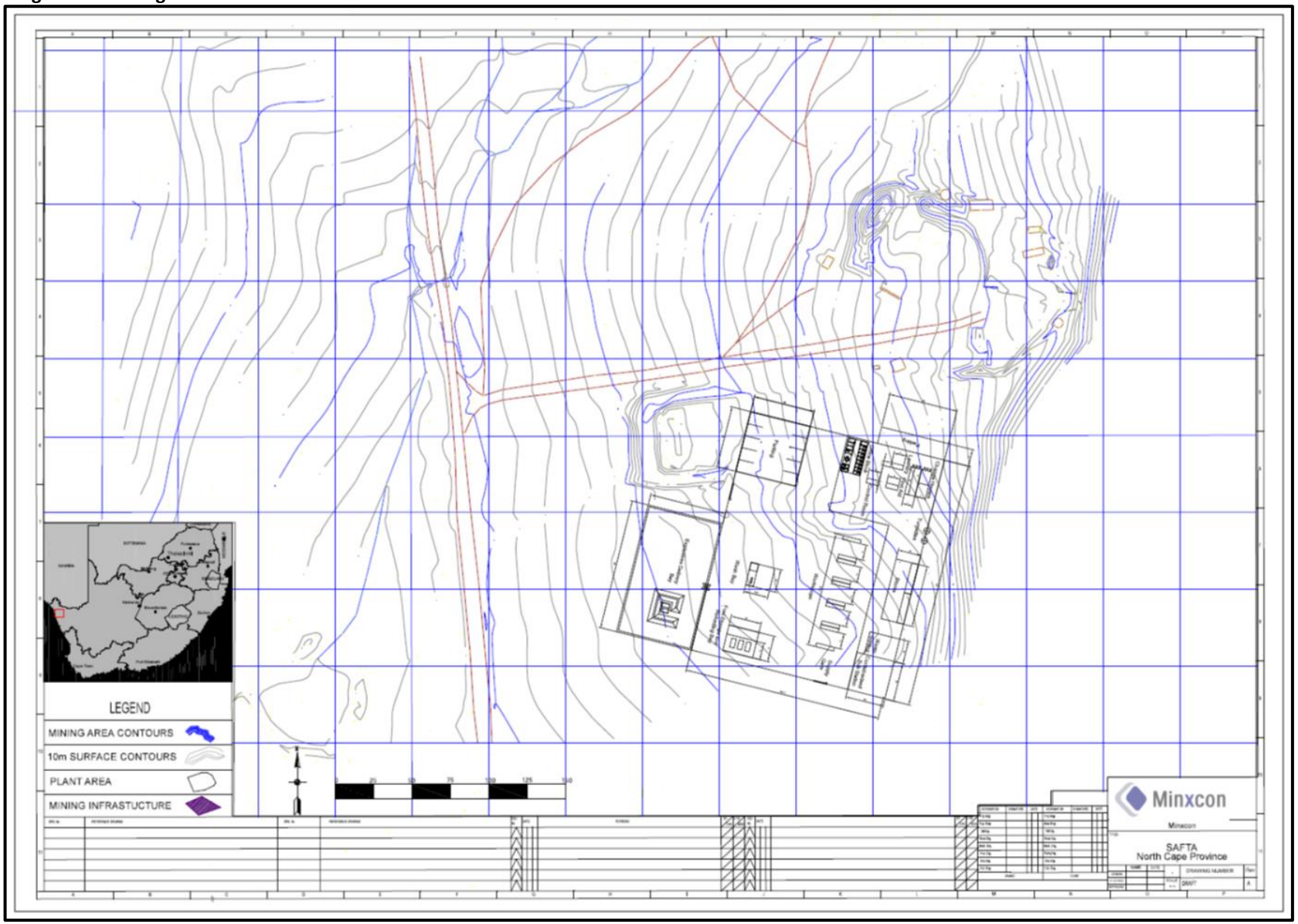


Diagram 8: Sewage Treatment Plant

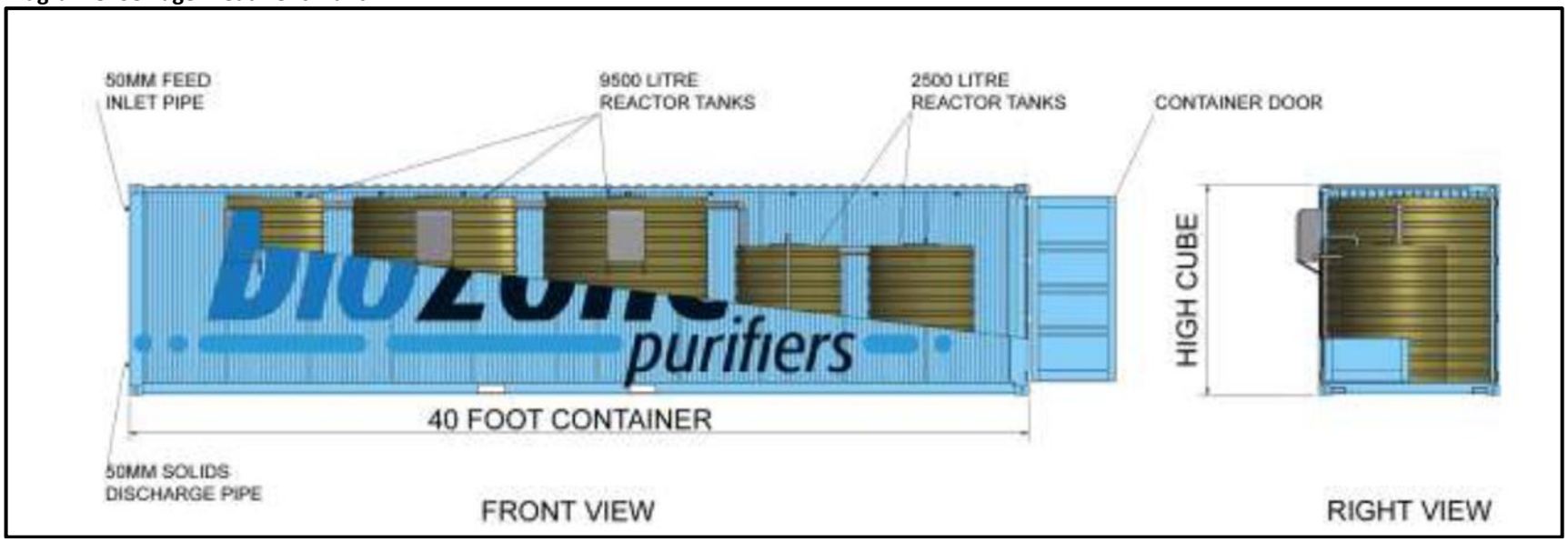


Diagram 9: Perimeter Fencing

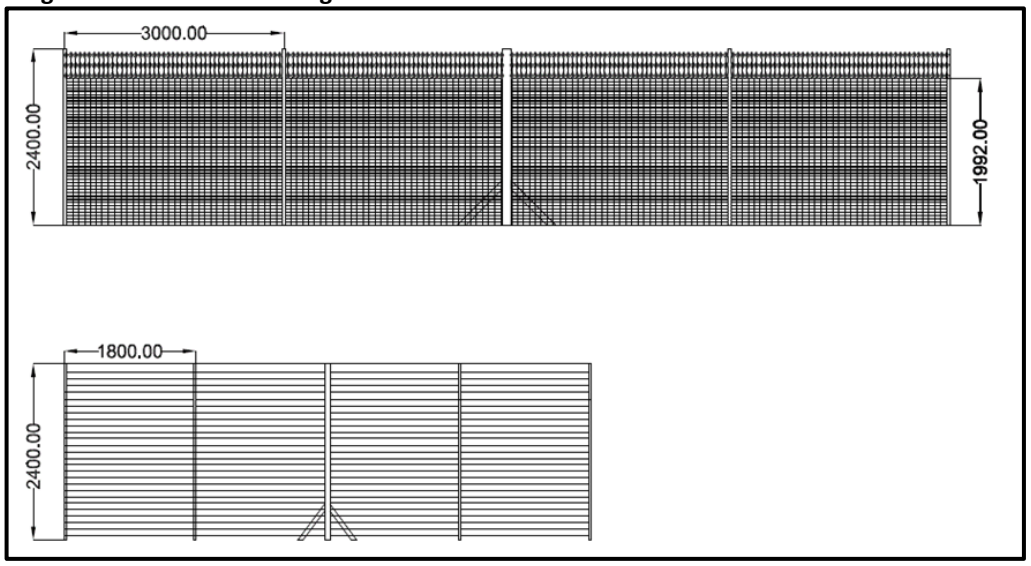


Diagram 10: Access Control

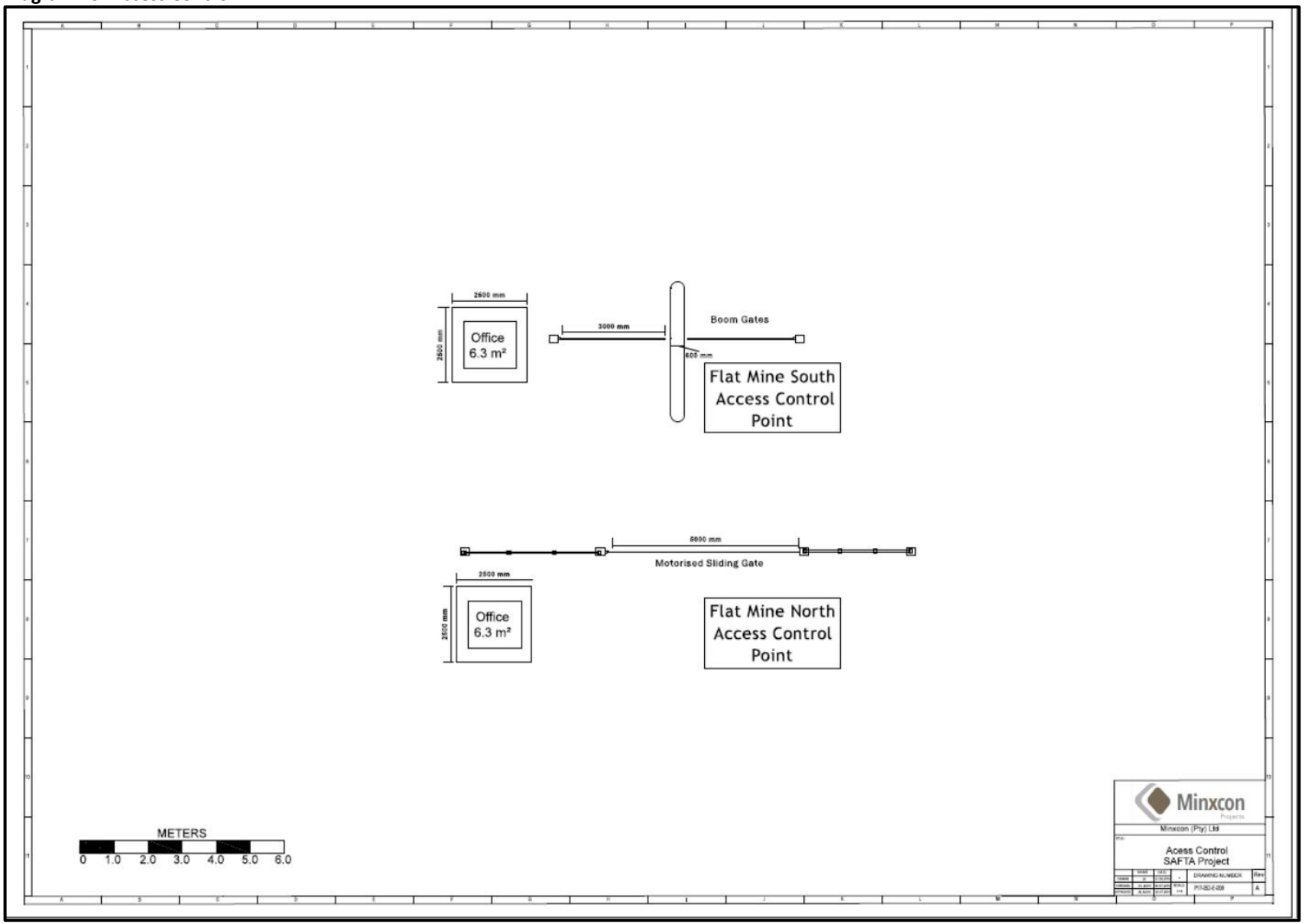


Diagram 11: Explosives Delivery Bay

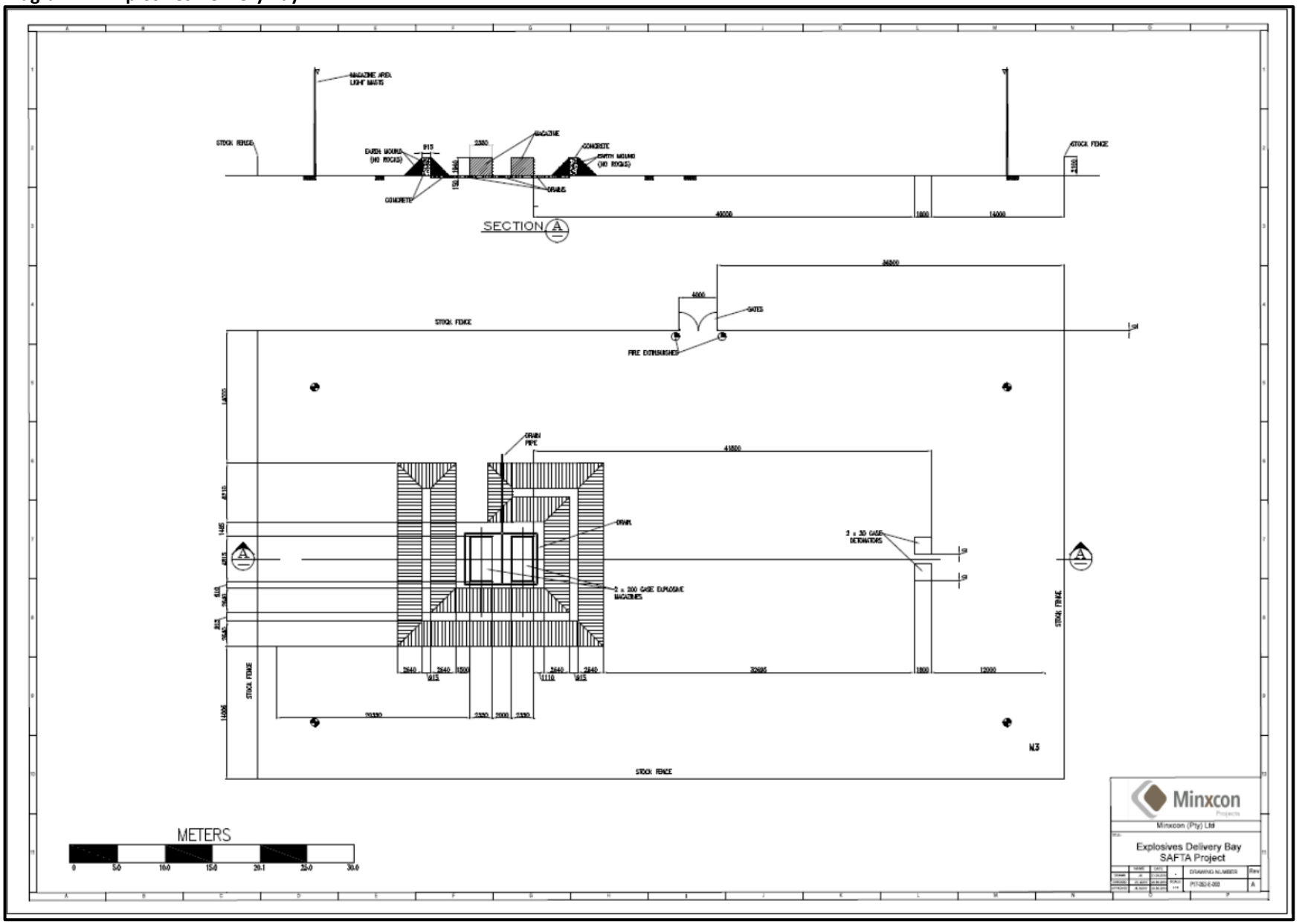


Diagram 12: Mine Logistics

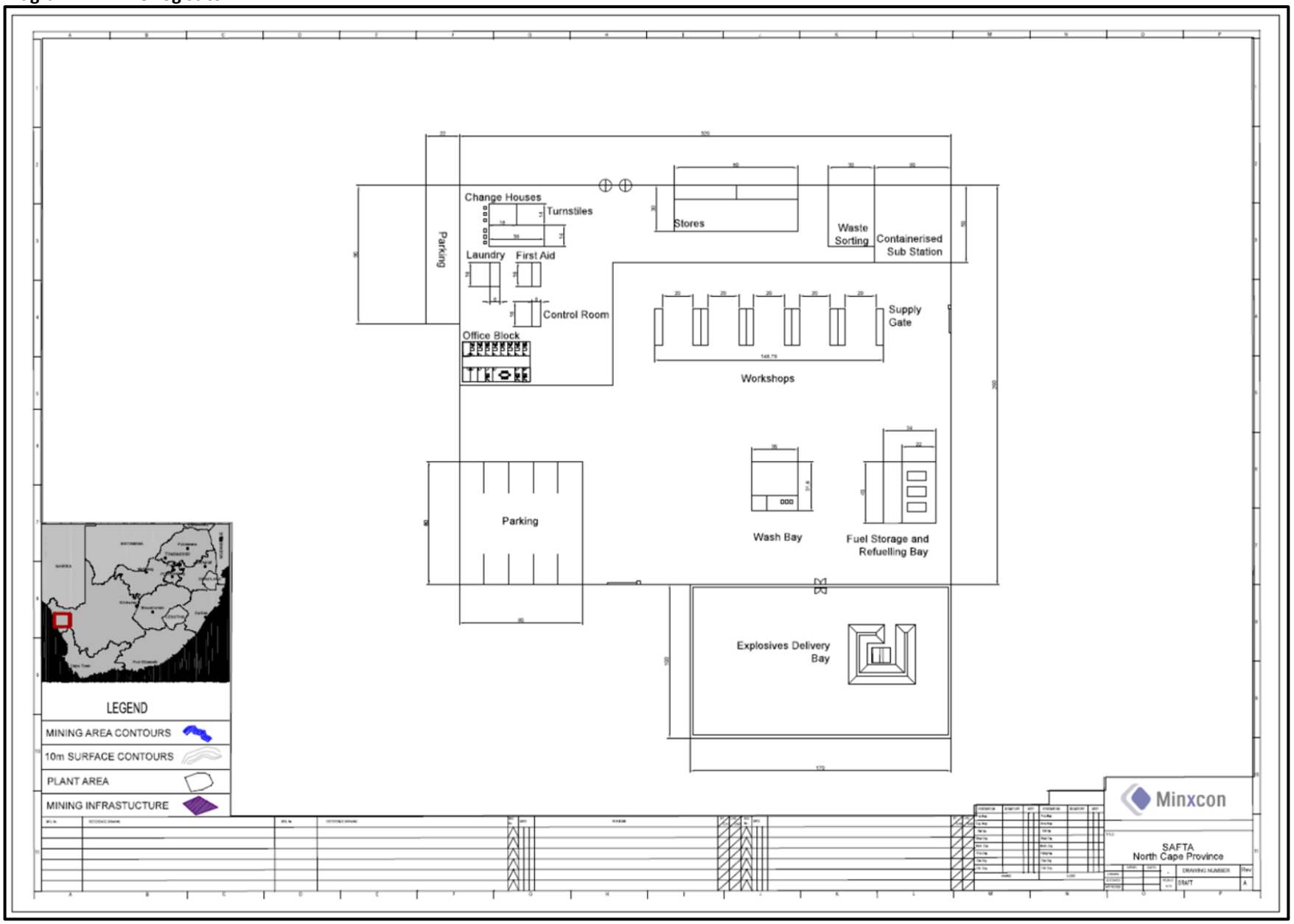


Diagram 13: Crushing and Screening

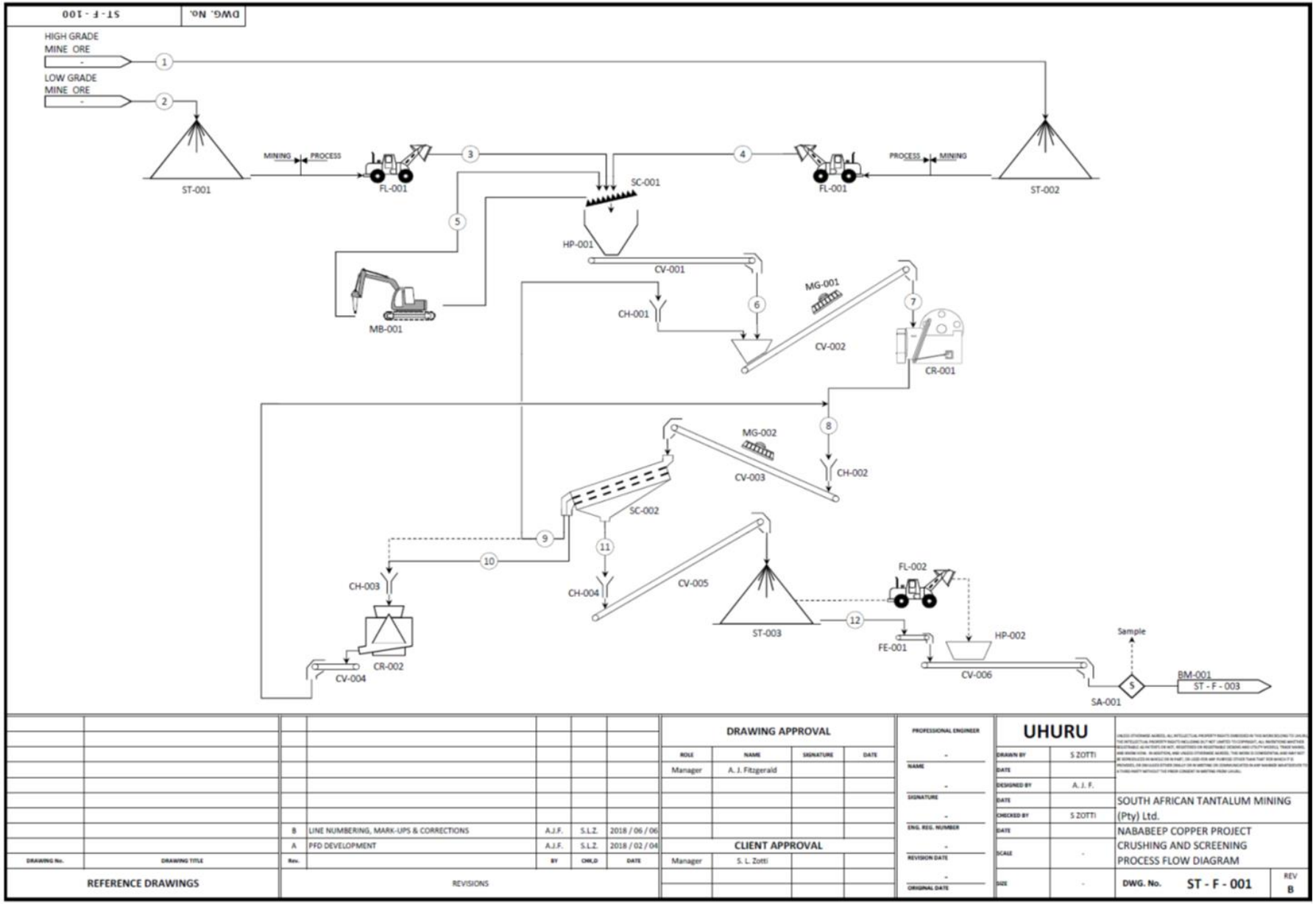


Diagram 14.1: Milling Circuit

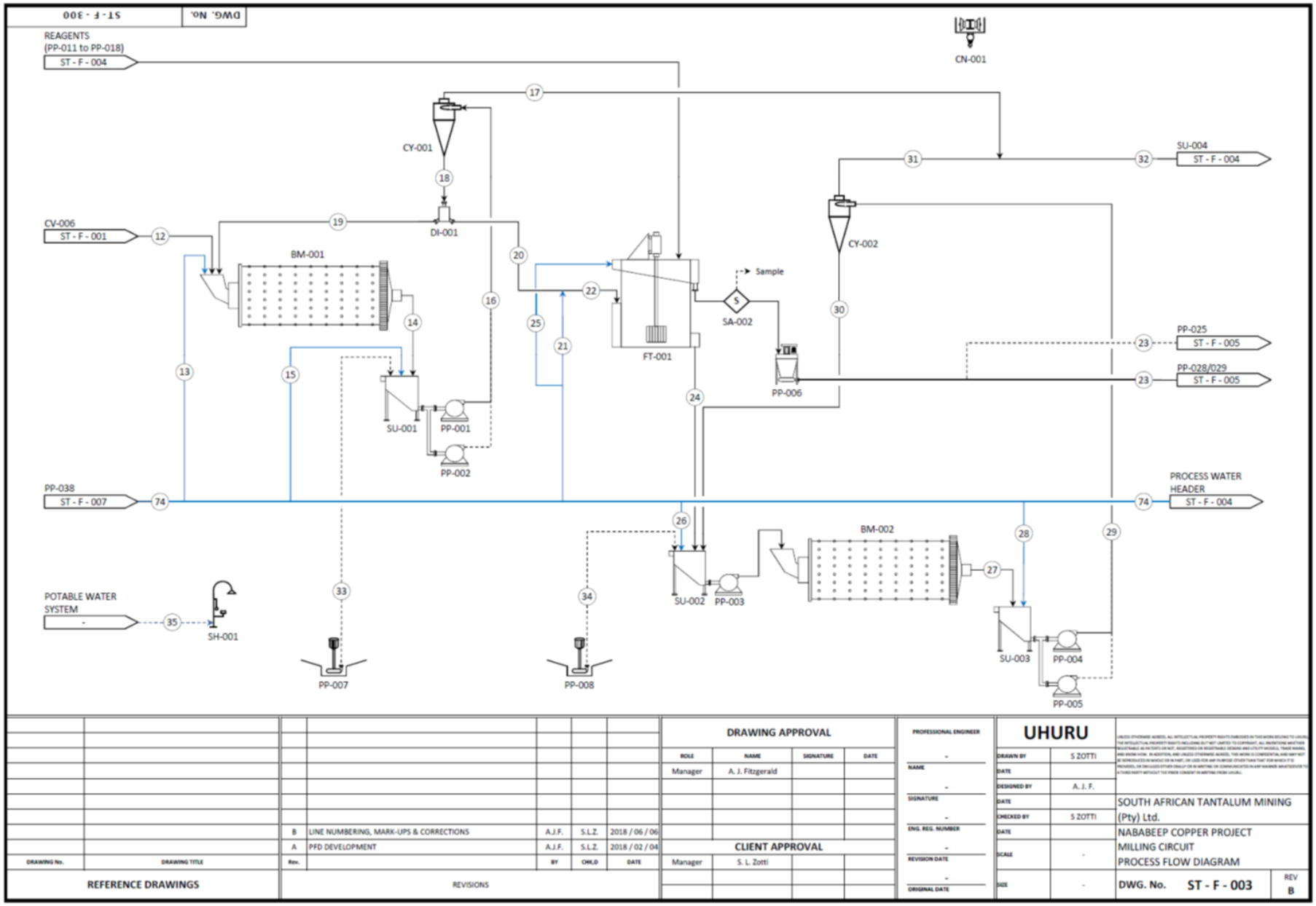


Diagram 14.2: Diagrammatic Representation of Process Milling Circuit

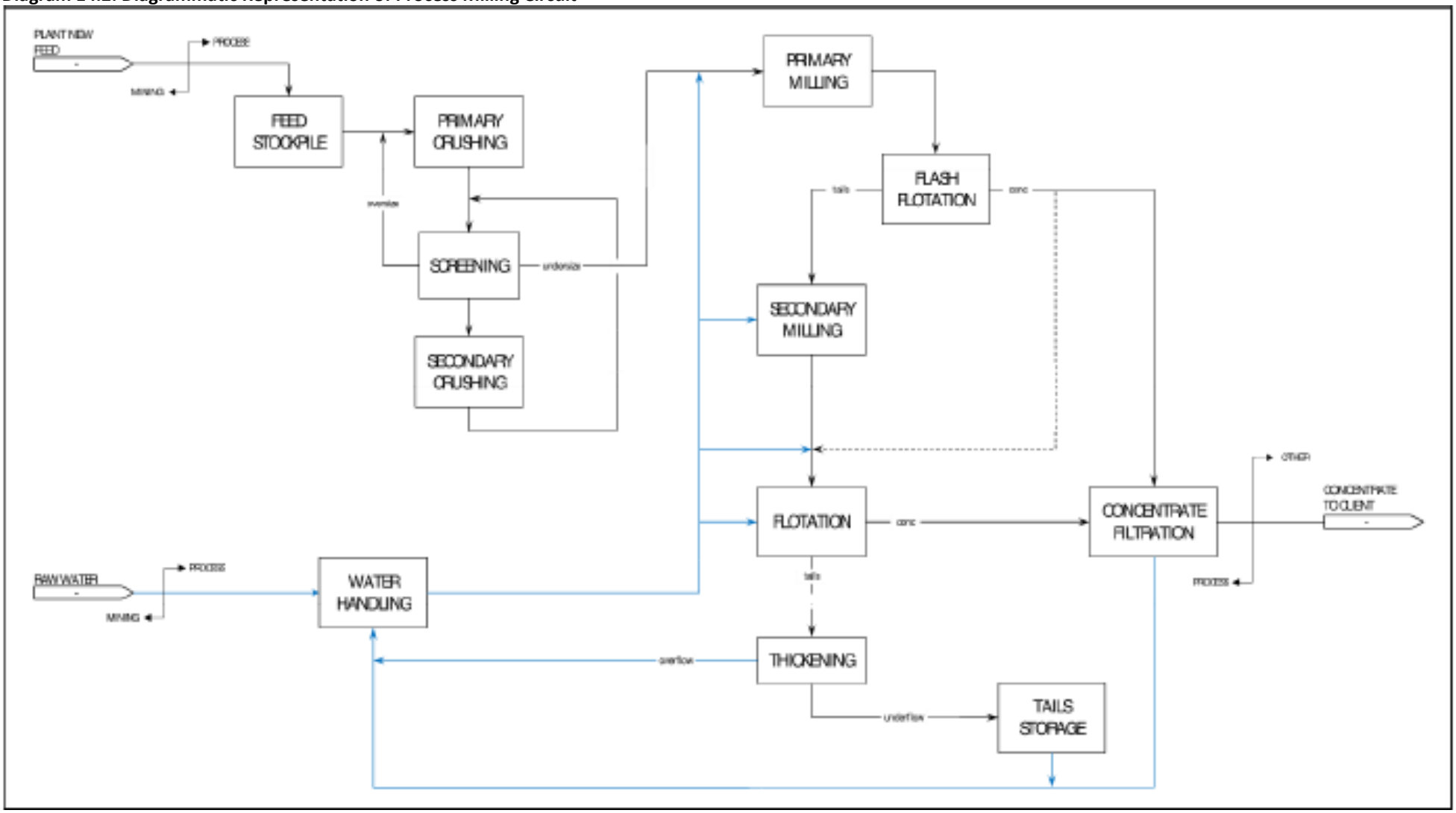


Diagram 15: Reagent Make-Up and Conditioning

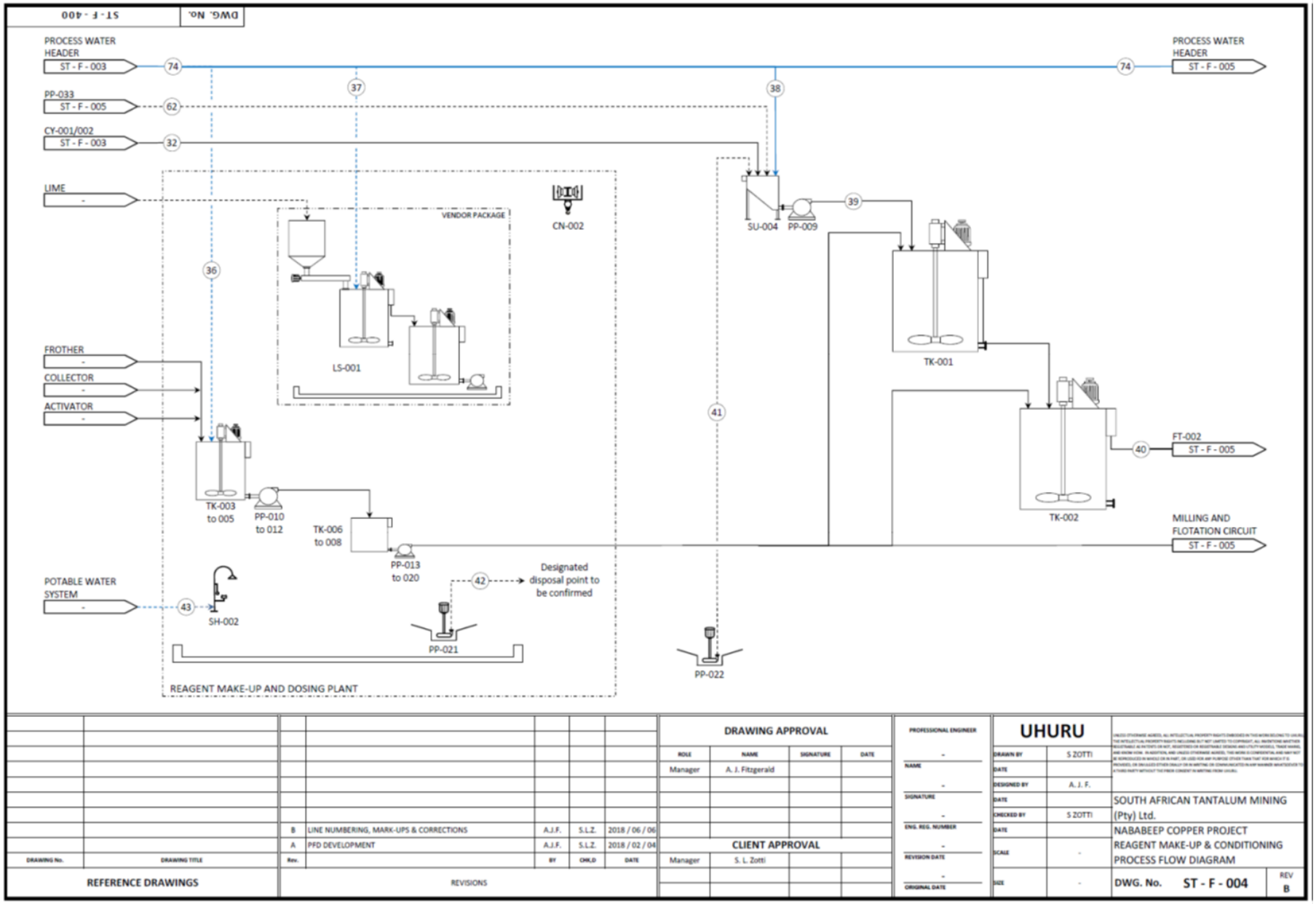


Diagram 16: Flotation Circuit

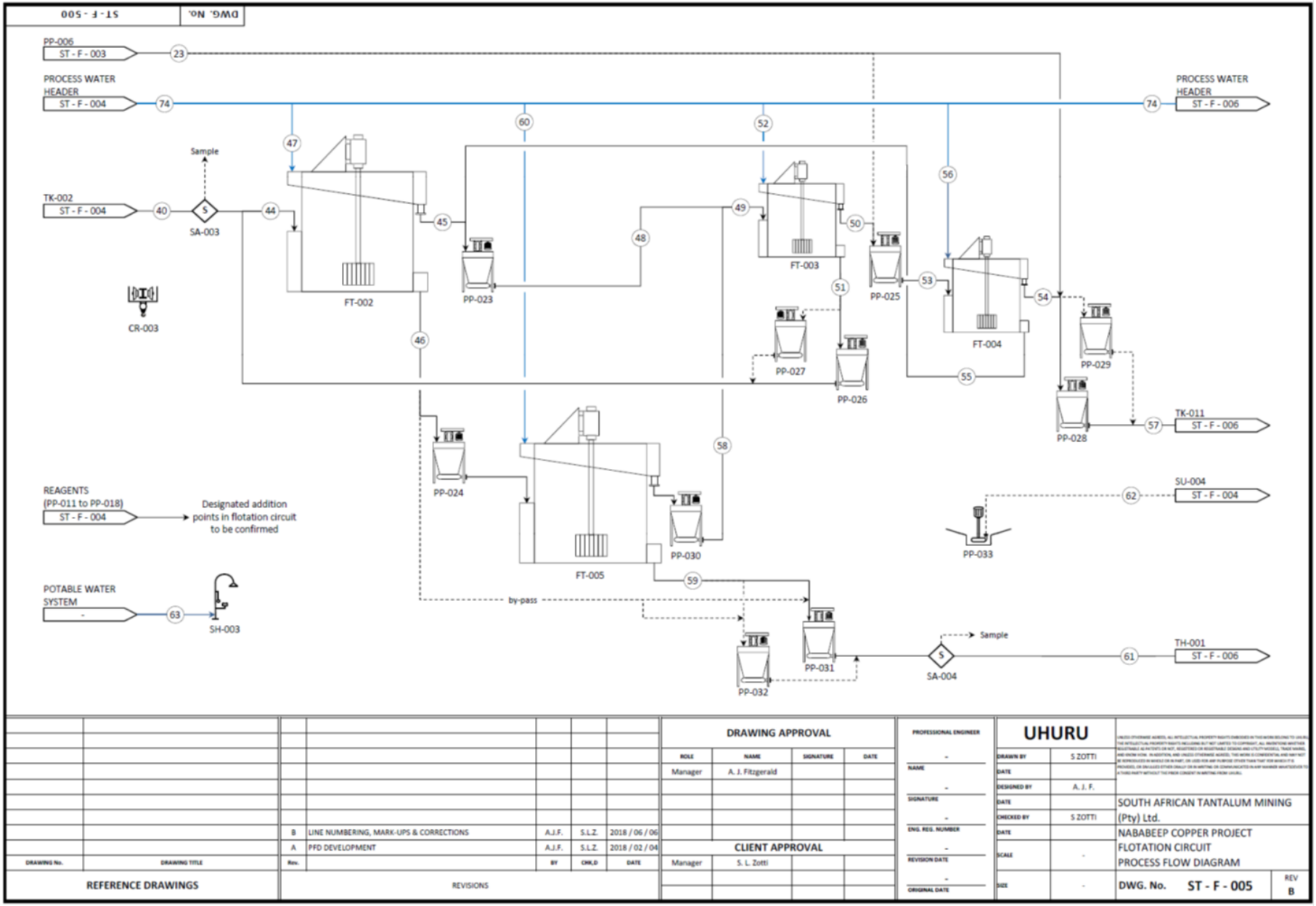


Diagram 17: Product Handling

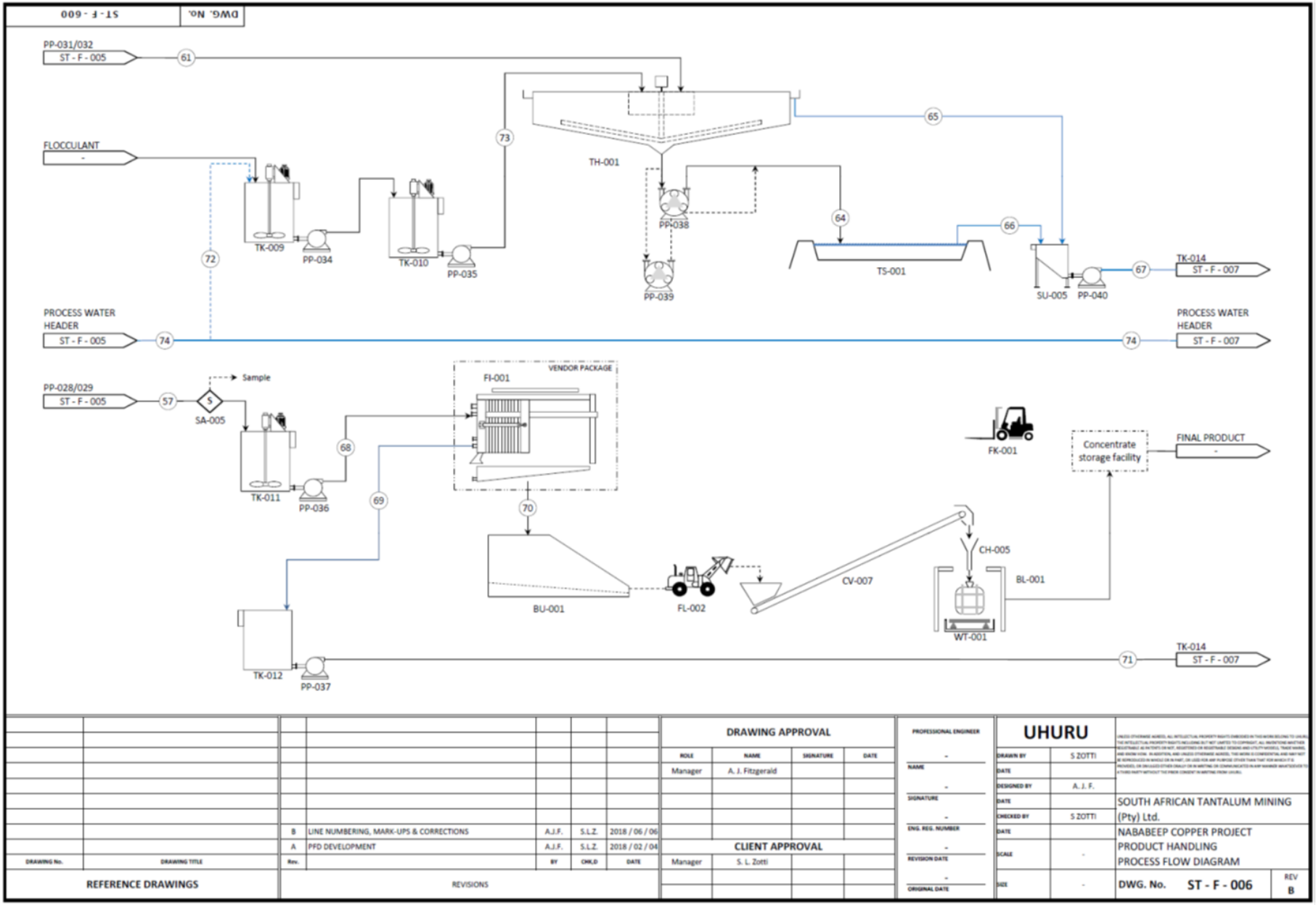


Diagram 18: Water Supply

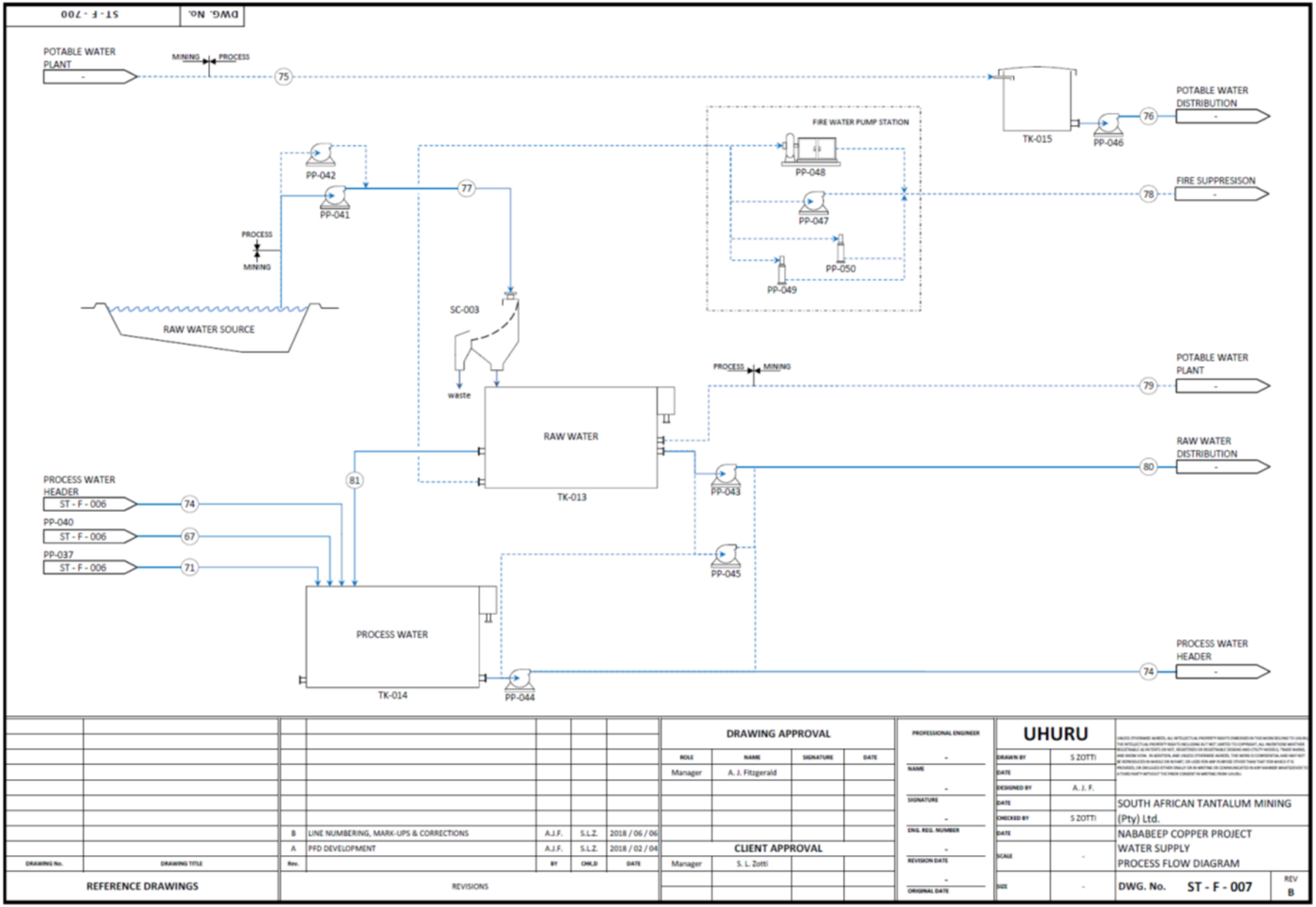


Diagram 19: Services

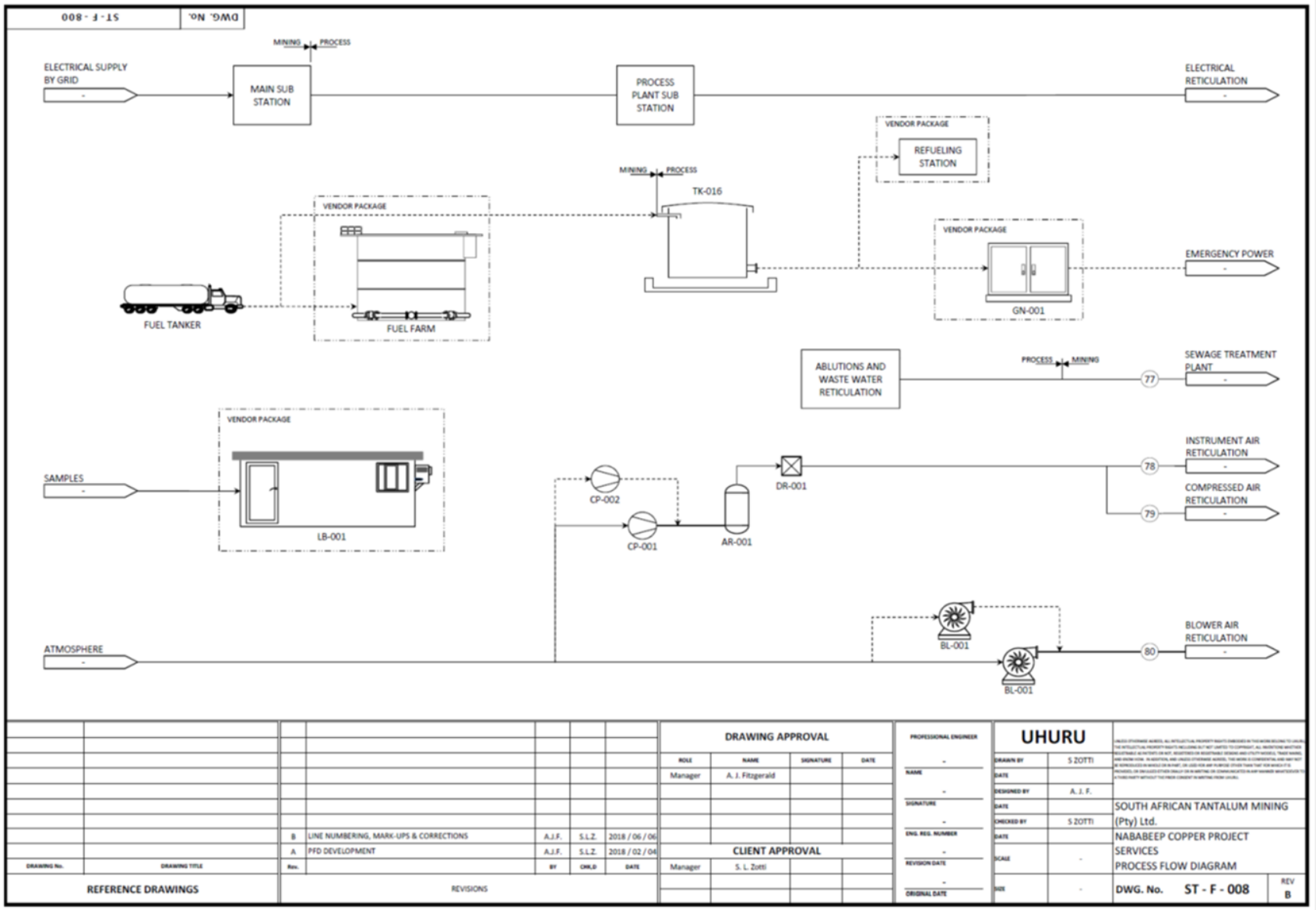
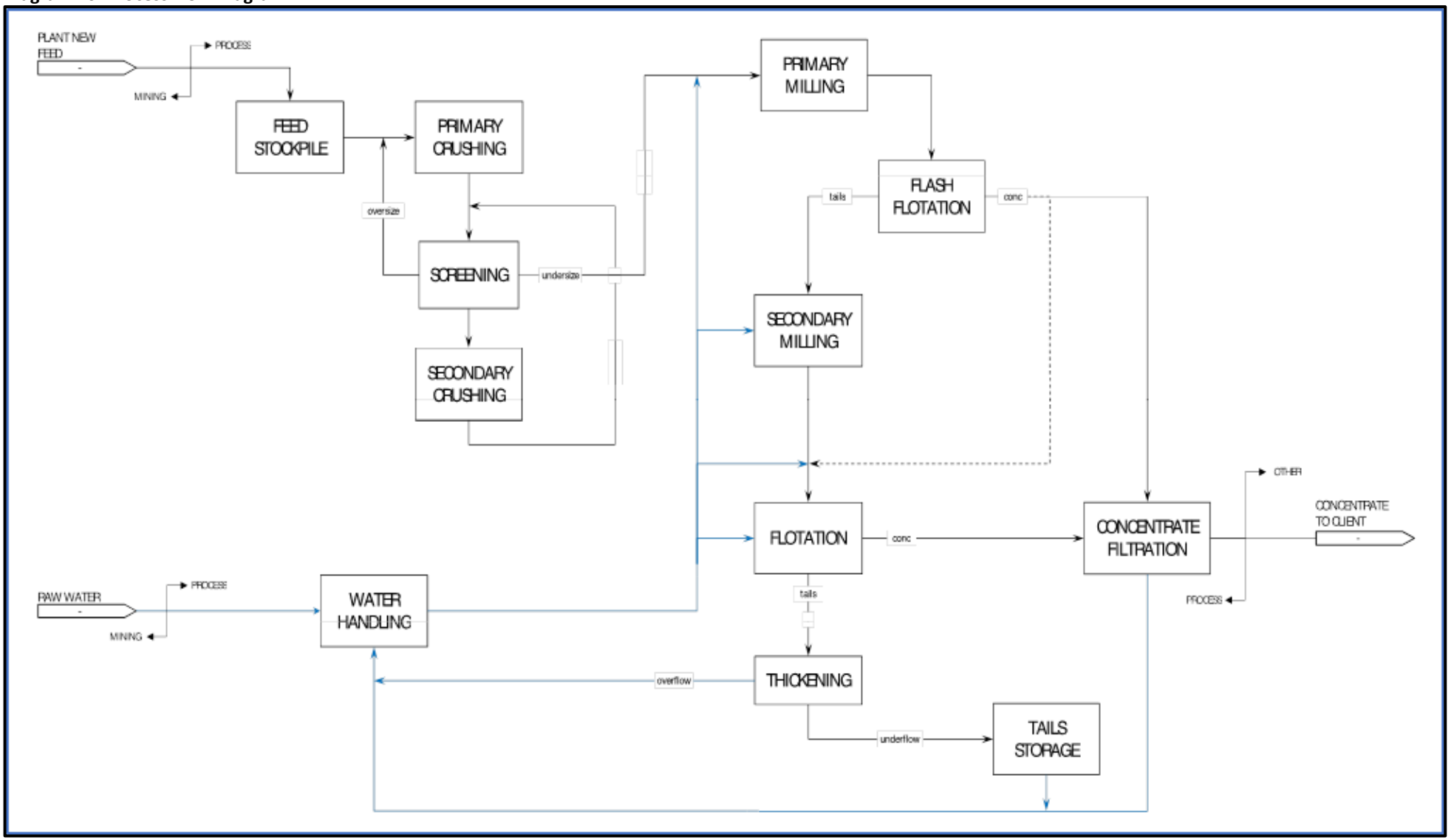


Diagram 20: Process Flow Diagram



3.3.11 Waste Rock Dumps

Waste dumps must be designed to meet minimum slope stability and safety standards and vegetated to reduce erosion and runoff. Examples of waste dump classifications are provided in Diagram 21 below.

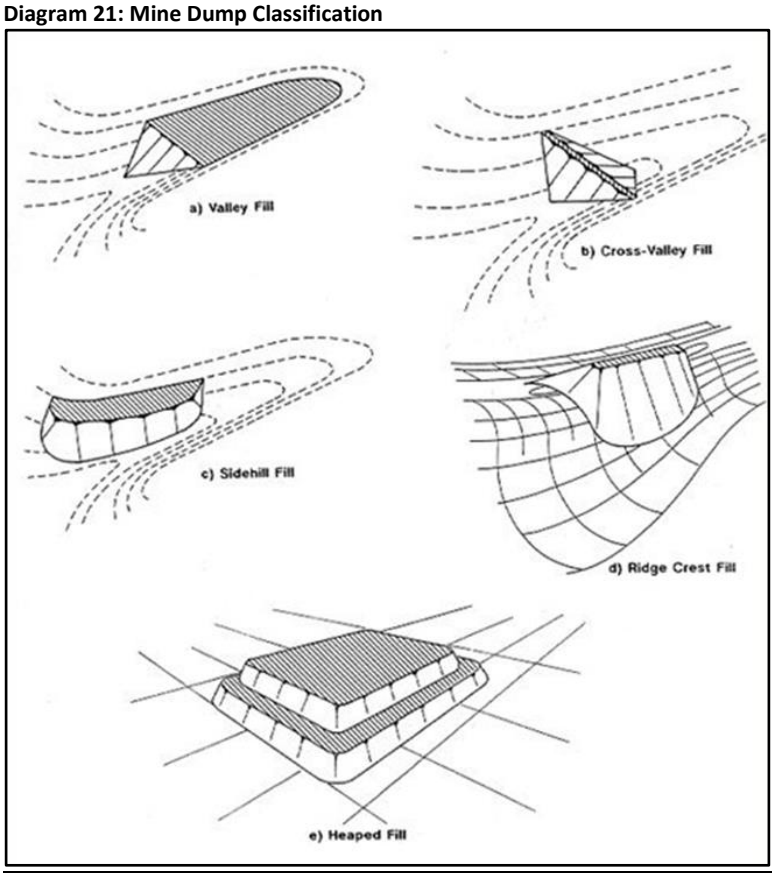
In mountainous terrain consisting of natural depressions along the slope and with the limited topsoil available, the best option for waste dumps is filling and levelling the top of these natural depressions "valley fill".

Waste dumps on the sides of kopjes "sidehill fill", which have large slopes will be terraced once the dump has reached its final profile at the top level, by dumping additional material along the sides at progressively lower levels, and developing these terraces at differing angles.

In the case of waste dumps in valleys "heaped fill" excavations are used with the final designed perimeter of the dump created to obtain cover material for the top of the dumps and profiling the slope of dumps. Dumping will proceed above surface on the top of this buried dump at successive tiers with an appropriate height of around 6 to 10m, leaving terraces of 6m wide and working from the perimeter toward the centre. This will allow for reclamation of the outside profiles at a much earlier stage, resulting in very little outstanding reclamation toward the end of the life of the dump.

A waste rock dump is incuded in the project design as shown on Diagram 5.1.1 above, and will be designed and managed as "valley fill" in the natural valley depression near Flat Mine North.

Diagram 21: Mine Dump Classification



3.4 Description of the activities to be undertaken

The project is divided into three phases as listed below:

- Construction: including the construction of infrastructure, mine or pit footprint, access ramps and haul roads, waste rock dump, residue and product stockpiles, handling areas, water storage and reticulation, stormwater management structures, and electrical connections to the existing substation in Nababeep with an 11kV line to the project site, detailed further in Section 3.4.1 below
- Operation: Mining below ground, processing activities, operation of the logistics, and all mining infrastructure detailed further in Section 3.4.2 below.
- Decommissioning and Closure: As detailed further in Section 3.4.3 below. This phase addresses the scaling down of activities ahead of temporary or permanent closure, cessation of mining or production, implementation of the rehabilitation programme, monitoring and maintenance for prescribed period after cessation of operations; and closure, including completion of rehabilitation goals, application for closure, transfer of liability to the State and agreed post-closure monitoring or maintenance.

The methodology and technology to be employed in each phase is described in detail in Section 3.3 above and summarised below:

3.4.1 Construction Phase: Development of infrastructure and logistics

The construction phase entails the development of the infrastructure and logistics, including the removal of vegetation and topsoil in preparation of development footprints:

- Erect **perimeter fences** for safety and security purposes, and to demarcate the project site. The total perimeter fence length has been measured at 5.21 km. The fence should have a total height of 2.4 m. The fully galvanised wire mesh fence should be 2.1m high with a razor mesh topping of 0.3m and spacing between stay and intermediate posts of 3m.

- Upgrade existing **access roads and develop new access roads**, with removal of vegetation and topsoil prior to construction. This will include upgrading of the existing gravel road for length 3.4km leading from the town of Nababeep in a northern direction to accommodate heavy equipment and two-way traffic. The portion of the access road from Flat Mine South will be upgraded to serve as main surface haul road (2.81km). The access/haul road length will be 6.23km long with an 8.9 m width to accommodate two-way traffic should allow for a trench and berm on each side of the road. A new haul road will be constructed between the waste rock dump and the main surface haul road (0.5Km) and another from between FME and the main surface haul road (1.54km). The widening of the road could impact on the adjacent watercourse which flows parallel to the road before crossing below the road and flowing in a westerly direction.

- Provide **electrical supply** to Project Area as there is currently no power supply to the Project Area. In order to establish power to the project site a number of off-site installations will be required.
  This will include: -
  - Construction of 1 x 66 (132) kV line bay at Nababeep Town (132KV) Substation (Refer to Diagram 5.1.1);
  - Construction of a 1 x 5.6 km 11kV squirrel line from Nababeep Town Substation (110/66KV) to SAFTA Project Intake Yard; and,
  - Substation ancillary services, control room building, protection equipment, metering equipment, and power network control and communication systems for the substations.

- Development of **water supply and water management infrastructure** to Project Area for all activities requiring water for processing and consumption; diverting stormwater and recycling. Water supply is an essential service as various steps in the mining and particularly the processing processes are heavily reliant on the usage of water. Refer to Diagrams 5, 5a, 5b, 5c and 5d.
  - Apart from the mining and process requirements, water will be required for potable use. The applicant has advised that there is potable water supply in the area, and a letter from the Municipality has been obtained that approves use of this potable water. Refer to the letter included in **Appendix B**.
  - The water sources for mine processing will be supplied from SME-VS1 to supply 60 KL/d during the 8 – 9 months construction period and 6 KL/d during operations; and NEM-MS can be utilised to supply 1 363 KL/d during the 10 or 15-year LoM. Water supply infrastructure will include all pipes and pumps to transport water from the NEM-MS located on Farm Nababeep 134, to the reservoir and water treatment plant located on the project site. The water pipeline from NEM-MS will be located within the same servitude as the 11kV powerline as far as possible.
  - Water columns, with a total length of 10.1km as well as 8 Lorentz ps4000 pumps, will be required in FMN and FMS for dewatering and fire suppression purposes.
  - The storage of water in the project area will be less than 50 000m³.
  - All dirty rainfall run-off, process plant discharge, treated sewage and grey water will be collected, stored, treated and recycled as far as possible.
  - Should an excess of water exist on the operation, all effluent from the site will be suitably treated. All clean rainfall run-off should be diverted from dirty and contaminated areas.
  - Trenches will be constructed to divert clean run-off, collect dirty run-off and route dirty water to suitable storage dams.
  - A surface collection dam will be constructed to store all dirty water from the mining area and a series of dams will also be constructed within the plant to store run-off and discharged process water.
  - FMS Collection dam is 0.15Ha.
  - FME Collection Dam is 0.2Ha.
  - Process water reservoir is 5600m²
  - Potable water reservoir is 5250m².
  - Settling dam at FMN is 6000m².
  - Temporary storage for stormwater control is 12500m²

- Development of **mine logistics**. The mine logistics will be the area from where the mining contractor and relevant technical services personnel will manage the mine. The site will cover an area of 20 800 m². The mine site will be enclosed by a security fence. Access to the site will be controlled by security personnel posted at the access gates to the site. The mine site will include offices, change houses, control room, first aid station, stores, waste handling area, explosive delivery area, earth moving vehicle and engineering workshops as well as an earth moving vehicle parking area, fuel storage facility and a wash bay. This area will be mainly constructed and established by the appointed mining contractor but services like water supply, power supply, water management and other services will be constructed by contractors appointed for the construction of the balance of infrastructure areas. The construction of the hydrocarbon storage area, explosives bay and storage room for hazardous chemicals will take place within the logistics footprint, comprising of:
  - Fuel storage area comprised of 2 tanks x 45m³ is 90m³.
  - Volume of hazardous chemicals with 3 month stock stored on site will not exceed 80m³:
    - Xanthate storage of 24.072m³;
    - Dow Frother is storage of 27.582m³.
  - Explosives capacity not provided but a 7 day supply is the normal volume for storage.

- Establishment of **Processing Plant Site** that will include the processing plant, a metallurgical and assay laboratory, offices, reagent storage facility and a workshop, located adjacent to the mine site with a development footprint of 26ha or 26000m² as shown on Diagram 5.1.1 and 5.1.2.

- Establishment of areas for **RoM stockpiles** (FMN; FME & FMS) and process plant feed at FMN, and mining portals as shown on the Diagram series.

- Establishment of area for **Waste Rock Dump**, near FMN with a footprint of approximately 2.8ha as shown on Diagram 5.1.1.

- Construction of Tailings Storage Facility (TSF) as shown in Diagram 5.5.1 and detailed further in the Conceptual Design as Diagram 5.5.2, referenced from the MRDSF Report (**Appendix E**).

3.4.2 Operational Phase

As detailed in Section 3.2.3 above, the **underground mining method** will be the "long-hole stoping method" which is a bulk mining method that provides good ore recovery and minimal dilution. It is an overhand, vertical stoping, utilising long-hole drilling and blasting carried out from sublevels to break the ore. Although the stopes are supported by long anchors, pillars are usually left between stopes and occasionally within stopes. The ore flows through the stope by gravity. Ore will then be extracted from the stope via the lower extraction drift using LHDs. The LHDs will then move the rock to either an orepass tipping point or into a re-muck bay and re-handle the material into a truck when one is available. The trucks will transport the ore to surface via the decline.

Long-hole open stoping is a highly mechanised mining method utilising a wide range of equipment for drilling and mucking. Typically production drilling is carried out by high-efficiency column and arm long-hole drills or down-the-hole ("DTH") drill rigs.

These systems use electric drive instead of hydraulic and have high pressure pneumatic DTH hammers or rotary percussion drilling systems. It is with recent gains in drilling technology that these systems have revolutionised long-hole stoping operations.

In the long-hole open stoping method access onto a level, from the decline, will be via an access cross cut. From the access cross cut ore access drives will be developed into the orebody from the footwall to the hangingwall. The mining block will be split into stopes with a horizontal span of 20 m and a vertical span of 30 m. The strike will be the length of the orebody width from the hangingwall to the footwall. Only one level will be in production at a time.

The **primary processing activities** include:

- Crushing and screening;
- Milling Circuit
- Reagent Make-up and conditioning
- Flotation circuit; and,
- Product Handling

As detailed above the Processing Plant is illustrated in the Plant Flowsheet (Diagram 20) and incorporates a conventional two stage crushing circuit with a primary jaw crusher followed by a secondary cone crusher in closed circuit with a vibrating screen. The primary mill discharge is pumped through a cyclone with the underflow passing through a flash flotation cell before gravitating to the secondary milling circuit. The cyclone overflow streams from the primary and secondary milling circuits form the feed to the flotation circuit. The flotation circuit comprises rougher,

cleaner and re-cleaner tank flotation cells. The rougher concentrate is pumped to the cleaner cells with that concentrate progressing to the re-cleaner stage. The tailings from each stage are returned to the previous stage with the rougher tailings passing through a scavenger stage. The re-cleaner concentrate is the final concentrate which is filtered to and stored prior to export. The scavenger tailings will be thickened to 60% solids before being pumped to the tailings dam. The concentrate, equating to 10% of the original plant feed mass, will be sold at the mine gate.

For the 35,000 t/m operation the feed to the plant will be a nominal 54t/h with a 1:1 water requirement, i.e. 1m³ of water required per tonne of ore treated. Roughly 50% of the water requirement will be provided by reticulated water within the plant.

The design philosophy is that the processing plant would initially be designed to treat 35,000 t/m. This will be known as Phase 1. At the beginning of Year 4, a parallel stream (Phase 2), treating a further 35kt/m will be commissioned bringing the total design throughput to 70kt/m. The life of the project, based on the current resource, would be 14 years. The plant should have a 90% availability and operate on a 24 hour/day basis with 3 operational shifts and a relief shift. The plant will not be fully automated but there will be sufficient instrumentation to ensure a stable operation and allow for reliable metallurgical accounting.

Other operational activities include:

- Transporting waste rock to the waste rock dump site, and managing the profiling of the slope angle.
- Operating the RoM stockpiles, which will have an expected footprint of :
  - Phase 1 FMN RoM Stockpile is 4,250m².
  - Phase 2 FMN RoM Stockpile is 7,200m².
  - FMS RoM stockpile is 1Ha
  - FME RoM Stockpile is 1.26Ha
- Usage of all facilities and amenities associated with the mine logistics.

3.4.3 Decommissioning Phase

Planning for closure and restoration from the beginning of an operation makes the process easier; waste can be removed as it is created, excavation can be planned so that topography restoration is less complicated, and topsoil soil can be re-used at shorter intervals. Site rehabilitation can make the land more valuable and attractive for resale. Additionally, establishing a closure strategy (and communicating that activity to the public) can help enhance the company's reputation as a socially-responsible operation. The decommissioning and closure phase at the end of the life of the mine will consist of implementing the final rehabilitation, decommissioning and closure plan, which will be included in the EIA Phase of the project.

As included in Section 3.3.11 above, activities undertaken during this final project phase include:

- Removal of all structures and infrastructure not to be retained by the landowner in terms of section 44 of the MPRDA.
- All fixed assets that can be profitably removed will be removed for salvage or resale.
- Any item that has no salvage value to the mine, but could be of value to individuals, will be sold and the remaining treated as waste and removed from site.
- All structures will be demolished and terracing and foundations removed to the lesser of 500 mm below the original ground level.
- Inert waste, which is more than 500 mm underground, such as pipes, will be left in place
- A hazardous disposal site will not be constructed and all hazardous waste will be removed from site and transported to the nearest licensed facility.
- All services related to the mining operation, water supply lines and storage on site will be demolished.
- Existing tracks will be used and no new roads will be developed.
- It is assumed that the post-mining pit stability and waste dump profile will be addressed as part of the operation and necessary remedial actions implemented prior to closure.
- Diversion of drainage channels due to historic waste dumps or agricultural practices will not be reinstated but mitigation to prevent damming of water will be implemented as part of annual rehabilitation.
- The FRD and development areas will not exceed the planned footprint.

Recommendations for the decommissioning, closure and rehabilitation of the residue stockpile are provided in the MRDSF Specialist Report prepared in accordance with the "Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation" in GNR 632 of 24 July 2015 (in GG No. 39020), attached as **Appendix E**.

The following sections provide a guideline as to the proposed closure, rehabilitation, and aftercare of the MRSDF (Section 15: **Appendix E**).

CLOSURE ACTIVITIES AT CESSATION OF OPERATIONS

At the cessation of operation of the TSF, the focus will be on the cover and vegetation of the top surface and side slopes of the facility, the decommissioning of facilities associated with the TSF and the construction of storm water control measures as required. Specific activities that will be carried out will include:

- The dismantling and removal from site of all pipes and supports associated with the slurry delivery and return water systems;
- The plugging of penstock inlets;
- The construction of storm water decant points from the TSF basin. The decant points will be located so as to control the rate of decant from the basin and will be constructed along the up-gradient side of the facility to minimize the flow velocities associated with the decanting process. The spillways will be designed to accommodate the peak design flows from the facility area and will be rock and/or concrete lined;
- The stripping of sufficient soil from the footprint of the facility to enable the placement of a soil cover to the outer slopes and cover layer on top of the TSF;
- The placement of a mixture of soils and selected waste materials to the outer slopes of the impoundment and top of the TSF wall in preparation for the establishment of vegetation;
- The supply and hand planting of vegetation to the outer slopes of the impoundment wall and top of the TSF to assist in the prevention of erosion;
- The aftercare and maintenance of the cover layers and vegetation; and
- Minor earthworks to drains, roads, trenches, etc.

The duration of the final closure process may be affected by the length of time required for the basin of the facility to dry sufficiently to enable the placement of cover material in preparation for the vegetation establishment.

The nature of the available soils likely to be stripped from the footprint of the TSF requires that they are protected against erosion. This will be done by a combination of mixing with selected waste material and the establishment of vegetation to the cover. The mixing of soil with material of a gravel/rocky nature has been found to be effective in improving the erosion resistance of cover layers to sloped areas. The establishment of vegetation to the side slopes of the facility could be done by hand planting, seeding or hydro-seeding and should comprise a mixture of grass, shrubs and trees. The most effective method of covering and vegetation establishment will be arrived at during the operational life of the facility by a process of trial and error. The vegetation used in the establishment of the vegetative cover will all be indigenous and should not require irrigation.

AFTERCARE AND MAINTENANCE REQUIREMENTS

On completion of the final rehabilitation and closure works, an aftercare and maintenance program will be required to assist in ensuring that the closure measures are robust, have performed adequately and that no further liabilities arise. The aftercare period is normally not less than 5 years but can extend into decades depending on the physical and chemical characteristics of the facility. The aftercare and maintenance program for SAFTA is expected to include:

- Periodic inspection of the cover and vegetation for signs of erosion damage and failures of the vegetation establishment process;
- Repairs and amendments to the closure works as necessary;
- Re-planting of areas of vegetation where required;
- Periodic inspection and monitoring to confirm the effectiveness of the closure works in achieving the stated closure objectives, including:
  - Collection and analysis of ground and surface water samples;
  - Measuring of phreatic surfaces within the TSF and assessment of the overall structural stability of the facility; and,
  - Inspections of storm water decant facilities for signs of damage.

No allowance has been made for the treatment of water that will need to be discharged into the environment from the MRDF after closure. This water could be released through the TSF drain outlets, which is gravitated to the RWD and SWD from where it may be collected.

The maintenance requirements for the facility should decrease with time and should be confined to minor earthworks to repair erosion damage and upgrade facilities as required, as well as re-planting of areas of vegetation damaged due to erosion.

4 POLICY AND LEGISLATIVE CONTEXT

4.1 Table of Applicable Legislation and Guidelines

Table 8: Applicable Legislation and Guidelines

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT.
Constitution of South Africa, specifically everyone has a right; a. to an environment that is not harmful to their health or wellbeing; and b. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that: i. prevents pollution and ecological degradation; ii. promote conservation; and iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.	Mining Right activities	The mining right activities shall be conducted in such a manner that significant environmental impacts are avoided, where significant impacts cannot all together avoided be minimised and mitigated in order to protect the environmental right of South Africans.
Minerals and Petroleum Resources Development Act (No 28 of 2002) [MPRDA] Section 24 (as amended) **MPRDA Regulations as amended by GNR349 of 18 April 2011.**	Application to the DMR for a mining right in terms of Section 22.	The conditions and requirements attached to the granting of the Mining Right will apply to the mining activities. DMR is the Competent Authority (CA) for this NEMA and NEM:WA application.
National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]	Application to the DMR for Environmental Authorisation in terms of the 2014 EIA Regulations as amended by the 2017 EIA Regulations. Refer to Table 1.	An Application for Environmental Authorisation must be submitted to DMR for an Environmental Authorisation (EA). The listed activities in Table 1 that are triggered determine the Environmental Authorisation (EA) application process to be followed. The appropriate EA will be obtained before proceeding with any mining activities in terms of the mining right application. The compilation of this Draft EIR and the Public Participation Process is required in terms of NEMA.
National Environmental Management: Waste Act, (Act 59 of 2008) [NEMWA] (as amended) **Waste listed activities in GNR 921 (dated 29/11/ 2013)** **Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation in GNR 632 of 24 July 2015.** **GNR 633 (dated 24/07/2015):** **Category B (15): Residue stockpiles or residue deposits**	Refer to Table 9 for the listed waste activities. The **Conceptual Design for the Mine Residue Disposal Storage Facility** for the SAFTA Copper Project is attached at **Appendix E.** • The "Tailings Geochemistry and Waste Classification Report" for the mine tailings is included in this **Appendix E** as Appendix 1. • The "Hydrogeological	The listed activities that are triggered determine the Environmental Authorisation (EA) application process to be followed. The Application for Environmental Authorization has included these waste listed activities as shown in Table 9 below. The Conceptual Design of the MRDSF (**Appendix E**) ensures compliance with GNR 632, and is a listed activity included in GNR 633. Mitigation measures are included in Table 14, in the EMPr; Impact Tables in **Appendix F**, and Closure Plan attached at **Appendix G**.

	Assessment" is included as Appendix 2 in **Appendix E**. • The "High Level Seepage and Slope Stability Assessment" is included as Appendix 3 in **Appendix E**. • The "Flood Peak Rational Method Determination" is included as Appendix 4 in **Appendix E**. • The "Information Drawings" are included as Appendix 5 in **Appendix E**. • The "Bill of Quantities" is included as Appendix 6 in **Appendix E**.	
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) [NEMBA] National list of ecosystems that are threatened and in need of protection, 2011 (in GN 1002 dated 2 December 2011)	Section 8.1.8 & 8.1.9. Figures 2, 3 & 4.	There are no listed Critically Endangered, Endangered or Vulnerable ecosystems on site. The site is located within in an Ecological Support Area (ESA) and not within a River FEPA sub-catchment.
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) [NEMBA] Alien and Invasive Species List, 2016 (in GN No. 864 dated 29 July 2016)	Section 8.1.6	Alien invasive vegetation management is included in the EMPr.
National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004). National Dust Control Regulations in GN R827 of 1 November 2013	Section 8.1.10	Dust control measures are included in the EMPr
National Heritage Resources Act, 1999 (Act No. 25 of 1999)	Section 8.1.12 A Heritage Impact Assessment and a Palaeontological Report has been prepared and is attached at **Appendix C1** and **Appendix C2** respectively.	Mitigation measures are included in the Impact Tables (**Appendix F**), the EMPr, and Closure Plan (**Appendix G**). SAHRA submitted interim Comments (dated 08/01/2019) included in **Appendix B**, and will provide further comments on receipt of the DEIR.
National Water Act, 36 (Act 36 of 1998) **Government Notice 704 (dated 4 June 1999) and associated "Guideline Document for the Implementation of Regulations on use of water for mining and related activities aimed at the protection of water resources" (DWAF 2nd Ed.; May 2000)**	Section 8.1.8 for description of water resources in local area, and Figures 3.1 and 3.2. The Baseline Water Report prepared to inform the prospecting phase is attached at **Appendix D.** The Conceptual Design for the Mine Residue Disposal Storage Facility for the SAFTA Copper Project is attached at **Appendix E.** • The Hydrogeological Assessment is	A site visit with DWS will confirm the listed activities requiring a Water Use License. In terms of the National Water Act, the following water uses are likely to be identified: (a) Taking water from a water resource; (b) Storing water; (c) Impeding or diverting the flow of water in a watercourse; (f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit; (g) Disposing of waste in a manner which may detrimentally impact on a water resource; (h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process; (i) Altering the bed, banks, course or

	included as Appendix 2 in **Appendix E**.	characteristics of a watercourse; (j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people. The proposed mining activities require a water use license for a number of listed water uses. An Integrated Water Use License Application (IWULA) will be applied for.
Hazardous Substances Act (Act No. 15 of 1973)	Storage and control of hazardous substances to be included in EMPr.	The objective of the Act is to provide for the control of substances which may cause injury or ill health to or death of human beings due to their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure. In terms of the Act, substances are divided into schedules, based on their relative degree of toxicity and the Act provides for the control of importation, manufacture, sale, use, operation, application, modification, disposal and dumping of substances in each schedule. The reagent chemicals to be used in the mineral processing plant, as well as chemicals typically found in petroleum products (for example) benzene, are regulated in terms of this Act. The processing plant, chemical storage area, proposed fuel storage facility and refueling bay, with all appropriate controls in place, will not conflict with the Act. The EMPr provides mitigation measures in this regard.
Mine Health and Safety Act, 1996 (Act No. 29 of 1996) (MHSA)	Safety precautions to be taken into account by Project Team in design of Mine.	The objective of the Act is to cover all aspects relating to health and safety of employees and other persons on the mine property. The Act places the responsibility on the mine owner for ensuring that the mine is designed, constructed and equipped in a manner which allows for a safe and healthy working environment.
Promotion of Administrative Justice Act, 2000 (Act 3 of 2000) [PAJA]	Decision by the Competent Authority	Gives effect to section 33 of the Constitution that requires that "Everyone has the right to administrative action that is lawful, reasonable and procedurally fair". All administrative actions must be based on the relevant considerations
Land Use Planning Act, 2014 (Act 3 of 2014) (LUPA)	Comments required from the Nama Khoi Local Municipality.	Consent use in terms of the Municipal Planning By-Law, 2015 is required to permit mining on properties that are zoned for Agricultural purposes.
Municipal Plans and Policies		
Nama Khoi Local Municipality Integrated Development Plan (Draft IDP 2018-2019)	Section 5.3	The Need & Desirability of the project is referenced in terms of the Nama Khoi Local Municipality IDP, specifically relating to enhancing the mining potential of the local municipality, employment creation, rehabilitation of mining areas, and adaption to climate change and sustainable resource utilisation. Relevant mitigation measures will be included in the EMPr.
Namakwa District Municipality (Draft IDP 2017 2018)	Section 5.4	The Need & Desirability of the project is referenced in terms of the District Municipality IDP, specifically relating to employment creation, and ensuring the implementation of environmentally sustainable practices, along with an integrated approach to addressing climate change

		response, which will be included in the EMPr
Northern Cape Provincial Spatial Development Framework (NCPSDF)	Section 5.5	Sustainable development is a key consideration as addressed in this impact assessment report.
Northern Cape Provincial Growth and Development Strategy 2004-2014 (NCPGDS)	Section 5.6	Sustainable development is a key consideration as addressed in this impact assessment report.
Standards, Guidelines and Spatial Tools		
Mining and Biodiversity Guideline: 2013 Mainstreaming biodiversity into the mining sector. Pretoria.	Section 5.1 & 8.1.9 & Figure 5	The mitigation measures to address and mitigate the potential impacts of the mining will be included in the EMPr.
DEA Guideline on Need & Desirability (2017)	Section 5.9	Refer to Section 5.9
DEA Guideline on PPP DMR Guideline on Consultation with Communities and I&APs (undated)	Section 7, Table 8 & **Appendix B**.	Refer to Section 7 & Table 13 and **Appendix B.**
DEAT Integrated Environmental Management Information Series 5: Impact Significance (2002)	Section 8	Refer to Impact Tables (Appendix F).
DEAT Integrated Environmental Management Information Series 7: Cumulative Effects Assessment (2004)	Section 8	Refer to Impact Tables (**Appendix F**).
SANBI BGIS databases (www.bgis.sanbi.org)	Baseline environmental description and Figures 1 to 5	Used during desktop research to identify sensitive environments within the mining permit area.
SANS 1929:2005 Edition 1.1 – Ambient Air Quality Limits for Common Pollutants	Management and monitoring measures	Standard for dust fallout. Dust mitigation measures are included in the EMPr.

4.2 Listed Activities

Table 9: Listed and Specified Activities

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE	WASTE MANAGEMENT AUTHORISATION
Application for Mining Right	1214 Ha	**X**	**GNR 984 (dated 8/12/2014) LN2 Activity 17, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 17:** Any activity including the operation of that activity which requires a mining right as contemplated in S22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including - (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing.	**X** **See below for specific activities.**
1. POST-APPROVAL ACTIVITIES				
1.1. Demarcate mining areas as defined in Mine Plan and EMPr.	Refer to 2.2 below	**NA**	**NA**	**NA**
2. ESTABLISHMENT / CONSTRUCTION ACTIVITIES				
2.1. Conduct Environmental Induction training to staff	All staff members	**NA**	**NA**	**NA**
2.2 Safety & Security	Using fences as demarcation system. The total perimeter fence length has been measured at 5.21 km. The fence should have a total height of 2.4 m. The fully galvanised wire mesh fence should be 2.1 m high with a razor mesh topping of 0.3 m and spacing between stay and intermediate posts of 3m. • Footprint of fence posts included in calculation of total area of mine infrastructure (113Ha), including areas of vegetation to be cleared and topsoil to be stockpiled.	**X**	**GNR 983 (dated 8/12/ 2014) LN1 Activity 28, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 28:** Commercial or industrial developments where such land was used for agriculture on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. **GNR 984 (dated 8/12/2014) LN2 Activity 15, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 15:** The clearance of an area of 20 ha or more indigenous vegetation, excluding for linear activity. **GNR 985 (dated 8/12/2014) LN3 Activity 12, as amended by GNR 324 (dated 7/04/2017) LN3 Activity 12(g) iv.[1]:** The clearance of an area of 300 square metres or more of indigenous vegetation (g) in the Northern Cape iv. on land where at the time of coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	

[1] Status of land's zoning to be determined. Only applies if zoning is Open Space, conservation or equivalent zoning.

2.3 Upgrade existing access roads and develop new access roads, with removal of vegetation and topsoil prior to construction.	Upgrading of existing gravel road for length 3.4km leading from the town of Nababeep in a northern direction to accommodate heavy equipment and two-way traffic. The portion of the access road from Flat Mine South will be upgraded to serve as main surface haul road (2.81km). The access/haul road length will be 6.23km long with an 8.9 m width to accommodate two-way traffic should allow for a trench and berm on each side of the road. A new haul road will be constructed between the waste rock dump and the main surface haul road (0.5Km) and another from between FME and the main surface haul road (1.54km).	**X**	**GNR 983 (dated 8/12/2014) LN1 Activity 12, as amended by GNR 327 (dated 7/04/2017), LN1 Activity 12:** The development of (ii) infrastructure or structures with a physical footprint of 100m² or more (a) within a watercourse (c) within 32 metres of a watercourse measured from the edge of the watercourse • Applicable to the upgrading of the existing gravel road and river crossing within a watercourse and within 32 m of a watercourse outside an urban area where no road reserve exists. **GNR 983 (dated 8/12/2014) LN1 Activity 19, as amended by GNR 327 (dated 7/04/2017), LN1 Activity 19:** The infilling or depositing of any material of more than 10m³ into or removal or moving of soil, sand or rock of 10m³ or more from a watercourse. • Applicable to the upgrading of the existing gravel road and river crossing within a watercourse. **GNR 983 (dated 8/12/2014) LN1 Activity 24, as amended by GNR 327 (dated 7/04/2017), LN1 Activity 24:** The development of a road (ii) where no reserve exists is wider than 8 metres and longer than 1km outside an urban area. • Applicable to the section of new haul road **GNR 983 (dated 8/12/2014) LN1 Activity 48, as amended by GNR 327 (dated 7/04/2017), LN1 Activity 48:** The expansion of (i) infrastructure where the physical footprint is expanded by 100m² or more where such expansion occurs - (a) within a watercourse; and (c) within 32 metres of a watercourse. • Applicable to the upgrading of the existing road and creation of trench and berm on each side that will be constructed adjacent to the existing road and not inside a road reserve outside an urban area, within a watercourse and within 32m of a watercourse. **GNR 985 (dated 8/12/2014) LN3 Activity 18, as amended by GNR 324 (dated 7/04/2017), LN3 Activity 18:** The widening of a road by more than 4 metres (g) Northern Cape ii. Outside urban areas (ii) within a watercourse or within 100 metres from the edge of a watercourse • Applicable to the upgrading of the existing road and creation of a trench and berm on each side that will be constructed adjacent to the existing road	**No**

2.4 Provide electrical supply to Project Area, with removal of vegetation and topsoil prior to construction where relevant.	Currently no power supply exists to the Project Area. In order to establish power to the project site a number of off-site installations will be required. This will include: - • Construction of 1 x 66 (132) kV line bay at Nababeep Town (132KV) Substation; • Construction of a 1 x 5.6 km 11kV squirrel line from Nababeep Town Substation (110/66KV) to SAFTA Project Intake Yard; and • Substation ancillary services, control room building, protection equipment, metering equipment, and power network control and communication systems for the substations. **The electrical supply infrastructure is included in the mine logistics component described in section 2.5 below, which has a total footprint of 20,800 m².** The off-site power supply infrastructure designs will be done on a maximum demand of 4.54 MVA to the Project Area during the 35 ktpm first phase, which will be increased to 6.4 MVA once production increases to 70 ktpm as determined by a load summary.	X	**GNR 984 (dated 8/12/2014) LN2 Activity 15, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 15:** The clearance of an area of 20 ha or more indigenous vegetation, excluding for linear activity. • Applicable to the footprint of the SAFTA intake yard, which is included in the total area of 20 hectares or more of vegetation that will need to be cleared for the Mining Right Application.	**NA**

2.5 Development of water supply and water management infrastructure to Project Area for all activities requiring water for processing and consumption; diverting stormwater and recycling, including removal of vegetation and topsoil prior to construction where relevant. .	Water supply is an essential service as various steps in the mining and particularly the **processing processes** are heavily reliant on the usage of water. Apart from the mining and process requirements, water will also be required for use as **potable water**. The water sources on the Project Area will be **supplied by a vent raise 1.6 km from the decline near Flat Mine South**. Water will be pumped from the vent to a **reservoir** using a total of 8.9 km of piping. **Major infrastructure will include all pipes and pumps to transport water from the raise to the reservoir.** Water columns, with a total length of 10.1km as well as 8 Lorentz ps4000 pumps, will be required in FMN and FMS for **dewatering and fire suppression purposes**. The **storage of water** in the project area will be less than 50 000m³. All dirty rainfall run-off, process plant discharge, treated sewage and grey water will be **collected, stored, treated and recycled** as far as possible. Should an excess of water exist on the operation, all **effluent** from the site will be suitably treated. All **clean rainfall run-off should be diverted** from dirty and contaminated areas. **Trenches** will be constructed to divert clean run-off, collect dirty run-off and route dirty water to suitable storage dams. A **surface collection dam** will be constructed to store all dirty water from the mining area and a series of dams will also be constructed within the plant to store run-off and discharged process water. • FMS Collection dam is 0.15Ha. • FME Collection Dam is 0.2Ha. • Process water reservoir is 5600m² • Potable water reservoir is 5250m². • Settling dam at FMN is 6000m². • Temporary storage for stormwater control is 12500m²	**X**	**GNR 983 (dated 8/12/ 2014) LN1 Activity 12, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 12:** The development of – (ii) Infrastructure with a physical footprint of 100m² or more (a) within a watercourse; (c) or, if no development setback exits, within 32m of a watercourse, measured from the edge of the watercourse – excluding located in an urban area or in road reserve. • Pipeline infrastructure crosses the watercourse and is located within 32m of the watercourse. • The stormwater diversion berm near FMN is located within a watercourse and within 32m of watercourse. • The access road upgrading will take place within 32 m of a watercourse adjacent to the road where no road reserve exists. • All infrastructure is outside an urban area. **GNR 983 (dated 8/12/ 2014) LN1 Activity 19, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 19:** The infilling or depositing of any material of more than 10m³ into or removal of soil, sand or rock of more than 10m³ from a watercourse • The diversion berm near FMN is located within watercourse and 32m of a watercourse. Some sections of road upgrade are within 32m of a water course. • Pipeline infrastructure crosses the watercourse and is located within 32m of the watercourse. **GNR 983 (dated 8/12/ 2014) LN1 Activity 28, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 28:** Commercial or industrial developments where such land was used for agriculture on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. • The combined water infrastructure footprint contributes to the total area to be developed being greater than 1 hectare.	

2.5 Development of water supply and water management infrastructure to Project Area for all activities requiring water for processing and consumption; diverting stormwater and recycling, including removal of vegetation and topsoil prior to construction where relevant (continued).			**GNR 983 (dated 8/12/ 2014) LN1 Activity 48, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 48:** The expansion of (i) infrastructure where the physical footprint is expanded by 100m² or more where such expansion occurs (a) within a watercourse; (c) if no setback exists, within 32 metres of a watercourse. • The upgrading of the existing road and creation of trenches and berms for stormwater management on each side will occur adjacent to the existing road and not inside a road reserve outside an urban area, within a watercourse and within 32m of a watercourse. **GNR 984 (dated 8/12/2014) LN2 Activity 15, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 15:** The clearance of an area of 20 ha or more indigenous vegetation, excluding for linear activity. • The footprint of all the water and waste water infrastructure is included in the total area of 20 hectares or more of vegetation that will need to be cleared. **GNR 985 (dated 8/12/2014) LN3 Activity 12, as amended by GNR 324 (dated 7/04/2017) LN3 Activity 12(g) iv. [2]:** The clearance of an area of 300 square metres or more of indigenous vegetation (g) in the Northern Cape iv. on land where at the time of coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning. • The combined footprint of the water and waste water infrastructure exceeds 300m².	

[2] Status of land's zoning to be determined. Only applies if zoning is Open Space, conservation or equivalent zoning.

2.6 Development of mine logistics, including removal of vegetation and topsoil prior to construction where relevant.	The mine logistics will be the area from where the mining contractor and relevant technical services personnel will manage the mine. **The site will cover an area of 20 800 m²**. The mine site will be enclosed by a security fence. Access to the site will be controlled by security personnel posted at the access gates to the site. The mine site will include offices, change houses, control room, first aid station, stores, waste handling area, explosive delivery area, earth moving vehicle and engineering workshops as well as an earth moving vehicle parking area, fuel storage facility and a wash bay. This area will be mainly constructed and established by the appointed mining contractor but services like water supply, power supply, water management and other services will be constructed by contractors appointed for the construction of the balance of infrastructure areas. • Fuel storage area comprised of 2 tanks x 45m³ is 90m³. • Volume of hazardous chemicals with 3 month stock stored on site will not exceed 80m³: Xanthate storage of 24.072m³; Dow Frother is storage of 27.582m³. • Explosives capacity not provided but a 7 day supply is the normal volume for storage.	**X**	**GNR 983 (dated 8/12/2014) LN1 Activity 14, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 14:** The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. **GNR 983 (dated 8/12/ 2014) LN1 Activity 28, as amended by GNR 327 (dated 7/04/2017) LN1Activity 28:** Commercial or industrial developments where such land was used for agriculture on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. **GNR 984 (dated 8/12/2014) LN2 Activity 15, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 15:** The clearance of an area of 20 ha or more indigenous vegetation, excluding for linear activity. **GNR 985 (dated 8/12/2014) LN3 Activity 12, as amended by GNR 324 (dated 7/04/2017) LN3 Activity 12(g) iv.[3]:** The clearance of an area of 300 square metres or more of indigenous vegetation (g) in the Northern Cape iv. on land where at the time of coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	**NA**
2.7 Construction of Hydrocarbon storage area, explosives bay and storage room for hazardous chemicals within logistics footprint, including removal of vegetation and topsoil prior to construction where relevant. (See 2.6 above).	• Fuel storage area comprised of 2 tanks x 45m³ is 90m³. • Volume of hazardous chemicals with 3 month stock stored on site will not exceed 80m³: Xanthate storage of 24.072m³; Dow Frother is storage of 27.582m³. • Explosives capacity not provided but a 7 day supply is the normal volume for storage.	**X**	**GNR 983 (dated 8/12/2014) LN1 Activity 14, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 14:** The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	**NA**

[3] Status of land's zoning to be determined. Only applies if zoning is Open Space, conservation or equivalent zoning.

2.8 Establishment of Processing Plant Site including removal of vegetation and topsoil prior to construction where relevant. The processing plant site will include the processing plant, a metallurgical and assay laboratory, offices, reagent storage facility and a workshop.	The Processing Plant Site will be 130 m x 200 m and will be located adjacent to the Mine site. Footprint is 26ha or 26000m².	**X**	**GNR 983 (dated 8/12/ 2014) LN1 Activity 28, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 28:** Commercial or industrial developments where such land was used for agriculture on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. **GNR 984 (dated 8/12/2014) LN2 Activity 15, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 15:** The clearance of an area of 20 ha or more indigenous vegetation, excluding for linear activity. **GNR 985 (dated 8/12/2014) LN3 Activity 12, as amended by GNR 324 (dated 7/04/2017) LN3 Activity 12(g) iv.[4]:** The clearance of an area of 300 square metres or more of indigenous vegetation (g) in the Northern Cape iv. on land where at the time of coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	**NA**
2.9 Establishment of areas for RoM stockpiles (FMN; FME & FMS) and process plant feed at FMN, and mining portals, including removal of vegetation and topsoil prior to construction where relevant.	• Phase 1 FMN RoM Stockpile is 4,250m². • Phase 2 FMN RoM Stockpile is 7,200m². • FMS RoM stockpile is 1Ha • FME RoM Stockpile is 1.26Ha		**GNR 983 (dated 8/12/ 2014) LN1 Activity 28, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 28:** Commercial or industrial developments where such land was used for agriculture on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. **GNR 984 (dated 8/12/2014) LN2 Activity 15, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 15:** The clearance of an area of 20 ha or more indigenous vegetation, excluding for linear activity. **GNR 985 (dated 8/12/2014) LN3 Activity 12, as amended by GNR 324 (dated 7/04/2017) LN3 Activity 12(g) iv.[5]:** The clearance of an area of 300 square metres or more of indigenous vegetation (g) in the Northern Cape iv. on land where at the time of coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	**NA**

[4] Status of land's zoning to be determined. Only applies if zoning is Open Space, conservation or equivalent zoning.
[5] Status of land's zoning to be determined. Only applies if zoning is Open Space, conservation or equivalent zoning.

2.10 Establishment of area for Waste Rock Dump including removal of vegetation and topsoil prior to construction where relevant.	• The footprint of the waste rock dump is approximately 2.8Ha	**X**	**GNR 983 (dated 8/12/ 2014) LN1 Activity 28, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 28:** Commercial or industrial developments where such land was used for agriculture on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. **GNR 984 (dated 8/12/2014) LN2 Activity 15, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 15:** The clearance of an area of 20 ha or more indigenous vegetation, excluding for linear activity. • The total footprint of the area required for infrastructure, etc. is 113Ha **GNR 985 (dated 8/12/2014) LN3 Activity 12, as amended by GNR 324 (dated 7/04/2017) LN3 Activity 12(g) iv.[6]:** The clearance of an area of 300 square metres or more of indigenous vegetation (g) in the Northern Cape iv. on land where at the time of coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	**X** **GNR 921 (dated 29/11/ 2013) Category B: Disposal of waste on land** (8) The disposal of general waste to land covering an area in excess of 200m^2 and with a total capacity exceeding 25 000 tons. *General waste includes insert waste, as defined in the NEM:WA; Act 59 of 2008, as amended.* **GNR 921 (dated 29/11/ 2013) Category B: Disposal of waste on land** (9) The disposal of inert waste to land in excess of 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorized by or under other legislation. *Inert waste as defined in the NEM:WA; Act 59 of 2008, as amended.*

[6] Status of land's zoning to be determined. Only applies if zoning is Open Space, conservation or equivalent zoning.

2.11 Construction of Tailings Storage Facility (TSF) or Fine Residue Dam (FRD), including removal of vegetation and topsoil prior to construction where relevant.	• The Fine Residue Dam is Approx. 25.5 Ha. • The FRD Collection Pond is 2.97Ha.	**X**	**GNR 983 (dated 8/12/ 2014) LN1 Activity 12, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 12:** The development of – (ii) Infrastructure with a physical footprint of 100m² or more (a) within a watercourse; (c) or, if no development setback exits, within 32m of a watercourse, measured from the edge of the watercourse – excluding located in an urban area or in road reserve. • The Fine Residue Dam (FRD) and FRD Collection Pond of 2.97 Ha are located within drainage lines and within 32 m of watercourses. **GNR 983 (dated 8/12/ 2014) LN1 Activity 19, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 19:** The infilling or depositing of any material of more than 10m³ into or removal of soil, sand or rock of more than 10m³ from a watercourse • The Fine Residue Dam (22.8ha of which 12.8 ha is undisturbed) is located within drainage lines and the FRD Collection Pond 2.97Ha in size is located within 32m of the watercourse. **GNR 984 (dated 8/12/2014) LN2 Activity 15, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 15:** The clearance of an area of 20 ha or more indigenous vegetation, excluding for linear activity. • The footprint of all the water and waste water infrastructure is included in the total area of 20 hectares or more of vegetation that will need to be cleared. **GNR 985 (dated 8/12/2014) LN3 Activity 12, as amended by GNR 324 (dated 7/04/2017) LN3 Activity 12(g) iv.[7]:** The clearance of an area of 300 square metres or more of indigenous vegetation (g) in the Northern Cape iv. on land where at the time of coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	**X** **GNR 921 (dated 29/11/ 2013) Category B: Disposal of waste on land** (7) the disposal of any quantity of hazardous waste to land **GNR 921 (dated 29/11/ 2013) Category B: Construction of facilities and associated structures and infrastructure** (10) The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity). **GNR 632 (dated 24/07/2015): Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits from a Prospecting, Mining, Exploration or Production Operation** • The Fine Residue Dam has a footprint of 22.8 Hectares. **GNR 633 (dated 24/07/2015): Category B: Residue stockpiles or residue deposits** (11) The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the MRPDA (28 of 2002) • The Fine Residue Dam has a footprint of 22.8 Hectares.

[7] Status of land's zoning to be determined. Only applies if zoning is Open Space, conservation or equivalent zoning.

2.11 Construction of Tailings Storage Facility (TSF) or Fine Residue Dam (FRD), including removal of vegetation and topsoil prior to construction where relevant.	• The Fine Residue Dam is Approx. 25.5 Ha. • The FRD Collection Pond is 2.97Ha.	**X**	**GNR 983 (dated 8/12/ 2014) LN1 Activity 12, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 12:** The development of – (ii) Infrastructure with a physical footprint of 100m² or more (a) within a watercourse; (c) or, if no development setback exits, within 32m of a watercourse, measured from the edge of the watercourse – excluding located in an urban area or in road reserve. • The Fine Residue Dam (FRD) and FRD Collection Pond of 2.97 Ha are located within drainage lines and within 32 m of watercourses. **GNR 983 (dated 8/12/ 2014) LN1 Activity 19, as amended by GNR 327 (dated 7/04/2017) LN1 Activity 19:** The infilling or depositing of any material of more than 10m³ into or removal of soil, sand or rock of more than 10m³ from a watercourse • The Fine Residue Dam (22.8ha of which 12.8 ha is undisturbed) is located within drainage lines and the FRD Collection Pond 2.97Ha in size is located within 32m of the watercourse. **GNR 984 (dated 8/12/2014) LN2 Activity 15, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 15:** The clearance of an area of 20 ha or more indigenous vegetation, excluding for linear activity. • The footprint of all the water and waste water infrastructure is included in the total area of 20 hectares or more of vegetation that will need to be cleared. **GNR 985 (dated 8/12/2014) LN3 Activity 12, as amended by GNR 324 (dated 7/04/2017) LN3 Activity 12(g) iv.[8]:** The clearance of an area of 300 square metres or more of indigenous vegetation (g) in the Northern Cape iv. on land where at the time of coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	**X** **GNR 921 (dated 29/11/ 2013) Category B: Disposal of waste on land** (7) the disposal of any quantity of hazardous waste to land **GNR 921 (dated 29/11/ 2013) Category B: Construction of facilities and associated structures and infrastructure** (10) The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity). **GNR 632 (dated 24/07/2015): Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits from a Prospecting, Mining, Exploration or Production Operation** • The Fine Residue Dam has a footprint of 22.8 Hectares. **GNR 633 (dated 24/07/2015): Category B: Residue stockpiles or residue deposits** (11) The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the MRPDA (28 of 2002) • The Fine Residue Dam has a footprint of 22.8 Hectares.

[8] Status of land's zoning to be determined. Only applies if zoning is Open Space, conservation or equivalent zoning.

3. OPERATIONAL PHASE ACTIVITIES				
3.1 Mining activities	**Mining takes place underground** Basic overview of the mining method (Ref: MWP) The long-hole stoping method is a bulk mining method that provides good ore recovery and minimal dilution. It is an overhand, vertical stoping, utilising long-hole drilling and blasting carried out from sublevels to break the ore. Although the stopes are supported by long anchors, pillars are usually left between stopes and occasionally within stopes. The ore flows through the stope by gravity. Ore will then be extracted from the stope via the lower extraction drift using LHDs. The LHDs will then move the rock to either an orepass tipping point or into a re-muck bay and re-handle the material into a truck when one is available. The trucks will transport the ore to surface via the decline. Long-hole open stoping is a highly mechanised mining method utilising a wide range of equipment for drilling and mucking. Typically production drilling is carried out by high-efficiency column and arm long-hole drills or down-the-hole ("DTH") drill rigs. These systems use electric drive instead of hydraulic and have high pressure pneumatic DTH hammers or rotary percussion drilling systems. It is with recent gains in drilling technology that these systems have revolutionised long-hole stoping operations. In the long-hole open stoping method access onto a level, from the decline, will be via an access cross cut. From the access cross cut ore access drives will be developed into the orebody from the footwall to the hangingwall. The mining block will be split into stopes with a horizontal span of 20 m and a vertical span of 30 m. The strike will be the length of the orebody width from the hangingwall to the footwall. Only one level will be in production at a time.	**X**	**GNR 984 (dated 8/12/2014) LN2 Activity 17, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 17:** Any activity including the operation of that activity which requires a mining right as contemplated in S22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including - (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing.	**X** **As listed where relevant.**
3.2. Processing activities: 3.2.1 Crushing and screening 3.2.2 Milling Circuit 3.2.3 Reagent Make-up and conditioning 3.2.4 Flotation circuit 3.2.5 Product Handling	• The Processing Plant Site has a footprint of 26Ha.	**X**	**GNR 984 (dated 8/12/2014) LN2 Activity 17, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 17:** Any activity including the operation of that activity which requires a mining right as contemplated in S22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including - (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing.	**NA**

3.3 Transport waste rock to waste rock dump	NA	NA	NA	NA
3.4 Operation of RoM Stockpiles	• Phase 1 FMN RoM Stockpile is 4,250m². • Phase 2 FMN RoM Stockpile is 7,200m². • FMS RoM stockpile is 1Ha • FME RoM Stockpile is 1.26Ha	**X**	**GNR 984 (dated 8/12/2014) LN2 Activity 17, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 17:** Any activity including the operation of that activity which requires a mining right as contemplated in S22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including - (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing.	**NA**
3.5 Operation of Waste Rock Dump	Waste rock dump has a footprint of 2.8Ha.	**X**	**GNR 984 (dated 8/12/2014) LN2 Activity 17, as amended by GNR 325 (dated 7/04/2017), LN2 Activity 17:** Any activity including the operation of that activity which requires a mining right as contemplated in S22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including - (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing.	**GNR 921 (dated 29/11/ 2013) Category B: Disposal of waste on land** (8) The disposal of general waste to land covering an area in excess of 200m² and with a total capacity exceeding 25 000 tons. *General waste includes insert waste, as defined in the NEM:WA; Act 59 of 2008, as amended.* **GNR 921 (dated 29/11/ 2013) Category B: Disposal of waste on land** (9) The disposal of inert waste to land in excess of 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorized by or under other legislation. *Inert waste as defined in the NEM:WA; Act 59 of 2008, as amended.*
3.6 Use of all facilities and amenities associated with mine logistics	NA	NA	NA	NA
4. DECOMMISSIONING PHASE ACTIVITIES				
4.1. Cover waste rock dump leading edge with topsoil removed prior to establishment.	Leading edge	NA	NA	NA
4.2. Secure mine shafts & fence off access securely	Included in total of 113Ha (extent of area required for infrastructure)	NA	NA	NA

4.3. Remove all structures, foundations and footings not required by landowner/s	Approx. 113Ha	NA	NA	NA
4.4. Rip all hardened areas and allow to revegetate naturally	Approx. 113Ha	NA	NA	NA
4.5 Decommissioning of waste management facility – Waste rock dumps and FRD	Final footprint of waste rock dump is approx. is 2.8Ha and FRD is approx. 25.5Ha	NA	NA	**GNR 921 (dated 29/11/ 2013) Category A: Decommissioning of facilities and associated structures and infrastructure** (14) The decommissioning of a facility for a waste management activity listed in Category A or B of this schedule.
5. AFTERCARE PERIOD				
5.1. Remove alien vegetation, if present	Unknown	NA	NA	NA
5.2. Monitor revegetation success and continue	Unknown	NA	NA	NA
5.3. Conduct final environmental audit	NA	NA	NA	NA
5.4. Lodge closure Application	1214 Ha	**X**	**GNR 983 (dated 8/12/2014) LN1 Activity 22, as amended by GNR 327 (dated 7/04/2017) Activity 22:** The decommissioning of any activity requiring – (i) a closure certificate in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). Only applies at time of final closure.	**NA**

5 NEED & DESIRABILITY OF THE PROPOSED ACTIVITIES

5.1 Mining and Biodiversity Guidelines (2013)

The Mining and Biodiversity Guidelines (2013)[9] state that: "Sustainable development is enshrined in South Africa's Constitution and laws. The need to sustain biodiversity is directly or indirectly referred to in a number of Acts, not least the National Environmental Management: Biodiversity Act (No. 10 of 2004) (hereafter referred to as the Biodiversity Act), and is fundamental to the notion of sustainable development. International guidelines and commitments as well as national policies and strategies are important in creating a shared vision for sustainable development in South Africa".

DMR, as custodian of South Africa's mineral resources, is tasked with enabling the sustainable development of these resources. This includes giving effect to the constitutional requirement to "prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development"[10].

The primary environmental objective of the MPRDA is to give effect to the "environmental right"[11] contained in the South African Constitution. The MPRDA further requires the Minister to ensure the sustainable development of South Africa's mineral resources, within the framework of national environmental policies, norms and standards, while promoting economic and social development.

The Mining and Biodiversity Guidelines (2013) document identifies four categories of biodiversity priority areas in relation to their biodiversity importance and implications for mining. The categories of relevance to this Core Area 1 are: Category B: Highest Biodiversity importance – highest risk for mining; Category C: High Biodiversity Importance – high risk to mining; and "Category D: Moderate Biodiversity Importance" – moderate risk for mining.
The latest conservation mapping (refer to **Figure 4**) indicates that only Category B is applicable to this project site.
These categories basically require an environmental impact assessment process to address the issues of sustainability. Refer to Section 8.1.9 and **Figure 5**.

5.2 Copper and Tungsten Mineral Resources Supply and Employment Benefits

The intention to secure an off-take agreement with a copper smelter who will purchase the copper concentrate at the mine gate (ex-works). Negotiations with potential consumers have commenced. The product specification is a 25% Cu concentrate at a moisture content of 8% to 10%.
In terms of **new employment opportunities**, there will be 7 posts for senior-management; 20 posts for professional qualified staff; 127 posts for skilled technical staff; 44 posts for semi-skilled staff; and 26 posts for unskilled staff; providing a total of 224 employment opportunities.
Services that will outsourced and that will provide **job security** will be environmental monitoring services and compliance officer, training, security, consultant geologist, main workshop and auditing/tax/accounting services.
In addition, it is expected that there will be 53 sub-contractor employees from Year 1 to 5.

5.3 Nama Khoi Local Municipality IDP (Draft IDP 2018/2019)

In the Constitution of South Africa (108 of 1996) the objectives of a municipality or local government structure are described as follows under "section 152. (1) The objects of local government are-
(a) to provide democratic and accountable government for local communities;
(b) to ensure the provision of services to communities in a sustainable manner;
(c) to promote social and economic development;
(d) to promote a safe and healthy environment; and
(e) To encourage the involvement of communities and community organisations in the matters of local government".

The vision of the Nama Khoi Municipality is:
"To proudly deliver sustainable local economic development and climate resilient quality services to the Nama Khoi Municipality"

The development and implementation of the Nama Khoi Local Economic Development (LED) strategy aims at ensuring the alignment to the economic sectors and also assist the SMME's in co-operation with other stakeholders:

[9] Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute. 2013. Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector. Pretoria.
[10] Constitution of the Republic of South Africa (No. 108 of 1996).
[11] Section 24 of the Constitution states that "everyone has the right (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that: prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

- To initiate, lead and sustain an environment for job creation in the Nama Khoi Municipal Area.
- To leverage municipal assets and the municipal procurement process with the view to stimulate redistribution and growth.

The Macro Strategic Development concept provides a broad spatial development framework for the total municipal area and contains spatial planning proposals based on the following concepts (only those of relevance referenced here):

SPATIAL OBJECTIVE 3: To develop sustainable and diverse local economies by the utilisation of opportunities in the different spatial categories.

MINING

- There is a concentration of minerals around the Springbok area, as well as in a broad band along the south of the Orange River.
- Although many of these sources have been depleted, there are still plenty occurrences that can be exploited and this should be considered for small scale mining.
- The Industrial mining corridor as indicated in the PSDF must be investigated for opportunities and exploited where possible.
- To solve the disputes and issues related to mining rights and to investigate the possibility for local communities to gain access and limited mining rights in areas to be identified for this.

SPATIAL OBJECTIVE 4: To protect the pristine and unique natural environment with its four distinct bio-geographical regions by means of effective management and managed use.

CORE & BUFFER AREAS

- To protect and manage the following environmentally important areas in line with the objectives and targets of the NBSAP:
  - The western part of the local municipality from the coast to the east of the N7, which has been identified as a SANBI priority area; and
  - The western mountain ranges including the Kamiesberg and the Hantam which has been identified as a SANBI Escarpment.
- To protect the natural spaces affected by the Terrestrial and Aquatic Critical Biodiversity areas against development and overgrazing, due to its vital role in maintaining biodiversity.
- To support the Critical Biodiversity Corridor Linkages towards the surrounding municipalities.
- To expand the three statutory protected conservation areas in the municipal area, i.e. Goegap Provincial Nature Reserve, Namaqua National Park and Nature Reserve.
- To rehabilitate all mining areas and damaged areas in the region and to remove and terminate unwanted activities and undesirable structures in and around protected areas.
- To investigate and eradicate the invasive Prosopis tree which poses a significant threat to biodiversity and ecosystem services in the Northern Cape Province of South Africa.

OTHER

- To ensure that future planning in the region consider the mitigation of climate change, including the curbing of greenhouse emissions associated with transport and electricity use. A Climate-Neutral Strategy is to be developed for the Northern Cape. The implementation of this strategy into land use management regulations would be mandatory on all municipalities and the private sector.
- To improve the urban areas' natural character through landscaping, tree planting, the development of natural parks and the protection of natural areas and (flowers) in the neighbourhoods, e.g. Nababeep area.
- To rehabilitate the old mining areas to improve the environmental character of the area.
- To develop additional environmental awareness campaigns and environmental education programmes for the communities and visitors.

Broad development framework per settlement area: Nababeep

The area to the north of the settlement is subject to mining activities and could possibly provide opportunities and small scale mining beneficiation for local residents, which should be investigated.

5.4 Namakwa District Municipality Draft IDP 2017 2018

The vision of the Namaqua District Municipality IDP is: "Namakwa District Municipality, a centre of excellence!"

The Mission Statement is:

- A government institution legislatively mandated to stimulate economic and social transformation within the jurisdiction of the Namakwa District Municipality;
- By fostering partnership with relevant institutions to ensure sustainable development;
- Proactively supporting and capacitating B-municipalities;
- Be a transparent and accountable centre of excellence; and,
- Provide local leadership on environmental sustainability and climate change response.

The Strategic Objectives are

- Ensuring the delivery of basic services which include water, sanitation, electricity and waste management
- Creation of a thousand job opportunities through the community public works programme, as part of 4,5 million EPWP jobs.
- Transformation of administrative and financial systems of NDM and relevant B-Municipalities, which includes supply chain management
- Ensure the filling of six critical posts (Municipal Manager, Chief Financial Officer (CFO), Town Planner, Town Engineer, Human Resource Manager, Communication Manager) in all municipalities in the District
- Clean audits for all Municipalities.
- Building municipal capacity to enable municipalities to collect their revenue.
- Ensure sustainable economic and social transformation in the District.
- A society with a renewed sense of identity and confident in their skills and knowledge.
- Bridging the digital divide.
- Ensure the implementation of environmentally sustainable practices, along with an integrated approach to addressing climate change response, across all sectors.

The Namakwa District Municipality adheres to the values contained in the Batho Pele Principles.

The effects of climate change, such as flood events, on the proposed mining project will be mitigated as per the measures to be contained in the EMPr. The mitigation for emissions of greenhouse gases from vehicles and machinery associated with the mining activities will be addressed in the EMPr and Closure and Rehabilitation Plan.

5.5 Northern Cape Provincial Spatial Development Framework (NCPSDF)

The NCPSDF states that the: "Cape is not one of South Africa's richest provinces in monetary terms. Accordingly, there is a need for coherent prioritisation of projects within a spatial economic framework that takes due cognisance of environmental realities and the imperative to create a developmental state". The NCPSDF was designed as an integrated planning and management tool for all spheres of government to facilitate on-going sustainable development throughout the province.

The NCPSDF, together with the Provincial Growth and Development Strategy (PGDS), is set to fulfil an important role as a spatial and strategic guideline that addresses the key challenges of poverty, inequality and environmental degradation through the innovative use of the resources (capital) of the province for the benefit of all concerned."

The potential for job security, employment and skills transfer are identified as positive environmental impacts in this Report. The potential negative environmental impacts can be mitigated through the implementation of the EMPr and the Closure and Rehabilitation Plan, to ensure a sustainable mining activity.

5.6 Northern Cape Provincial Growth and Development Strategy 2004 – 2014 (NCPGDS)

The NCPGDS has the following vision for the Province: "Building a prosperous, sustainable growing provincial economy to reduce poverty and improve social development." The strategy for the growth and development of the Province is guided by the following key principles:

- Equality – notwithstanding the need to advance persons previously disadvantaged, development planning should ensure that all persons should be treated equally;
- Efficiency –the promotion of the optimal utilisation of existing physical, human and financial resources;
- Integration – the integration of spatially coherent regional and local economic development and improved service delivery systems.
- Good Governance – the promotion of democratic, participatory, cooperative and accountable systems of governance and the efficient and effective administration of development institutions;
- Sustainability – the promotion of economic and social development through the sustainable management and utilisation of natural resources and the maintenance of the productive value of the physical environment;
- Batho Pele – the placement of people and their needs at the forefront of its concern and serve their physical, psychological, developmental, economic, social and cultural interests equitably.

5.7 DEA Guideline on Need and Desirability (2017)

As referenced in the DEA Guideline on Need and Desirability (2017), NEMA defines "evaluation" as "the process of ascertaining the relative importance or significance of information, in the light of people's values, preferences and judgements, in order to make a decision." In evaluating each impact (negative and positive) in terms of each of the aspects of the environment, "need and desirability" must specifically be considered in the analysis of each impact of the proposed activity. However, to determine if the proposed activity is the best option when considering "need and desirability", it must also be informed by the sum of all the impacts considered holistically. In this regard "need and desirability" also becomes the impact summary with regard to the proposed activity. The impact summary will be included in the EIR.

These Guidelines state that: "In considering the impact summary it must be remembered that ultimately the aim of EIA is to identify, predict and evaluate the actual and potential risks for and impacts on the geographical, physical, biological, social, economic and cultural aspects of the environment, in order to find the alternatives and options that

best avoid negative impacts altogether, or where negative impacts cannot be avoided, to minimise and manage negative impacts to acceptable levels, while optimising positive impacts, to ensure that ecological sustainable development and justifiable social and economic development outcomes are achieved".

The **principles of Integrated Environmental Management (EIM)** as set out in Section 23 of NEMA have been considered in this scoping environmental assessment and will be applied in the EIR, EMPr and Closure Report, as explained below.

- **Environmental management placing people and their needs at forefront of its concern, and serve their physical, physiological, developmental, cultural and social interests equitably** – This process will be undertaken in a transparent manner and all effort will be made to involve all the relevant stakeholders and Interested and Affected Parties. I.e. Public participation will be undertaken to obtain the issues / concerns / comments of the affected people for input into the process.
- **Socially, environmentally and economically sustainable development** – All aspects of the receiving environment and how this will be impacted has been considered and investigated to ensure a minimum detrimental impact to the environment. Where the impact could not be avoided, suitable and effective mitigation measures were proposed to ensure that the impact is mitigated. i.e. this report along with the EMPr (to be included in the EIA Phase) proposes mitigation measures which will minimise the negative impacts of the proposal on the environment.
- **Consideration for ecosystem disturbance and loss of biodiversity** – the project site is located within in an Ecological Support Area (ESA). The vegetation type found on site is not listed in the "National List of Threatened Ecosystems that are Threatened and in Need of Protection" in GN 1002 dated 9/12/2011. Ecosystem disturbance and loss of biodiversity are considered in the impact assessment. Rehabilitation back to the natural state is a key component, and will be undertaken in a phased manner as the mining activities progress. This report together with the EMPr and Closure Plan proposes mitigation measures which will minimise the impacts of the proposal on the environment.
- **Pollution and environmental degradation** – The implementation of recommendations made and proposed mitigations to be detailed in the EIR and Environmental Management Programme Report (EMPr), and Closure Plan will ensure minimum environmental degradation.
- **Landscape disturbance** – All aspects of the receiving environment and how this will be impacted has been considered and investigated at a scoping level to ensure a minimum detrimental impact to the environment. Where the impact could not be avoided, suitable and effective mitigation measures will be detailed in the EIR, EMPr and Closure Plan to ensure that the impact is mitigated. For example, landscape disturbance impacts associated with the development such as the Mine Residue Disposal Facility (MRDF), waste rock dump sites, erosion and dust have been identified and detailed mitigation measures will be included in the EMPr to minimise the impacts.
- **Waste avoidance, minimisation and recycling** – These aspects were considered and incorporated into the operational component of the project, and mitigation measures included in the EMPr.
- **Responsible and equitable use of non-renewable resources** – These aspects have been considered and there is not much scope to reduce the use of non-renewable resources, such as vehicle transport. Solar panels do however, provide power to borehole pumps.
- **Avoidance, minimisation and remedying of environmental impacts** - All aspects of the receiving environment and how this will be impacted have been considered and investigated to ensure a minimum detrimental impact to the environment. Where the impact could not be avoided, suitable and effective mitigation measures will be proposed to ensure that the impact is mitigated. A number of mitigation measures will be detailed to minimise the impact of the proposal on the environment.
- **Interests, needs and values of Interested and Affected Parties** – This process has been undertaken in a transparent manner and all effort is being made to involve all the relevant stakeholders and Interested and Affected Parties (I&APs). The DSR was made available to all identified I&APs to obtain comments on the proposed development.
- **Access of information** – Potential Interested and Affected Parties have been notified of the proposal and the availability of the Draft Scoping Report (DSR). They were also notified of having the opportunity to register as an I&AP, and registered I&APs will be kept informed during the course of the EIA process.
- **Promotion of community well-being and empowerment** – This process will be undertaken in a transparent manner and all effort will be made to involve all the relevant stakeholders and I&APs.

Potential impacts on the biophysical environment and socio-economic conditions have been assessed, and steps have been taken to mitigate negative impacts, and enhance positive impacts. Any mitigation measures from SAHRA will be included in the FEIR. SAHRA has provided Interim Comment, included in **Appendix B**, and the mitigation measures are included in this DEIR. Adequate and appropriate opportunity will be provided for public participation. Environmental attributes have been considered based on the available information, and environmental management practices have been identified and established to ensure that the proposed activities will proceed in accordance with the principles of IEM.

6 DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PREFFERED SITE, ACTIVITY & ALTERNATIVE

6.1 Process to Reach the Proposed Preferred Alternative

With reference to the Mine Site Plan provided as the Diagram 5 series and the location of the individual activities on site, details are provided of the alternatives considered with respect to the:

(a) Property on which or location where it is proposed to undertake the activity;
(b) Type of activity to be undertaken;
(c) Design or layout of the activity;
(d) Technology to be used in the activity;
(e) Operational aspects of the activity; and
(f) Option of not implementing the activity.

Appendix 2 Section 2 (h)(i) of the EIA Regulations, 2014, requires that all S&EIR processes must identify and describe feasible and reasonable alternatives. Alternatives considered during the screening phases of the project are described below.

6.2 Location or Site Alternatives

- The N7 national road to Springbok provides excellent access to Nababeep and the mining operation. Nababeep is 17km north-west of Springbok.
- The design or layout of the mining is determined by the shape, position and orientation of the mineral resource as explained in Section 3.2.2 above and illustrated in Diagram 3.
- The location of the mine logistics, processing components and rock dump site has been based on the existing disturbed footprint of the previous mining activity at FMN (previously referred to as Wheal Flat), the topography of the site and distance to the main mine shaft (FMN) to minimise transport costs for ore removal, processing and waste rock dumping.
- The processed copper is to be sold at the gate, and therefore ease of access off the road leading past the mine area is required.
- The availability of water resources such as the groundwater in the existing mine shaft at FMN and the existing boreholes are described in Appendix 2 of **Appendix E**.
- The location of the Tailings Storage Facility (TSF) is earmarked for the existing disturbed footprint as described in **Appendix E**, shown on Diagram 5.5.1 and 5.5.2 and in Photograph Compilation 2, where a single site was identified as a potential suitable location based on the following:
  - Location overlies an existing environmentally disturbed location;
  - The site is positioned over a wide valley in which it is possible to establish a large depositional basin reducing the volume requirement for a starter embankment; and
  - The location does not encroach on nearby settlements.
  - It is centrally located within the mining right area, approximately 1.5 km south-east of the processing plant.
- In addition, the linear type infrastructure as the electricity supply follows the existing lines of development that being the existing access road to the north of Nababeep.
- Other linear infrastructure, such as pipelines follow the topography and lie of the land in a direct path wherever possible to minimise cost of materials and to maximise gravity feed where relevant, this reducing costs of electricity for pumping.

6.3 Type of Activity

The Applicant is not the land owner, so it would not be realistic for this company to propose another type of activity as their core business is mining. Although the proposed mining activity takes place over a long time period, the best post-mining land use alternative is to return the site to its natural state. The holder of a mining right is required to rehabilitate the environment affected by mining to its natural state or to another predetermined land use.

Other activity alternatives have therefore not been considered as the purpose of the proposed project is to mine copper and tungsten from the identified deposits with the Mining Right application area as shown in Diagram 3.

The only other activity required to be assessed in terms of NEMA is the "do-nothing" alternative, as detailed further in section 6.7 below.

6.4 Design or Layout of Activity

The design or layout of a mining project is determined by the shape, position and orientation of the mineral resource.

The layout of the Mine as shown in the Mine Site Plan in Diagram 5.1.1 (and 5.1.2) is based on the location of the mineral resources as shown in Diagram 3; the position of the existing FMN shaft; utilising the existing disturbed footprints from the previous mining at FMN, and at the area earmarked for the Mine Residue Disposal Facility (MRDF) detailed in Section 3 above. The location of the waste rock dump is positioned in a valley-fill location which has the least visual impact, and does not require disposal off site. The associated infrastructure servicing the Mine has been

positioned according to the topography and existing infrastructure such as the access road to minimise the area of disturbance.

Best practice dictates that it is best to mine and rehabilitate the area sequentially, as this minimises the disturbance to the mining areas once they have been rehabilitated. The significance of the environmental impacts associated with different possible design or layout alternatives would be very similar.

There are no reasonable or feasible design or layout alternatives for further consideration.

6.5 Technology Alternatives

The technology used in a mining project is determined by the type, shape, position and orientation of the mineral resource. The technology applied in each major component of the mine is considered to be the only reasonable and feasible alternative as described below:

- **Underground mining technology**: Long-hole open stoping is a highly mechanised mining method utilising a wide range of equipment for drilling and mucking. Typically production drilling is carried out by high-efficiency column and arm long-hole drills or down-the-hole ("DTH") drill rigs. These systems use electric drive instead of hydraulic and have high pressure pneumatic DTH hammers or rotary percussion drilling systems. It is with recent gains in drilling technology that these systems have revolutionised long-hole stoping operations. Refer to Section 3.2.3 above.
- **Processing Plant technology**: as detailed in Section 3.3.7.1 above and illustrated in the Plant Flowsheet (Diagram 20) the processing incorporates a conventional two stage crushing circuit with a primary jaw crusher followed by a secondary cone crusher in closed circuit with a vibrating screen. The primary mill discharge is pumped through a cyclone with the underflow passing through a flash flotation cell before gravitating to the secondary milling circuit. The cyclone overflow streams from the primary and secondary milling circuits form the feed to the flotation circuit. The flotation circuit comprises rougher, cleaner and re-cleaner tank flotation cells. The rougher concentrate is pumped to the cleaner cells with that concentrate progressing to the re-cleaner stage. The tailings from each stage are returned to the previous stage with the rougher tailings passing through a scavenger stage. The re-cleaner concentrate is the final concentrate which is filtered to and stored prior to export. The scavenger tailings will be thickened to 60% solids before being pumped to the tailings dam. The concentrate, equating to 10% of the original plant feed mass, will be sold at the mine gate.

  For the 35,000 t/m operation the feed to the plant will be a nominal 54t/h with a 1:1 water requirement, i.e. 1m³ of water required per tonne of ore treated. Roughly 50% of the water requirement will be provided by reticulated water within the plant.

  The design philosophy was that the processing plant would initially be designed to treat 35,000 t/m. This will be known as Phase 1. At the beginning of Year 4, a parallel stream (Phase 2), treating a further 35kt/m will be commissioned bringing the total design throughput to 70kt/m. The life of the project, based on the current resource, would be 14 years. The plant should have a 90% availability and operate on a 24 hour/day basis with 3 operational shifts and a relief shift. The plant will not be fully automated but there will be sufficient instrumentation to ensure a stable operation and allow for reliable metallurgical accounting.
- **Mine Residue Disposal Facility (MRDF)**: As detailed in Section 3.3.9 above, the technology to inform the design of the MRDF is further detailed in **Appendix E**, where compliance with GNR 632 regarding the planning and management of a MRDF is provided. The report classifies the waste type as Type 3 waste (Appendix 1 in **Appendix E**), requiring a Class C Liner to provide the minimum water tightness measures, until additional test work is completed indicating otherwise. The Hydrogeological Assessment (attached as Appendix 2 in **Appendix E**) has assessed the worse-case scenario of an unlined MRDF/TSF, and concluded that the contaminant plume originating from an unlined TSF is likely to cease expanding post-operation and groundwater quality will slowly improve due to recharge dilution and attenuation. For purposes of assessing technology alternatives, it is assumed that the TSF will be lined with a Class C Liner, and an unlined TSF is not included for comparison purposes, as more detailed investigations are required as mentioned above (and in **Appendix E**).
- **Water management:** The existing underground water resources will need to be utilised for the provision of water for the mining processing and activities, and a sustainable groundwater yield has been confirmed based on the findings of the Hydrogeological Assessment (attached as Appendix 2 in **Appendix E**).
- **Use of electricity**: The use of alternative sources of energy has not been included in the design of the mine due to costs. An 11kV powerline will supply electricity from the Nababeep substation to the mine site. Back-up generators will be provided to ensure a continuous source of power in the event of power failure..

There are no reasonable or feasible technology alternatives for further consideration.

6.6 Operational alternatives

As described in the operational phase (Section 3.4.2 above) long-hole open stoping is a highly mechanised mining method utilising a wide range of equipment for drilling and mucking. Typically production drilling is carried out by high-efficiency column and arm long-hole drills or down-the-hole ("DTH") drill rigs.

These systems use electric drive instead of hydraulic and have high pressure pneumatic DTH hammers or rotary percussion drilling systems. It is with recent gains in drilling technology that these systems have revolutionised long-hole stoping operations.
The primary processing activities include of crushing and screening; Milling Circuit; Reagent Make-up and conditioning; Flotation circuit; and, Product Handling are specific operational activities required to process copper bearing ore.
The Plant Flowsheet (Diagram 20) illustrates best practice for efficient and effective primary processing of the ore. The design philosophy is based on the phasing of the processing plant to initially treat 35,000 t/m in Phase 1. At the beginning of Year 4, a parallel stream (Phase 2), treating a further 35kt/m will be commissioned bringing the total design throughput to 70kt/m. The life of the project, based on the current resource, would be 14 years. The plant should have a 90% availability and operate on a 24 hour/day basis with 3 operational shifts and a relief shift. The plant will not be fully automated but there will be sufficient instrumentation to ensure a stable operation and allow for reliable metallurgical accounting.
There are no reasonable or feasible operational alternatives for further consideration.

6.7 The No-go Alternative

The No-Go Alternative will mean that the existing copper and tungsten prospecting right will not be realised into a Mining Right. There will be no supply of copper and tungsten for the local and international market, and no generation of much needed employment opportunities. The town of Nababeep has a high unemployment rate, as does most of the local municipality with the decline in mining a decade ago resulting in existing mines being closed. The opportunity provided by the increase in the price of copper has led to the revitalisation of interest in copper mining of the existing deposits north of Nababeep as detailed in this report. The inflow of revenue and employment opportunities will have a very positive spin-off locally and regionally.

6.8 Summary of Alternatives

The assessment of alternatives must at all times include the "no-go" option as a baseline against which all other alternatives must be measured. The "no go" alternative will therefore be further assessed together with the preferred and only alternative in the impact rating component of the EIA Phase.
The project site has been selected based on the results from prospecting. The layout and technology of each mine shaft and associated infrastructure has been determined by the shape, position and orientation of the mineral resource, Refer to the Overall Site Plan included as Diagram 5.5.1 (and 5.1.2). The existing infrastructure and access roads will be utilised, and existing dump sites expanded where indicated. The operational approach is practical and based on best practice to ensure a phased mining, followed by rehabilitation in sequential stages.
In summary therefore:

- The Preferred and Only Alternative is the Mining and Primary Processing of copper and tungsten on the Mining Right area demarcated in Diagram 2 and Diagram 5.1.1 (and 5.1.2)
  - The preferred and only **location** alternative of the mining activity is on the earmarked sites shown on the Mine Site Plan as per Diagram 5.1.1 (and 5.1.2). The location of the mining logistics, processing components and associated infrastructure have been positioned in relation to the location of the mineral resource below ground, the existing mine shaft at FMN, the existing disturbed footprints in close proximity to FMN, and the suitable topography of these sites for these structures. In addition, the linear type infrastructure such as the electricity supply follows the existing lines of development, such as the existing access road to the north of Nababeep.
  - The preferred and only **activity** alternative is the mining of copper and tungsten based on the mineral resources investigated during prospecting.
  - The preferred and only **technology** alternative is for the underground mining, extraction, processing, waste and water management, and the development of a lined (Class C Liner) TSF, with the use of electricity as a source of power, as described in Section 6.5.above.
  - The preferred and only **operational** alternative is the highly mechanised underground mining method of long-hole open stoping, and the above-ground primary processing activities (crushing and screening; Milling Circuit; Reagent Make-up and conditioning; Flotation circuit; and, Product Handling) as illustrated in the Plant Flowsheet (Diagram 20).

There are therefore no other reasonable or feasible sites, layouts, activities, technologies, or operational alternatives for further consideration in the impact assessment component, other than the mandatory "no-go" alternative that must be assessed for comparison purposes as the environmental baseline.

7 PUBLIC PARTICIPATION PROCESS

7.1 Introduction

The public participation process has been conducted according to the requirements as prescribed in Regulations 40 to 44 of the EIA Regulations, 2014 (as amended). Full details of the public participation process conducted including copies of all supporting documents (e.g. the information provided to Interested & Affected Parties (I&APs) and the comments received) on the DEIR will be included in **Appendix B** in the Final EIR.

7.2 Comment period on Draft Scoping Report

The Draft Scoping Report was distributed with the project notification via email to relevant Organs of State, and included with the Registered Letter to landowners and adjacent neighbours, and proof was included in the FSR. The commenting period of 30 days on the Draft Scoping Report was from 2nd November 2018 to 2nd December 2018. Only one Registration Form was received from the O'kiep Copper Company. All public consultation documents, such as a copy of the advertisement placed in a local newspaper; site notices placed on site; registered letters; and proof of project notification, were included in Appendix B of the Final Scoping Report.

7.3 DMR Acceptance of FSR & Applicant Requests for Extensions of Time

The FSR was accepted by DMR in their letter dated 16/01/2019, included in **Appendix B** of this DEIR.
SAFTA requested an extension of time of 60 days for the EIA Phase to conduct the specialist studies required, in their letter dated 5 March 2019. DMR granted this extension and the original deadline of 8 May 2019 was extended to 8 July 2019. Due to additional delays experienced, SAFTA requested another extension of time for 60 days in their letter 22 May 2019, to end on 8 September 2019. The extension of time requests were applied for in terms of EIA Regulation 3(7) in GN 326 (dated 7 April 2017). Refer to the SAFTA letters and email correspondence from DMR included in **Appendix B**.

7.4 Comment period on DEIR

The relevant Organs of State and Registered I&APs are hereby notified of the commencement of the EIA Phase, and the opportunity to comment on this DEIR. A copy of the notification letter, process diagram and comment form is included in **Appendix B**.
The 30 day public comment period commences on **6th August 2019 and ends on 5th September 2019.**

7.5 Summary of Issues Raised by I&APs

The table below indicates the receipt of a completed Registration Form that was distributed at the start of the Draft Scoping Report commenting period.

Table 10: Summary of Issues Raised by I&APs

Interested and Affected Parties **List the names of persons consulted in this column, and** **Mark with an X where those who must be consulted were in fact consulted.**		**Date Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
AFFECTED PARTIES					
Landowner/s	**X**				
Nama Khoi Municipal Manager: Landowner Ptn 3 Nababeep 134: Mr. Russel Hardley	X	None.			
Landowner Ptn 13 Nababeep 134: Mr Leroy Brandt	X	Notes of meeting held on 21/11/2018 related to Prospecting process. No comments on DSR received.	• Need for compensation for any damage. • Support for mining and job creation. • No unauthorized access to his land; no trespassing on his land.	Included in EMPr	Included in EMPr
Mora Plase (Ply) Ltd Landowner Ptn 14, 15 & 21 Nababeep 134: Mr. Japie van Zyl	X	None received.			
Lawful occupier/s of the land					
See landowners above					
Landowners or lawful occupiers **on adjacent properties**	**X**				
Municipal Manager: Landowner Ptn 3 Nababeep 134: Mr. Russel Hardley	X	See above for Nama Khoi Local Municipality			
Landowner Ptn 13 Nababeep 134: Mr Leroy Brandt	X	See above for Mr. Brandt			
Mora Plase (Ply) Ltd Landowner Ptn 14, 15 & 21 Nababeep 134: Mr. Japie van Zyl	X	None received.			
Municipal Councillor	**X**				
c/o Nama Khoi Municipal Manager: Mr. Russel Hardley	X	See above for Nama Khoi LM			
Municipality	**X**				
Nama Khoi Municipal Manager: Mr. Russel Hardley		See above for Nama Khoi Local Municipality			

Namakwa District Municipality Municipal Manager: Mr. Christo Fortuin		None received.			
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA)					
Eskom Regional Manager: Mr Sammy Engelbrecht	X	None received.			
Communities					
N/A					
Dept. Land Affairs					
Dept. Agric., Land Reform & Rural Development: Mr. Christo Smit	X	None received.			
Traditional Leaders					
N/A					
Dept. Environmental Affairs & Nature Conservation	**X**				
Mr. Ordain Riba (Upington office)	X	None received.			
Other Competent Authorities affected	**X**				
Dept. Water & Sanitation: Mr. Shaun Cloete	X	Site visit held with Mr. Cloete on 12 November 2018. Confirmation of WULA requirements in email dated 6/12/2018 and email dated 10/12/2019 (**Appendix B**)	iWULA required. Hydrogeological Assessment Report included as Appendix 2 in MRDSF Conceptual Design Report (**Appendix E**)	iWULA to be prepared.	Mitigation measures included in DEIR and EMPr. Hydrogeological Assessment Report included as Appendix 2 in MRDSF Conceptual Design Report (**Appendix E**). Impact Tables (**Appendix F**), and Closure Plan (**Appendix G**) iWULA to be prepared.
South African Heritage Resources Agency (SAHRA)	X	Interim Comment received dated 08/01/2019.	Recommendations provided, and to be confirmed with comment on FEIR.	Mitigation measures included in DEIR.	Section 10, **Appendix B** Impact Tables (**Appendix F**), and Closure Plan (**Appendix G**)
Department of Roads and Public Works (Deputy Information Officer): Mr Kholekile Nogwili	X	None received.			
OTHER AFFECTED PARTIES					
O'Okiep Copper Company (Proprietary) Limited: Mr P.J. (Basie) Fourie		Registration Form received on 5 November 2018.	Mr. Fourie indicated a business and financial interest in the application. He provided no comments.	No response required.	Noted.
Nama Copper Resources (Pty) Ltd: Ms Fiaan Cloete		None received.			
INTERESTED PARTIES					
None		N/A			

8 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PROJECT SITE

8.1 Type of Environment Affected by the Proposed Activity

8.1.1 Regional Setting

Namaqualand is a unique and diverse environment owing in large part to the presence of four distinct biogeographically regions within its boundaries. The Orange River valley lies to the north and is characterized by very dry desert conditions. In the west the area is composed of coastal plains, which transition into granite hills that straddle the escarpment, before transforming into low lying Bushmanland plains to the East of Springbok.

8.1.2 Landscape and Land Use

Mucina and Rutherford (2006) describe the landscape as being a dramatic landscape of huge granite and gneiss domes, smooth glacis and disintegrated boulder kopies supporting open shrubland up to 1m tall dominated by shrubs of dwarf to medium stature and with ericoid or succulent leaves.

Refer to **Figure 1** which shows the land-use as per the SANBI BGIS map viewer database dated 2009. The red patches at the project site represent the existing mined areas devoid of vegetation, and the pink represents mines (semi-bare areas). The white areas are either eroded areas or areas devoid of vegetation. The green patches indicate low shrubs; the light purple low shrub land; and, the brown patches are indicated as grassland. Therefore the land use of the project site as observed on site comprises areas previously disturbed by past mining practices at FMN.

8.1.3 Geology and Soils

The soils in a regional context are reddish, moderately shallow, sandy, and often overlay layers of calcrete of varying depths and thickness. The soils are typically weakly structured with low organic content. These soils drain freely which results in a soil surface susceptible to erosion, especially wind erosion when the vegetation cover is sparse and gulley erosion in areas where storm-water is allowed to concentrate. The soils in the area are generally not suitable for dry land crop production and the only area where intensive crop cultivation is feasible is along the Orange River where irrigation is possible therefore the land capacity is categorized as Class III grazing land. The productivity of the area is very low at 8Ha/SSU.

The project area has been classified into the following classes of land capability:

- Arable land: 0%
- Grazing land: 80%
- Wetland: 0%
- Wilderness land: 0%
- Urban and mining: 20%

The mining area lies close to the old mines at OKiep and Nababeep. Copper operations in this district date back over 150 years and hence the general geology is known as is the general style and form of the copper mineralization.

Within the mining area several rock types occur, however, the surface geology is dominated by two major intrusive lithologies; in the South the Nababeep granite-gneiss (Klein Namaqualand Suite) and in the North the Concordia Granite (Spektakel Suite). The former is a quartz – microcline – biotite granite gneiss with plagioclase and the latter a quartz – microcline granite with oligoclase. The granite-gneiss pre-dates the granite.

The Nababeep granite-gneiss' greatest development is centred on Nababeep where it can obtain a thickness of several hundred meters. It is well foliated and with a pronounced lineation. The formation is also augen rich (up to 7cm) but xenoliths are largely absent.

Strike and dips in the foliation are widely variable and although dip directions are usually North to West, the angle of dip is from near horizontal to sub-vertical. The Concordia granite occurs as an intrusive sheet becoming coarser grained towards the top of the unit where it grades into the overlying Rietberg Granite. The entire formation is dipping variously at some 30 – 40 degrees away from the Springbok dome. This unit shows conspicuous lineation but indistinct foliation. Orientation of lineations is far more consistent with East-West strikes generally plunging 10-25 degrees to the North in the prospecting area

There are several rock types present with a lesser surface expression, namely:

- The meta – volcano sedimentary quartzites of the Khurisberg Subgroup (O'Kiep Group) hosted within the Concordia Granite.
- Rietberg granites.
- Pegmatite clusters and aplite veins which because of their small size cannot be marked on the map. The pegmatites occur in all the major rock types. These are irregular, lensoidal shaped bodies of more leucocratic material formed locally.

- But most importantly, the intrusive anorthosites, diorite and norite of the Koperberg Suite are described in more detail below as these are the hosts of the copper mineralisation.

Structurally the whole area is complex having undergone extensive high-grade polyphase metamorphism and deformation. The grade of metamorphism is highest around Nababeep and reaches granulite facies and is characterized by minerals consistent with temperatures of 800 -1000°C.
The area is intersected by numerous shear faults and breccia faults, including a major shear fault in the center trending directly North from Nababeep. The main contact between the granite-gneiss and the Concordia granite is also believed to be a faulted contact. Although fold patterns appear relatively simple, there is evidence of several deformation and F3 folding. Numerous steeply inclined structures locally referred to as 'steep structures' occur within the area and post-date the F3 folding.
It is these structures and their associated megabreccias that have greatly controlled the emplacement and distribution of the Koperberg Suite and hence the copper ores. The Koperberg Suite is essentially basic intrusives that form narrow, dyke-like bodies typically associated with older fold structures termed steep structures and also with the breccias. They transgress all other rock units in the region and in the licence area. These structures are commonly 500 – 1000m horizontal extent and have a strongly aligned orientation dipping to the East. They also tend to exhibit a sharply antiformal structure with a vertical to sub-vertical core which extends to considerable depth. Mining in the area has exceeded 2000m but the structure extends unchanged below any known drilling.
The Nababeep district and the mining area in particular is rich in both steep structures and the Koperberg Suite – more so than any other part of the whole copper district. A large portion of the mining area holds as much as 2 – 5% of the outcrops as Koperberg Suite, whereas the regional average would be < 1%. Since this is by far the main mineralised unit in the entire district.
Since none of the deposits in this specific area have much of a surface expression the oxide assemblage is of little significance and sulphides dominate the economic geology. Ore minerals are present either as blebs or disseminations or more rarely as sulphide pockets of some size. Minerals present are primary chalcopyrite, bornite and some chalcocite.
Generally copper ore in this district is contained in a series of steep structures. Potentially economic concentrations of ores occur in clusters of pods as grade distribution is erratic and irregular. Only a small percentage of each structure carries reasonable grade ore and the rest is normally low grade. Hence the resources are a function of the cut-off grade and the current costs of mining and extraction.

8.1.4 Slope

Refer to **Figure 1** which shows the contours at 20 metre intervals. Refer to the Diagram 5 series of the Google Earth™ images base layer with the Mine Site Plan overlaid on areas that are suitable for the particular component, such as the location of the processing plan and logistics on the flatter area near FMN and the rock waste dump in a valley fill position.

8.1.5 Climate

The project site is located within the Succulent Karoo Biome where the climate has epizodic drought periods (well below 100mm per year) of one or two years in succession. The area experiences hot summers with mean maximum and minimum daily temperatures of 30°C and 5°C for January and July respectively. Given the variability of semi-arid rainfall, the mean annual runoff (MAR) is very low given the low rainfall which is less than 200mm per year occurring mainly in the winter months with high evaporation rates.

Refer to the climate diagram included as Diagram 22 below.

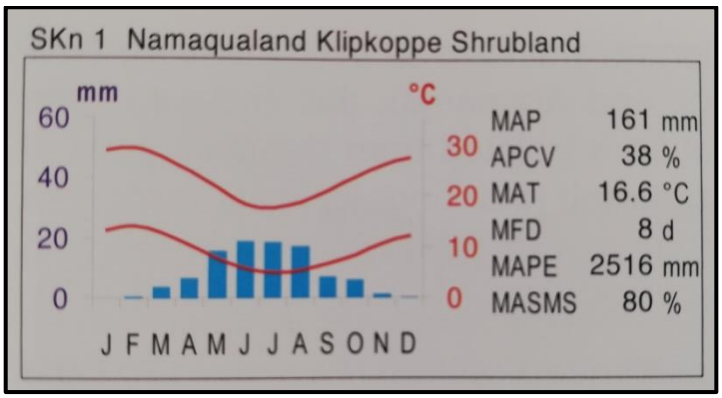
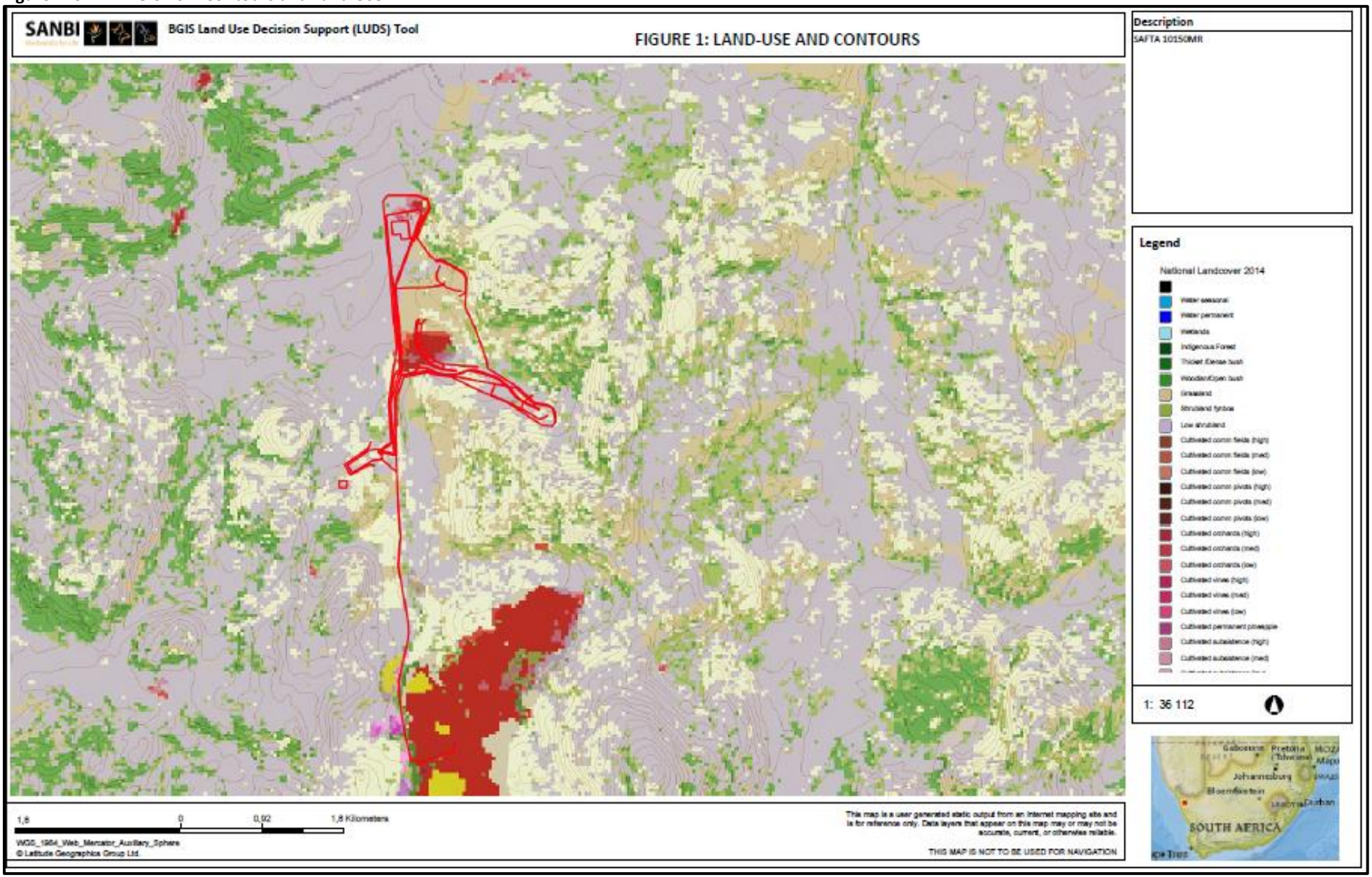


Diagram 22: Climatic data for vegetation type on site
[The blue bars show the median monthly precipitation. The red lines show the mean daily maximum and minimum temperature.]

Figure 1: SANBI BGIS 20m Contours and Land Use



8.1.6 Vegetation

The Nama Khoi local municipality contains 37 of the 93 vegetation types found in Namaqualand. Of these, 23 are endemic a remarkably high number that demonstrates the high levels of diversity in the area.

Refer to Figure 2 mapped from the SANBI BIS National Vegetation Map, which shows the location of the project site within the Skn1 Namaqualand Klipkoppe Shrubland.

The Namaqualand Klipkoppe Shrubland of which the mining right area forms part has 15 endemic plant species. The Namaqualand Klipkoppe Shrubland (SKn 1) and the Kamiesberg Mountain Shrubland vegetation types are structurally very similar, and also share many species. Typically Kamiesberg Mountain Shrubland occurs at higher elevations (900–1300m) than Namaqualand Klipkoppe Shrubland (<600 – 1300m), or in moister situations, such as on south and east facing slopes or in the western part of the Kamiesberg. A significant number (>15) of endemic species occur primarily or wholly within these two vegetation types, but as noted, this may be partly a function of insufficient habitat or locality information, and also partly a function of the physical extent of these two vegetation types, which cover very large areas in Namaqualand. Namaqualand Klipkoppe Shrubland fades into various forms of Succulent Karoo at lower elevations, and on the dry eastern fringes of the Kamiesberg (at the relatively high altitude of 1000m) changes into Platbakkies Succulent Shrubland (and Blomveld).

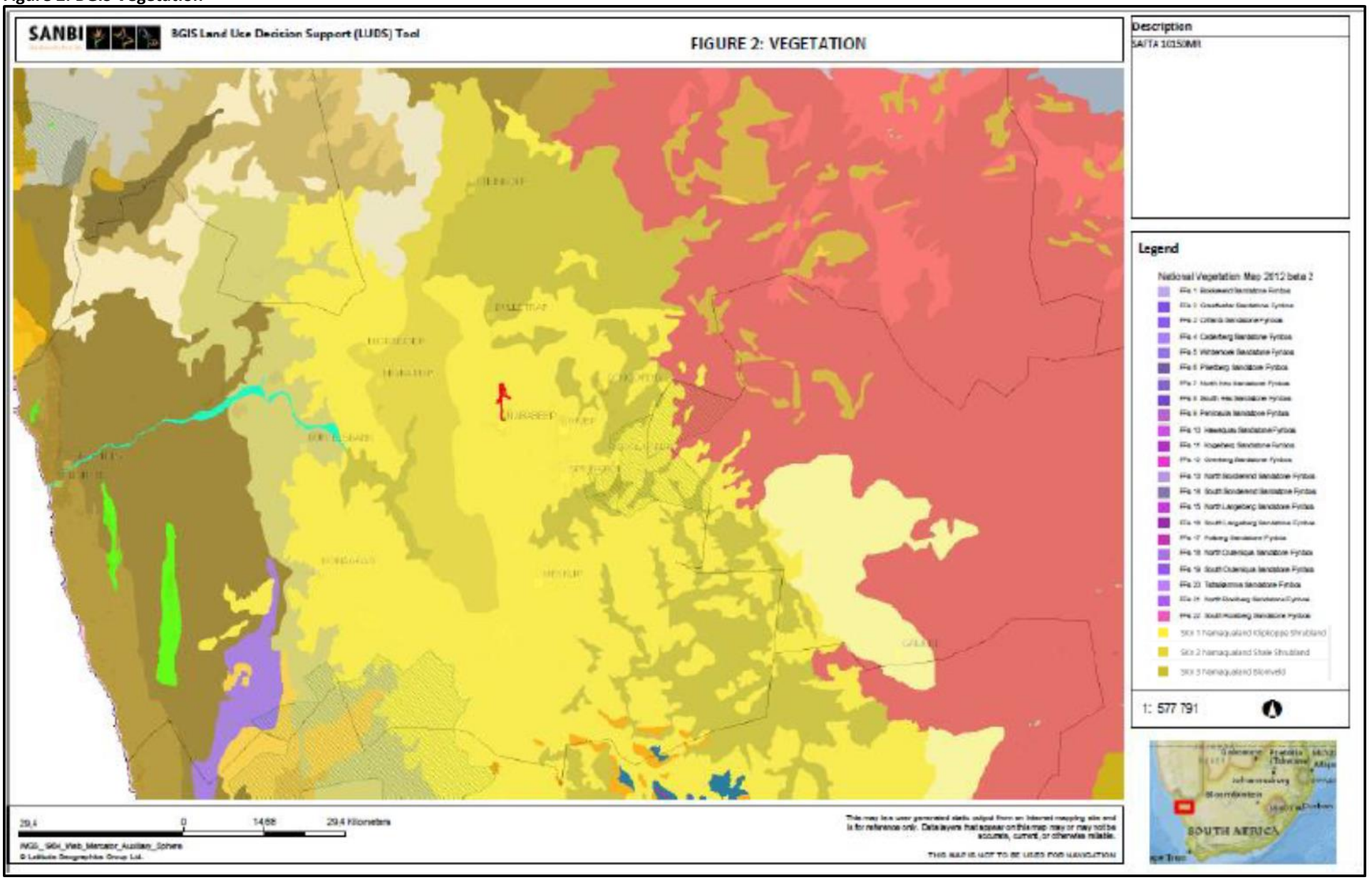
There are no listed Critically Endangered, Endangered or Vulnerable ecosystems on site, as confirmed by checking the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) [NEMBA] National list of ecosystems that are threatened and in need of protection, 2011 (in GN 1002 dated 2 December 2011).

Photograph 1: Typical vegetation found at Flat Mine North Shaft taken during the January 2018 drought.

8.1.7 Fauna

Endemism rates for invertebrates are high, and many unique and remarkable adaptive insects can be found in this region, including the scorpion – of which 22 are already known to be endemic to the Namakwa District Municipality. Likewise, there is an abundance of reptiles and snakes in the region, many of which are near endemic (including the Namaqua dwarf adder, which is the smallest of Africa's adders, measuring between 20-25 cm), as well as a few unique frogs such as the endemic rain frog, the marbled rubber frog and the paradise toad. Larger herbivores are absent due to the altered habitat and competitive land uses.

Figure 2: BGIS Vegetation



8.1.8 Water Resources

The project site is located within the Department of Water & Sanitation's Lower Orange Water Management Area (14), and in Quaternary Catchment F30E. Surface water only accumulates in the drainage channels after exceptionally good rains. The Mean Annual Run-off (MAR) is in very low given the low rainfall average occurring in the winter months, with high evaporation rates. Refer to the Climatic Diagram 22 above.

Refer to **Figure 3.1 and 3.2** that shows the location of the project site in relation to the watercourse, which is not a Freshwater Ecosystem Priority Area (FEPA)[12]. There are no wetlands within the project site as shown in **Figure 3.1**. According to the SANBI BGIS database the section of the watercourse highlight in Figure 3.2 is classified as a Category C watercourse which means it is moderately modified.

Refer to the Baseline Assessment of the Nababeep Shaft Water Quality dated January 2014 (attached as **Appendix D**) which was prepared during the prospecting investigations as shaft water was hindering exploration of the mineral resource in FMN, and further information was required on the existing boreholes in the vicinity, and the surface water in the nearby watercourse. The report describes the shaft water quality as being comparable to the baseline groundwater conditions and significantly better quality than the local surface water. The water from the shaft would add a significant dilution (during the prospecting phase) capacity to the impacted drainage channel thereby providing a measure of mitigation for the deleteriously impacted drainage channel (upstream pollution evident from perceived lack of sewage management in the town of Nababeep).

Clarity has been sought from the Department of Water and Sanitation during the site visit that took place on the 12th November 2018. Written confirmation was received clarifying the WULA requirements as included in **Appendix B**). The following water use activities need to applied for in the Integrated Water Use License (iWULA):

- Section 21(a): Taking water from a resource.
- Section 21(b): Storing water.
- Section 21(c): Impeding or diverting the follow in a watercourse.
- Section 21(f): Discharging waste or water containing waste into a water resource though a pipe, canal or other conduit.
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on water resource.
- Section 21(i): Altering the beds, banks, course or characteristics of a watercourse.
- Section 21(j): Removing, discharging or disposing of water found underground.

The **Hydrogeological Assessment** (included as Appendix 2 in the MRDFS Report attached at **Appendix E**) prepared to inform the EIA Phase addresses the prevailing groundwater conditions and aquifer characterization, including the availability of groundwater for production purposes from existing mine shafts in the vicinity, and from dewatering of the mine shafts under production.

8.1.9 Critical Biodiversity Areas

Refer to **Figure 4** which shows that the project site is located within an Ecological Support Area (ESA). The Conservation Status database referenced for Figure 4 was sourced from the Department of Environment and Nature Conservation (DENC) in November 2017. It has not been gazetted and approved by the Minister, only approved by the MEC.

An ESA is described as an area that is not essential for meeting biodiversity targets, but that plays an important role in supporting the functioning of Protected Areas or Critical Biodiversity Areas, and are required for delivering ecosystem services. They support landscape connectivity, encompass the ecological infrastructure from which ecosystem goods and services flow, and strengthen resilience to climate change. They include features such as regional climate adaptation corridors, water source and recharge areas, riparian habitat surrounding rivers or wetlands, and endangered vegetation. ESAs need to be maintained in at least a functional state, in order to support the purpose for which they were identified, but some limited habitat loss may be acceptable. A greater range of land uses over wider areas is appropriate, subject to an authorization process that ensures the underlying biodiversity objectives and ecological functioning are not compromised. Cumulative impacts should also be considered.

Refer to **Figure 5** below that shows that the project site has sections demarcated as Category B, C and D in terms as the "Mining and Biodiversity Guidelines" categories referenced from the SANBI BGIS map viewer from 2013.

[12] FEPAs are strategic spatial priorities for conserving freshwater ecosystems and supporting sustainable use of water resources. FEPAs were determined through a process of systematic biodiversity planning and were identified using a range of criteria for conserving ecosystems and associated biodiversity of rivers, wetlands and estuaries. FEPA maps are suitable to use at a desktop level for planning and decision-making processes at the national or water management area level. In general, confidence in the FEPA maps at a national level is high but decreases at more local levels of planning.

Figure 3.1: BGIS National Wetlands & NFEPA Map

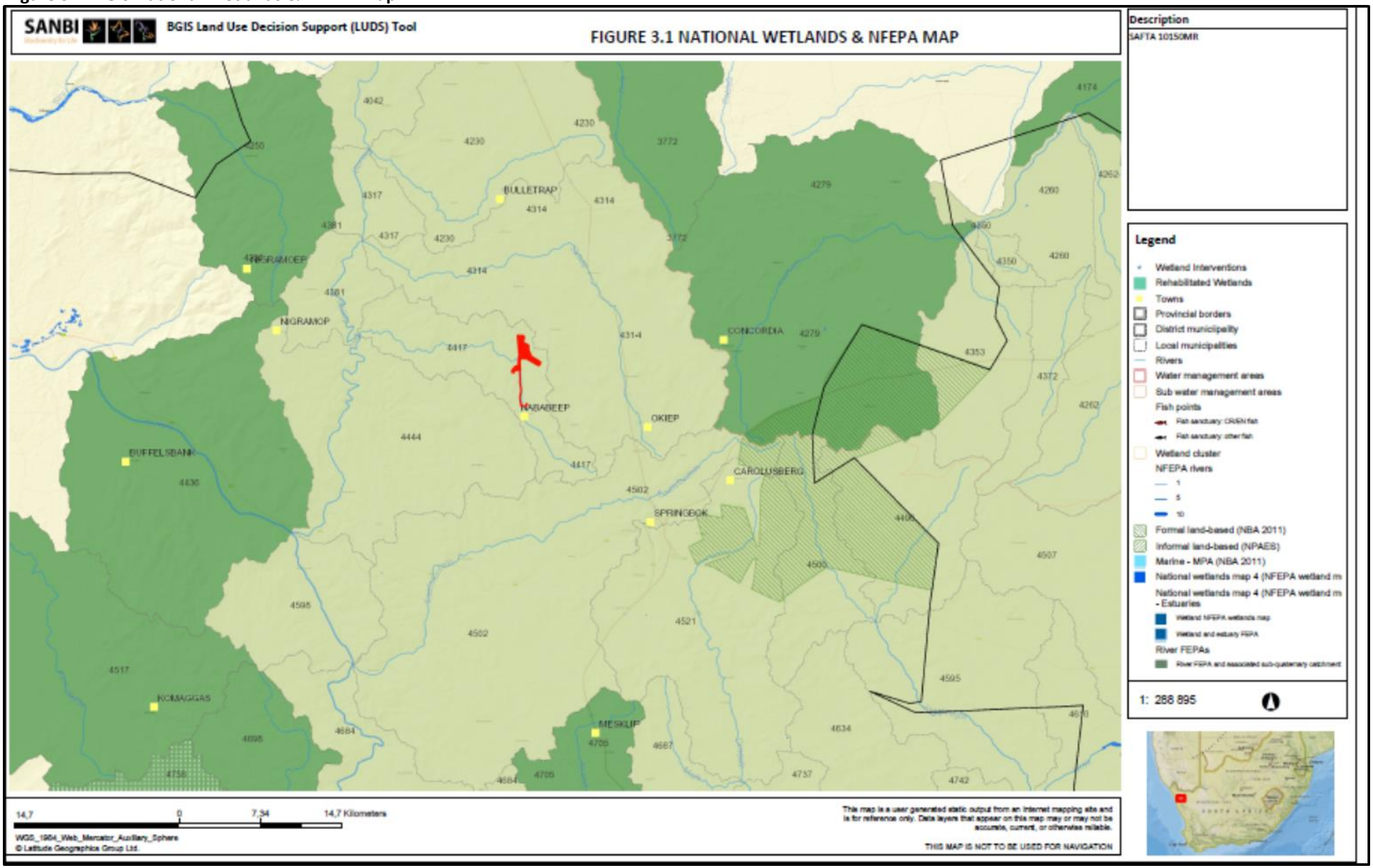


Figure 3.2: BGIS National Wetlands & NFEPA Map

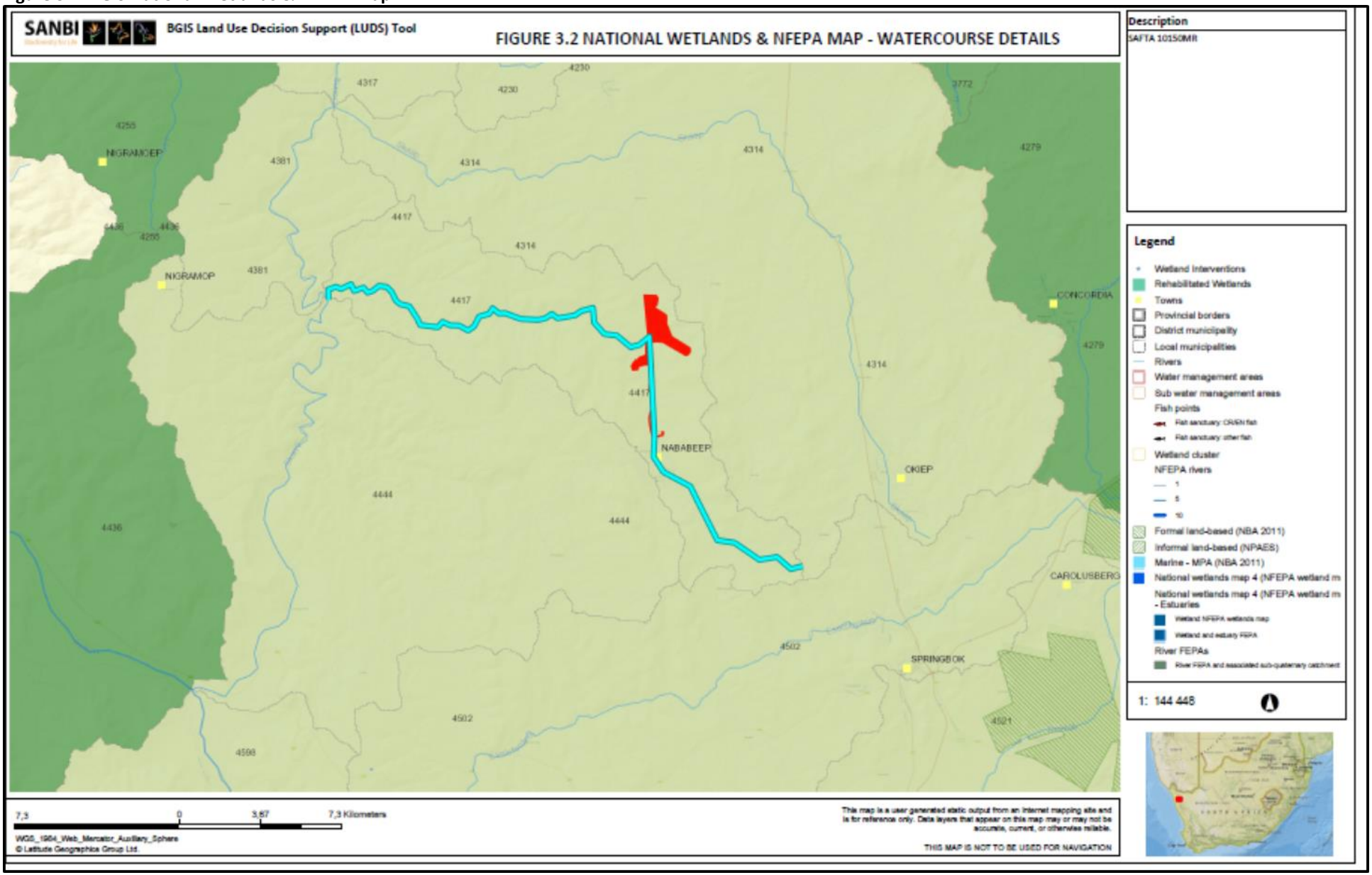


Figure 4: Biodiversity Map

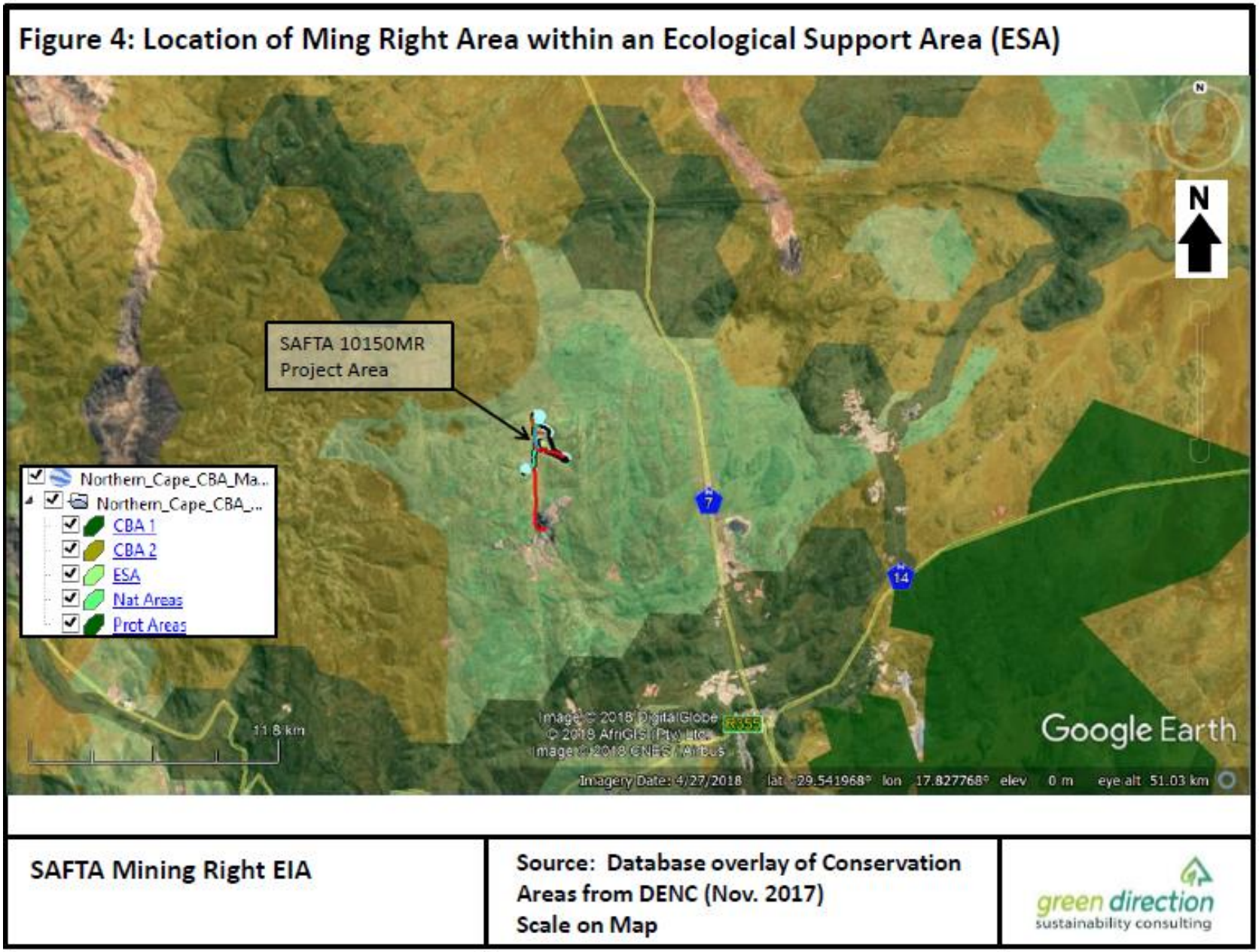
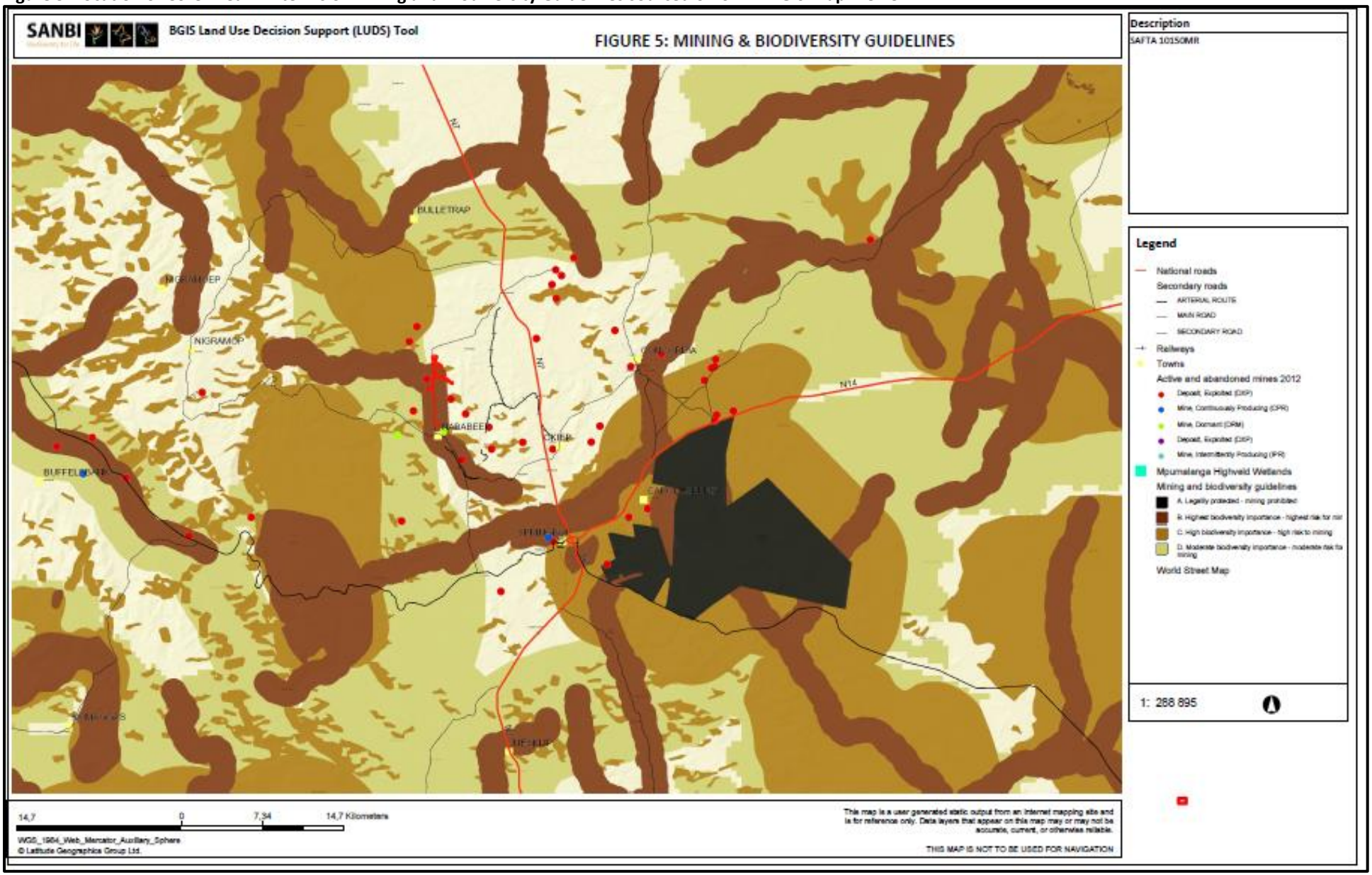


Figure 5: Location of Core Area 1 in terms of Mining and Biodiversity Guidelines sourced off SANB BGIS Map Viewer



8.1.10 Emissions

Air Quality

Dust is generated by wind over un-vegetated or denuded areas and given the surrounding extent of the semi-desert environment, dust generation will occur under windy conditions. Dust is generated off un-surfaced roadways when vehicles transport materials on site and in off-loading materials to the rock waste dump and RoM stockpiles.

Dust will be generated underground during blasting, and will be controlled in terms of the Mine Health and Safety Regulations and Dust Control Regulations in terms of NEM:AQA. Air ventilation shafts are included in the mine site plan. Mining activities take place in a remote area 6km from the town of Nababeep and dust generation will be limited to a small radius at each site of activity.

Noise and vibration

- Noise and vibration will be generated during blasting below ground.
- Mine related traffic and operational activities will generate noise within the Mine area.
- The remote locality of the Mine has few receptors in close proximity.

Light Pollution

- The Mine will operate for 24 hours a day, with the need to have lighting for operational and security purposes.
- The remote locality of the Mine has few receptors in close proximity.

8.1.11 Socio-economic characteristics

Approximately 90% of the region is used for livestock grazing and production, with the remainder comprising of agriculture and urban development. Tourism is a seasonal but rapidly growing feature with visitors to the region arriving almost exclusively between July and October in order take in the world renowned yearly flower display. Urban development is not a major feature of the landscape, and is not expected to increase much in the coming years.

The project site falls within the Namakwa District Municipality, and the Local Municipality of Nama Khoi. The socio-economic profiles are referenced from the IDPs and included below.

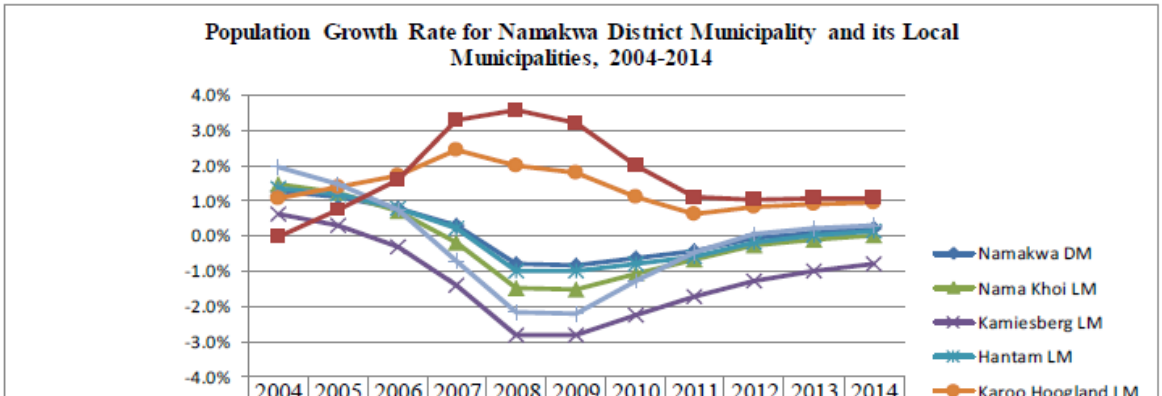
The **Namakwa District Municipality** is sparsely populated, with a population of 115 842 and is the least populated district in the Northern Cape Province (and Country, although geographically the largest) with a population comprising 10.11% of the Province's total population.

- The average growth rate for GGP in the area from 1996-2011 was 5.4 % and in 2007-2011 this slowed down slightly to an average growth rate of 4.8%.
- The largest contributing sector to employment in the local economy (21.12% of total employment in the formal sector) is the retail, catering and accommodation sectors.

The population growth rate of the **Nama Khoi Local Municipality** located within the Namakwa District is shown as improving from a negative growth rate to 0%, as illustrated in **Figure 6** below (sourced from the Nama Khoi Draft IDP 2018 2019).

Figure 6: Population growth rate in the Namaqua District Municipality (Source: Nama Khoi Draft IDP 2018 2019)

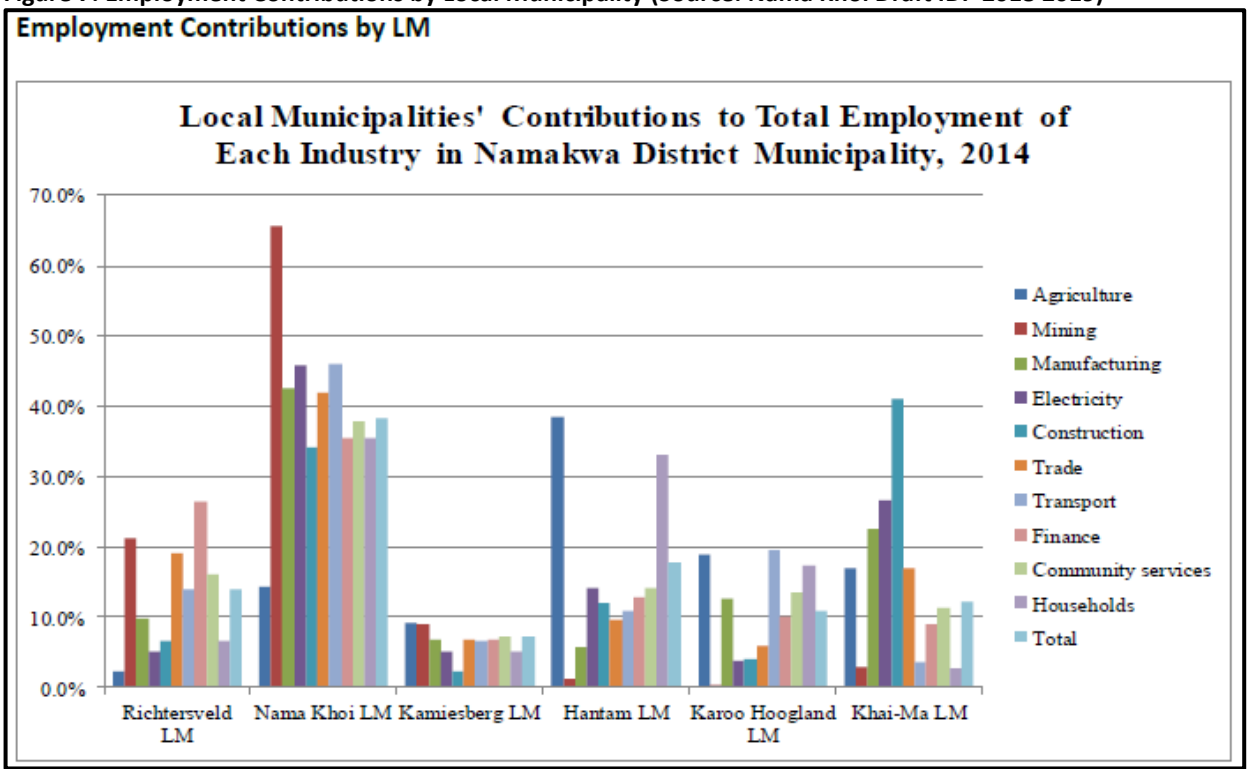
Population growth rate in Namaqua District Municipality



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Namakwa DM	1.2%	1.1%	0.8%	0.3%	-0.8%	-0.8%	-0.6%	-0.4%	-0.1%	0.1%	0.2%
Nama Khoi LM	1.5%	1.2%	0.7%	-0.2%	-1.5%	-1.5%	-1.1%	-0.7%	-0.3%	-0.1%	0.0%
Kamiesberg LM	0.6%	0.3%	-0.3%	-1.4%	-2.8%	-2.8%	-2.2%	-1.7%	-1.3%	-1.0%	-0.8%
Hantam LM	1.3%	1.2%	0.8%	0.2%	-1.0%	-1.0%	-0.8%	-0.6%	-0.2%	0.0%	0.1%
Karoo Hoogland LM	1.1%	1.4%	1.7%	2.4%	2.0%	1.8%	1.1%	0.6%	0.8%	0.9%	0.9%
Khai-Ma LM	2.0%	1.4%	0.7%	-0.7%	-2.2%	-2.2%	-1.3%	-0.5%	0.0%	0.2%	0.3%
Richtersveld LM	0.0%	0.7%	1.6%	3.3%	3.6%	3.2%	2.0%	1.1%	1.0%	1.1%	1.1%

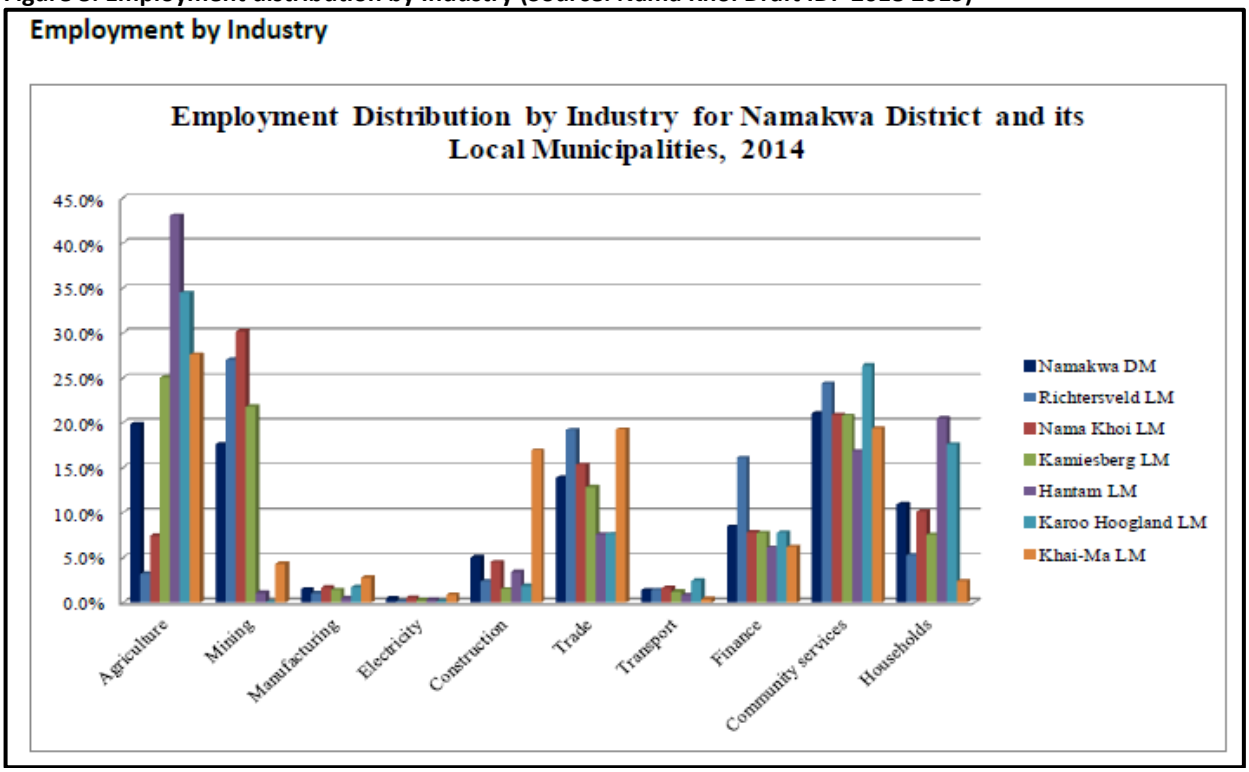
Nama Khoi had the largest number of people employed, unemployed, economically active and not economically active in 2004 and 2014. In 2014 Nama Khoi made the largest contribution to employment in the following industries (**Figure 7**): mining (65.6%), manufacturing (42.6%), electricity (45.7%), trade (42.0%), transport (46.0%), finance (35.4%), community services (37.9%) and households (35.3%). This municipality also employed the largest proportion of people in the district, accounting for 38.2 per cent of the people in formal employment.

Figure 7: Employment Contributions by Local Municipality (Source: Nama Khoi Draft IDP 2018 2019)



Mining was the largest employing industry in 2014 in Richtersveld and Nama Khoi as illustrated in **Figure 8** Below.

Figure 8: Employment distribution by Industry (Source: Nama Khoi Draft IDP 2018 2019)



8.1.12 Cultural, Heritage and Palaeontological Resources

8.1.12.1 Heritage Impact Assessment

A Heritage Impact Assessment was prepared by David Morris and Abenicia Henderson, dated June 2018 (McGregor Museum, Kimberley (attached as **Appendix C1**) and was submitted to the South African Heritage Resources Agency (SAHRA) during the 30-day public participation comment period. Proof of submission is included in Section 10 of **Appendix B**. Interim comment was received on 8/01/2019, as included in **Appendix B**. The recommendations and/or mitigation measures stipulated by SAHRA have been included in the DEIR, EMPr, Impact Tables (**Appendix F**), and Closure Plan (**Appendix G**).

As referenced from the HIA (on page 9): "Copper was discovered by Dutch colonials in 1685 in the Northern Cape province of South Africa during an expedition led by Simon van der Stel.

The beginning of commercial mining in the area only commenced once The South African Mining Company started mining operations in 1846 (Smalberger, 1975). In 1852, a company called Phillips and King purchased the farm upon which the town of Springbok is located today. Phillips and King owned the Spektakel, Nababeep and Okiep mines which were later taken over by the Cape Copper Company. Another company called Namaqua Copper Company had mining operations at Concordia, an area north east of Okiep. In 1919, the Cape Copper Company ceased their operations in the area due to the post First World War economic slump. Most of the mines today are inactive with only remnants of past usage.

Historically, both Okiep and Nababeep are important towns in the history of copper mining in Namaqualand (Smallberger 1995). Okiep was for many years the centre of the Namaqualand copper fields and was known at the turn of the 20th century as the richest copper mining area in the world. The mining town of Nababeep developed shortly after Okiep."

Most of the area traversed during the survey was found to have low occurrences of colonial and archaeological traces. The areas of immediate impact were the focus of the assessment and were as follows (**Appendix C1**; pages 13 and 14):

"On Portion 3 of the farm Nababeep 134: Fine Residue dam

In light of this area many surface scatters in terms of archaeology and pre-colonial traces were found. Three ovens- "bak oonde" were found in isolated areas across the terrain (co-ordinates indicated in Table 3); in close proximity to this were marked and unmarked porcelain, glass and ceramic sherds. From what could be identified from one marked piece was the Royal Staffordshire Pottery: Wilkinson LTD England dinnerware symbol which was in use during the early 19th century. Finding ceramic pieces in close proximity to the burnt oven is indicative of occupation during that time.

Stonewalling structures which might have been used as a dwelling or kraal have also been found near the ovens as well as a 20th century homestead foundation. Surface scatters of lithics occur across the terrain in sparse isolated frequencies.

Upslope on the hilly area an MSA quartzite handaxe was found near what is perceived as the quartz source with no flaked nodules. Water slopes running downhill indicate that the surface scatters found in the plateau might have been washed down, from this possible platform of habitation. No rock art sites were found during a search of any of the rocky overhangs and shelters

Further north from the dam the landscape changes exposing a sandier area, which indicates that the area has been disturbed; it is also seen by the Mica piles (mining dumps) and demolished infrastructure that used to be there.

On portion 3 of the farm Nababeep 134 Wheat Flat Incline

No significant archaeological observations were made in this area. Isolated Stone Age and sparse scatters were recorded throughout the study area. The raw material used consists mostly of quartzite and quartz. Previous studies have mentioned similar landscapes to be either bereft of Stone Age traces or to have a very low frequency of occurrences (Kaplan 2010; Janeker & Mosajee 2010). From the small and isolated sample, it is difficult to comment definitively on typology but the material ranges from Pleistocene to Holocene.

This area has been previously disturbed and is indicated by the prospecting drill holes, bore hole, ventilation shaft and copper pegs- past remnants of mining activities which have already taken place.

Artefact densities were generally low and sporadic and therefore recorded as occurrences of low to very low archaeological significance. Quartz clusters in isolated areas could contain possible lithics but it is difficult to tell by the way quartz naturally brakes. It is therefore maintained that the proposed development will not have an impact of great significance on archaeological remains."

The sites listed in Table 3 of the AIA (on page 15) all have low significance are the co-ordinates are provided and mapped on page 16.

The report concluded that Precolonial/Stone Age material noted and investigated on farm Nababeep 134 was found to be of generally low significance.

- On archaeological grounds, the Stone Age occurrences, generally sparse, can be said to be of mainly low significance.

- For colonial era context, the site has a low to medium significance of occurrences in terms of physical heritage traces.

The report states that no mitigation is required, other than the need for monitoring during construction as artifacts could occur sub-surface.

The recommended mitigation measures for monitoring will be included in the EMPr, which is a component of the EIA Report.

8.1.12.2 Palaeontological Assessment

A desktop Palaeontological Assessment (attached as **Appendix C2**) was prepared by Professor Marion Bamford, Director of the WITS Evolutionary Studies Institute for ACO Associates. Professor Bamford stated that based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the gneisses, schists, granites, amphibolites and sands are typical for the country and do not contain any microfossils, fossil plant, insect, invertebrate and vertebrate material, and made the following recommendation:

"Based on the ancient volcanic rocks and the lack of any previously recorded fossils from the area, it is extremely unlikely any fossils would be identified in the proposed site. No further palaeontological assessment is required. As far as the palaeontology is concerned the project may continue."

8.2 Description of the current land uses

There are existing mining sites in the project area, as detailed in Section 3 above. The existing Mine Shaft known as Flat Mine North has been closed for a number of years. There are existing disturbed development footprints associated with the operation of the mine at that time in close proximity to FMN, such as a rock waste dump, and collection dam, and there is an old slimes dam further south (as shown on Diagram 5.1.1) that has been identified as the best location for the MRDF.

Refer to **Figure 1** and Section 8.1.2 above, and **Figure 5** that shows the status of mines in the local area (the red dots represent deposits exploited, and the green dot is a dormant mine located in Nababeep).

8.3 Description of specific environmental features and infrastructure on the site

Refer to the Mine Site Plans (Diagram 5 series) that provide an overview of the project site and the existing and proposed infrastructure of each mine site.

Figures 1 to 5 and the corresponding paragraphs in Section 8.1, provide a description of the environmental features on site.

8.4 Environmental and current land use map

Refer to **Figures 1 to 5** in Section 8.1 provided as part of the specific attributes of the proposed project site.

9 IMPACTS IDENTIFIED

The potential risks arising from the mining operation discussed in Section 3 above are applicable to the proposed mining right application as listed below.

9.1 Potential Risks/Impacts

9.1.1 Potential Risks with regard to mining underground

- Safety of personnel mining underground.
- Use of explosives.
- Management of dust, noise and vibration associated with blasting of ore.
- Ventilation required.
- Dewatering of groundwater required.
- Potential contamination of groundwater.
- Potentially dangerous areas like deep mine shafts or equipment left behind and uncontrolled access to a potentially unsafe post-mining area.

9.1.2 Potential risk of environmental impacts

- Waste classes not kept in separate streams and incomplete removal of waste.
- Large volumes of waste rock that requires a large waste rock dump site.
- Creation of waste rock residue deposits or stockpiles (MRDSF) with infiltration of leachate due to inadequate basal sealing or leakage from sealed pollution control facilities.
- Stockpiles and leftover product left behind.
- Loss of indigenous vegetation.
- Increased erosion, dust generation and potential chemical contaminants reduce surface water quality or result in discharge that exceeds the maximum concentrations permitted.
- Vehicle wash bays and workshop facilities produce petrochemical and solvent contaminated runoff.
- Sanitary conveniences, fuel depots or storage facilities of potentially polluting substances can contaminate surface water.
- Oil fuel leaks onto soil through the earthmoving and transport equipment and machinery or spillage of fuel during transfer from fuel bowser to equipment in the field.
- Inadequate capping or sealing of the boreholes can lead to infiltration of potentially contaminated surface water leading to chemical or biological contamination of groundwater.
- Pumping of process water can discharge poor quality water exceeding minimum standards.
- Groundwater recovery from drawdown during mining operations taking a long time, post-operation.
- Post mining landscape that increases the requirement for long term monitoring and management.
- Unwanted ruins, buildings, foundations, footings and waste management practices creating or leaving legacies.
- Sub-surface infrastructure remaining behind, limiting the intended post closure land use including footings and foundations and power supply and water installations including pumps and pipelines.
- Equipment and other items used during the mining operation left behind.
- Incomplete removal of re-usable infrastructure.
- Rubble from demolished infrastructure left behind.
- Post mining topography not compatible with original landform.

9.1.3 Potential risks with regard to viable and sustainable land

- Uncontrolled expansion of mining footprint by not restricting the area disturbed by mining and the associated activities/infrastructure, resulting in loss of land with agricultural potential. Uncontrolled development of roads where existing farm roads are not used for mining operations and redundant internal roads are left behind. Duel used roads required by the landowner and fences not maintained or repaired.
- Post mining landform not compatible with the surrounding landscape and not capable of a productive land use that achieves a land capability equal to that of pre-mining conditions
- Long term changes in land use caused by not implementing prompt rehabilitation and maintenance of disturbances when possible as part of annual rehabilitation plan.
- Unsuccessful rehabilitation can reduce the post-mining land use options. Rehabilitated areas could be too unstable to support post-mining land use objectives compatible with surrounding areas.
- Disturbance of agricultural potential and subdivision of high potential arable land into uneconomic farming units. Inadequate planning or loose development can subdivide high potential land or habitats into un-viable small areas.
- Disturbance of ecology due to loss of habitat and cumulative impact of illegal collecting during long-term or life of mine can degrade areas and reduce the viability of adjacent areas. Inadequate control of alien species can result in establishment of populations or seed sources that threaten adjacent areas.

9.1.4 Potential Risks with regard to stable, free draining post mining landform

- Impact on surface water through modification of infiltration rates by increasing the extent of hardened surfaces.
- Inadequate topsoil restoration or creation of unnatural surface topography or slope form which could impact lower or adjacent slopes due to increased runoff velocity.
- Altered storm water runoff response due to large impervious areas and concentrated runoff in drainage systems. Concentrated storm runoff from infrastructure areas is erosive, causing sheet, rill and donga erosion features.

9.1.5 Potential Risks with regard to the social environment

- No positive and transparent relationships with stakeholders and not maintaining communication channels by not providing stakeholders including government authorities with relevant information as per legislative requirements.
- Not undertaking environmental management according to approved EMPr and plans and no auditing of the environmental management system.
- Disturbance to sensitive environments such as land with historical or conservation value, urban areas, watercourses, high potential agricultural land, transport infrastructure, power transmission lines. Slow continuous damage to habitat such as wood collection, is a typical impact on adjacent areas.
- Staff losing their jobs - mine closure can have devastating effects on communities that are reliant on mine-based income. Job losses of secondary industries, businesses and contractors. Contractual agreements with service providers surpassing mine closure date.
- Closure standards not accepted and/or are changing. Mine closure being jeopardised by other land uses.
- Poorly defined transition from mining to farming activities within different legislation.
- Mine closure stalled due to non-compliance with South African legislation (national, provincial and local).
- Insufficient funds to complete rehabilitation.
- Use of public road to gain access to mining operations.

9.1.6 Potential Risks with regard to aesthetic impact

Terrain morphology plays a critical role in defining the visual envelope of mining developments and can either reduce or enhance visual impact. Apart from visual intrusion there is also the risk of reduced sense of place. The visual intrusion impact of mining activity would be on nearby roads, homesteads, settlements and tourist sites.

- Visual disturbance from the public road views – excavations or overburden dumps blocking views. Large buildings, colour contrast of disturbed areas against adjacent veld or dust emission plumes.
- Nuisance effects of air emissions (dust) no implementation and maintenance of dust monitoring programs accompanied by dust suppression activities if required.
- Dust generated on haul roads reduces visibility, representing a safety hazard. Dust can retard vegetation growth and reduce the palatability of vegetation.
- The cumulative effect of a raise in the ambient noise levels or high noise levels in specific areas that exceed specified levels.
- Noise disturbance and light pollution as a result of night-time activities.

9.1.7 Potential Risks with regard to archaeological sites, cultural heritage sites or graves

- Disturbance of unknown sub-surface archaeological sites if monitoring is not implemented as per mitigating measures in AIA (**Appendix C1**).
- Progressive development can encroach upon or disturb archaeological sites, cultural heritage sites or graves.

9.2 Potential Impacts and Risks associated with the Preferred and Only Alternative

Refer to Section 6 above, which describes the location, type of activity, design or layout, technology and operational alternatives, and the reasoned deduction for the preferred and only alternative, that of the SAFTA Mining Right as per the Mine Plan shown in the Diagram 5 series. The potential impacts and risks associated with this preferred and only alternative are listed in Table 11 below, and detailed in **Appendix F: Impact Tables**.

Table 11: Preferred and Only Alternative: Potential Impacts and Risks per Phase per Activity

Phase	Activities	Potential Impacts & Risks	Significance (before mitigation)	Probability	Duration
CONSTRUCTION PHASE	Access & Haul Roads	Dust generation & soil compaction from vehicles using existing public access road and haul roads.	Medium (-)	Definite	Short-term
		Widening of existing access road impacting on public transport and water course.	Medium (-)	Definite	Short-term
	Construction of Site Establishment Activities for : • Processing plant and associated infrastructure • Water and wastewater infrastructure • Electricity infrastructure • Waste management • Stormwater control • Access roads	Topsoil stripping and stockpiling, soil erosion and soil compaction	Medium (-)	Probable	Short-term
		Surface Water resource pollution	High (-)	Unlikely	Short-term
		Groundwater: • Quantity water for construction phase to be sourced from mine shaft (FMS-VS1) • Quality: Potential for contaminants to pollute groundwater	 High (-) High (-)	 Unlikely Unlikely	 Short-term Long-term
		Biodiversity (wildlife and vegetation) disturbance from activities and vehicles	Low (-)	Definite	Short-term
		Soil contamination and waste management: • Storage of hazardous materials, such as hydrocarbons (feuls) for the construction phase. • Waste generated during construction phase.	Medium (-)	Possible	Short-Term
		Visual impact	Medium (-)	Definite	Short-term
		Emissions (dust, vehicles, noise, light): Air emissions causing nuisance from top soil stripping, site establishment activities, earth moving equipment, mobile machinery and vehicles during the construction phase. These include wind-blown dust and fugitive emissions. The noise sources during construction phase will be from the excavation, blasting (as part of preparation of the mine), earth moving equipment, mobile machinery, vehicles, and plant construction activities; traffic associated with the transport of construction materials and construction workers will result in increased noise levels along the public road. Light emissions from night time activities.	Medium(-)	Definite	Short-term
		Socio-economic impact: • Job security, employment creation and economic spin-offs with potential impact on local community demographics associated with influx of workers looking for opportunities, and the presence of construction workforce from outside local project area will result in change in demographics of local communities. • Equipment and activities will create noise and vibration and changes to air quality during construction, operations and demolition that could impact human health. Movement of materials and workers during construction could impact public safety.	 Medium (+) Medium (-)	 Definite Definite	 Short-term Short-term
		Impact on archaeological resources	Very Low (-)	Unlikely	Long-term

OPERATIONAL PHASE	Services and associated infrastructure Primary Processing operation Water and wastewater management Waste generation and management Mine Residue Disposal Storage Facility (MRSDF) Waste rock dumps Access roads	Change in topography above ground due to rock waste dumps and FRD.	Medium (-)	Definite	Long-term
		Creation of voids below ground from abstraction of rock materials.	Medium (-)	Definite	Long-term
		Erosion control or runoff diversion structures and soil compaction (land capability)	Medium (-)	Definite	Long-term
		Ground Water resources: • Quantity: process water obtained from mine shafts (NEM-MS and possibly FMS-VS1) and recycled during operation. • Quality: potential for groundwater pollution from hydrocarbons, hazardous chemicals, and MRDSF (lined versus unlined).	High (-) High (-)	Definite Possible	Long-term Long-term
		Surface Water Resources: • Watercourse impacted positively through dewatering of mine shafts disposed of into polluted watercourse (subject to DWS approval), and • Potential for contamination from hydrocarbons, hazardous chemicals and incorrect management of the MRDSF.	High (+) dilution of pollution watercourse High (-) pollution risks	Possible Unlikely	Long-term Long-term
		Biodiversity (wildlife and vegetation) disturbance from activities	Medium (-)	Definite	Long-term
		Soil contamination and waste management: • Storage of hazardous materials: such as hydrocarbons and fuel, and chemicals (Xanthate; Dow Frother) for the operational phase. • Waste generated during operational phase.	High (-)	Possible	Short-term
		Visibility of mining operations	Medium (-)	Definite	Long-term
		Emissions (Noise, Air , Odour, Light): • Blasting activities at the mine and the transport of materials to the processing plant will result in dust generation. In addition, machinery and vehicles will also generate emissions into the atmosphere. Dumps and stockpiles may also be a source of wind-blown dust. Light emissions at night from mining activities. • MRDSF Dust suppression if required.	Medium (-) Medium (-)	Definite Possible	Long-term Long-term
		Socio-economic impact: • Job security, employment creation and economic spin-offs with potential impact on local community demographics associated with influx of workers looking for opportunities, and the presence of operational workforce from outside local project area will result in change in demographics of local communities. • Equipment and activities will create noise and vibration and changes to air quality during construction, operations and demolition that could impact human health. Movement of materials and workers during operation could impact public safety. • Road access improved through upgrading and improving access for community. • Safety during underground blasting, and associated with storage of explosives on site in magazine. Safety within the Zone of Influence of the Tailings Storage Facility (refer to Appendix E), which has been given a Medium Hazard Classification.	Medium (-) Medium (-) Medium (-) Medium (-)	Definite Definite Definite Possible	Long-term Long-term Long-Term Long-Term
		Impact on archaeological resources	Very Low (-)	Unlikely	Long-term

DECOMMISSIONING PHASE & POST-OPERATION PHASES	Decommissioning & Rehabilitation of the MRDSF	Removal of all associated infrastructure; construction of stormwater decant points from TSF basin; placement of soil layer to outer slopes and cover layer on top of TSF for vegetation establishment to assist in preventing erosion. Basin of facility must dry before soil layer is place and vegetation can become established. Vegetation establishment through hand planting, seeding or hydro-seeding with an appropriate mix of indigenous species endemic to the area. Establish an aftercare and maintenance programme to ensure closure measures are robust.	Medium (-)	Definite	Long-term
	Groundwater	Monitoring as per Annexure 2 in Appendix E.	High (-)	Definite	Lon-term
	Rehabilitation of the mining right area: removing infrastructure; shaping landscape profile; landscape the waste rock dumps; scarifying compacted areas and vehicle tracks; & replacing topsoil, etc.	Rehabilitation: Visibility of the rehabilitated mining operations; Biodiversity (wildlife and vegetation) disturbance from vehicles; Dust and vehicle emissions from rehabilitation activities. Erosion control on run-off diversion structures. Aftercare and maintenance of cover layers and vegetation.	Medium (-)	Definite	Long-term
		Socio-economic impacts: • Employment during rehabilitation and decommissioning activities followed by end of employment contracts once Mining Right has expired. • Equipment and activities will create noise and vibration and changes to air quality during demolition that could impact human health. Movement of materials and workers during demolition could impact public safety. • Change in demographics after mining closure.	Medium (-) Medium (-) Medium (-)	Definite Definite Definite	Short-term Short-term Short & Long-term

9.3 Potential Impacts and Risks associated with the No-Go Alternative

There would be no change to the biophysical environment with the No-Go Alternative. The No-Go Alternative implies that the Applicant would forgo an opportunity to provide employment opportunities in an area and sector identified for opportunities for job provision and economic growth. There is a renewed demand for copper due to advances in technology, resulting in the potential for re-investment in an existing copper mine. This potential would not be reached with the "no-go" option.

9.4 Methodology used in determining significance of potential impacts

Refer to Table 12 below, which provides the impact assessment criteria applied in the rating of the impacts associated with each phase of the proposed mining activity for the Preferred and Only Alternative. Each impact is assessed in terms of: nature (character status); extent (spatial scale); duration (time scale); probability (likelihood) of occurring; reversibility of the impact; the degree to which the impact may cause irreplaceable loss of resources; the significance (size or magnitude scale) prior to mitigation; the degree to which the impact can be mitigated; and, the significance (size or magnitude scale) after mitigation.

Table 12: Impact Assessment Criteria

ASSESSMENT CRITERIA	
NATURE	
Positive	Beneficial to the receiving environment
Negative	Harmful to the receiving environment
Neutral	Neither beneficial or harmful
EXTENT (GEOGRAPHICAL)	
Site	The impact will only affect the site
Local/ district	Will affect the local area or district
Province/region	Will affect the entire province or region
International and National	Will affect the entire country
CONSEQUENCE	
Loss/gain	The impact will result in loss or gain of resource
No loss/gain	The impact will result in no loss or no gain of resource
DURATION	
Construction period / Short term	Up to 3 years
Medium term	Up to 6 years after construction
Long term	More than 6 years after construction
PROBABILITY	
Definite	Impact will certainly occur (>75% probability of occurring)
Probable	Impact likely to occur (50 – 75% probability of occurring)
Possible	Impact may occur (25 – 50% probability of occurring)
Unlikely	Impact unlikely to occur (0 – 25% probability of occurring)
REVERSIBILITY	
Reversible	Impacts can be reversed though the implementation of mitigation measures
Irreversible	Impacts are permanent and can't be reversed by the implementation of mitigation measures
IRREPLACEABLE LOSS OF RESOURCES	
High	The impact is result in a complete loss of all resources
Medium	The impact will result in significant loss of resources
Low	The impact will result in marginal loss of resources
No Loss	The impact will not result in the loss of any resources
CUMULATIVE EFFECTS	
High	The impact would result in significant cumulative effects
Medium	The impact would result in moderate cumulative effects
Low	The impact would result in minor cumulative effects
SIGNIFICANCE RATINGS	
Very High	Major to permanent environmental change with extreme social importance.
High	Long term environmental change with great social importance.
Medium	Medium to long term environmental change with fair social importance.
Low	Short to medium term environmental change with little social importance.
Very low	Short-term environmental change with no social importance
None	No environmental change
Unknown	Due to lack of information
DEGREE TO WHICH IMPACT COULD BE AVOIDED/MANAGED/MITIGATED	
High	The impact could be significantly avoided/managed/mitigated.
Medium	The impact could be fairly avoided/managed/mitigated.
Low	The impact could be avoided/managed/mitigated to a limited degree.
Very Low	The impact could not be avoided/managed/mitigated; there are no mitigation measures that would prevent the impact from occurring.

9.5 The positive and negative impacts that the proposed activity and alternatives will have

Positive impacts

- Creation of employment and job security with economic spin-offs;
- Provision of copper and tungsten for international markets;
- Income generation for landowners;
- Access road upgrading;
- Integrated waste management;
- Replacing of topsoil and planting of vegetation to rehabilitate disturbed areas, especially the existing disturbed footprint of the proposed location of the MRDSF, and,
- Improved water quality in highly contaminated watercourse caused by pollution from the WWTW.\

Negative impacts

The key potential negative impacts associated with the mining activity include the following:

- Site access:
  - Disturbance of onsite fauna and flora; and,
  - Soil compaction from repeated use of access tracks.
- Site Establishment Activities (including: topsoil stripping and stockpiling, placement of logistics, waste generation and management)
  - Visual intrusion;
  - Emissions (dust, vehicle and noise) from top soil stripping; vehicle and machinery;
  - Wildlife and vegetation disturbance from site preparation;
  - Contamination and disturbance of topsoil and soil from compaction and soil disturbance due to topsoil stockpiling;
  - Waste generation;
  - Water use from boreholes;
  - Dewatering of the mine shafts; and,
  - Public safety on public access road.

- Mining of copper and tungsten and processing activities:
  - Noise caused by the machinery and vehicles on site, and by vehicles going to and from the mining site;
  - Blasting noise and vibration;
  - Visibility of the mining operations;
  - Dust emissions from general site activities (vehicle entrained dust);
  - Disturbance of biodiversity from vehicles;
  - Groundwater use from mine shafts, causing a drawdown in groundwater levels that will last for many years depending of rainfall received in the area;
  - Dewatering of mine shafts;
  - Contamination from hydrocarbon spills, hazardous chemicals and compaction on access tracks;
  - Use of hazardous chemicals in processing;
  - Unmanaged hazardous and general waste;
  - Disposal of fine residue deposits, and impact on groundwater resources;
  - Public Safety within the Zone of Influence of the Tailings Storage Facility, during blasting, and along public access road; and,
  - Disposal of sewage from logistics, and waste water from mining operations;

- Rehabilitation of the mining area, scarifying compacted areas and vehicle tracks, removing mining infrastructure, and decommissioning the MRDSF:
  - Mine shaft stability and slope stability;
  - Slope stability of MRDSF during decommissioning;
  - Dust emission from decommissioning activities (vehicle entrained dust and from MRDSF that needs to dry out); and,
  - Soil erosion of topsoil.

9.6 The possible mitigation measures that could be applied

Refer to Appendix F and Table 19 for the potential mitigation measures included under each impact.

9.7 The outcome of the Site Selection Matrix & Final Site Layout Plan

Refer to Diagram 5.1.1 and 5.1.2 (Note: Location of FMS to be corrected) for the overall mining right site plan and Diagrams 5.2 to 5.5 for the site plan for each component.

9.8 Motivation where no alternative sites were considered

Alternatives have been considered for this project, as described in Section 6 above. There are no reasonable or feasible alternative sites for the mining of the mineral resources, or for the location of the MRDSF, as the site selected is based on the location of the mineral resources and existing shafts, and an existing disturbed footprint for the MRDSF, as described in Section 6.

9.9 Statement Motivating the Preferred Sites

Refer to Section 6 above. The project site has been selected based on the results from prospecting. The layout and technology of each mine shaft and associated infrastructure has been determined by the shape, position and orientation of the mineral resource. Refer to the Overall Site Plan included as Diagram 5.1.1 and 5.1.2. The existing infrastructure and access roads will be utilised, and existing disturbed footprints from previous mining activities at this mine. The operational approach is practical and based on best practice to ensure a phased mining, followed by rehabilitation in sequential stages.

In summary therefore:

- The Preferred and Only Alternative is the Mining and Primary Processing of copper and tungsten on the Mining Right area demarcated in Diagram 2 and Diagram 5 series.
  - The preferred and only **location** alternative of the mining activity is on the earmarked sites shown on the Mine Site Plan as per Diagram 5.1.1 and 5.1.2 (Note: FMS location to be corrected to west of river). The location of the mining logistics, processing components and associated infrastructure have been positioned in relation to the location of the mineral resource below ground, the existing mine shaft at FMN, the existing disturbed footprints in close proximity to FMN, and the suitable topography of these sites for these structures. In addition, the linear type infrastructure such as the electricity supply follows the existing lines of development, such as the existing access road to the north of Nababeep.
  - The preferred and only **activity** alternative is the mining of copper and tungsten based on the mineral resources investigated during prospecting.
  - The preferred and only **technology** alternative for the underground mining, extraction, processing, waste and water management, and use of electricity are those described in Section 6.5.above. The MRDSF is proposed to be lined with a Class C Liner as detailed in Section 6.5 above.
  - The preferred and only **operational** alternative is the highly mechanised underground mining method of long-hole open stoping, and the above-ground primary processing activities (crushing and screening; Milling Circuit; Reagent Make-up and conditioning; Flotation circuit; and, Product Handling) as illustrated in the Plant Flowsheet (Diagram 20).

There are therefore no other reasonable or feasible sites, layouts, activities, technologies, or operational alternatives for further consideration in the impact assessment component, other than the mandatory “no-go” alternative that must be assessed for comparison purposes as the environmental baseline.

9.10 Full Description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (in respect of the final site layout plan) through the life of the activity

Refer to the Impact Assessment Methodology detailed in Section 9.4 above and employed in the rating of impacts detailed in **Appendix F**.

Table 13: Assessment of each identified potentially significant impact and risk for the Preferred & Only Alternative

NAME OF ACTIVITY	PHASE In which impact is anticipated	POTENTIAL IMPACT	ASPECTS AFFECTED	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
POST APPROVAL ACTIVITIES						
Negotiate access with landowner – roads to be used and open or close status of gates to be used	Planning and design	• Loss of vegetation and associated biodiversity • Loss of livestock	• Biodiversity • Landowner's assets	Low (-)	• Unnecessary destruction of vegetation avoided by ensuring that traffic and personnel movement is restricted to demarcated areas. No traffic should be allowed on the rehabilitated areas. • Ensure all gates are kept closed and locked as required by the landowner.	Low (-)
Demarcate mining area as defined in MWP and EMPr		Non-compliance	Legal compliance	High (-)	• Ensure that mining activities are contained within approved boundaries. • Prevent access onto private land by mine workers. • Prevent poaching of game and livestock.	Low (-)
SITE ACCESS & SITE ESTABLISHMENT ACTIVITIES						
Conduct Environmental Induction training of staff	Construction	Poor management of environmental impacts	General environmental management	Medium (-)	Impacts to be addressed: • Hydrocarbon and waste management • Dust control • Traffic safety • Water conservation management	Low (-)
Upgrading of public access road, and haul roads in mine area	Construction	• Soil erosion and compaction • Impact on watercourse	Land capability	Medium (-)	• Protect watercourse and water resource during road improvement • Scarify compacted areas during rehabilitation	Low (-)
Electrical supply to be provided via 11kV powerline from Nababeep substation	Construction	• Use of non-renewable energy • Potential interruption in supply	• Non-renewable energy consumption • Mine safety	Low (-)	• Provide generator to ensure continuous power supply to ensure mine safety.	Low (-)

Construction of Site Establishment Activities for : • Processing plant and associated infrastructure • MRDSF • Water and wastewater infrastructure • Waste management • Hazardous materials storage • Stormwater control measures	Construction	• Soil Erosion • Loss of biodiversity • Emissions (dust, vehicles & noise) • Water resource protection (ground and surface) • Socio-economic impacts (+)	• Land capability • Biodiversity • Air quality • Water Resource management (ground and surface) • Socio-economic spin-offs (+)	• Medium • Low • Low • High	• Topsoil management • Demarcate area for development footprint • Dust reduction • Hydrocarbon, hazardous waste management and overall integrated waste management • Job creation (+) & local economic spin-offs (+)	• Low • Low • Low • Low
Access groundwater from FMS-VS1 during construction	Construction	Water availability	Groundwater resources	High	Groundwater abstraction requires a WULA, Water is recycled in the mining process.	Low
OPERATIONAL PHASE ACTIVITIES						
Services and associated infrastructure Primary Processing operation Water and wastewater management Waste generation and management Mine Residue Disposal Storage Facility (MRSDF) Waste rock dumps Access roads	Operational	• Change in topography • Management of emissions (dust, machinery & noise) • Soil erosion • Soil contamination • Water use (groundwater) • Water quality contamination • Loss of vegetation • Lack of waste management • Visual impact • Safety (public road use; underground blasting and Zone of Influence of MRDSF)	• Land capability • Air quality • Groundwater resources quality and quantity • Biodiversity • Waste management • Visual landscape • Socio-economic impact – public safety	• High • Medium • High • Medium • High • Medium • Medium	• Remove vegetation and topsoil if required and stockpile topsoil. • Limit size of excavation. • Apply for water use license. • Dust management and monitoring • Health and safety protection equipment for noise and dust • Demarcate development footprint • Apply mitigation to reduce visual impact during rehabilitation • Apply mitigation measures contained in MRDSF Report (**Appendix E**)	• Medium-low • Low • Low • Medium-Low • Low • Low • Medium

Transport waste to waste rock dump and dump waste rock	Operational	• Management of emissions (dust, machinery & noise) • Waste management	• Air quality • Waste management	• Medium • High	• Dust and emissions control • Waste dump management	• Low • Medium-Low
Remove topsoil from all development footprints to be used in future rehabilitation	Operational	• Emissions • Visual impact	• Air quality • Visual landscape	• Medium • Medium	• Remove vegetation and topsoil if required and stockpile topsoil. • Management of emissions (dust, vehicles & noise)	• Low • Low
Hazardous chemical and substances storage, including explosives	Operational	• Soil and groundwater contamination • Emission (dust, vehicles & noise) • Safety (staff and community)	• Land capability • Air quality • Groundwater resource • Socio-economic health & safety	• Medium • Medium • High	• Dust reduction • Hydrocarbon and waste management.	• Low • Low • Medium
Personnel amenity use and generation of effluent waste water	Operational	• Soil and groundwater contamination	• Groundwater resource • Land capability	• High • Medium	• Effluent management via purification and recycling systems to contain and treat the waste on site, with recycling of grey water.	• Medium-High • Low
Use of groundwater	Operational	Water quantity and quality	Groundwater resources	• High	• Groundwater abstraction requires an iWULA. • Water is recycled in the mining process and will be purified and recycled in a sewage and effluent management system. • Monitoring as per Appendix 2in **Appendix E**.	• Medium-Low
DECOMMISSIONING PHASE ACTIVITIES						
MRDSF and Groundwater	Decommissioning Rehabilitation	Topography Visual Ground water pollution	Land capability Landscape Groundwater management	Medium (-)	Safety of decommissioned MRDSF Groundwater monitoring (Appendix 2 in **Appendix E**)	Medium-Low (-)
					Waste rock dumping management and rehabilitation	Very low (-)
Remove all structures, foundations and footings not required by landowner	Decommissioning Rehabilitation				Rehabilitation according to Rehabilitation, Decommissioning and Closure Plan attached at **Appendix G**.	Very Low (-)
Rip all hardened areas and allow to revegetate naturally	Decommissioning Rehabilitation					

10 SUMMARY OF SPECIALIST REPORTS

Table 14: Summary of Specialist Reports

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Heritage Impact Assessment	A Heritage Impact Assessment (HIA) was prepared by David Morris and Abenicia Henderson, dated June 2018 (McGregor Museum, Kimberley (attached as **Appendix C1**) Refer to Section 8.1.12.1 above for a description of the findings. According to the HIA, Precolonial/Stone Age material noted and investigated on farm Nababeep 134 was found to be of generally low significance. • On archaeological grounds, the Stone Age occurrences, generally sparse, can be said to be of mainly low significance. • For colonial era context, the site has a low to medium significance of occurrences in terms of physical heritage traces. Mitigation (based on present observations and development proposal as communicated) is not considered to be necessary. The report states that no mitigation is required, other than the need for monitoring during construction as artifacts could occur sub-surface. The following recommendations are made: • Provision for on-going heritage monitoring by an environmental manager acquainted at a basic level with the kinds of heritage resources potentially occurring in the area. • Should unexpected finds be made during development (e.g. precolonial burials; ostrich eggshell container cache; or localised Stone Age sites with stone tools, pottery), the relevant Heritage Authority should be contacted. • Officials from relevant heritage authorities (National, Provincial or Local) to be permitted to inspect the site at any time in relation to the heritage component of the management plan.	 **X** **X**	Section 8.1.12.1 PART B: EMPr **Appendix B**: SAHRA Interim Comment dated 8/01/2019, providing the same mitigation measures listed by the specialists. **Appendix F**: Impact Tables **Appendix G**: Closure Plan
A desktop Palaeontological Impact Assessment (PIA) was provided by Professor Marion Bamford, Director of the WITS Evolutionary Studies Institute	"A Palaeontological Impact Assessment for the proposed mining operation near Nababeep and Springbok, Northern Cape Province" dated 20 March 2018, was prepared by Professor Bamford, who stated that "Based on the ancient volcanic rocks and the lack of any previously recorded fossils from the area, it is extremely unlikely any fossils would be identified in the proposed site. No further palaeontological assessment is required. As far as the palaeontology is concerned the project may continue."	NO RECOMMENDATIONS MADE.	Section 8.1.12.2

	Refer to Section 8.1.12.2 above for a summary of the report. Refer to **Appendix C2**.		
Hydrogeological Assessment Report in Appendix 2 of **Appendix E**. (Revised dated July 2019). Prepared by SRK.	The Hydrogeological Assessment provides the following in Section 12 Conclusions and Recommendations: **Based on the data and information discussed in this report, the following is recommended regarding the** geohydrology at the site: • Groundwater in the area is naturally of poor quality and generally unfit for long term human consumption unless treated by desalination; • Groundwater quality calculated for a blend of water abstracted for process water supply from NEM-MS (95%) and FMS-VS1 (5%) indicates that EC, manganese, fluoride and lead are likely to exceed the DWA (2013) permissible limits for discharging wastewater to water resources; • High sulfate concentrations and above background trace-metal concentrations of groundwater abstracted from FMS-VS1 and NEM-MS are indicative of pollution from the old mines and associated remnants of their sulfide orebodies; • Surface water samples (SW1 and SW3) collected in 2014 in the drainage course running from Nababeep northwards through the site indicate high concentrations of TDS, sulfate and potassium. These may be indicative of pollution from the Nababeep WWTW and possibly also leachate and mine water decant originating from the old Nababeep Mines; • Aquifers in the area is predominantly of the fractured-rock type and are generally low yielding with very low transmissivities, poorly developed fracture systems of limited extent and are classified as minor aquifers. In many areas of the site the bedrock is solid with no fractures and hence no groundwater present. Boreholes drilled in these areas remain dry with no evidence of groundwater ingress; • Groundwater usage in the study area is limited, with only one borehole for domestic and stock watering at Jakkalswater, which is located upstream and c.8 km south-southeast of the site. Until recently, small amounts of groundwater were apparently being abstracted from NNM-MP by Nama Copper for process water. Artesian seepage from exploration drill hole FMS073A west of FMS isalso used as a temporary measure for stock watering. This usage will be ceased once the mining area is fenced off during construction; • The two low flowing (seepage) artesian boreholes are drilled on joint systems extending from the higher lying rocky hills occurring west of FMS; • Modelled groundwater ingress rate at the three mines over the LoM are extremely low ranging from 18 KL/a to 136 KL/a. FME experiences the highest total groundwater ingress of 707 KL, FMS 184 KL and FMN the lowest of 72 KL over LoM. • The post mitigation impact of the proposed mine on the groundwater	**X** **All recommendations included**	PART B: EMPr **Appendix F**: Impact Tables **Appendix G**: Closure Plan

	quantity and quality over a worst-case scenario of 15 years LoM is deemed: – insignificant during the construction phase; – medium (quantity) to low and very low (quality) during the operation phase; and, – very low to insignificant during the de-commissioning phase. • During the post-operational phase, the groundwater level will slowly recover from its maximum drawdown to its pre-project state. Model results indicate recovery after 30 years post-operation (indicated as drawdown below pre-abstraction levels) likely to be 11 m at FME, 14 m at FMN, 19 m at FMS and 44 m at NEM-MS. Full (100%) recovery is likely after 50 to 80 years, albeit this time might be much reduced should exceptionally good rains occur; • The contaminant plume originating from an unlined TSF is likely to cease expanding post-operation and groundwater quality will slowly improve due to recharge dilution and attenuation; • The potential contaminant plume from an unlined TSF does not migrate beyond the site boundary with the maximum concentration never exceeding 40% of the TSF leachate concentration in the upper aquifer. Thirty years post closure the plume appears to have spread <150 m from the TSF perimeter; • The model results indicate that no known private or community water supplies are likely to be impacted by the water level zone of drawdown and potential contaminant plume; and • From a hydrogeological perspective, there is no obvious reason why the proposed mine should not be authorised provided the recommendations in this report are implemented and adhered to. **Based on the data and information discussed in this report, the following is recommended regarding the groundwater resources at the site:** • SME-VS1 can be utilised to supply 60 KL/d during the 8 – 9 months construction period and 6 KL/d during operations. • NEM-MS can be utilised to supply 1 363 KL/d during the 10 or 15-year LoM. • Alternatively, additional process waste water can be sourced from the Nababeep WWTW, which treats c.1 000 KL of wastewater per day. • The groundwater quality from both mine shafts is poor with high salinity (TDS) and sulfate with elevated levels of trace metal concentrations. The water is not suitable for mixing of concrete due to sodium (and sulfate at FMS-VS1) exceeding recommended SANS 51008:2006 limits. The groundwater has a corrosive tendency, especially for Mild Steel. • A groundwater monitoring and management plan as indicated in 8.1.3, 8.2.3, 8.3.3, 8.4.4 and 9 of this report should be implemented (*and included below in this table*). • All essential mitigation measures listed in this report (subsection 8) should be implemented (*as included below in this table*).		

	<u>Mitigation measures during Construction Phase</u> (section 8.1.3 in Appendix 2 of **Appendix D**) **Essential** groundwater mitigation measures during construction are as follows: • Ensure that the design of the TSF and WRD complies with GN R632 published in terms of the NEM:WA: the Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits. • Limit abstraction to 130 KL/d over an eight hour per day, followed by 16h recovery, before the next pumping schedule commences. • Implement and follow water saving procedures and methodologies. • Take care that onsite sanitation facilities are well maintained and serviced regularly. • Place oil traps under stationary machinery, only re-fuel machines at fuelling station, construct structures to trap fuel spills at fuelling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only. • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials; • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained. • Ensure that good housekeeping is implemented. **Best practice** groundwater mitigation measures during construction are as follows: • Implement a monitoring system to record the abstraction point's (NEM-MS) water level and volume abstracted on a regular basis, i.e. at least monthly, preferably weekly; • Monitor water levels in FMS073A, NEM-MS, NNM-MP, FMS-VS1, and FMN-VS on a regular basis, i.e. at least monthly, preferably weekly; • Collect water samples at FMS073A, NEM-MS, NNM-MP, FMS-VS1, and FMN-VS every 3 months and submit to SANAS accredited laboratories for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH4, Cl, SO4, Total Alkalinity, PO4, F, NO3), VOC, TOC and trace-metals (Fe, Al, Se, Cu, Pb, Zn, Cd, As, Sb and U) and microbiology; • Adhere to the recommended abstraction rates indicated (in subsection 4.6 in Appendix 2 of **Appendix E**); • Minimise storage of hazardous substances onsite during construction; • Service construction vehicles at a commercial service station if possible; • Maintain vehicles to limit the potential for accidental hydrocarbon spillages; • Encourage contractors to report, react and manage all spills and leaks so that any subsequent spills can be cleaned up immediately to prevent		

	contamination of the groundwater; and, • Maintain and service onsite sanitation facilities regularly. **<u>Mitigation Measures during Operational Phase</u>** (see Section 8.2.3 in Appendix 2 of **Appendix E**): **Essential** groundwater mitigation measures during operations are as follows: • Implement and follow water saving procedures and methodologies; • Take care that onsite sanitation facilities are well maintained and serviced regularly; • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials; • Place oil traps under stationary machinery, only re-fuel machines at fuelling station, construct structures to trap fuel spills at fuelling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only; • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials; • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained; • Ensure that good housekeeping rules are applied, and emergency spill clean-up procedures and equipment are in place; • Incorporate adequate lining, under drainage and seepage collection facilities into the TSF design; • Design and construct the RWD and SWD with adequate liners in place; • Draw-up and strictly enforce procedures to handle accidental spillage and leaks at process water producing/using facilities and pipelines; • Slope the WRD and RoM Stockpiles to prevent rainwater ponding and maximises storm water runoff; • Channel dirty stormwater runoff to the SWD; and, • Incorporate adequate leakage detection and spill control measures in the facility's design and construction. **Best practice** groundwater mitigation measures during operation are as follows: • Install a groundwater monitoring system with monitoring boreholes drilled upstream and downstream of facilities where potential groundwater risk is highest, i.e. TSF, RWD, SWD and Treatment Plant. Suggested number of monitoring boreholes are as follows: – TSF and RWD – one upstream and two downstream; and – SWD – one upstream and one downstream.		

	• Install a monitoring borehole upstream of the site on the Nababeep Fault to monitor background groundwater level and chemistry downstream of the old Nababeep mine site; • Install a monitoring borehole downstream of the site on the Nababeep Fault to monitor groundwater level and chemistry downstream of the site; • Monitor groundwater dewatering discharge and water quality at the three SAFTA underground mines, i.e. FMS, FME and FMN; • The groundwater monitoring should include the following: – The water levels at all monitoring boreholes and the NEM-MS must be recorded on at least a monthly basis. Best results are obtained if automatic flow meters and water level recorders set to take hourly readings are installed; – Water samples must be collected at all monitoring boreholes, the NEM-MS and the three SAFTA mines on a three-monthly basis and submitted to a SANAS accredited laboratory for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH4, Cl, SO4, Total Alkalinity, PO4, F, NO3), COD and trace-metals (Fe, Mn, Al, Se, Cu, Pb, Zn, Cd, As, Sb and U); and, – A SACNASP registered hydrogeologist should evaluate the monitoring data on an annual basis and compile a monitoring report. • Adhere to the recommended abstraction rate for NEM-MS (indicated in subsections 4.6 of in Appendix 2 of **Appendix E)**; and • Minimise storage of hazardous substances onsite during operation. **<u>Mitigation measures during Decommissioning Phase</u>** (See Section 8.3.3 in in Appendix 2 of **Appendix E**) **Essential** groundwater mitigation measures during decommissioning are as follows: • Take care that onsite sanitation facilities, machinery and vehicles are well maintained and serviced regularly; • Place oil traps under stationary machinery, only re-fuel machines at fuelling station, construct structures to trap fuel spills at fuelling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only; • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials; • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained; • Ensure that good housekeeping rules are applied; • Encourage contractors to report, react and manage all spills and leaks so that spills can be cleaned up immediately to prevent contamination of the groundwater;		

	• Limit rainwater infiltration by top-soiling and vegetating the TSF; • Continue to collect and return leachate from the under drainage and seepage collection facilities at the RWD until dry; • Maintain RWD until leachate from the under drainage and seepage collection facilities of the TSF are dry before decommissioning the RWD; and, • Continue with groundwater monitoring detailed (in subsection 8.2 *[as included above]* of in Appendix 2 of **Appendix E**). **Best practice** groundwater mitigation measures during decommissioning are as follows: • Maintain the groundwater monitoring system and procedures described (in subsection 8.2.3 of in Appendix 2 of **Appendix E**); • The groundwater monitoring should include the following: – The water levels at all monitoring boreholes and the NEM-MS must be recorded on at least a three-monthly basis. Best results are obtained if automatic flow meters and water level – recorders set to take hourly readings are installed; – Water samples must be collected at all monitoring boreholes, the NEM-MS and the three SAFTA mines on a three-monthly basis and submitted to a SANAS accredited laboratory for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH4, Cl, SO4, Total Alkalinity, PO4, F, NO3), COD and trace-metals (Fe, Mn, Al, Se, Cu, Pb, Zn, Cd, As, Sb and U); and – A SACNASP registered hydrogeologist should evaluate the monitoring data on an annual basis and compile a monitoring report. **Mitigation Measures in Post-Operational Phase** (see Section 8.4.4 in in Appendix 2 of **Appendix** E) Best practice groundwater mitigation measures during post-operational decommissioning are as follows: • Maintain the groundwater monitoring system and procedures described in subsection 8.2.3 (in Appendix 2 of **Appendix E**) for five years, or as indicated by the regulatory authorities; • Groundwater monitoring should include the following: – The water levels at all monitoring boreholes and the NEM-MS must be recorded on at least a six-monthly basis. Best results are obtained if automatic flow meters and water level recorders set to take hourly readings are installed; – Water samples must be collected at all monitoring boreholes, the NEM-MS and the three SAFTA mines vent shafts if possible, on a six-monthly basis and submitted to a SANAS accredited laboratory for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH4, Cl, SO4, – Total Alkalinity, PO4, F, NO3), COD and trace-metals (Fe, Mn, Al, Se, Cu,		

	Pb, Zn, Cd, As, Sb and U); and – A SACNASP registered hydrogeologist should evaluate the monitoring data on an annual basis and compile a monitoring report. **Groundwater Monitoring System** (Section 9 in Appendix 2 of **Appendix E**) A groundwater monitoring plan as indicated in subsection 8 must be implemented as early as possible, and before the proposed mining activities commence, to identify trends in water level and water quality behaviour in local aquifers pre-development, during construction, operation, decommissioning and post-operation. This information will inform the ongoing implementation and development of a water management strategy and management of impacts within the site area and on downstream or down gradient water users. The results of monitoring, and any changes to the water management strategies, must be reported to management and DWS as per the WUL for specific items, and a detailed monitoring report submitted to the DWS on an annual basis. The report serves to notify DWS of areas of contamination (concentrations exceeding baseline quality) or reduction in water supply and the actions implemented, in progress or planned to address the identified impacts including source identification and control. Water quality data is assessed against the baseline data and subjected to trend analysis and waste load calculations. Should contamination (concentrations exceeding baseline quality) or reduction in water supply be detected, SAFTA will notify the Regional Director of DWS as soon as it is practicable. **Groundwater EMPr** (Section 10.3 in Appendix 2 of **Appendix E**). 1. Lowering of Groundwater Levels during Facility Operation • Implement and adhere to water saving procedures and methodologies. 2. Rise of Groundwater Levels Post-Facility Operation Based on the flow modelling results, which takes into consideration the mining schedules, dewatering, water supply abstraction and natural recharge, the groundwater drawdown levels from the end of the 15-year LoM to 30 years post-facility operation, are likely to change as follows: • FMN (mined & dewatered year 2 to 5) – decline from a drawdown of c.5 m to c.13 m, i.e. a decline of c.0.27 m/a. This decline will cease and start to rise once the rate of recovery at the other two mines have started to reduce, where after full recovery will also likely to be c.50-60 years post-facility operation; • FME (mined & dewatered year 5 to 11) – rise from a drawdown of c.28 m to c.11 m, i.e. a rise ofc.0.57 m/a. Should this rate of recovery continue, the water level might only fully recover c.50 years post-facility operation; • FMS (mined & dewatered year 11 to 15) – rise from a drawdown of c.47 m to c.19 m, i.e. a rise of c.0.93 m/a. Should this rate of recovery continue, the water level might only fully recover c.50 years post-facility operation;		

	• NEM-MS (abstraction over 15 years LoM) – rise from a drawdown of c.67 m (i.e. 138 mbgl) to c.44 m (i.e. 115 mbgl), i.e. a rise of c.0.77 m/a. Should this rate of recovery continue, the water level might only fully recover c.87 years post-facility operation. Note: The decline after closure at FMN, which is to be mined first, is caused by groundwater flowing from this area to recharge the dewatered mine voids at FME, FMS and NEM-MS. Also, actual recovery time could be much reduced by an exceptionally good rainy season, or two. 3. Spread of Groundwater Pollution Post-Facility Operation The model results indicate that the potential contaminant plume from the unlined TSF (worse-case scenario) does not migrate beyond the site boundary with the maximum concentration not exceeding 40% of the leachate concentration in the upper aquifer. Thirty years post closure the plume appears to be confined to the immediate vicinity of the TSF and within <150 m of the TSF perimeter (Figure 7-5 in Appendix 2 of **Appendix E**).		
A Conceptual Design for the **Mine Residue Disposal Storage Facility (MRDSF)** for the SAFTA Copper Project (prepared by epoch dated May 2019) Attached as **Appendix E**.	As per the "Conclusions and Recommendations" in Section 17 of **Appendix E**. The Conceptual Design of the SAFTA MRDF has been undertaken, and the following was concluded: • A site has been identified within the available survey capable of containing the tailings stream over the 10 year LoM; • The TSF conceptual design was undertaken on the basis that the geochemical classification of the tailings were determined as a Type 3 waste product and that a Class C liner is required in accordance with South African legislation; • A hydrogeological study undertaken by SRK indicated a low to very low risk of further contamination of the groundwater reserves in the project location; • A RWD was sized to contain 5 days of slurry water, or 6 000 m³; • A SWD was sized to contain the volume of water that would resulting from a 7 day 1:50 year return period flood over the entire MRDF footprint, or 41000m³; • A high level seepage and stability assessment indicate that the TSF will achieve a Factor of Safety (FoS) of 1.5 with a toe drain and blanket drain in place to provide redundancy under static conditions; • The TSF was assessed under pseudo-static conditions and found to achieve a FoS of 1.1 with active drains; • A high level water balance yielded returns of: – Between 20% – 40% for an unlined facility; and – Between 40% - 60% for a lined facility. For the Definitive Feasibility stage of the project (*applicable on the receipt of a positive EA*), it is recommended that the following be undertaken:	**X**	**Appendix E (MRDSF) report containing the following specialist reports:** ▪ The "Tailings Geochemistry and Waste Classification Report" for the mine tailings is included in this **Appendix E** as Appendix 1. ▪ The "Hydrogeological Assessment" is included as Appendix 2 in **Appendix E**. ▪ The "High Level Seepage and Slope Stability Assessment" is included as Appendix 3 in **Appendix E**. ▪ The "Flood Peak Rational Method Determination" is included as Appendix 4 in **Appendix E**. ▪ The "Information Drawings" are included as Appendix 5 in **Appendix E**. ▪ The "Bill of Quantities" is included as Appendix 6 in **Appendix E**. Section 3.3.8: Description of MRDF and conclusions provided **Appendix F**: Impact Tables **Appendix G**: Closure Plan

	• Based on the recommendations by Digby Wells, the findings from the hydrogeological study that indicate a low to very low further contamination potential of the local groundwater may be utilised to substantiate any softening of the liner requirements at the MRDF; • The geotechnical parameters of a representative sample of the tailings must be determined by an accredited laboratory to determine strength and seepage parameters and confirm the assumptions made with regard to the high level assessment; • A detailed geotechnical investigation must be conducted of the site footprint and include: – Depth of soil to bedrock/refusal; – Depth of in-situ soil layers; – Foundation indicators of the in-situ soils; – Shear strength parameters of the in-situ soils; – Potential dispersiveness and collapse potential of the in-situ soils; – Permeability/hydraulic conductivity of the in-situ soils; and – Identification of any natural fault lines. • A detailed Seep and Stability analysis of the facility be undertaken using the results of the geotechnical investigation; • Accurate rainfall and evaporation data must be acquired for the site, as well as confirmation of the design flood depths to complete a detailed water balance of the MRDF; • Proximity of the MRDF to sensitive flora and fauna in accordance with an Environmental Impact Assessment, as well as its impact on local communities *[to confirm the potential hazard posed within the Zone of Influence as the safety classification has been identified as "medium hazard" in section 10.2 of **Appendix E**];* • An extension to the existing topographical survey would be required to accurately assess the TSF site expandability; • The tailings mass balance (including the potential of utilising tailings as backfill) must be determined for the next phase of study for further refinement to the design of the TSF. • The GA *[no definition provided in **Appendix E**]* may be further optimised and the potential of phasing the preparatory works may be assessed in further studies.		

11 ENVIRONMENTAL IMPACT STATEMENT

11.1 Summary of the key findings of the environmental impact assessment

The significance ratings of impacts after mitigation on the key aspects of the "preferred alternative" and the "no go" alternative are shown per phase in the following tables.

Table 15: Significance Ratings of Impacts after Mitigation during Construction Phase

IMPACTS AND ASPECTS	PREFERRED AND ONLY ALTERNATIVE	NO-GO ALTERNATIVE
1. IMPACT 1: SOIL EROSION AND COMPACTION The clearing of areas for mining logistics, the waste rock dump site, MRDSF and all other infrastructure will result in the removal of existing vegetation and topsoil, which will disturb the soil increasing the potential for soil erosion by wind and loss of soil in the event of rainfall. Soil compaction will result from ongoing repeated use of access tracks.	**Low** **Insignificant Risk**	**N/A**
2. IMPACT 2: SURFACE & GROUND WATER RESOURCES Potential for ground water pollution due to oil spills during routine maintenance of equipment, and potential for polluted run-off into nearby watercourse. Limited use of groundwater during site establishment.	**Low** **Insignificant Risk**	**N/A**
3. IMPACT 3: LIMITED LOSS OF NATURAL VEGETATION AND ECOLOGICAL FUNCTIONING IN AN ESA	**Very Low** **Insignificant Risk**	**N/A**
4. IMPACT 4: POTENTIAL FOR SOIL CONTAMINATION AND WASTE GENERATION DURING CONSTRUCTION PHASE	**Low** **Insignificant Risk**	**N/A**
5. IMPACT 5: VISUAL INTRUSION Caused by machinery, topsoil stockpiles, cleared areas, and movement of trucks on site during preparation of site establishment.	**Very Low** **Insignificant Risk**	**N/A**
6. IMPACT 6: EMMISSIONS (DUST, VEHICLES, NOISE & LIGHT): Noise and dust will be created by site establishment equipment (e.g. front-end loaders), blasting (if required during construction), and vehicles (emitting Greenhouse Gases & other fugitive emissions). Light pollution will occur from safety lighting at the construction camp, etc.	**Very low** **Insignificant Risk**	**N/A**
7. IMPACT 7: PALAEONTOLOGICAL AND CULTURAL IMPACTS Refer to Appendix C1 (AIA) AND C2 (PIA).	**Very Low** **Insignificant Risk**	**N/A**
8. IMPACT 8: CREATION OF EMPLOYMENT & JOB SECURITY WITH LOCAL AND REGIONAL ECONOMIC SPIN-OFFS	**Medium (+)**	**Medium (-)**

Table 16: Significance Ratings of Impacts after Mitigation during Operational Phase

IMPACTS AND ASPECTS	PREFERRED AND ONLY ALTERNATIVE	NO-GO ALTERNATIVE
1. IMPACT 1: CHANGE IN TOPOGRAPHY ABOVE GROUND & GEOLOGY BELOW GROUND: Ore removed below ground will leave voids. Mined ore will be stored as Run of Mine rock stockpiles prior to processing; waste rock dump, and a self-raising Mine Residue Disposal Storage Facility impacting on the site's topography.	**Medium-Low** **Medium Risk**	**N/A**
2. IMPACT 2: SOIL EROSION & SOIL COMPACTION The potential for soil erosion by wind and stormwater run-off; soil compaction from repeated use of access tracks inside mining area.	**Low** **Insignificant Risk**	**N/A**
3.1 IMPACT 3.1: GROUNDWATER RESOURCES: QUALITY & QUANTITY Process water is to be obtained from the Nababeep shaft (NEM-MS), as per the sustainable yield of the groundwater detailed in Appendix 2 in **Appendix E**. Water is to be recycled from the mining operations.	**Medium-High** **Significant Risk**	**N/A**
3.2 IMPACT 3.2: SURFACE WATER RESOURCES A watercourse is located to the west of the logistics area. Management of stormwater run-off to keep clean water from entering polluted water systems.	**Low** **Insignificant Risk**	**N/A**
4. IMPACT 4: LIMITED LOSS OF NATURAL VEGETATION AND ECOLOGICAL FUNCTIONING IN AN ESA The proposed mining area footprint will result in an impact on localised ecological functioning, although limited as much of the site is disturbed from historical mining activities.	**Low** **Insignificant Risk**	**N/A**
5. IMPACT 5: POTENTIAL FOR SOIL CONTAMINATION, AND WASTE GENERATION DURING OPERATIONAL PHASE Waste rock dump; overburden; industrial waste (hazardous wastes, oil & greases); domestic waste; waste water, including effluent & sewage sludge and the MRDSF	**Medium-Low** **Insignificant Risk**	**N/A**
6. IMPACT 6: VISUAL INTRUSION Caused by the machinery, topsoil and rock stockpiles, cleared areas, and movement of trucks on site.	**Low** **Insignificant Risk**	**N/A**
7. IMPACT 7: EMMISSIONS (DUST, VEHICLES, NOISE & LIGHT)	**Low**	**N/A**

Blasting will generate noise, vibration and dust. Hauling vehicles emit Greenhouse Gases and other fugitive emissions. Dust will be generated on access roads, and in rock dumping. Lighting impacts on surrounding communities and fauna.	**Insignificant Risk**	
8. IMPACT 8: HERITAGE, PALAEONTOLOGICAL AND CULTURAL IMPACTS Refer to **Appendix C1 and C2**.	**Very-Low Insignificant Risk**	**N/A**
9. IMPACT 9: CREATION OF EMPLOYMENT & JOB SECURITY WITH LOCAL AND REGIONAL ECONOMIC SPIN-OFFS	**Medium (+)**	**Medium (-)**

Table 17: Significance Ratings of Impacts after Mitigation during Decommissioning Phase

IMPACTS AND ASPECTS	PREFERRED AND ONLY ALTERNATIVE	NO-GO ALTERNATIVE
1. IMPACT 1: REHABILITATION OF MINED AND CLEARED AREAS As per Rehabilitation, Decommissioning and Mine Closure Plan (**Appendix G**)	**Very Low Insignificant Risk**	**N/A**
2. IMPACT 2: GROUND WATER RESOURCES As per Appendix 2 in **Appendix E** and Rehabilitation, Decommissioning and Mine Closure Plan (**Appendix G**)	**Medium-Low Insignificant Risk**	**N/A**
3. IMPACT 3: CREATION OF EMPLOYMENT, JOB SECURITY WITH LOCAL AND REGIONAL ECONOMIC SPIN-OFFS DURING DECOMMISSIONING & CLOSURE PHASE	**Medium (+) Insignificant Risk**	**N/A**

All of the negative identified impacts will occur for a limited period (except for the potential contaminant plume in groundwater for a worse-case scenario of an unlined MRDSF and the recovery of the groundwater levels) and the extent of the negative impacts will be localised. All of the identified impacts can be suitably mitigated. There is a correlation between cumulative impacts post mitigation, and significance rating of impacts after mitigation as indicated in **Appendix F.**

11.2 Final Site Map

Refer to Diagram 5.1.1 and 5.1.2 (Note: location of FMS to be corrected to west of river) above for the location and layout of the Mining Right Application.

11.3 Summary of the positive and negative implications and risks of the proposed activity and identified alternatives

Refer to Tables 11, 13, 15, 16 and 17.

11.4 Proposed Impact Management Objectives and the impact management outcomes for inclusion in the EMPr

11.4.1 Management Objectives

The proposed impact management objectives are listed below:

- Objective 1 - To create a safe and rehabilitated post-mining environment.
  - Ensure safe mining area with no potentially dangerous areas like deep excavations.
  - Topsoil to be stockpiled and replaced during decommissioning and closure, and rehabilitation.

- Objective 2 - To minimise pollution or degradation of the environment
  - Design, construct and manage the MRDSF according to the specialist report (**Appendix E**) and legislative requirements.
  - Provide sufficient information and guidance to plan the mining activities in a manner that would reduce impacts as far as practically possible.
  - Limit residual environmental impact on surface water and soil by ensuring that no fuel or oil spills occur in the mining area causing contamination.
  - Access groundwater in a sustainable manner according to the hydrogeological report (Appendix 2 in **Appendix E**) conditions of the IWUL to be provided by DWS.
  - Ensure that no solid waste or rubble is dumped on the site.
  - Ensure that portable toilets are used in places far from the logistics area (where permanent ablution facilities are provided). Permanent ablution facilities at the logistics areas shall have effluent purification and recycling systems in place to contain and treat the waste on site. The grey water shall be recycled for mining use.

- Objective 3 – To minimise impacts on the community and to provide optimal post-mining social opportunities
  - Ensure that workers remain within the mining right area.
  - Operate during normal working hours only.
  - Minimise the generation of noise and dust.
  - Respond rapidly to any complaints received.
  - Minimal negative aesthetic impact.
  - Optimised benefits for the social environment.

11.4.2 Outcomes

- By providing sufficient information to strategically plan the mining activities, unnecessary social and environmental impacts will be avoided.
- Ensure an approach that will provide the necessary confidence in terms of environmental compliance.
- Provide a management plan that is effective and practical for implementation.
- A well-managed compliant MRDSF that contains the mine residue without causing unacceptable environmental degradation.
- Through the implementation of the proposed mitigation measures it is anticipated that the identified social and environmental impacts can be managed and mitigated effectively.
- Noise generation can be managed through consultation and restriction of operating hours and by maintaining equipment and applying noise abatement equipment if necessary.
- Visual intrusion can be managed through natural vegetation or shade cloth, etc.
- Dust fall can be managed by reducing driving speeds when driving on unpaved roads.
- Wildlife disturbance and clearance of vegetation will be limited to the absolute minimum required and disturbed areas will be re-vegetated with locally indigenous species as soon as possible.
- Surface water and groundwater contamination by hydrocarbons can be managed by conducting proper vehicle maintenance, refueling with care to minimise the chance of spillages and by having a spill kit available on site.

11.5 Final Proposed Alternatives

Refer to Section 6.

11.6 Aspects for inclusion as conditions of authorisation

- All mining and rehabilitation to be conducted as per the approved EMPr, and Rehabilitation, Decommissioning and Closure Plan (**Appendix G**).
- The groundwater management recommendations (refer to Table14) contained in Appendix 2 of **Annexure E** need to be implemented.
- For the Definitive Feasibility Stage the recommendations need to be followed with regard to the MRDSF (refer to Table 14 and **Appendix E**):
- Concurrent mining and rehabilitation must be undertaken wherever possible.
- The proposed mining area must be clearly demarcated with semi-permanent markers.
- The upper 50cm of soil must be removed and stockpiled to be returned after mining by spreading evenly over the mined area.
- Eradicate all alien vegetation in the area during and regularly after mining.
- The Applicant must appoint a suitably qualified ECO who will be responsible for ensuring compliance with the requirements of the EMPr during the mine operation and decommissioning.
  - The ECO must:
    - Inspect the site and record compliance with the EMPr;
    - Inform key, on-site staff of their roles and responsibilities in terms of the EMPr;
    - Ensure that all activities on site are undertaken in accordance with the EMPr;
    - Immediately notify the mine operator of any non-compliance with the EMPr, or any other issues of environmental concern.
- Should any burials or other historical material be encountered during construction, work must cease immediately and SAHRA must be contacted. Refer to **Appendix C1**.
- The mine operation must follow an Integrated Waste Management approach. Control measures must be implemented to prevent pollution of any water resource or soil surface by oil, grease, fuel or chemicals. Appropriate pollution prevention measures must be implemented to prevent dust.
- The ablution facilities at the logistics areas shall have effluent purification and recycling systems in place to contain and treat the waste on site. The grey water shall be recycled for mining use.

- Access via the public access roads shall be managed to avoid traffic impacts and road surface deterioration. The access road shall be maintained during operational activities and the life of the mine.
- A speed limit of 30km/hour will be displayed and enforced through a fining system. All vehicle drivers will be informed of the speed limit applicable to the length of the public access road where local speed limits will be applicable for hauling trucks.
- Haul roads to be upgraded and the mine site farm boundary to be fenced during the LoM.
- The fence around the MRDSF shall be maintained to ensure community safety.

11.7 Descriptions of any Assumptions, Uncertainties & Gaps in Knowledge

- The desk-top research included reference to the SANBI BGIS database map viewer for the various baseline environmental attributes, and any assumptions or gaps in knowledge expressed by SANBI in the provision of this information would be applicable to this information as referenced.
- It is assumed that the proposed mitigation measures as listed in this report and included in the EMPr will be implemented and adhered to. Mitigation measures are proposed which are considered to be reasonable and must be implemented in order for the outcome of the assessment to be accurate.
- It is assumed that the Rehabilitation, Decommissioning and Closure Plan (**Appendix G**) and any annual rehabilitation plans as part of production, will be implemented and adhered to.
- DWS will assess the Water Use Application and the decision to grant of refuse the license with any conditions of the WULA that needs to be implemented by the Applicant will be determined by DWS. Obtaining a WUL will however be one of the conditions for granting of the Mining Right.
- Diagram 5.1.2 and Diagram 5.3.2 shows the incorrect location of FMS on the east of the river and will be corrected in the FEIR.

For the Definitive Feasibility Stage of the Project it is recommended that the following be undertaken with regard to the MRDSF (refer to **Appendix E**):

- Based on the recommendations by Digby Wells, the findings from the hydrogeological study that indicate a low to very low further contamination potential of the local groundwater may be utilised to substantiate any softening of the liner requirements at the MRDF;
- The geotechnical parameters of a representative sample of the tailings must be determined by an accredited laboratory to determine strength and seepage parameters and confirm the assumptions made with regard to the high level assessment;
- A detailed geotechnical investigation must be conducted of the site footprint and include:
  - Depth of soil to bedrock/refusal;
  - Depth of in-situ soil layers;
  - Foundation indicators of the in-situ soils;
  - Shear strength parameters of the in-situ soils;
  - Potential dispersiveness and collapse potential of the in-situ soils;
  - Permeability/hydraulic conductivity of the in-situ soils; and
  - Identification of any natural fault lines.
- A detailed Seep and Stability analysis of the facility be undertaken using the results of the geotechnical investigation;
- Accurate rainfall and evaporation data must be acquired for the site, as well as confirmation of the design flood depths to complete a detailed water balance of the MRDF;
- Proximity of the MRDF to sensitive flora and fauna in accordance with an Environmental Impact Assessment, as well as its impact on local communities *[to confirm the potential hazard posed within the Zone of Influence as the safety classification has been identified as "medium hazard" in section 10.2 of **Appendix E**];*
- An extension to the existing topographical survey would be required to accurately assess the TSF site expandability;
- The tailings mass balance (including the potential of utilising tailings as backfill) must be determined for the next phase of study for further refinement to the design of the TSF.
- The GA *[no definition provided in **Appendix E**]* may be further optimised and the potential of phasing the preparatory works may be assessed in further studies.

11.8 Reasoned opinion as to whether the proposed activity should or should not be authorised

11.8.1 Reasons why the activity should be authorized or not

It is the opinion of the EAP that the proposed granite mining right activity **should be authorised**. In reaching this conclusion the EAP has considered that:

- The "preferred alternative" takes into account location alternatives, activity alternatives, layout alternatives, technology alternatives and operational alternatives.
- The approach taken is that it is preferable to avoid significant negative environmental impacts, wherever possible, and to provide acceptable mitigation measures.
- The role of specialists are key in providing the necessary understanding to key impacts, such as the groundwater sustainability and the MRSDF, required by legislation to follow specific planning and design parameters. These specialist studies are attached as **Appendix E**.
- It is the opinion of the EAP that the underlying biodiversity objectives and ecological functioning will not be compromised, subject to the strict adherence to the EMPr and Rehabilitation, Decommissioning and Closure Plan (**Appendix G**).
- DWS will assess the Water Use Application and the decision to grant of refuse the license with any conditions of the WULA that needs to be implemented by the Applicant will be determined by DWAS. Obtaining a WUL will however be one of the conditions for granting of the Mining Right.
- The activity has been assessed to have a positive socio-economic impact, especially in terms of the creation of employment and the provision of copper and tungsten for the local and international market.
- Provided the recommended mitigation measures are implemented in an environmentally sound manner and mining activities are managed in accordance with the stipulations of the EMPr, and Rehabilitation, Decommissioning and Closure Plan (**Appendix G**), the potential negative impacts associated with the implementation of the preferred alternative can be reduced to acceptable levels.

11.8.2 Conditions that must be included in the authorization

11.8.2.1 Specific conditions to be included into the compilation and approval of EMPr

As per section 11.6 above:

- All mining and rehabilitation to be conducted as per the approved EMPr, and Rehabilitation, Decommissioning and Closure Plan (**Appendix G**).
- Concurrent mining and rehabilitation must be undertaken wherever possible.
- Recommendations from the Hydrogeological Report (Appendix 2 in **Appendix E**) to ensure sustainable groundwater use be included in the EMPr.
- The recommendations for the **Definitive Feasibility Stage of the Project** be undertaken with regard to the MRDSF (refer to **Appendix E**):
- The mine operator must appoint a suitably qualified ECO who will be responsible for ensuring compliance with the requirements of the EMPr during the mine operation and decommissioning.
    - The ECO must:
        - Inspect the site and record compliance with the EMPr;
        - Inform key, on-site staff of their roles and responsibilities in terms of the EMPr;
        - Ensure that all activities on site are undertaken in accordance with the EMPr;
        - Immediately notify the mine operator of any non-compliance with the EMPr, or any other issues of environmental concern.
- Should any burials or other historical material be encountered during construction, work must cease immediately and SAHRA must be contacted.
- The mine operation must follow an Integrated Waste Management approach. Control measures must be implemented to prevent pollution of any water resource or soil surface by oil, grease, fuel or chemicals. Appropriate pollution prevention measures must be implemented to prevent dust.
- A speed limit of 30km/hour will be displayed and enforced through a fining system. All vehicle drivers will be informed of the speed limit applicable to the length of the access road off the N14 where after the national speed limits will be applicable for hauling trucks. The access road will be maintained during operational activities.

11.8.2.2 Rehabilitation requirements

- At final closure geotechnical investigations will identify unstable rock conditions, slopes that require support in the short-, medium- and long-term. Geotechnical slope stabilisation methods including concreting (gunnite), rock

bolting, wire mesh restraint, bench wrecking to lower highwalls, rehabilitative blasting etc. which will be investigated and implemented during decommissioning.

- Waste dumps must be designed to meet minimum slope stability and safety standards and vegetated to reduce erosion and runoff.

11.9 Period for which the environmental authorisation is required

The authorisation is required for the duration of the Mining Right, which is a period of 30 years.

11.10 Undertaking

It is confirmed that the undertaking required to meet the requirements of this section is provided at the end of the report and is applicable to both the Impact Assessment Report (EIR) and the Environmental Management Programme Report (EMPr).

12 FINANCIAL PROVISION

12.1 Introduction

With the repeal of Section 41 of the MPRDA (Act 28 of 2002) that requires that the owner of a mine must make financial provision for the remediation of environmental damage, regulations pertaining to the financial provision for prospecting, exploration, mining or production operations under section 44, read with sections 24 of the National Environmental Management Act, 1998 (Act No.107 of 1998) were issued in 2015.

According to regulation 7 the applicant or holder of a right or permit must ensure that the financial provision is, at any given time, equal to the sum of the actual costs of implementing the plans and report contemplated in regulation 6 and regulation 11(1). In terms of regulation 11(1) the holder of a right or permit must ensure that a review is undertaken of the requirements for:

(a) annual rehabilitation, as reflected in an annual rehabilitation plan;
(b) rehabilitation, decommissioning and closure of the prospecting, exploration, mining or production operations at the end of the life of operations as reflected in a final rehabilitation, decommissioning and mine closure plan; and,
(c) remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an environmental risk assessment report.

Financial provision in terms of reg. 6(c) are covered by the requirements for the actual costs of implementation of the measures required for rehabilitation, decommissioning and closure of the mining operations at the end of the life of operations as reflected in the Rehabilitation, Decommissioning and Mine closure plan in terms of regulation 6(b) and attached as **Appendix G**.

The calculation below is for the environmental and social costs as referenced from Table 24 in the Mining Work Programme (MWP).
The financial guarantee for current operations is already in place with DMR as part of approved closure plans for the Prospecting Right and will be upgraded as part of this environmental authorization and reviewed annually.

Table 18: Table of Costs for Final Rehabilitation, Decommissioning and Closure of the Mining Operations

Cost Category	Year 6	Year 7	Year 8	Year 9	Year 10
Annual rehabilitation, as reflected in an annual rehabilitation plan Reg 6 (a) NEMA Financial Regulation	R 200 000.00	R 200 000.00	R 200 000.00	R 200 000.00	R 200 000.00
Final rehabilitation, decommissioning and closure of the operation at the end of the life of operations, as reflexted in a final rehabilitation, decommissioning and mine closure plan; Reg 6(b) NEMA Financial Regulation **PROGRESSIVE TOTAL**	R 1 000 000.00	R 1 000 000.00	R 1 000 000.00	R 1 500 000.00	R 1 500 000.00
Remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an environmental risk assessment report. Reg 6(c) NEMA Financial Regulation **PROGRESSIVE TOTAL**	R -	R -	R -	R 500 000.00	R 1 000 000.00

Cost Category	Year 1	Year 2	Year 3	Year 4	Year5
Annual rehabilitation, as reflected in an annual rehabilitation plan Reg 6 (a) NEMA Financial Regulation	R150 000.00	R150 000.00	R 150 000.00	R 200 000.00	R 200 000.00
Final rehabilitation, decommissioning and closure of the operation at the end of the life of operations, as reflexted in a final rehabilitation, decommissioning and mine closure plan; Reg 6(b) NEMA Financial Regulation **PROGRESSIVE TOTAL**	R500 000.00	R500 000.00	R 1 000 000.00	R 1 000 000.00	R 1 000 000.00
Remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an environmental risk assessment report. Reg 6(c) NEMA Financial Regulation **PROGRESSIVE TOTAL**	R -	R -	R -	R -	R -

12.2 Explain how the aforesaid amount was derived

According to regulation 6 an Applicant must determine the financial provision through a detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required for:

(a) annual rehabilitation, as reflected in an annual rehabilitation plan;
(b) rehabilitation, decommissioning and closure of the prospecting, exploration, mining or production operations at the end of the life of operations, as reflected in a final rehabilitation, decommissioning and mine closure plan; and,
(c) remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an environmental risk assessment report.

12.3 Confirm that this amount can be provided for from operating expenditure

The amount needed for the implementation of the rehabilitation, decommissioning and closure plan will be provided to DMR in the form of a bank guarantee and the plan will be revised on an annual basis in terms of regulation 11(1) of the NEMA Financial Regulations 2015.

Provision for implementation of the annual rehabilitation plan is to be provided as part of the environmental audit report in terms of Regulation 34 (1)(b) of the NEMA EIA Regulations (2014) and will be provided as part of the operational budget. Proof of access to the necessary fund will be provided as part of the Mine Works Plan (MWP) together with proof of access to the necessary financial resources.

13 DEVIATIONS FROM APPROVED SCOPING REPORT AND PLAN OF STUDY

13.1 Deviations from the methodology used in determining the significance of potential environmental impacts and risks

No deviations were made.

13.2 Motivation for the deviation

Not applicable.

14 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

14.1 Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998)

The EIA report must include the:

(1) Impact on the socio-economic conditions of any directly affected person

Potential socio-economic impacts will be addressed by the specialists who will prepare the Social and Labour Plan which will be completed after the EIA process due to the nature of the process involved. High level socio-economic impacts and mitigation measures are included in Tables 15 to 18 and in **Appendix F**.

A full consultation process is being implemented during the environmental authorisation process. The purpose of the consultation is to provide affected and interested persons with the opportunity to raise any potential concerns. Concerns raised during the Scoping Phase were captured and addressed within the public participation section of this report. The 30-day comment period on the Draft EIR and any subsequent comments will be included in the PPP chapter, attached as **Appendix B** to the FEIR, to inform the decision-making process.

2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act

The specialist heritage resources report is attached at **Appendix C1** and the Palaeontological Report at **Appendix C2** with recommendations included under section 8.1.12 above, was submitted to the South African Heritage Resources Agency (SAHRA) during the 30 day public participation comment period. Interim comment was received on 8/01/2019 as included in Appendix B. The recommendations and/or mitigation measures stipulated by SAHRA have been included in the DEIR, EMPr, Impact Tables (**Appendix F**), and Closure Plan (**Appendix G**). Any additional measures stipulated by SAHRA will be included in the Final EIR.

14.2 Other matters required in terms of sections 24(4)(a) and (b) of the Act

Section 2 of NEMA sets out a number of principles (see section 5.9 above) that are relevant to the:

- EIA process, such as:
  - Adopt a risk-averse and cautious approach;
  - Anticipate and prevent or minimise negative impacts;
  - Pursue integrated environmental management;
  - Involve stakeholders in the process; and,
  - Consider the social, economic and environmental impacts of activities.
- Project such as:
  - Place people and their needs at the forefront of concern and serve their needs equitably;
  - Ensure development is sustainable, minimises disturbance of ecosystems and landscapes, pollution and waste, achieves responsible use of non-renewable resources and sustainable exploitation of renewable resources;
  - Assume responsibility for project impacts throughout its life cycle; and
  - Polluter bears remediation costs.

This EIA process complies with the principles set out in section 2 of NEMA through its adherence to the EIA Regulations, 2014, and associated guidelines, which set out clear requirements for, inter alia, impact assessment and stakeholder involvement, and through the assessment of impacts and identification of mitigation measures during the Impact Assessment Phase.

- The Preferred and Only Alternative and motivation thereof have been considered in Section 6.
- The potential social and environmental impacts of the project have been identified, assessed and evaluated using Green Direction's impact assessment methodology (Section 9.4; Table 12 and **Appendix F**) to understand the significance of each positive and negative impact.
- An EMPr has been compiled to ensure that potential environmental impacts are prevented or minimised.

- Mitigation measures have been recommended in the Impact Assessment Phase to allow for unavoidable impacts on the environment and people's environmental rights to be minimized and remedied.
- Opportunities for additional public participation are provided for in the EIA process.
- The needs and interests of I&APs have been taken into account.
- All relevant information will be made available for public comment before submission to DMR, as part of the public participation process.
- Comments made by the relevant government departments will inform the decisions taken by DMR regarding Environmental Authorisation of the project.

PART B
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

15 DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

15.1 Details of the EAP
Refer to Section 1.1 In Part A above.

15.2 Description of the Aspects of the Activity
Refer to Section 11.6, Table 15, 16 and 17, and **Appendix F**.

15.3 Composite Map
This is addressed in Section 8.

15.4 Description of Impact Management objectives including Management Statements
This is addressed in Section 11.4.1 in Part A above.

15.5 Determination of Impact management objectives including management statements

15.5.1 Determination of Closure Objectives

Objective 1 - To create a safe and healthy post-mining environment

- Safe excavations
  - No potentially dangerous areas, secured if required
- Limited residual environmental impact
  - Rehabilitate the MRDSF as per the Recommendations in **Appendix E.**
  - Develop a landscape that reduces the requirement for long term monitoring and management
  - No surface and/or groundwater contamination
  - Waste management practices not creating or leaving legacies

Objective 2 - To create a stable, free draining post mining landform, compatible with the surrounding landscape

- Economically viable and sustainable land, as close as possible to its natural state.
  - Prepare area to promote natural re-establishment of vegetation that is self-sustaining, perpetual and provides a sustainable habitat for local fauna and successive flora species
  - Prevent long term changes in land use by implementing prompt rehabilitation and maintenance of disturbances when possible as part of rehabilitation plan.
- Stable, free draining post mining landform
  - Prevent alteration or diverting natural drainage lines and reduced natural runoff.
  - Prevent concentration of runoff, mixing of clean runoff with contaminated runoff and creation of large open water bodies.

Objective 3 – To provide optimal post-mining social opportunities

- Optimised benefits for the social environment
  - Positive and transparent relationships with stakeholders and maintaining communication channels, providing stakeholders including government authorities with relevant information as per legislative requirements.
  - Providing opportunities for skills transfer for ongoing employment in mining sector.
  - Undertaking environmental management according to approved EMPr and Closure plans and regular auditing of the environmental management system.
- Minimal negative aesthetic impact
  - Mitigate the nuisance effects of air emissions (dust), visual intrusion and the cumulative effect of an increase in the ambient noise levels
  - Prevent disturbance of archaeological sites and implement mitigating measures according to the archeological assessment if required.

15.5.2 The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity

The mitigation measures contained in **Appendix F** provide the measures for managing any environmental damage, pollution, water or ecological degradation.

In addition, an Environmental Control Officer is required to audit the mine on an annual basis, to ensure that mitigation measures are employed correctly and continuously.

15.5.3 Potential risk of Acid Mine Drainage

The risk of acid mine drainage is to be contained with the Mine Residue Disposal Storage Facility (as per the Conceptual Design attached at **Appendix E**).

15.5.4 Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

The risk of acid mine drainage is to be contained with the Mine Residue Disposal Storage Facility (as per the Conceptual Design attached at **Appendix E**) for the LoM including decommissioning, closure and rehabilitation and ongoing monitoring during the post-operational management phase.

15.5.5 Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage

Refer to the Conceptual Design of the Mine Residue Disposal Storage Facility (**Appendix E**).

15.5.6 Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage

Refer to the Conceptual Design of the Mine Residue Disposal Storage Facility (**Appendix E**).

15.5.7 Volumes and rate of water use required for the mining operation

Refer to the Hydrogeological report attached as Appendix 2 in **Appendix E**.

15.5.8 Has a water use license been applied for?

The iWULA will be submitted as a separate application. Refer to Section 8.1.8.1 above. Clarity has been sought from the Department of Water and Sanitation during the site visit that took place on the 12th November 2018. Written confirmation was received clarifying the WULA requirements as included in **Appendix B**.

The following water use activities need to apply for in the Integrated Water Use License (iWULA):

- Section 21(a): Taking water from a resource.
- Section 21(b): Storing water.
- Section 21(c): Impeding or diverting the follow in a watercourse.
- Section 21(f): Discharging waste or water containing waste into a water resource though a pipe, canal or other conduit.
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on water resource.
- Section 21(i): Altering the beds, banks, course or characteristics of a watercourse.
- Section 21(j): Removing, discharging or disposing of water found underground.

15.6 Impacts to be mitigated in their respective phases

Table 19: Measures to rehabilitate the environment affected by the undertaking of any listed activity

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
SITE ACCESS & SITE ESTABLISHMENT	**CONSTRUCTION**	Mine logistics will be 20.8Ha Processing Plant size will be 26Ha RoM combined stockpile area totals approx. 3.3Ha. Waste rock dump area is 2.8Ha MRDSF totals 32.81Ha Upgrading public access road of 3.4km. Existing roads to be upgraded total approx. 9km. New road access required total approx. 2km.	**Impact 1: Soil erosion & soil compaction** • After clearing, the affected area shall be stabilized to prevent any erosion or sediment runoff. Stabilized areas shall be demarcated accordingly. • Incremental clearing of ground cover should take place to avoid unnecessary exposed surfaces. • Reasonable measures must be undertaken to ensure that any exposed areas are adequately protected against the wind and stormwater run-off. • Top soil shall be removed separately and stockpiled separately from other soil base layers. • Stockpiles should ideally be located to create the least visual impact and must be maintained to avoid erosion of the material. • Topsoil storage areas must be convex and should not exceed 2m in height. • Topsoil must be treated with care, must not be buried or in any other way be rendered unsuitable for further use (e.g. by mixing with spoil) and precautions must be taken to prevent unnecessary handling and compaction. • In particular, topsoil must not be subject to compaction greater than 1 500 kg/m² and must not be pushed by a bulldozer for more than 50 metres. Trucks may not be driven over the stockpiles. • Reduce drop height of material to a minimum. • Temporarily halt material handling in windy conditions. • A speed limit of 30km/hour will be displayed and enforced through a fining system. All vehicle drivers using the access road and entering the site will be informed of the speed limit. • Compacted areas that are not required for access shall be scarified after use during decommissioning and rehabilitation. **Impact 2: Surface and Groundwater resources** **Groundwater Mitigation measures during Construction Phase** (section 8.1.3 in Appendix 2 of **Appendix D**) **Essential** groundwater mitigation measures during construction are as follows: • Ensure that the design of the TSF and WRD complies with GN R632 published in terms of the NEM:WA: the Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits. • Limit abstraction to 130 KL/d over an eight hour per day, followed by 16h recovery, before the next pumping schedule commences. • Implement and follow water saving procedures and methodologies.	NEMA Section 2 Principles Environmental Authorisation IWUL	Start of activity and continuous as mining progresses over the site during construction period (site access and site establishment activities) Upon cessation of each activity where applicable. Immediately in the event of spills

			• Take care that onsite sanitation facilities are well maintained and serviced regularly. • Place oil traps under stationary machinery, only re-fuel machines at fueling station, construct structures to trap fuel spills at fueling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only. • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials; • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained. • Ensure that good housekeeping is implemented. **Best practice** groundwater mitigation measures during construction are as follows: • Implement a monitoring system to record the abstraction point's (NEM-MS) water level and volume abstracted on a regular basis, i.e. at least monthly, preferably weekly; • Monitor water levels in FMS073A, NEM-MS, NNM-MP, FMS-VS1, and FMN-VS on a regular basis, i.e. at least monthly, preferably weekly; • Collect water samples at FMS073A, NEM-MS, NNM-MP, FMS-VS1, and FMN-VS every 3 months and submit to SANAS accredited laboratories for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH4, Cl, SO4, Total Alkalinity, PO4, F, NO3), VOC, TOC and trace-metals (Fe, Al, Se, Cu, Pb, Zn, Cd, As, Sb and U) and microbiology; • Adhere to the recommended abstraction rates indicated (in subsection 4.6 in Appendix 2 of **Appendix E**); • Minimise storage of hazardous substances onsite during construction; • Service construction vehicles at a commercial service station if possible; • Maintain vehicles to limit the potential for accidental hydrocarbon spillages; • Encourage contractors to report, react and manage all spills and leaks so that any subsequent spills can be cleaned up immediately to prevent contamination of the groundwater; and, • Maintain and service onsite sanitation facilities regularly. **Generic mitigation measures for surface water resources** • Manage any road widening activities and construction of culverts and pipelines within the watercourse and (National Water Act Regulated Area), to prevent an increase in suspended solids, turbidity and pollution from machinery entering the watercourse habitat. • Oils and lubricants must be stored within sealed containment structures. • Any mechanical equipment maintenance must be undertaken on drip trays or UPVC sheets to prevent spills/ leaks onto the soil. • When not in use, a drip tray must be placed beneath mechanical equipment and vehicles. • Machinery must be kept in good working order and regularly inspected for leaks. • A spill kit will be available on each site where mining activities are in progress. • Any spillages will be cleaned up immediately and treated in the bio-cells (soil farms) which are located on the adjacent mine. • Waste materials generated on site must be stored in suitable lidded containers and removed off site to a suitable disposal facility. • Waste separation must be undertaken if practical for recycling • Provide all workers with environmental awareness training and comply with the requirements of the EMPr. • Provide a bin at the site and provide a mobile ablution facility.		
			Impact 3: Impact on biodiversity • Refer to **Diagram 5.1.1 and 5.1.2,** which show the proposed areas for mining and the existing tracks that will be used.		

			• Manage any road widening activities and construction of culverts and pipelines within the watercourse and (National Water Act Regulated Area), to prevent an increase in suspended solids, turbidity and pollution from machinery entering the watercourse habitat. • The location of the MRDSF has been earmarked for the existing disturbed area from historical mining activities on the site as shown in Diagram 5.5.1., where there is barren soil, and almost no vegetation. • Remove alien invasive vegetation if required and ensure ongoing alien vegetation clearing in the area. • No indigenous plants outside of the demarcated work areas may be damaged. • The noise and vibration caused by the earthmoving equipment will disturb smaller animals . These will move away whilst operations are in progress. Should any animals be encountered these should be moved away by a suitably trained nature conservation officer, if necessary. • Topsoil is to be stockpiled and replaced during the Decommissioning and Closure Phase.		
			Impact 4: Contamination & Pollution • Oils and lubricants must be stored within sealed containment structures. • Any mechanical equipment maintenance must be undertaken on drip trays or UPVC sheets to prevent spills/ leaks onto the soil. • When not in use, a drip tray must be placed beneath mechanical equipment and vehicles. • Machinery must be kept in good working order and regularly inspected for leaks. • A spill kit will be available on each site where mining activities are in progress. • Any spillages will be cleaned up immediately. • Waste materials generated on site must be stored in suitable lidded containers and removed off site to a suitable disposal facility. • Waste separation must be undertaken. • Provide all workers with environmental awareness training. • Provide a bin at the site. • Regularly dispose of any solid waste at a municipal waste disposal site. • Ensure all workers comply with the requirements of the EMPr. Provide mobile ablution facilities.		
			Impact 5: Visual landscape • The construction areas shall be kept neat and tidy at all times. Equipment must be kept in designated areas and storing/stockpiling shall be kept orderly. • Place shade cloth around the construction site camp to demarcate the area.		
			Impact 6: Emissions • The Applicant shall adhere to the local by-laws and regulations regarding the noise and associated hours of operations. • The Applicant shall limit noise levels (e.g. install and maintain silencers on machinery). The provisions of SANS 1200A Sub clause 4.1 regarding "built-up" area shall apply to all areas within audible distance of residents whether in urban, peri-urban or rural areas. • Construction and demolition activities generating output of 85dB or more, shall be limited to normal working hours and not allowed during weekends to limit the impact of noise of neighbours. No amplified music shall be allowed on site. • Hauling vehicles shall adhere to municipal and provincial traffic regulations including speed limits. • Vehicles used on site for the construction related activities shall be maintained and in a good working condition so as to reduce emissions. • Engines shall be turned off when the vehicle is temporarily parked or stationery for long periods. • Stockpiles must be maintained (covered where necessary) to avoid wind erosion of the material. • Incremental clearing of ground cover should take place to avoid unnecessary exposed surfaces. • Provide lighting to ensure safety standards are met, and direct light away from public areas (such as the		

			public access road). • Ensure workers are supplied with Health and Safety equipment for noise and dust where applicable. • Apply safety standards for blasting. **Impact 7: Heritage resources** • Provision for on-going heritage monitoring by an environmental manager acquainted at a basic level with the kinds of heritage resources potentially occurring in the area. • Should unexpected finds be made during development (e.g. precolonial burials; ostrich eggshell container cache; or localised Stone Age sites with stone tools, pottery), the relevant Heritage Authority should be contacted. • Officials from relevant heritage authorities (National, Provincial or Local) to be permitted to inspect the site at any time in relation to the heritage component of the management plan. **Impact 8: Socio-economic** • Employment of local previously disadvantaged labour wherever possible, with provision of training (upskilling). • Employment of skilled labour.		
Services and associated infrastructure Primary Processing operation Water and wastewater management Waste generation and management Mine Residue Disposal Storage Facility (MRSDF) Waste rock dumps Access roads	**OPERATION**	Mine logistics will be 20.8Ha Processing Plant size will be 26Ha RoM combined stockpile area totals approx. 3.3Ha. Waste rock dump area is 2.8Ha MRDSF totals 32.81Ha Upgrading public access road of 3.4km. Existing roads to be upgraded total approx. 9km. New road access required total approx. 2km.	**Impact 1: Change in Topography** • The waste rock dump must be designed to meet minimum slope stability and safety standards and vegetated to reduce erosion and runoff. • The "valley fill" natural angle of repose of 37° for rock waste dumps is compatible with the natural rocky terrain with steep slopes and no terracing will be required. • The ongoing management of the self-raising MRDSF shall be in accordance with the relevant regulations and as per the Conceptual Design Report contained in **Appendix E**. • The basic rehabilitation methodology will therefore strive to replicate the pre-mining topography, wherever possible, or at least not to increase overall slope gradients without emplacement of adequately designed erosion control or runoff diversion structures.		
			Impact 2: Soil erosion & soil compaction • After clearing, the affected area shall be stabilized to prevent any erosion or sediment runoff. Stabilized areas shall be demarcated accordingly. • Incremental clearing of vegetation should take place to avoid unnecessary exposed surfaces. • Reasonable measures must be undertaken to ensure that any exposed areas are adequately protected against the wind and storm water run-off. • Stockpiles should ideally be located to create the least visual impact and must be maintained to avoid erosion of the material. • Reduce drop height of material to a minimum. • Temporarily halt material handling in windy conditions. • A speed limit of 30km/hour will be displayed and enforced through a fining system. All vehicle drivers using the access road and entering the site will be informed of the speed limit. • Compacted areas that are not required for access shall be scarified after use during decommissioning and rehabilitation. • Provision must also be made for efficient storm water control to prevent erosion. • Soil erosion and compaction on the section of public road, should it remain unsurfaced, used by the Applicant is required to be monitored and timeously repaired. • Soil erosion on private haul roads is to be regularly monitored and repaired.	NEMA Section 2 Principles Environmental Authorisation	During the estimated 10 to 15 year lifespan of the mine. Start of activity and continuous as mining progresses over the site during operational period. Upon cessation of each activity where applicable. Immediately in the event of
			Impact 3.1: Ground Water Resources **<u>Mitigation Measures during Operational Phase</u>** (see Section 8.2.3 in Appendix 2 of **Appendix E**): **Essential** groundwater mitigation measures during operations are as follows:		

			• Implement and follow water saving procedures and methodologies; • Take care that onsite sanitation facilities are well maintained and serviced regularly; • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials; • Place oil traps under stationary machinery, only re-fuel machines at fueling station, construct structures to trap fuel spills at fueling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only; • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials; • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained; • Ensure that good housekeeping rules are applied, and emergency spill clean-up procedures and equipment are in place; • Incorporate adequate lining, under drainage and seepage collection facilities into the TSF design; • Design and construct the RWD and SWD with adequate liners in place; • Draw-up and strictly enforce procedures to handle accidental spillage and leaks at process water producing/using facilities and pipelines; • Slope the WRD and RoM Stockpiles to prevent rainwater ponding and maximises storm water runoff; • Channel dirty stormwater runoff to the SWD; and, • Incorporate adequate leakage detection and spill control measures in the facility's design and construction. **Best practice** groundwater mitigation measures during operation are as follows: • Install a groundwater monitoring system with monitoring boreholes drilled upstream and downstream of facilities where potential groundwater risk is highest, i.e. TSF, RWD, SWD and Treatment Plant. Suggested number of monitoring boreholes are as follows: • TSF and RWD – one upstream and two downstream; and • SWD – one upstream and one downstream. • Install a monitoring borehole upstream of the site on the Nababeep Fault to monitor background groundwater level and chemistry downstream of the old Nababeep mine site; • Install a monitoring borehole downstream of the site on the Nababeep Fault to monitor groundwater level and chemistry downstream of the site; • Monitor groundwater dewatering discharge and water quality at the three SAFTA underground mines, i.e. FMS, FME and FMN; • The groundwater monitoring should include the following: o The water levels at all monitoring boreholes and the NEM-MS must be recorded on at least a monthly basis. Best results are obtained if automatic flow meters and water level recorders set to take hourly readings are installed; o Water samples must be collected at all monitoring boreholes, the NEM-MS and the three SAFTA mines on a three-monthly basis and submitted to a SANAS accredited laboratory for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH4, Cl, SO4, Total Alkalinity, PO4, F, NO3), COD and trace-metals (Fe, Mn, Al, Se, Cu, Pb, Zn, Cd, As, Sb and U); and, o A SACNASP registered hydrogeologist should evaluate the monitoring data on an annual basis and compile a monitoring report. • Adhere to the recommended abstraction rate for NEM-MS (indicated in subsections 4.6 of in Appendix 2 of **Appendix E)**; and • Minimise storage of hazardous substances onsite during operation.		spills.

			Generic mitigation measures • Ensure water abstraction is within allowable limits set by the Department of Water & Sanitation (DWS). Any conditions set by DWS in the license approval process will need to be adhered to. • Ensure that an effluent purification and recycling system is installed.		
			Impact 3.2: Surface water resources • Ensure that an effluent purification and recycling system is installed. • Implement an integrated waste management system on site. • Ensure all hazardous substances are stored correctly. • Ensure stormwater berms divert stormwater away from infrastructure in the mine area. • Adhere to the management of the MRDSF contained in the Conceptual Design report (**Appendix E**) to ensure that this waste disposal facility does not pollute surface water resources, and ensure the ongoing maintenance of the stormwater diversion trenches associated with this MRDSF. • Ensure all pipelines and powerlines located within close proximity to the water course are maintained and erosion of support structures does not occur to compromise the integrity of the infrastructure, resulting in water pollution or river bank erosion.		
			Impact 4: Impact on biodiversity • The mining area and stockpile areas must be demarcated and the footprint contained within the demarcated areas as shown on Diagram 5.1.1 and 5.1.2 (position of FMS to be corrected). • The annual rehabilitation plan must be implemented. • Rehabilitation of the MRDSF as per the Conceptual Design Report (**Appendix E**) will improve the local biodiversity of this site. • Remove alien invasive vegetation, and ensure ongoing alien vegetation clearing should this be required. • No indigenous plants outside of the demarcated work areas may be damaged. • The noise and vibration caused by the earthmoving equipment will disturb smaller animals. These will move away whilst operations are in progress. Should any animals be encountered these should be moved away by a suitably trained nature conservation officer, if necessary.		
			Impact 5: Contamination & Pollution • **Waste rock** from the mining process is to be disposed of in the waste rock dump as show in Diagram 5.1.1. • **Industrial waste (i.e. including hazardous wastes and oils and greases)** - Separation of wastes into classes will ensure that waste is disposed of safely and according to the correct procedure. In order to ensure that waste classes are kept in separate streams, training will be undertaken. - Petrochemical spillages to be collected in a drip tray and drum to store; excavate spill affected soil for disposal at a registered hazardous waste facility. - Hazardous waste is to be disposed of at Vissershoek Landfill. • **Domestic waste (i.e. waste that is generated from the offices)** - Domestic waste - separated at source into recyclable products. These must then be removed and recycled by recognised contractors. (Note that the mine is responsible for the waste from cradle to grave). - Disposal at a registered and officially permitted commercial or municipal landfill site is the most cost-effective option for materials that cannot be recycled. - Domestic waste generated by workers needs to be sorted and all biodegradable waste must be stored in separate drums provided for. • **Mine residue Disposal Storage Facility (MRDSF)** - Manage the MRDSF according to the Conceptual Report (**Appendix E**) to ensure that the waste disposal facility complies with relevant legislation. • **Waste water** - Equipment used in the mining process will be adequately maintained so that during operations it does not spill oil, diesel, fuel, or hydraulic fluid.		

			- By keeping contaminated and clean water separate and establishing controlled runoff washing bays, the flow and end destination of decontamination washing water will be controlled. - Slow storm water runoff with contoured, low-gradient drains and channels, as well as retention ponds. A series of ponds may also be used to remove sediment and other contaminants from water before reuse or reintroduction into the mining process. - Ensure that a purification and recycling sewage and effluent management system is installed. **Impact 6: Visual landscape** • The site shall be kept neat and tidy at all times. Equipment must be kept in designated areas and storing/stockpiling shall be kept orderly. • Mitigation of the visual impact of "heaped fill dumps" and "sidehill dumps" will include limited topsoil application to the slope and revegetation on the top of the dump. • The visual impact of the MRDSF will be mitigation during rehabilitation when re-vegetation is facilitated. **Impact 7: Emissions** • Health and safety equipment is required for workers. • Wetting helps reduce dust generation. • No amplified music should be allowed on site. • Existing tracks will be used as haul roads and will only be upgraded to facilitate haul trucks by applying dust suppression and/or hardening compound such as Macadamite. • On public roads the vehicles shall adhere to municipal and provincial traffic regulations including speed limits. • Vehicles used on site for the construction related activities shall be maintained and in a good working condition so as to reduce emissions. • Engines shall be turned off when the vehicle is temporarily parked or stationery for long periods. • Reduce drop height of material to a minimum. • Temporarily halt material handling in windy conditions. • Provide lighting to ensure safety standards are met, and direct light away from public areas (such as the public access road). • Use energy efficient bulbs that do not attract insects. • Ensure workers are supplied with Health and Safety equipment for noise and dust where applicable. • Apply safety standards for blasting. • Ensure dust suppression on MRDSF if required. **Impact 8: Heritage resources** • Provision for on-going heritage monitoring by an environmental manager acquainted at a basic level with the kinds of heritage resources potentially occurring in the area. • Should unexpected finds be made during development (e.g. precolonial burials; ostrich eggshell container cache; or localised Stone Age sites with stone tools, pottery), the relevant Heritage Authority should be contacted. • Officials from relevant heritage authorities (National, Provincial or Local) to be permitted to inspect the site at any time in relation to the heritage component of the management plan. **Impact 9: Socio-economic** • Employment of local previously disadvantaged labour wherever possible, with provision of training (upskilling).		

Final Rehabilitation and removal of temporary infrastructure	DECOMMISSIONING		**IMPACT 1: REHABILITATION OF MINED AND CLEARED AREAS** • Implementation of Final Rehabilitation, Decommissioning and Mine Closure Plan (**Appendix G**). • The focus of topographic rehabilitation may not be obvious at the time of mine planning and must be addressed as the mine develops and the Closure Plan must be reviewed periodically for continued relevance in the light of changed mine path or long-term plans. • Compacted areas shall be scarified after use during decommissioning and rehabilitation. • Any stored topsoil shall be spread over the scarified surfaces. • Rehabilitation of the MRDSF as per **Appendix E**. • **Other mitigating with regard to residual environmental impact** - Implementing screening as part of the cleaning activities before materials is moved from the mine. - The infrastructure area will be screened for petrochemical spills and cleaned and waste from the temporary storage facility will be removed and the area cleaned. - Unwanted steel, sheet metal and equipment needs to be sold or disposed of as scrap metal. Recycling and reusing materials may reduce garbage haul fees or generate income through the sale of scrap metal and old equipment. - All steel structures and reinforcing will be discarded or sold as scrap. - All equipment and other items used during the mining operation needs to be removed from the site. - Used oils / hydrocarbons fuels / liquids are to be collected in sealed containers (stored on concrete slabs) and removed from site for recycling by a reputable company. - All waste in the temporary storage area for used lubrication products and other hazardous chemicals will be disposed of at a collection point from where it will be collected by a waste recycling company. - All temporary waste storage areas need to be cleaned out and waste removed. - Tyres to be return to supplier or a company that uses old tyres for making door mats, shoes, swings, etc. - Batteries to be return to supplier or disposed at a permitted hazardous waste facility. - Fluorescent tubes to be collected in sealed containers (stored on concrete slabs) and removed from site for disposal at a permitted hazardous waste facility. - Chemical containers to be returned to supplier or disposed of at a legal, permitted facility that is capable of disposing of the waste. (DO NOT sell chemical containers to workers or communities). - Laboratory waste (chemicals) - Returned to supplier or disposed of at a permitted facility that is capable of disposing of the waste. - Industrial chemicals (laboratory waste) - Returned to supplier or disposed of at a permitted facility that is capable of disposing of the waste. These liquid wastes cannot be disposed of on the waste dumps. - Redundant structures, buildings and civil foundations (down to one meter below surface for subsurface infrastructure) will be removed for use elsewhere or demolished and discarded. - All redundant infrastructure and services needs to be demolished including ruins, buildings, foundations and footings. - Building rubble will be used as backfill in excavations or removed from site in the absence of excavations. - Remove all power and water supply installations not to be retained by landowner in terms of section 44 of the MPRDA. - Removing underground infrastructure to one meter below surface. - Excavations created by removing subsurface infrastructure needs to be filled, levelled and compacted. - Final walk through of complete mining lease area to ensure no mining related waste and of re-usable infrastructure remain on site. • As part of this phase training of personnel in the implementation of the Closure Plan will be done and the implementation of the environmental awareness plan will be an ongoing process.	NEMA Section 2 Principles Environmental Authorisation iWUL	

			IMPACT 2: GROUNDWATER **<u>Mitigation measures during Decommissioning Phase</u>** (See Section 8.3.3 in in Appendix 2 of **Appendix E**) **Essential** groundwater mitigation measures during decommissioning are as follows: • Take care that onsite sanitation facilities, machinery and vehicles are well maintained and serviced regularly; • Place oil traps under stationary machinery, only re-fuel machines at fueling station, construct structures to trap fuel spills at fueling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only; • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials; • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained; • Ensure that good housekeeping rules are applied; • Encourage contractors to report, react and manage all spills and leaks so that spills can be cleaned up immediately to prevent contamination of the groundwater; • Limit rainwater infiltration by top-soiling and vegetating the TSF; • Continue to collect and return leachate from the under drainage and seepage collection facilities at the RWD until dry; • Maintain RWD until leachate from the under drainage and seepage collection facilities of the TSF are dry before decommissioning the RWD; and, • Continue with groundwater monitoring detailed (in subsection 8.2 *[as included above]* of in Appendix 2 of **Appendix E**). **Best practice** groundwater mitigation measures during decommissioning are as follows: • Maintain the groundwater monitoring system and procedures described (in subsection 8.2.3 of in Appendix 2 of **Appendix E**); • The groundwater monitoring should include the following: – The water levels at all monitoring boreholes and the NEM-MS must be recorded on at least a three-monthly basis. Best results are obtained if automatic flow meters and water level – recorders set to take hourly readings are installed; – Water samples must be collected at all monitoring boreholes, the NEM-MS and the three SAFTA mines on a three-monthly basis and submitted to a SANAS accredited laboratory for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH4, Cl, SO4, Total Alkalinity, PO4, F, NO3), COD and trace-metals (Fe, Mn, Al, Se, Cu, Pb, Zn, Cd, As, Sb and U); and – A SACNASP registered hydrogeologist should evaluate the monitoring data on an annual basis and compile a monitoring report.		

			Mitigation Measures in Post-Operational Phase (see Section 8.4.4 in in Appendix 2 of **Appendix** E) Best practice groundwater mitigation measures during post-operational decommissioning are as follows: • Maintain the groundwater monitoring system and procedures described in subsection 8.2.3 (in Appendix 2 of **Appendix E**) for five years, or as indicated by the regulatory authorities; • Groundwater monitoring should include the following: – The water levels at all monitoring boreholes and the NEM-MS must be recorded on at least a six-monthly basis. Best results are obtained if automatic flow meters and water level recorders set to take hourly readings are installed; – Water samples must be collected at all monitoring boreholes, the NEM-MS and the three SAFTA mines vent shafts if possible, on a six-monthly basis and submitted to a SANAS accredited laboratory for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH4, Cl, SO4, – Total Alkalinity, PO4, F, NO3), COD and trace-metals (Fe, Mn, Al, Se, Cu, Pb, Zn, Cd, As, Sb and U); and – A SACNASP registered hydrogeologist should evaluate the monitoring data on an annual basis and compile a monitoring report. **Groundwater Monitoring System** (Section 9 in Appendix 2 of **Appendix E**) A groundwater monitoring plan as indicated in subsection 8 must be implemented as early as possible, and before the proposed mining activities commence, to identify trends in water level and water quality behaviour in local aquifers pre-development, during construction, operation, decommissioning and post-operation. This information will inform the ongoing implementation and development of a water management strategy and management of impacts within the site area and on downstream or down gradient water users. The results of monitoring, and any changes to the water management strategies, must be reported to management and DWS as per the WUL for specific items, and a detailed monitoring report submitted to the DWS on an annual basis. The report serves to notify DWS of areas of contamination (concentrations exceeding baseline quality) or reduction in water supply and the actions implemented, in progress or planned to address the identified impacts including source identification and control. Water quality data is assessed against the baseline data and subjected to trend analysis and waste load calculations. Should contamination (concentrations exceeding baseline quality) or reduction in water supply be detected, SAFTA will notify the Regional Director of DWS as soon as it is practicable.		

			Groundwater EMPr (Section 10.3 in Appendix 2 of **Appendix E**). 1. Lowering of Groundwater Levels during Facility Operation • Implement and adhere to water saving procedures and methodologies. 2. Rise of Groundwater Levels Post-Facility Operation Based on the flow modelling results, which takes into consideration the mining schedules, dewatering, water supply abstraction and natural recharge, the groundwater drawdown levels from the end of the 15-year LoM to 30 years post-facility operation, are likely to change as follows: • FMN (mined & dewatered year 2 to 5) – decline from a drawdown of c.5 m to c.13 m, i.e. a decline of c.0.27 m/a. This decline will cease and start to rise once the rate of recovery at the other two mines have started to reduce, where after full recovery will also likely to be c.50-60 years post-facility operation; • FME (mined & dewatered year 5 to 11) – rise from a drawdown of c.28 m to c.11 m, i.e. a rise ofc.0.57 m/a. Should this rate of recovery continue, the water level might only fully recover c.50 years post-facility operation; • FMS (mined & dewatered year 11 to 15) – rise from a drawdown of c.47 m to c.19 m, i.e. a rise of c.0.93 m/a. Should this rate of recovery continue, the water level might only fully recover c.50 years post-facility operation; • NEM-MS (abstraction over 15 years LoM) – rise from a drawdown of c.67 m (i.e. 138 mbgl) to c.44 m (i.e. 115 mbgl), i.e. a rise of c.0.77 m/a. Should this rate of recovery continue, the water level might only fully recover c.87 years post-facility operation. Note: The decline after closure at FMN, which is to be mined first, is caused by groundwater flowing from this area to recharge the dewatered mine voids at FME, FMS and NEM-MS. Also, actual recovery time could be much reduced by an exceptionally good rainy season, or two. 3. Spread of Groundwater Pollution Post-Facility Operation The model results indicate that the potential contaminant plume from the unlined TSF (worse-case scenario) does not migrate beyond the site boundary with the maximum concentration not exceeding 40% of the leachate concentration in the upper aquifer. Thirty years post closure the plume appears to be confined to the immediate vicinity of the TSF and within <150 m of the TSF perimeter (Figure 7-5 in Appendix 2 of **Appendix E**).		
			IMPACT 3: CREATION OF EMPLOYMENT, ETC. • Ongoing employment of local previously disadvantaged labour wherever possible, with provision of training (upskilling)		

15.7 Impact Management Outcomes

Table 20: Impact Management Outcomes

ACTIVITY (whether listed or not listed).	**POTENTIAL IMPACT**	**ASPECTS AFFECTED**	**PHASE** In which impact is anticipated	**MITIGATION TYPE**	**STANDARD TO BE ACHIEVED**
Site access	Disturbance of fauna and flora	Biodiversity in a ESA	Construction	Remedy through restriction and rehabilitation	Impacts minimised and mitigated. End use objectives achieved through rehabilitation.
	Soil compaction and erosion	Soil resource		Control through monitoring and management	
Site establishment, including waste generation and management	Visibility	Visual intrusion	Construction	Control through monitoring and management	Impacts minimised and mitigated. End use objectives achieved through rehabilitation.
	Emissions (dust, noise & vehicles)	Noise & Air quality		Control through monitoring and management	
	Disturbance of fauna and flora	Biodiversity in an ESA		Remedy through restriction and rehabilitation	
	Soil and sand contamination, soil compaction and disturbance	Soil resource		Remedy through restriction and rehabilitation & control through monitoring and management	
	Destruction or loss of Heritage resources	Cultural and Heritage		Avoidance by relocation of activity if required	Impact avoided
Removal of ore, loading and hauling, primary processing, waste generation and management	Change in landscape	Topography	Operation	Remedy through restriction and rehabilitation	Impacts minimised and mitigated. End use objectives achieved through rehabilitation.
	Soil and ground water contamination, and waste management	Contamination & pollution		Control through monitoring and management	
	Visibility	Visual		Control through monitoring and management	
	Emissions (dust, noise & vehicles)	Noise & Air quality		Control through monitoring and management	
	Disturbance of fauna and flora	Biodiversity in an ESA.		Remedy through restriction and rehabilitation	
	Soil erosion and compaction	Soil resource		Remedy through restriction and rehabilitation & control through monitoring and management. Management and control would include	
	Use of groundwater water for mining processes.	Ground water resource			

				focus on recycling of water wherever possible.	
	Destruction or loss of Heritage resources	Cultural and Heritage		Avoidance by conducting a heritage impact assessment, followed by control and management if necessary.	Impact avoided
Removal of temporary infrastructure and site rehabilitation Rehabilitation of MRDSF	Dust emissions (vehicle entrained dust)	Soil resource	Decommissioning	Control through monitoring and management	Impacts minimised and mitigated. End use objectives achieved through rehabilitation.
	Soil erosion due to slow recovery of vegetation	Soil resource & biodiversity		Remedy through restriction and rehabilitation & control through monitoring and management	
	Change in topography	Topography			

15.8 Impact Management Actions

Table 21: Impact Management Actions

ACTIVITY whether listed or not listed.	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
Site access	Disturbance of fauna and flora	Remedy through restriction and rehabilitation Control through monitoring and management	Concurrently with site access activities Upon cessation of activity	Remain within the ambit of the Mining Right Programme and Environmental Authorisation
	Soil compaction and erosion			
Site establishment, including waste generation and management	Visibility	Control through monitoring and management		
	Emissions (dust, noise & vehicles)			
	Disturbance of fauna and flora	Remedy through restriction and rehabilitation		
	Soil and sand contamination, soil compaction and disturbance	Remedy through restriction and rehabilitation & control through monitoring and management		
	Destruction or loss of Heritage resources	Avoidance		
Removal of ore, loading and hauling, primary processing, waste generation ad management	Change in Topography	Remedy through restriction and rehabilitation	Concurrently with site access activities Upon cessation of activity	Remain within the ambit of the Mining Right Programme and Environmental Authorisation, and Water Use License.
	Visibility	Control through monitoring and management		
	Emissions (dust, noise & vehicles)	Control through monitoring and management		
	Disturbance of fauna and flora	Remedy through restriction and rehabilitation		
	Soil and sand contamination, soil compaction and disturbance	Remedy through restriction and rehabilitation & control through monitoring and management		
	Groundwater extraction for mining			
	Destruction or loss of Heritage resources	Avoidance		
Removal of temporary infrastructure and site rehabilitation	Dust emissions (vehicle entrained dust)	Control through monitoring and management	Upon cessation of activity	Remain within the ambit of the Mining Right Programme and Environmental Authorisation
	Soil erosion due to slow recovery of vegetation	Remedy through restriction and rehabilitation & control through monitoring and management		
	Change in topography			

16 FINANCIAL PROVISION

16.1 Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation

As detailed in Section 15.5.1 above:

Objective 1 - To create a safe and healthy post-mining environment

- Safe excavations
  - Slope stability of remaining excavation
  - No potentially dangerous areas secured if required
- Limited residual environmental impact
  - Develop a landscape that reduces the requirement for long term monitoring and management
  - No surface and/or groundwater contamination
  - Waste management practices not creating or leaving legacies

Objective 2 - To create a stable, free draining post mining compatible with the surrounding landscape

- Economically viable and sustainable land, as close as possible to its natural state.
  - Prepare area to promote natural re-establishment of vegetation that is self-sustaining, perpetual and provides a sustainable habitat for local fauna and successive flora species
  - Prevent long term changes in land use by implementing prompt rehabilitation and maintenance of disturbances when possible as part of annual rehabilitation plan.
- Stable, free draining post mining landform
  - Prevent alteration or diverting natural drainage lines and reduced natural runoff.
  - Prevent concentration of runoff, mixing of clean runoff with contaminated runoff and creation of large open water bodies.

Objective 3 – To provide optimal post-mining social opportunities

- Optimised benefits for the social environment
  - Positive and transparent relationships with stakeholders and maintaining communication channels, providing stakeholders including government authorities with relevant information as per legislative requirements.
  - Undertaking environmental management according to approved EMPr and Rehabilitation, Decommissioning and Closure Plan (**Appendix G**) and regular auditing of the environmental management system.
- Minimal negative aesthetic impact
  - Mitigate the nuisance effects of air emissions (dust), visual intrusion and the cumulative effect of an increase in the ambient noise levels
  - Prevent disturbance of archaeological sites and implement mitigating measures according to the archeological assessment.

16.2 Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties

The closure objectives are included in this Draft EIR and in the Rehabilitation, Decommissioning and Mine Closure Plan (**Appendix G**), which is being made available to all registered Interested and Affected Parties.

16.3 Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure

Refer to the Rehabilitation, Decommissioning and Mine Closure Plan, which includes the Environmental Risk Assessment in **Appendix G**.

16.4 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives

The closure objectives are to return the land disturbed by mining activities back to its original condition. The rehabilitation plan provides the detail on how this will be achieved as detailed in Appendix D.

16.5 Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline

Refer to Part A, Section 12, and Table 18 of this report.

16.6 Confirm that the financial provision will be provided as determined

Refer to Part A, Section 12 of this report.

16.7 Mechanisms for monitoring compliance with and performance assessment against the Environmental Management Programme and reporting

Table 22: Mechanisms for Monitoring Compliance

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
All mining activities	All commitments contained in the EIA Report and accompanying EMPr.	Ensure commitments made within the approved EIR and EMPr are being adhered to.	Site Manager and EAP.	Annual Undertake and submit an environmental performance audit to DMR
Site access and site establishment	Visual inspection of soil erosion and/or compaction	All exposed areas, access roads and soil stockpiles must be monitored for erosion on a regular basis, specifically after rainfall events.	Site Manager and Independent EAP	Weekly, and after rain-fall events Weekly monitoring reports to be signed-off by the Site Manager Corrective action to be confirmed and signed-off by the Site Manager. Consolidated monthly monitoring reports (including confirmation of corrective action taken, with photographic evidence) to be submitted to the Site Manager.
Operational – Copper and Tungsten Mining	Visual inspection of biodiversity impacts Visual inspection of waste and effluent management, access and haul roads, housekeeping and maintenance.	Visual inspection of mining activities and other possible secondary impacts Control and prevent the development of new access tracks. Repair and maintenance of access roads and boundary fence. Control and prevent growth of alien vegetation in cleared areas and on stockpiles. Standard waste management practices must be implemented to prevent contamination and littering. All spill incidents will be reported and corrective action taken in accordance with an established spill response procedure.	Site Manager & Contractor (or sub-contractors)	Daily Weekly monitoring reports to be signed-off by the Site Manager. Corrective action to be confirmed and signed-off by the Project Site Manager. Consolidated monthly monitoring reports (including confirmation of corrective action taken, with photographic evidence) to be submitted. Report incidents in terms of the relevant legislation, including the MPRDA, NWA and NEMA.
Closure & Rehabilitation	Revegetation; Stability; Soil erosion Alien invasive species	Inspection of all rehabilitated areas to assess whether soil erosion is occurring and to implement corrective action where required.	Site Manager	Bi-Annual A final audit report for site closure must be submitted to the DMR for approval.

16.8 Indicate the frequency of the submission of the performance assessment/ environmental audit report

An external environmental performance audit and the EIA & EMPr performance assessment shall be conducted annually interchangeably by an independent environmental assessment practitioner.

17 ENVIRONMENTAL AWARENESS PLAN

17.1 Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work

Environmental awareness and training includes:

- Awareness training for contractors and employees.
- Job specific training – training for personnel performing tasks which could cause potentially significant environmental impacts.
- Comprehensive training – on emergency response, spill management, etc.
- Specialised skills.
- Training verification and record keeping.

Before commencement of the mining activities all new employees and contractors who are involved with such activities should attend relevant induction and training. It is standard practice for employees and the employees of contractors that will be working on a new project or at a new site to attend an induction course where the nature and characteristics of the project and the site are explained.
The training course should include key information abstracted from the EMPr pertaining to the potential environmental impacts, the mitigation measures that will be applied, the monitoring activities that will be undertaken and the roles and responsibilities of contractors' and personnel.
The EMPr document will also be made available to attendees.

17.2 Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment

Environmental risks and how to manage them are dealt with in the induction course referred to above. Should an incident of environmental pollution or damage occur it will be analysed and appropriate prevention and/or mitigation measures developed. These measures will be added to the EMPr and conveyed to the relevant personnel.
All unplanned incidents with the potential to cause pollution or environmental degradation or conflict with local residents will be reported to the Mineral Resources Manager within 24 hours.

Hydrocarbon Spills

Hydrocarbon spills that are considered to be emergency incidents are large-scale spills (cover a surface area >1m^2), resulting from situations such as: a leaking diesel bowser; an oil drum that is knocked over; and, large spillages from equipment.

Activities that are involved in the clean-up of such instances include:

- The containment of the spill;
- The removal of all contaminated material; and,
- The disposal (at a licensed hazardous disposal facility) or bioremediation (at a licensed facility) of this material.

Fire

There is the potential for fire to occur in the following locations of the mining site:

- Veld fires across vegetated areas; and
- Vehicles and equipment.

Veld fires: Any person who observes the fire must report it to the fire brigade immediately and then to their supervisor. If possible, additional personnel may be sent to contain the fire, but only if the lives of the personnel will not be endangered.
Vehicles and Equipment: Fire extinguishers will be available at the site where sand mining activities will take place and in the vehicles. All staff members will be trained in the use of fire-fighting equipment.

17.3 Specific information required by the Competent Authority

Not applicable at this stage.

18 UNDERTAKING

The EAP herewith confirms

(a) The correctness of the information provided in the reports;	**X**
(b) The inclusion of comments and inputs from stakeholders and I&APs;	**X**
(c) The inclusion of inputs and recommendations from the specialist reports where relevant; and	**X**
(d) That the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein (from Scoping Phase, and will be included following comment period after EIA Phase)	**X**

Signature of the environmental assessment practitioner:

Green Direction Sustainability Consulting (Pty) Ltd

Name of company:

5 August 2019

Date:

-END-

19 REFERENCES

Heritage Impact Assessment Report for the proposed mining extensions on farm Nababeep 134, Namaqualand, Northern Cape. June 2018. Prepared by David Morris and Abenicia Henderson, of the McGregor Museum, KImberley

Nama Khoi Draft Integrated Development Plan (IDP) 2018 2019.

Namakwa District Municipality Integrated Development Plan (IDP) 2017-2022.

Paleontological Impact Assessment for the proposed mining operation near Nababeep and Springbok, Northern Cape Province. Desktop study for SAFTA. March 2018.

SAFTA Copper Project Conceptual Design for the Mine Residue Disposal Facility. May 2019. Prepared by epoch mine residue and environmental engineering consultants (May) (**Appendix E**)

SMS Nababeep Shaft Water Quality: Geochemical Baseline Assessment, Technical Report AS-R-2014-01-23 prepared by AGES. January 2014.

SRK Hydrogeological Assessment Report (May 2019), included as Appendix 2 in **Appendix E**.

20 APPENDIX A: CV OF EAP

Summary of the Environmental Assessment Practioner's Experience

Jennifer Barnard has been registered with the South African Council for Natural Scientific Professions since 2009, and was awarded certification as an Environmental Assessment Practioner (EAP) by the Interim Certification Board of South Africa in 2010. She has worked on numerous Environmental Impact Assessments, both in South Africa and the United Kingdom and has considerable experience in the preparation and compilation of Environmental Impact Reports, Environmental Management Programmes, Environmental Audits, and Environmental Management Frameworks, including construction monitoring where required. She has been working in the environmental consultancy field for 20 years, and prior to that in the KwaZulu-Natal Provincial Local Government and Development Planning (Environmental Planning and Policy Division) for 5 years.

Specific examples of private consultancy EAP experience include:

- Project Manager for numerous Basic Assessments for Eskom Distribution and CapeNature in the Western Cape.
- Project Manager and Lead EAP of the Eskom Transnet Coal Link Suite of Projects, spanning both Mpumalanga and KwaZulu-Natal.
- Project Manager and Lead EAP of two SANRAL Road Upgrades on the N7, that included Borrow Pits.
- EAP for various Basic Assessments and EIAs in the Northern Cape for agricultural activities, and related Water Use General Authorisation Risk Matrices.
- Water Use General Authorisation for a sand mining outside Pella, Northern Cape.
- EAP for Basic Assesment and Water Use General Authorisation for a Sand Mining Application in the Hartbees River, Kakamas, Northern Cape.
- EAP for Basic Assessment for a Kaoline Mining Permit outside Garies in the Northern Cape.
- EAP for three Granite Mining Right Applications located to the north-east of Pofadder, including the Integrated Water Use License Application, and Integrated Water and Wastewater Management Plan.
- EAP for Sand Mining Permit on inland dune system outside Klawer, Western Cape.

20.1 Appendix B: Public Participation Process Report

20.2 Appendix C1: Archeological/Heritage Impact assessment scoping report

20.3 Appendix C2: Paleontological Impact assessment

20.4 Appendix D: Nababeep Water Quality Baseline Report (2014)

20.5 Appendix E: Conceptual Design for the Mine Residue Disposal Storage Facility (MRDSF) (2019)

20.6 Appendix F: Impact Tables

20.7 Appendix G: Closure Plan

20.8 Appendix H: Water Infrastructure Layout