mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT SCOPING REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH THE MINING RIGHT FOR THE PROPOSED CONSTRUCTION AND OPERATION OF THE ZEBEDIELA NICKEL MINE AND ASSOCIATED INFRASTRUCTURE

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).

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ZEBEDIELA NICKEL MINE: DRAFT SCOPING REPORT

Technical Report: **DSR-2019-10-31**

Prepared for: **Department of Mineral Resources and Energy**

Prepared by: **Exigo Sustainability (Pty) Ltd**

ZEBEDIELA NICKEL MINE:

DRAFT SCOPING REPORT

31 October 2019

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PLEASE NOTE:

The outline of this report was compiled in terms of the official scoping report template by the Department of Mineral Resources and Energy (DMRE). Where repetition occurs as a result of the template being used, the relevant information will be cross referenced. An executive summary of the most important aspects of the report is provided in order to assist the reader. The DMRE template furthermore requires the report to contain preliminary impacts and provide mitigation measures for the impacts identified. It should be noted that the identified impacts and mitigation measures will be subject to change in the Environmental Impact Assessment Report (EIR) once the environmental specialist studies become available and input from Interested and/or Affected Parties (I&APs) are taken into consideration.

Executive Summary

(Vir 'n Afrikaanse Opsomming verwys na bladsy xiv hieronder)

1. Introduction

Lesego Platinum Uitloop (Pty) Ltd (LPU) intends to develop a nickel mining operation near Mokopane in the Limpopo Province of South Africa. The proposed Zebediela Nickel Mine project is located in the Mogalakwena Local, and Waterberg District Municipalities, approximately 9 km north-east of the city centre of Mokopane and approximately 250 km north-northeast of Johannesburg. The project area can be accessed from Johannesburg using the N1 highway to Mokopane and then utilizing the Percy Fyfe road to the project area. The proposed site is mostly located on privately owned land, but also on government owned land and is situated immediately east of the local settlements Mahwelereng and Ga-Madiba near Mokopane in the Limpopo Province. The nearest settlement is Mahwelereng B, about 0.52 km from the western mining right boundary and 1.1 km from the edge of the open pit. The proposed mining right area will be located on farms where LPU currently owns the three prospecting rights namely; Uitloop 3KS (1,925.29 ha), Amatava 41 KS and Bloemhof 4 KS (2620.34 ha), and Piet Potgietersrust Town and Townlands 44 KS (115.26 ha). The Mining Right Area covers a combined area of roughly 4,660.90 ha, measuring approximately 11.9 km from south to north and 7.3 km from east to west. Mine infrastructure is however only planned to be located on approximately 350 ha of the larger Mining Right Area. Approximate coordinates for the center of the proposed open pit are:

Latitude: S - 24°7'17.154"

Longitude: E 29°1'5.63"

The resource limit of the identified nickel resource comprises an intrusive pyroxenite-harzburgite-dunite body, approximately 8 km by 1.5 km in extent at outcrop, previously correlated with the Lower Zone of the Bushveld Complex and called Uitloop II. The intrusion strikes northwest and dips at 40^0 to the south west. It is truncated by the Mahopani Fault and estimated that the body attains a thickness of 600 m. The proposed mine will predominantly mine nickel (Ni) and possibly platinum group minerals (PGM's) and associated minerals (platinum, palladium, rhodium, gold, ruthenium, iridium, osmium, copper, cobalt and chromite), iron ore and vanadium from magnetite. The Zebediela Ni resource will be exploited by open pit mining methods. Due to the thickness of the ore body, future underground mining is a possibility, however this will be subject to a separate authorisation process.

Mining will be focused on the extraction of 180.02 Mt of sulphide-containing material using an open pit, conventional truck and shovel with partial backfill mining method. The top 40 m to 50 m of the disseminated sulphide material is oxidized (Oxide Zone) and will be stockpiled on an overburden facility. The overburden will be trucked out and hauled to the overburden facility from the open pit. Concurrent backfilling will take place from year 10 once sufficient capacity exists in the open pit. The entire pit below the oxide zone is developed in mineralised material (Sulphide Zone) and ore would be trucked out and hauled to the processing plant. The open pit design has an approximate pit length of

1,150 m, with an average width on surface of 639 m and a depth of 220 m. A 5 m high and 10 m wide berm will be constructed around the entire pit perimeter. The life of mine is planned for 30 years, but with the potential to continue mining due to the size of the deposit. The first 5 years will be used for construction of the access roads, plant infrastructure, fencing and stripping of the open pit.

The Scoping and Environmental Impact Assessment Process (S&EIA) is being undertaken in support of an environmental authorisation application submitted to the Department of Mineral Resources en Energy (DMRE): Limpopo Region in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) read with the Environmental Impact Assessment Regulations, 2014 (as amended on 7 April 2017) and Environmental Impact Assessment Listing Notices 1, 2 and 3 (GNR 983, 984 and 985).

2. Mining Method

At full production, roughly 300 kilo ton per month (ktpm) Run of Mine (RoM) material will be mined with a 0.75 stripping ratio from year 5 to year 30. The first five years will mainly consist of stripping at a rate of 3,582 kilo ton per annum (ktpa), this will reduce to 2,700 ktpa for the remainder of the life of mine, except for year 5 where a ramp up of 70% will be applied. Overburden stripping is limited to the Oxide Zone which is some 46.5m thick. The designed pit will be mined through conventional truck and shovel with partial backfill mining methods.

Initially, mining will only be from one area of the pit with mining commencing from the north western sector of the mineral resource and will be develop across the full width of the pit in a south easterly direction along strike for a total length of 1,150 m. The overall slope of the sides of the pit will be 45^0. The overburden and mineralised material will be loaded in pit with excavators with 26 m^3 buckets and transported by 225 t rigid body dump trucks to the overburden facility and ROM pad respectively. A 15 m bench height and mining blocks of 100 m by 50 m are planned for the overburden and mineralised material. Ore will be processed at an on-site processing plant and tailings will be disposed of on a Tailings Storage Facility (TSF).

3. Life of Mine

The mineral resources included in this project are extensive, giving an overall life of mine of more than 30 years. Although, for the mining right application only 30 years life of mine will be applied for. The geometry of the orebody allows for continuous mining via open pit mining up to a depth of 220 m.

Pre-production overburden stripping of 18.11 Mt takes place in year 0 to year 4 and continues concurrent with production operations between year 5 and year 30 at a stripping ratio of 0.75:1. Overburden removal at the current pit design will only be completed after the 30 years life of mine, after which no further overburden stripping will be required. ROM production ramp up is based on 70% partial ramp of 2.52 Mt of mineralised material (year 5) with full production of 3.6 Mt achieved in year 6 continuing until year 30 to a depth of 220 m below surface.

4. Metallurgical Process

During the concentration process, ore is ground to liberate mineral particles. These are then recovered in the form of a concentrate by froth flotation. The ore mineralogy dictates both the fineness of grind required for liberation and the ideal flotation conditions. Very fine particles are difficult to recover, so two or even three milling and flotation stages may be used to minimise losses caused by over-grinding.

The material to be treated is a disseminated nickel sulphide deposit with an average nickel grade of 0.241%, of which ~62% Ni, or 0.15% Ni occurs in sulphide form. The design aims to achieve a minimum nickel recovery of greater than 50% by flotation of nickel sulphide concentrate at an overall mass pull of less than 1% and a concentrate grade of greater than 15% nickel.

The proposed process plant will consist of a standard MF2 circuit (i.e. mill/float followed mill/float of primary tailings) treating run of mine (ROM) ore crushed, by the primary crusher, processing approximately 300 ktpm Sulphide Zone material. The circuit will entail primary and secondary stage mills as well as flotation sections, which will generate primary and secondary concentrate. The generated concentrate will be filtered to 11 – 15% moisture from where it will be transported to a toll smelter.

5. Surface Infrastructure

The proposed Zebediela Nickel Mine is located within an area with existing mining activities, such as Anglo American's Mogalakwena Mine and Ivanplats Platreef Project which is approximately 22 km and 9 km north west of the proposed site respectively. The infrastructure in the area is fair with the city centre of Mokopane located approximately 9 km from the project area. Mokopane is a well-serviced town near National roads, the north-south National railway line, electricity, and bulk water supply.

The area is serviced by several provincial roads as well as the N1 national road linking it to Zimbabwe and the rest of South Africa. There is one commercial airport in the region (Polokwane International) as well as a few private airstrips that are mainly used for tourism and private use.

The town of Mokopane, as well as the nearby communities of Mahwelereng, Ga-Madiba, Masodi, Tshamahansi, Phola Park, Sekgakgapeng, Mosate, Maroteng, and Masehlaneng will provide skilled and unskilled labour for future operations. All proposed access roads are mainly existing tar and gravel district roads and will need to be upgraded.

Envisaged infrastructure will comprise of the following:

- Processing Plant
- Ore handling and storage facilities (ROM stockpiles)
- Administration building, security building, change house, messing and canteen facilities, mining and geology offices, maintenance and engineering workshops and offices, warehouse and offices, medical station, fire station, laboratory and satellite ablutions
- Potable water tank and reticulation
- Process water dam and process water tanks and reticulation

- Electricity distribution facilities (overhead powerlines, transformers and mini substations)
- Hydrocarbon storage facilities
- Sewage treatment plant & sewage reticulation
- Water treatment plant
- Pollution Control Dam (PCD)
- Haul and access roads and bridges
- Perimeter and internal fencing
- Overburden and topsoil storage facilities
- Tailings Storage Facility (TSF) & Return Water Dam
- Explosives Store

The open pit and plant footprints are proposed to be 74 ha and 53 ha respectively with an overburden and topsoil footprint of 49 ha and 25 ha respectively, and a proposed TSF footprint of 144 ha, in the larger proposed 4660.90 ha mining right area.

6. Services and Supporting Infrastructure

Water Supply

Various water supply options were identified and are included in Section 9.2.3.1. These options will be assessed in a Water Supply Options Analysis Study during the EIA Phase,

Electricity

The proposed mining activities will require an estimated 78 Megawatt (MW), which equates to 608 Megawatt Hours per annum (MWhr/a). Part of Eskom's capacity expansion programme in Limpopo is the Medupi Base Load Coal Power station with linkages into the existing power grids. Two Eskom expansion projects would influence the Zebediela mine area, namely the Mokopane Integration Project and the Medupit Integration (Charlie) Phase 2B project.

One of the reasons for these two expansion projects is the upsurge in demand for electricity in the Mokopane area due to the increased mining activity and that the Witkop substation close to Polokwane cannot support the load growth. The Mokopane integration project includes the recently constructed transmission substation (Borutho substation) near Mokopane. The Borutho substation is located 37 km north of Mokopane and approximately 30 km north of the Zebediela project.

Roads

The proposed site is located approximately 12.5 km north west of the N1 which serves as the main road between Polokwane and Johannesburg. Other roads close to the project area include the R101 (5.5 km south east) and the N11 (6.6 km north west). All three these roads are national roads managed by SANRAL.

The proposed access road (max length of 1.5 km) will consist of a single lane road for traffic in both directions. Each lane is to be 3.6 m wide with a 1.4 m yellow lane shoulder. The district roads proposed for the access are managed by the Limpopo Roads Agency (RAL) and any upgrade and access to it needs to be negotiated in conjunction with this authority. Other roads will include haul roads to the plant and overburden facility with a total width of 16 m for a two-lane haul road, which will form part of the internal road network.

The Percy Fyfe road connects the R101 to the proposed surface infrastructure of the mine to the east of the road. This would be the main access road for the mine site.

Water treatment

A turnkey package water treatment plant with a capacity of 5 ML per day will be constructed. Some of the raw water as well as treated water from the sewage plant will be fed into the water treatment plant for further processing as per the staged water requirements. The water will be treated in two stages within the water treatment plant. Stage 1 of the treated water will be used for the concentrator plant requirements and Stage 2 will be used as make-up for potable water requirements.

The raw feed water will consist of dirty water returned from operations and of top-up water from dewatering the pit and will be treated to ensure that it meets SANS 241 Class I (potable water) standards.

Sewage treatment

An onsite activated sludge treatment facility will be constructed to treat sewage generated during the operational phase. The sludge treatment plant will be designed to process 700 m^3 per day. This would cater for both mining and plant personnel. The position of the sewage plant close to the water treatment plant and the pollution control dam allows for easy local distribution of treated water.

Use will be made of temporary chemical sanitary facilities for sewage to be generated by construction workers during the construction phase. Third party waste removal contractors will be responsible for the supplying, servicing, and relocating of temporary chemical sanitary facilities. The contents of the temporary chemical toilets will be disposed of at a registered hazardous waste disposal facility.

Solid waste management

All waste will be collected at the mine salvage yard where it will be sorted. Dedicated bays will be provided for different wastes. Recycling initiatives from the local communities will be investigated. Solid waste will be collected by a contractor and transferred to the closest registered waste facility. Used hydrocarbons will be stored in containers within a bunded area from where it will be collected and removed by an accredited contractor.

Blasting

The bulk emulsion will be stored on the surface in the Explosives Store prior to mixing in the open pit with sensitizer. Anfex will be received at the off-loading bay on the surface. The Anfex will be logged into a register, before being transported to the open pit by the explosives transporter. The combined capacity of the Explosives Store will not exceed 500 cubic metres.

Explosives will be delivered daily and transported to the open pit to be combined with the Anfex for blasting purposes. An explosives disposal facility for the destruction of explosives has been provided for on the surface.

Stormwater management

The proposed water management methodology at the mine should be based on the Best Practicable Environmental Option (BPEO) principle with responsible use and best practices. The impact of development on water quantity, quality and cost should be minimised. According to the GNR 704 of 4 June 1999 clean and dirty water should be separated and process water recycled and re-used. The dirty water will be kept in a closed circuit and spillages minimised.

Note that the term “clean water” refers to water that has not been interfered with and “dirty water” is water that is handled in or precipitated on the mine operations. Dirty water is therefore not necessarily contaminated. The following water management aspects are included in the design of the mine infrastructure and waste facilities:

- Clean stormwater will be diverted around the mine areas so that dirty and clean water are separated.
- No infrastructure will be located below the 1:100 year river floodline.
- Dirty water will be kept in a closed circuit and be re-used in the mining processes.

Make-up process water will also be used in the following order:

- Return water from the tailings facility
- On-site stormwater
- On site Sewerage Treatment Plant

The requirements of regulation GNR704 will be adhered to, especially the requirement for the 90 ML pollution control dam which should be designed to spill not more than once in fifty years.

Evaporation losses should be minimised, unless there is surplus water in the system (e.g. during storm events, the pollution control dam could be used to evaporate surplus water.

7. Alternatives

The Department of Environmental Affairs and Tourism’s (DEAT’s) guidelines for Integrated Environmental Management (IEM)) procedure (information Series 11) requires that an environmental investigation needs to consider feasible alternatives for any proposed development. The EIA Regulations also require that a number of possible proposals or alternatives for accomplishing the same objectives be considered.

Various alternatives have been assessed for the project on scoping level and workshopped by means of specialist, applicant and engineering team interactions. The alternatives were also influenced by means of discussions with authorities, discussions with I&AP's, considering the existing baseline environmental data and specialist input.

Alternatives relevant to this development can be categorized into the following:

1. **Site Location alternatives**
    - Location of the Processing Plant
    - Location of the Tailings Storage Facility (TSF)
    - Location of the Overburden facility and topsoil stockpile
2. **Layout alternatives**
    - Layout of the Processing Plant
    - Layout of the TSF
    - Layout of the Overburden facility and topsoil stockpile
3. **Service alternatives**
    - Water Provision Alternatives
    - Site Access Alternatives
    - Energy Alternatives
    - Technology alternative
4. **The “no-go” alternative**
    - To be assessed per environmental aspect/area

8. Public Participation

The EIA Regulations 2014 (as amended) specify that the Draft Scoping Report (DSR) must be subjected to a public participation process of at least 30 days. A period of 30 days (31 October till 2 December 2019) will be made available for public comment on the DSR. The availability of the DSR was announced via advert, site notices and notification letters as specified above to all the identified potential I&AP's.

In addition, the DSR was distributed for comment as follows:

- Electronic copies were made available on Dropbox; and
- Hard copies were made available at the public libraries in Mokopane and Mahwelereng.

One public open day/public meeting will be held during the review period of the DSR on 14 November 2019, to provide I&APs with the opportunity to raise issues and comments and ask specific questions in the presence of the relevant consultants on the project as well as explain the authorisation process and associated timelines. The public open day/public meeting was advertised in two local newspapers.

All issues raised by the I&APs during the public open day/public meeting will be included in the Final Scoping Report (FSR) to be submitted to the DMRE.

The public open day/public meeting will take place on the following dates:

- **Thursday, 14 November 2019 from 09h00 to 13h00 and 14h00 to 18h00** at the Park Hotel in Mokopane

The details of the public participation process as well as a summary of the issues raised by interested and affected parties (I&APs) and the Environmental Assessment Practitioner's (EAP) response to the issues raised are captured in a Comments and Response Register (refer to Appendix 8.9).

Refer to Section 10 for the public participation process followed to date.

9. Environmental Baseline

The project area has a warm-temperate climate and falls within the summer rainfall region with rainfall over the period 2016 to 2018 ranging between 331 mm and 439 mm per annum. Most rainfall in the area occurs during October to March which overall signifies the summer growing season in the Limpopo Province. Temperatures range between 6.7°C and 29.6°C. The predominant wind direction is from the north-west.

The topography of the proposed mine footprint area varies from slightly undulating valleys, and plains to moderately undulating hills with a mountain ridge occurring in the northern section of the site. Three non-perennial drainage channels bisect the project area. The landuses on site are mainly crop cultivation, livestock and wildlife grazing, chicken farms and rural developments.

Soils in the area consist of shallow Mispah and Glenrosa soils with low agricultural potential and moderate to low land capability. Red apedal Hutton soils in the area have a moderate agricultural potential and is viable for livestock and/or game grazing. Black or Dark Grey Clayey Soils associated with the drainage channels on site have no agricultural potential but has high grazing potential due to the palatable grasses growing on these soils.

The project area lies within the Savanna Biome and is classified as Polokwane Plateau Bushveld and Makhado Sweet Bushveld. The Witvinger Nature Reserve is located directly north of the proposed mining right area while the Percy Fyfe Nature Reserve is located slightly north-east of the mining right area. A small section of the Limpopo Central Bushveld National Protected Areas Expansion Strategy (NPAES) falls within the mining right area, although none of the footprint areas for the mining development are located close to any NPAES. According to the Limpopo Conservation Plan the study area falls within Critical Biodiversity Areas (CBA's) as well as Ecological Support Areas (ESA's).

The study area is located in the Limpopo Water Management Area (WMA), and is located mainly in Quaternary Catchment Area (QCA) A61F. The Rooisloot (a National Freshwater Ecosystem Priority Areas (NFEPA) River) traverses the proposed mining right area and is located approximately 700 m to the north north-west of the proposed open pit boundary. A tributary of the Rooisloot occurs approximately 3 km to the north-east of the proposed open pit. Other watercourses on site are non-perennial drainage channels. The area is dominated by deeply weathered and fractured mafic rocks where the groundwater yield potential can be regarded as low. Boreholes within the dolomitic rocks are expected to have a higher yield as evident by the municipal water supply boreholes in the project area.

10. Impacts and Mitigation

A list of the preliminary impacts that could occur were identified for the activities described in Section 5 together with the significance, probability and duration of the impacts, and is included in Table 21.

Preliminary typical mitigation measures that could be applied and the potential for residual risk **without** mitigation is indicated in Table 22 and Table 23. It should be noted that the the potential for residual risk **with** mitigation will only be established during the EIA Phase once all the specialist studies have been completed. The reason for including an impact statement is to identify which aspects need to be investigated further in the EIA Phase by means of specialist studies and to identify mitigation measures in order to reduce the significance of the impact identified during the Scoping Phase.

11. Way Forward

- Completion of the Public Participation Process (PPP): The comments received from I&APs will be included and assessed in the EIA&EMPR.
- Appointment of Specialists: The identified specialists will be appointed to undertake the specialist studies as identified in this Scoping Report.
- Draft Environmental Impact Assessment Report and Environmental Management Programme Report (EIA&EMPR): The results of the specialist studies will be synthesized by the project team to provide a draft EIA&EMPR.
- Draft EIA&EMPR published: The draft EIA&EMPR will be circulated to registered I&APs for comment for a period of 30 days.
- Revise Draft EIA&EMPR: The draft report will be updated by addressing and responding to the issues raised by I&APs.
- Final EIA&EMPR. The updated final report with the various specialist reports appended will be submitted to the Department of Mineral Resources and Energy (DMRE).

Opsomming

1. Inleiding

Lesego Platinum Uitloop (Edms.) Bpk. (LPU) beoog om 'n mynboubedryf naby Mokopane in die Limpopo Provinsie van Suid-Afrika te ontwikkel. Die voorgestelde Zebediela-nikkelmynprojek is in die Mogalakwena plaaslike-en die Waterberg-distriksmunisipaliteite geleë, ongeveer 9 km noord-oos van die middestad van Mokopane en ongeveer 250 km noord-noordoos van Johannesburg. Toegang tot die projekarea kan verkry word vanaf Johannesburg met die N1-snelweg tot by Mokopane en dan deur gebruik te maak van die Percy Fyfe-pad. Die voorgestelde terrein is meestal op privaat en staatsgrond geleë en is direk oos van die plaaslike nedersettings Mahwelereng en Ga-Madiba naby Mokopane in die Limpopo Provinsie. Die naaste nedersetting is Mahwelereng B, ongeveer 0,52 km vanaf die westelike mynreggrens en 1,1 km vanaf die rand van die oopgroef. Die voorgestelde mynreggebied sal geleë wees op plase waar LPU tans drie prospekteerregte besit, naamlik; Uitloop 3KS (1.925,29 ha), Amatava 41 KS en Bloemhof 4 KS (2620,34 ha), en Piet Potgietersrust Town en Townlands 44 KS (115,26 ha). Die gebied van die mynreg bestaan uit 'n gekombineerde oppervlakte van ongeveer 4.660,90 ha, wat ongeveer 11,9 km van suid na noord en 7,3 km van oos na wes strek. Myninfrastruktuur word egter eers beplan op ongeveer 350 ha van die groter mynreggebied. Die koördinate vir die middelpunt van die voorgestelde oopgroef is:

Breedtegraad: S - 24°7'17.154"

Lengtegraad: E 29°1'5.63"

Die geïdentifiseerde nikkelhulpbron bestaan uit 'n indringende pyroxeniet-harzburgiet-duniet-liggaam, ongeveer 8 km by 1,5 km groot aan die buitewyke, wat voorheen in korrelasie is met die onderste sone van die Bosveldkompleks en Uitloop II genoem is. Die indringing strek noordwes en daal 40° in die suidweste. Dit word afgekap deur die Mahopani Fout en volgens beraming is die liggaam 600 m dik. Die voorgestelde projek sal oorwegend nikkel- (Ni) en moontlik platinumgroepminerale (PGM's) en gepaardgaande minerale (platinum, palladium, rodium, goud, ruthenium, iridium, osmium, koper, kobalt en chromiet), ystererts en vanadium van magnetite ontgin. Die Zebediela Ni-hulpbron sal met behulp van oopgroef-mynboumetodes ontgin word. Vanweë die dikte van die ertsliggaam is toekomstige ondergrondse ontginning 'n moontlikheid, maar dit sal onderhewig wees aan 'n afsonderlike magtigingsproses.

Die mynbou sal fokus op die onttrekking van 180,02 Mt sulfiedbevattende materiaal met behulp van oopgroef konvensionele vragmotor en skopgraafmynbou en gedeeltelike terugvulling metode. Die boonste 40 m tot 50 m van die verspreide sulfiedmateriaal is geoksideer (oksiedsone) en sal op 'n deklaag (overburden) fasiliteit gestoor word. Gelyktydige terugvulling van die deklaag sal vanaf jaar 10 plaasvind sodra voldoende kapasiteit in die oopgroef bestaan. Die hele put onder die oksiedsone bestaan uit gemineraliseerde materiaal (sulfiedsone) en erts sal na 'n verwerkings- en veredelingsaanleg vervoer word. Die oopgroefput-ontwerp het 'n putlengte van ongeveer 1,150 m, 'n gemiddelde breedte op die oppervlakte van 639 m en 'n diepte van 220 m. 'n Wal van 5 m hoog en 10 m breed sal rondom die hele putomtrek gebou word. Die minerale hulpbronne wat by hierdie projek ingesluit is, is omvattend en gevolglik sal die mynregaansoek wees vir 'n 30-jaar leeftyd (Life of Mine - LOM). Die eerste vyf jaar sal konstruksie van die toegangspaaie, aanleg-infrastruktuur, omheining en stroping van die oopgroef put behels

Die Omvangbepalings- en Omgewingsimpak Proses (S&EIA) word onderneem ter ondersteuning van 'n aansoek as deel van die omgewingsmagtiging wat by die Departement van Minerale Hulpbronne en Energie (DMRE): Limpopo-streek ingedien is ingevolge die Wet op Nasionale Omgewingsbestuur (Wet nr. 107 van 1998) (NEMA), saamgelees met die Omgewinsimpakregulasies van 2014 (soos gewysig op 7 April 2017) en kennisgewings 1, 2 en 3 (GNR 983, 984 en 985).

2. Mynbou Metode

Teen volle produksie sal ongeveer 300 kilo ton per maand (ktpm) ertsmateriaal (Run of Mine - RoM) gemyn word met 'n stroopverhouding van 0,75 vanaf jaar 5 tot jaar 30. Die eerste vyf jaar bestaan hoofsaaklik uit stroping teen 'n koers van 3.582 kilo ton per jaar (ktpa), dit sal verminder tot 2 700 ktpa vir die res van die lewensduur van die myn, behalwe vir jaar 5 waar 'n verhoging van 70% toegepas sal word. Stroping van die deklaag is beperk tot die oksiedsone wat ongeveer 46,5 m dik is. Die ontwerpte put word deur oopgroef konvensionele vragmotor en skopgraafmynbou en gedeeltelike terugvulling metode gemyn.

Aanvanklik sal mynbou slegs plaasvind vanuit een deel van die put en begin vanaf die noord-westelike gedeelte van die minerale hulpbron en ontwikkel word oor die volle breedte van die put in 'n suid-oostelike rigting oor 'n totale lengte van 1,150 m. Die totale helling van die kante van die put sal 45° wees. Die deklaag en gemineraliseerde materiaal word in die put gelaai met graafmasjiene met 26 m^3 emmers en met 225 t vragmotors na die deklaag (overburden) fasiliteit en ROM stoorfasiliteit vervoer. 'n Bankhoogte van 15 m en mynblokke van 100 m by 50 m word vir die deklaag en gemineraliseerde materiaal beplan. Erts word by 'n verwerkingsaanleg op die perseel verwerk, en slik sal op ‘n slikdam gedeponeer word.

3. Leeftyd van myn

Die minerale hulpbronne wat by hierdie projek ingesluit is, is omvattend en gevolglik en het ‘n algehele ‘n leeftyd (Life of Mine - LOM) van meer as 30 jaar. Alhoewel, vir die mynregaansoek sal daar slegs vir ‘n 30 jaar leeftyd aansoek gedoen word. Die geometrie van die ertsliggaam maak dit moontlik vir deurlopende ontginning via oopgroefmynbou tot 'n diepte van 220 m.

Die stroop van 18.11 Mt deklaag sal plaasving vanaf jaar 0 tot jaar 4 en gelyktydig voortgaan met die produksiebedrywighede tussen jaar 5 en jaar 30, met 'n stroopverhouding van 0,75:1. Die verwydering van die deklaag met die huidige putontwerp sal eers na die 30 LOM voltooi word, waarna geen verdere deklaag verwydering benodig sal word nie. Die verhoging van die ROM produksie is gebaseer op ‘n 70% gedeeltelike verhoging van 2,52 Mt gemineraliseerde materiaal (jaar 5), met 'n volledige produksie van 3,6 Mt in jaar 6 wat voortduur tot jaar 30 tot 'n diepte van 220 m onder die oppervlak.

4. Metallurgiese Proses

Tydens die konsentrasieproses word erts gemaal om minerale deeltjies vry te stel. Dit word dan herwin in die vorm van 'n konsentraat deur skuimflotasie. Die ertsmineralogie bepaal die fynheid van die maalproses wat benodig word vir bevryding asook die ideale omstandighede vir flotasie. Baie fyn deeltjies is moeilik om te herwin, dus kan twee of selfs drie maal- en flotasie stadiums gebruik word om verliese as gevolg van te veel maal te verminder.

Die materiaal wat behandel moet word, is 'n verspreide nikkel-sulfiedafsetting met 'n gemiddelde nikkelgraad van 0.241%, waarvan ~62% Ni, of 0.15% Ni in sulfiedvorm voorkom. Die ontwerp mik om 'n minimum herwinning van meer as 50% nikkel te verkry deur die flotasie van nikkelsulfiedkonsentraat met 'n totale massatrekking van minder as 1% en 'n konsentraatgraad van meer as 15% nikkel.

Die voorgestelde verwerkingsaanleg sal bestaan uit 'n standaard MF2-stroombaan (d.w.s. maal / flotasie gevolg deur maal / flotasie of primêre slik) wat die ROM erts wat fyngemaal is deur die primêre maler, verwerk tot ongeveer 300 ktpm sulfiedsone materiaal. Die stroombaan behels primêre en sekondêre stadium meule, sowel as flotasiesektore, wat primêre en sekondêre konsentraat sal genereer. Die konsentraat sal gefiltreer word tot 11 - 15% vog waarna dit na 'n tolsmelter vervoer sal word.

5. Oppervlak-infrastruktuur

Die voorgestelde Zebediela-nikkelmyn is geleë in 'n gebied met bestaande mynaktiwiteite, soos Anglo American se Mogalakwena-myn en Ivanplats se Platreef-projek, wat onderskeidelik ongeveer 22 km en 9 km noordwes van die voorgestelde terrein is. Die infrastruktuur in die omgewing is billik, met die middestad van Mokopane wat ongeveer 9 km van die projekgebied af geleë is. Mokopane is 'n goed gedienste dorp naby nasionale paaie, die noord-suid nasionale spoorlyn, elektrisiteit en grootmaat watervoorsiening.

Die gebied word gedien deur verskeie provinsiale paaie sowel as die N1-nasionale pad wat dit met Zimbabwe en die res van Suid-Afrika verbind. Daar is een kommersiële lughawe in die streek (Polokwane International), sowel as 'n paar privaat vliegbane wat hoofsaaklik vir toerisme en privaat-gebruik gebruik word.

Die stad Mokopane, sowel as die nabygeleë gemeenskappe Mahwelereng, Ga-Madiba, Masodi, Tshamahansi, Phola Park, Sekgakgapeng, Mosate, Maroteng en Masehlaneng sal vaardige- en ongeskoolde arbeid vir toekomstige mynbedrywighede bied. Die voorgestelde toegangspaaie is hoofsaaklik bestaande teer- en grondpadpaaie en moet opgegradeer word.

Myn infrastruktuur sal uit die volgende bestaan onder andere:

- Verwerkings- en veredelingsaanleg
- Erts-hanteringstoor fasiliteite (ROM-voorraad)
- Administratiewe gebou, sekuriteitsgebou, ablusieblok, rus- en kantienfasiliteite, mynbou- en geologie-kantore, instandhoudings- en ingenieurswerkswinkels met kantore, pakhuis met

gepaardgaande kantore, mediese stasie, brandweerstasie, laboratorium- en verplaasbare ablusies

- Drinkwater tenk en netwerk
- Proseswater dam, proseswater tenks en netwerk
- Elektrisiteit verspreidingsfasiliteite (hoofkraglyne, transformators en mini-substasies)
- Brandstof -stoorfasiliteite
- Rioolbehandelingsaanleg en pyplyne vir rioolwater
- Waterbehandelingsaanleg
- Besoedelingsbeheerdam (Pollution Control Dam - PCD)
- Vervoer- en toegangspaaie en brûe
- Omheining en interne heiningdraad
- Bogrond (topsoil) en deklaag (overburden) fasiliteite
- Slikdam (Tailings Storage Facility - TSF) en terugkeerwaterdam (Return Water Dam (RWD)
- Plofstofstoor

Daar word voorgestel dat die oopgroef- en verwerkingsaanleg onderskeidelik 74 ha en 53 ha is, met deklaag en bogrondse fasiliteite van onderskeidelik 49 ha en 25 ha, en 'n voorgestelde slikdam van 144 ha, in die groter voorgestelde mynregterrein van 4660,90 ha.

6. Dienste en ondersteunende infrastruktuur

Watertoevoer

Verskeie watervoorsieningsopsies is geïdentifiseer en is opgeneem in Afdeling 9.2.3.1. Hierdie opsies sal verder ondersoek word tydens die EIA-fase in die watervoorsieningsanalise studie.

Elektrisiteit

Die voorgestelde mynbedrywighede sal 'n geskatte 78 Megawatt (MW) benodig, wat gelykstaande is aan 608 Megawatt-ure per jaar (MWhr/a). 'n Deel van Eskom se kapasiteitsuitbreidingsprogram in Limpopo is die Medupi Basislading Steenkool-stasie met skakels na bestaande kragnetwerke. Twee Eskom-uitbreidingsprojekte sal die Zebediela-myngebied beïnvloed, naamlik die Mokopane-integrasieprojek en die Medupit-integrasie (Charlie) fase 2B-projek.

Een van die redes vir hierdie twee uitbreidingsprojekte is die toename in die vraag na elektrisiteit in die Mokopane-omgewing as gevolg van die verhoogde mynaktiwiteit en dat die Witkop-substasie naby Polokwane nie die vraggroei kan ondersteun nie. Die Mokopane-integrasieprojek sluit die onlangs geboude transmissiesubstasie (Borutho-substasie) naby Mokopane in. Die Borutho-substasie is 37 km noord van Mokopane en ongeveer 30 km noord van die Zebediela-projek geleë.

Paaie

Die voorgestelde terrein is ongeveer 12,5 km noordwes van die N1 geleë wat as die hoofweg tussen Polokwane en Johannesburg dien. Ander paaie naby die projekgebied sluit die R101 (5,5 km suidoos) en die N11 (6,6 km noordwes) in. Al drie hierdie paaie is nasionale paaie wat deur SANRAL bestuur word.

Die voorgestelde toegangspad (maksimum lengte van 1,5 km) bestaan uit 'n enkelbaan vir verkeer in albei rigtings. Elke baan sal 3,6 m breed wees met 'n geel baanskouer van 1,4 m. Die distrikspaaie wat voorgestel word vir toegang, word bestuur deur die Limpopo Road Agency (RAL), en enige opgradering en toegang daartoe moet in samewerking met hierdie owerheid onderhandel word. Ander paaie sluit vragpaaie na die aanleg en 'n deklaag (overburden) fasiliteit in met 'n totale breedte van 16 m vir 'n tweestaan-pad wat deel van die interne padnetwerk sal vorm.

Die Percy Fyfe-pad verbind die R101 met die voorgestelde myninfrastruktuur oos van die pad. Dit sal die hoof toegangspad vir die mynterrein wees.

Waterbehandeling

'n Waterbehandelingsaanleg met 'n kapasiteit van 5 ML per dag sal gebou word. Rou water sowel as behandelde water van die rioolaanleg sal na die waterbehandelingsaanleg getuur word vir behandeling volgens die vereiste waterbehoeftes. Die water sal in twee fases in die waterbehandelingsaanleg behandel word. Fase 1 van die behandelde water sal gebruik word vir die vereistes van die verwerkingsaanleg en fase 2 sal vir drinkwaterbehoeftes gebruik word.

Die rou voerwater sal bestaan uit vuil water van mynbedrywighede en water vanaf die ontwatering van die put en sal behandel word om te verseker dat dit aan SANS 241 Klas I (drinkwater) standaarde voldoen.

Rioolbehandeling

'n Rioolwateraanleg sal gebou word tydens die operasionele fase. Die rioolbehandelingsaanleg sal ontwerp word om 700 m³ riool per dag te verwerk. Dit sal voorsiening maak vir mynbou- sowel as aanlegpersoneel. Die ligging van die rioolaanleg sal naby die waterbehandelingsaanleg en die besoedelingsbeheerdam geleë wees vir maklike verspreiding van behandelde water.

Daar sal van tydelike chemiese sanitêre fasiliteite gebruik gemaak word gedurende die konstruksiefase vir konstruksiewerkers. Derdeparty afvalverwyderingskontrakteurs sal verantwoordelik wees vir die verskaffing, onderhoud en hervestiging van tydelike chemiese sanitêre fasiliteite. Die inhoud van die tydelike chemiese toilette sal by 'n geregistreerde fasiliteit vir gevaarlike afval verwyder word.

Soliede afvalbestuur

Alle afval sal geneem word tot by die myn sorteringswerf waar dit gesorteer word, en dan afgehaal word. Toegewyde paaie sal voorsien word vir verskillende afvalstowwe. Plaaslike gemeenskap herwinningsinisiatiewe sal ondersoek word. Vaste afval sal deur 'n kontrakteur afgehaal word en tot by die naaste geregistreerde afvalfasiliteit verwyder word. Gebruikte koolwaterstowwe (hydrocarbons) sal in houers gestoor word, binne 'n ommuurde area waar dit deur 'n geakkrediteerde kontrakteur afgehaal en verwyder sal word.

Skietwerk

Die massa-emulsie sal op die oppervlak in die plofstofstoor gestoor word voordat dit in die oopgroef met die sensitiseerder gemeng word. Anfex sal by die aflaai-baai op die oppervlak ontvang word. Die Anfex sal in 'n register aangeteken word voordat dit deur die plofstofvervoerder na die oopgroef vervoer word. Die gesamentlike kapasiteit van die plofstofstoor sal nie meer as 500 m^3 wees nie.

Plofstof sal daagliks afgelewer word en na die oopgroef vervoer woed om gekombineer te word met die Anfex vir skietwerkdoeleindes. Voorsiening is gemaak vir 'n fasiliteit vir die vernietiging van plofstof.

Stormwaterbestuur

Die voorgestelde metodologie vir waterbestuur by die myn moet gebaseer wees op die beste praktiese omgewingsopsie (BPEO)-beginsel met verantwoordelike gebruik en beste praktyke. Die impak van ontwikkeling op die hoeveelheid, kwaliteit en koste van water moet tot die minimum beperk word. Volgens GNR 704 van 4 Junie 1999 moet skoon en vuil water geskei word, herwin word en hergebruik word. Die vuil water moet in 'n geslote stroombaan gehou word en storting moet tot die minimum beperk word.

Let daarop dat die term “skoon water” verwys na water wat nie mee ingemeng is nie en “vuil water” is water is wat tydens mynbedrywighede hanteer of neergesit word. Vuil water is dus nie noodwendig besoedelde water nie. Die volgende aspekte van waterbestuur is ingesluit in die ontwerp van die myninfrastruktuur en afvalfasiliteite:

- Skoon stormwater word om die mynareas gelei sodat vuil en skoon water geskei word.
- Geen infrastruktuur sal onder die 1: 100 jaar riviervloedlyn geleë wees nie.
- Vuil water word in 'n geslote stroombaan gehou en weer in die mynproses gebruik.

Proseswater word ook in die volgende volgorde gebruik:

- Waterterugvoer vanaf die slikdam
- Stormwater op die perseel
- Rioolbehandelingsaanleg op die perseel

Daar sal aan die vereistes van regulasie GNR 704 voldoen word, veral die vereiste vir die 90 ML-besoedelingsbeheerdam wat ontwerp moet word om nie meer as een keer in vyftig jaar te stort nie.

Verdampingsverliese moet tot 'n minimum beperk word, tensy daar oorskotwater in die stelsel is (bv. tydens stormgebeurtenisse), kan die besoedelingsbeheerdam gebruik word om oorskotwater te verdamp.

7. Alternatiewe

Die Departement van Omgewingsake en Toerisme (DEAT) se riglyne vir geïntegreerde omgewingsbestuur (IEM) (prosedure Reeks 11) vereis dat 'n omgewingsondersoek, uitvoerbare alternatiewe vir enige voorgestelde ontwikkeling moet oorweeg. Die EIA-regulasies vereis ook dat 'n aantal moontlike voorstelle of alternatiewe om dieselfde doelstellings te bereik, oorweeg moet word.

Verskeie alternatiewe is op die omvangsbepalingsvlak vir die projek bepaal en geassesser deur middel van spesialis-, aansoeker- en ingenieurspan-interaksies. Die alternatiewe is ook beïnvloed deur besprekings met die owerhede, gesprekke met I&AP's, inagneming van die bestaande basislyn-omgewingsdata en spesialis terugvoer.

Relevante altenatiewe vir die ontwikkeling kan gekategoriseer word as volg:

1. **Terrein Ligging alternatiewe**
    - Ligging van die verwerkingsaanleg
    - Ligging van die Slikdam (TSF)
    - Ligging van die Bogrond (topsoil) en deklaag (overburden) fasiliteite
2. **Uitleg alternatiewe**
    - Uitleg van die verwerkingsaanleg
    - Uitleg van die Slikdam (TSF)
    - Uitleg van die Bogrond (topsoil) en deklaag (overburden) fasiliteite
3. **Diens alternatiewe**
    - Watervoorsieningsalternatiewe
    - Toegangsroetes alternatiewe
    - Energie alternatiewe
    - Tegnologie alternatiewe
4. **Die Geen Ontwikkeling("no-go") alternatief**
    - Word per omgewingsaspek/area geassesseer

8. Publieke deelname

Die EIA-regulasies 2014 (soos gewysig) spesifiseer dat die konsep-omvangbepalingsverslag (DSR) aan 'n openbare deelnameproses van minstens 30 dae onderwerp moet word. 'n Tydperk van 30 dae (31 Oktober tot 2 Desember 2019) sal beskikbaar gestel word vir openbare kommentaar op die DSR. Die beskikbaarheid van die DSR is gekommunikeer deur advertensies, kennisgewingsplakkate en kennisgewingsbriewe, soos hierbo gespesifiseer, aan al die geïdentifiseerde potensiële I&AP's.

Bo en behalwe is die DSR op die volgende maniere beskikbaar gestel:

- Elektroniese kopieë op die Dropbox webwerf; en

- Harde (uitgedrukte) kopieë sal beskikbaar gemaak word by die publieke biblioteke in Mokopane en Mahwelereng.

Een openbare opedag/vergadering word tydens die hersieningsperiode van die DSR op 14 November 2019 gehou om I&AP's die geleentheid te gee om kwessies en kommentaar te lewer en spesifieke vrae te stel in die teenwoordigheid van die betrokke konsultante oor die projek sowel as die magtigingsproses en gepaardgaande tydlyne te verduidelik. Die openbare opedag/vergadering is in afdeling 10.1 hierbo in twee plaaslike koerante geadverteer. Alle kwessies wat deur die B & GP's tydens die openbare opedag / openbare vergadering geopper word, sal opgeneem word in die Finale Omvangsbepalingsverslag (FSR) wat aan die DMRE voorgelê word.

Die openbare opedag/vergadering sal plaasvind op die volgende datums:

- **Donderdag, 14 November 2019 van 09h00 tot 13h00 en 14h00 tot 18h00** by die Park Hotel in Mokopane

Die besonderhede van die openbare deelname proses sowel as 'n opsomming van die kwessies wat geopper word deur I&AP's en die omgewingsbeoordelingspraktisyn (EAP) se reaksie op die kwessies word in 'n kommentaar- en antwoordtabel vervat (verwys na Bylaag 8.9).

Verwys na Gedeelte 10 vir die openbare deelnameproses wat tot dusver gevolg is.

9. Omgewingsbasislyn van die Projek Area

Die projekarea het 'n warm gematigde klimaat en val binne die somerreënvalstreek. Die reënval gedurende die periode 2016 tot 2018 wissel tussen 331 mm en 439 mm per jaar. Die meeste reënval in die omgewing kom gedurende Oktober tot Maart voor, wat ooreenstem met die somer groeiseisoen in die Limpopo-provinsie. Temperature wissel tussen 6,7°C en 29,6°C. Die oorheersende windrigting is uit die noordweste.

Die topografie van die voorgestelde mynvoetspoor-area wissel van effens golwende valleie en vlaktes tot matig golwende heuwels, met 'n bergrif wat in die noordelike deel van die terrein voorkom. Drie nie-standhoudende dreineringskanale verdeel die projekarea. Die grondgebruik op die terrein is hoofsaaklik gewasverbouing, vee- en wildweiding, hoenderplase en landelike ontwikkelings.

Grond in die omgewing bestaan uit vlak Mispah- en Glenrosa-grond met 'n lae landboupotensiaal en matige tot lae grond gebruik vermoë. Rooi apedal Hutton-gronde in die omgewing het 'n matige landboupotensiaal en is lewensvatbaar vir vee- en / of wildweiding. Swart of donkergrys klei-grond wat met die dreineringskanale op die terrein verband hou, het geen landboupotensiaal nie, maar het 'n hoë weidingspotensiaal as gevolg van die smaaklike grasse wat op hierdie gronde groei.

Die projekarea lê in die Savanna Biome en word geklassifiseer as Polokwane Plato Bosveld en Makhado Soet Bosveld. Die Witvinger-natuurreservaat is direk noord van die voorgestelde mynregarea geleë, terwyl die Percy Fyfe-natuurreservaat effens noord-oos van die mynregarea geleë is. 'n Klein gedeelte van die Limpopo Sentraal-Bosveld-uitbreidingstrategie vir beskermde areas (Limpopo Central Bushveld National Protected Areas Expansion Strategy - NPAES) val binne die mynregarea, hoewel geen van die voetspoorareas vir die mynbou-ontwikkeling naby enige NPAES geleë is nie. Volgens die Limpopo Bewaringsplan val die studiegebied binne ‘n kritieke biodiversiteitsareas (Critical Biodiversity Areas - CBA's) sowel as ekologiese ondersteuningsareas (Ecological Support Areas - ESA's).

Die projek is in die Limpopo Waterbestuursarea (Water Management Area - WMA) geleë, en is hoofsaaklik in die Kwaternêre opvanggebied (Quaternary Catchment Area - QCA) A61F geleë. Die Rooisloot ('n Nasionale varswater ekosisteem priotiteitsarea (National Freshwater Ecosystem Priority Areas - NFEPA)-rivier) kruis die voorgestelde mynregarea en is ongeveer 700 m noord van die voorgestelde oopgroef grens geleë. 'n Sytak van die Rooisloot kom ongeveer 3 km noord van die voorgestelde oopgroef voor. Ander waterlope op die terrein is nie-standhoudende dreineringskanale. Die gebied word oorheers deur diep verweerde en gebroke mafiese gesteentes waarvan die leweringspotensiaal van die grondwater as laag beskou kan word. Daar word verwag dat boorgate in die dolomitiese gesteentes 'n hoër lewering sal hê, soos blyk uit die munisipale watervoorsieningsboorgate in die projekarea.

10. Impakbepaling en versagtingsmaatreëls

'n Lys van die voorlopige impakte wat kan voorkom, is geïdentifiseer vir die aktiwiteite wat in Gedeelte 5 beskryf word, tesame met die gewig (significance), waarskynlikheid en duur van die impak, en word in Tabel 21 ingesluit.

Voorlopige tipiese versagtingsmaatreëls wat toegepas kan word en die potensiaal vir oorblywende (residual) risiko **sonder** versagting word in Tabel 22 en Tabel 23 aangedui. Daar moet kennis geneem word dat die potensiaal vir oorblywende risiko met versagting eers tydens die EIA-fase bepaal sal word. Die rede hoekom die impakbepaling ingesluit in hierdie verslag is, is om die aspekte aan te dui wat verder ondersoek moet word in die EIA fase deur middel van spesialis studies en om versagtingsmaatreëls te bepaal vir die impakte wat gedurende die Konsepstudie geidentifiseer is.

11. Pad Vorentoe

- Voltooiing van die publieke deelnemingsproses (PPP): Die kommentaar wat van I&AP’s ontvang word, sal ingesluit en aangespreek word in die Finale Omvangbepalingsverslag.
- Aanstelling van spesialiste: Die geïdentifiseerde spesialiste sal aangestel word om die spesialisstudies te onderneem soos geïdentifiseer in hierdie Konsep Omvangbepalingsverslag.
- Konsep Omgewingsinvloedbepalingsverslag en Omgewingsbestuursprogramverslag (EIA&EMPR): Die resultate van die spesialisstudies sal deur die projekspan gesintetiseer word om 'n konsep EIA&EMPR te voorsien.
- Konsep EIA&EMPR gepubliseer: Die konsep EIA&EMPR met die verskillende spesialisverslae aangeheg, sal aan geregistreerde I&AP’s gestuur word vir kommentaar vir 'n tydperk van 30 dae.

- Hersien Konsep EIA&EMPR: Die konsepverslag sal opgedateer word deur die kwessies wat deur I&AP's geopper word, aan te spreek en daarop te reageer.
- Finale EIA&EMPR. Die hersiende finale verslag sal aan die Departement van Minerale Hulpbronne en Energie (DMRE) voorgelê word.

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SCOPING REPORT

1. CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.1. Details of the Environmental Assessment Practitioner (EAP) who prepared the report

1.1.1. Details and Expertise of the EAP

Exigo Sustainability (Pty) Ltd (Exigo) assigned the environmental practioners listed in Table 1 to undertake the required environmental authorisation process.

Table 1: Environmental Assessment Practitioner Details

Consultant Name	Designation	Contract Number	Fax Number	Email
Herman Gildenhuys	Environmental Assessment Practitioner	012 751 2160	086 607 2406	herman@exigo3.com
Chantal Uys	Environmental Assessment Practitioner	012 751 2160	086 607 2406	chantal@exigo3.com

The following Environmental Scientists were furthermore instrumental in compiling this report:

- Dr. Koos Vivier (Director and Hydrogeologist)

1.2. Expertise of the EAP

1.2.1. The qualifications of the EAP

Please refer to Appendix 1 as well as Table 2 below.

Table 2: EAP Qualifications and Experience

Consultant Name	Qualifications	Years' Experience
Herman Gildenhuys	M.Sc. Environmental Ecology (Pr.Sci.Nat)	12 years
Chantal Uys	BHCS Hons Archaeology	10 years
Koos Vivier	Ph.D Environmental Management, M.Sc. Geohydrology (Pr. Sci Nat, MGSSA)	19 years

1.2.2. Summary of the EAP's past experience

Please refer to Appendix 2: Company Profile & EAP's Curriculum Vitae as well as Table 2 above.

2. DESCRIPTION OF THE PROPERTY

Table 3: Property Details

Farm Name:	Mining Right Application (MRA) proposed on: 1. Farm Uitloop 3 KS (Portion 0 (R/E), Portion 2, Portion 12, Portion 17, Portion 20, Portion 21, Portion 22, Portion 23, Portion 24, Portion 25, Portion 35, Portion 36, Portion 38, Portion 39, Portion 40, Portion 41, Portion 42, Portion 44, Portion 46, Portion 47, Portion 48, Portion 49, Portion 51, Portion 52, Portion 53, Portion 54, Portion 55, Portion 56, Portion 57, Portion 58, Portion 59, Portion 61, Portion 62, Portion 63, Portion 65, Portion 66, Portion 70, Portion 71, Portion 72, Portion 73, Portion 74, Portion 75) 2. Farm Amatava 41 KS (R/E of Portion 1, R/E of Portion 2, R/E of Portion 8 (a portion of Portion 1), R/E of Portion 9, Portion 10 (a portion of Portion 8), Portion 11, Portion 12 (a portion of Portion 4), Portion 13 (a portion of Portion 5), Portion 14 (a portion of Portion 5), Portion 15 (a portion of Portion 1), Portion 16 (a portion of Portion 1), Portion 17 (a portion of Portion 8), R/E of Portion 18 (a portion of Portion 8), R/E of Portion 23, Portion 28 (a portion of Portion 9) and Portion 29 (a portion of Portion 18)) 3. Farm Bloemhof 4 KS (Portion 1, R/E of Portion 3, R/E of Portion 4, Portion 6 (a portion of Portion 2), Portion 9 (a portion of Portion 5), Portion 11 (a portion of Portion 4), Portion 13, Portion 14 (a portion of Portion 3), Portion 15 (a portion of Portion 4), Portion 16, Portion 17 (a portion of Portion 3), Portion 18 (a portion of Portion 4), Portion 19 (a Portion of Portion 4), R/E of Portion 24, Portion 25 (a portion of Portion 24), and Portion 26) 4. Farm Piet Potgietersrust Town and Townlands 44 KS (R/E of Portion 46 (a portion of Portion 80), Portion 47, R/E of Portion 48, R/E of Portion 49 (a portion of Portion 80), Portion 50 (a portion of Portion 80), R/E of Portion 51, Portion 98, Portion 99, Portion 100, Portion 101, Portion 121) A section of the mine access road is proposed on Portion 45 and Portion 80 of the farm Piet Potgietersrust Town and Townlands 44 KS, which is not located on the mining right application area. For this reason, these properties are also included in the Environmental Impact Assessment (EIA) for the proposed project.
Application area (Ha)	Approximately 4660.90 Hectares (including portions 45 and 80 Piet Potgietersrust Town and Townlands 44 KS for the proposed mine access road)
Magisterial district:	The proposed Zebediela Nickel Mine Project is located within the Mogalakwena Local Municipality (LM) within the Waterberg District Municipality (DM) in the Limpopo Province.
Distance and	The city centre of Mokopane (Potgietersrus) is situated approximately 9 km south-west of the project area. The nearest settlement is Mahwelereng B, about 0.52 km from the

direction from nearest town	western mining right boundary and 1.1 km from the edge of the open pit.
21 digit Surveyor General Code for each farm portion	T0KS00000000000300000; T0KS00000000000300002; T0KS00000000000300012; T0KS00000000000300017; T0KS00000000000300020; T0KS00000000000300021; T0KS00000000000300022; T0KS00000000000300023; T0KS00000000000300024; T0KS00000000000300025; T0KS00000000000300035; T0KS00000000000300036; T0KS00000000000300038; T0KS00000000000300039; T0KS00000000000300040; T0KS00000000000300041; T0KS00000000000300042; T0KS00000000000300044; T0KS00000000000300046; T0KS00000000000300047; T0KS00000000000300048; T0KS00000000000300049; T0KS00000000000300051; T0KS00000000000300052; T0KS00000000000300053; T0KS00000000000300054; T0KS00000000000300055; T0KS00000000000300056; T0KS00000000000300057; T0KS00000000000300058; T0KS00000000000300059; T0KS00000000000300061; T0KS00000000000300062; T0KS00000000000300063; T0KS00000000000300065; T0KS00000000000300066; T0KS00000000000300070; T0KS00000000000300071; T0KS00000000000300072; T0KS00000000000300073; T0KS00000000000300074; T0KS00000000000300075. T0KS00000000000410001; T0KS00000000000410002; T0KS00000000000410008; T0KS00000000000410009; T0KS00000000000410010; T0KS00000000000410011; T0KS00000000000410012; T0KS00000000000410013; T0KS00000000000410014; T0KS00000000000410015; T0KS00000000000410016; T0KS00000000000410017; T0KS00000000000410018; T0KS00000000000410023; T0KS00000000000410028; T0KS00000000000410029. T0KS00000000000400001; T0KS00000000000400003; T0KS00000000000400004; T0KS00000000000400006; T0KS00000000000400009; T0KS00000000000400011; T0KS00000000000400013; T0KS00000000000400014; T0KS00000000000400015; T0KS00000000000400016; T0KS00000000000400017; T0KS00000000000400018; T0KS00000000000400019; T0KS00000000000400024; T0KS00000000000400025; T0KS00000000000400026. T0KS00000000004400045; T0KS00000000004400046; T0KS00000000004400047; T0KS00000000004400048; T0KS00000000004400049; T0KS00000000004400050; T0KS00000000004400051; T0KS00000000004400080; T0KS00000000004400098; T0KS00000000004400099; T0KS00000000004400100; T0KS00000000004400101; T0KS00000000004400121.

3. LOCALITY MAP

Please refer to Appendix 3: Locality Map.

4. DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

4.1. Listed and specified activities

For a Preliminary Site Layout Plan indicating the activities below refer to Appendix 4.

Table 4: Listed activities to be authorised

Name of Activity	Approximate Aerial Extent of the activity ha or m²	Listed Activity	Applicable Listing Notice [1]	Description of EIA Listed Activity	Waste Management Authorisation	Description of Waste Management Listed Activity
Mining of ore from open cast pit	One open pit with footprint of 74 ha	X	GNR 984 – NEMA Listing Notice 2 of 2014 Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation.		
Construction of a processing plant and associated infrastructure including mine offices and workshops & establishment of ore stockpiles	53 ha	X	GNR 984 – NEMA Listing Notice 2 of 2014 Activity 17	Any activity including the operation of that activity which requires a mining right as contemplated in section 22 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		

[1] **GNR 983 GNR 984 or GNR 985, as amended on 7 April 2017**

Name of Activity	Approximate Aerial Extent of the activity ha or m²	Listed Activity	Applicable Listing Notice [1]	Description of EIA Listed Activity	Waste Management Authorisation	Description of Waste Management Listed Activity
				washing; but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Notice 2 applies.		
			GNR 985 – NEMA Listing Notice 3 of 2014 Activity 14 (ii) & (a) or (c) e. i. (ff) (hh)	The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs — (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. e. Limpopo i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in Systematic biodiversity plans adopted by the competent authority or in bioregional plans; (hh) Areas within 10 kilometres		

Name of Activity	Approximate Aerial Extent of the activity ha or m²	Listed Activity	Applicable Listing Notice [1]	Description of EIA Listed Activity	Waste Management Authorisation	Description of Waste Management Listed Activity
				from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.		
Establishment of overburden and topsoil stockpiles & deposits	Overburden facility: 49 ha Topsoil stockpile: 25 ha		GNR 985 – NEMA Listing Notice 3 of 2014 Activity 12 e. (ii)	The clearance of an area of 300 square metres or more of indigenous vegetation. e. Limpopo ii. Within critical biodiversity areas identified in bioregional plans.	X (GNR 921 – NEMWA Category B, Activity 10, 11)	The construction of a facility for a waste management activity listed in Category B of this Schedule; and The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the MPRDA
Construction of facilities for the storage of oil, diesel, fuel and explosives	Hydrocarbon storage: total capacity of 607 m^3 Explosives storage: 250 m^2 , <500 m^3	X	GNR 984 – NEMA Listing 2 of 2014 Activity 4	The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.		
Construction of stormwater and service water dams:		X	GNR 984 – NEMA Listing Notice	The development of facilities or infrastructure for any process or activity which requires a permit		

Name of Activity	Approximate Aerial Extent of the activity ha or m²	Listed Activity	Applicable Listing Notice [1]	Description of EIA Listed Activity	Waste Management Authorisation	Description of Waste Management Listed Activity
1. Potable water tank 2. Process water tank x 2 3. Pollution Control Dam (Plant) 4. Process Water Dam 5. Return Water Dam 6. Pollution Control Dam (Overburden)	+/-2000 m^3 +/-5000 m^3 x 2 +/-90000 m^3 (+/- 2ha) +/-20000 m^3 +/-159359 m^3 (+/- 3.5 ha) +/-43214 m^3 (+/- 1 ha)		2 of 2014 Activity 6	or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.		
			GNR 983 – NEMA Listing Notice 1 of 2014 Activity 13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.		
Potable water reticulation	Potable water pipeline: 155 mm diameter and 725 m		GNR 983 – NEMA Listing Notice 1 of 2014	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or		

Name of Activity	Approximate Aerial Extent of the activity ha or m²	Listed Activity	Applicable Listing Notice [1]	Description of EIA Listed Activity	Waste Management Authorisation	Description of Waste Management Listed Activity
	length for surface pipes; 105 mm diameter and 6400 m for buried pipes.		Activity 9	stormwater— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more.		
Construction of Tailings Storage Facility	144 ha	X	GNR 984 – NEMA Listing Notice 2 of 2014 Activity 16	The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the highwater mark of the dam covers an area of 10 hectares or more.	X (GNR 921 – NEMWA Category B, Activity 10, 11)	The construction of a facility for a waste management activity listed in Category B of this Schedule; and The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the MPRDA
			GNR 983 – NEMA Listing Notice 1 of 2014 Activity 12	The development of— i. dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or ii. infrastructure or structures with a physical footprint of 100 square metres or more; where such development		

Name of Activity	Approximate Aerial Extent of the activity ha or m²	Listed Activity	Applicable Listing Notice [1]	Description of EIA Listed Activity	Waste Management Authorisation	Description of Waste Management Listed Activity
				occurs— (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;		
			GNR 985 – NEMA Listing Notice 3 of 2014 Activity 14 (i) & (a) or (c) e. i. (ff) (hh)	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; where such development occurs — (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. e. Limpopo i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in Systematic biodiversity plans adopted by the competent authority or in bioregional plans; (hh) Areas within 10 kilometres		

Name of Activity	Approximate Aerial Extent of the activity ha or m²	Listed Activity	Applicable Listing Notice [1]	Description of EIA Listed Activity	Waste Management Authorisation	Description of Waste Management Listed Activity
				from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.		
			GNR 984 – NEMA Listing Notice 2 of 2014 Activity 6	The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.		
Process water reticulation Pipeline from plant to TSF	Process water pipeline: 0.4 m diameter and 2350 m surface pipes Tailings pipeline: Slurry Flow Rate of 1025 m^3/h (285 l/s); diameter of		GNR 983 – NEMA Listing Notice 1 of 2014 Activity 10	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more		

Name of Activity	Approximate Aerial Extent of the activity ha or m²	Listed Activity	Applicable Listing Notice [1]	Description of EIA Listed Activity	Waste Management Authorisation	Description of Waste Management Listed Activity
Sewage reticulation	0.30 m and maximum length of 3,000 m Sewage pipeline: 0.155 m diameter and 725 m length for surface pipes; 0.105 m diameter and 6400 m for buried pipes.					
Construction of access roads and internal haul roads and upgrading of existing access roads (including the relevant stormwater infrastructure)	Access Roads and Internal Haul Roads: ± 1.5 km long x 10 m wide Haul Roads: ± 3.3 km long x 16 m wide	X	GNR 983 – NEMA Listing Notice 1 of 2014 Activity 24 (ii)	The development of a road— (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.		
			GNR 983 – NEMA Listing Notice 1 of 2014 Activity 56 (ii)	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is		

Name of Activity	Approximate Aerial Extent of the activity ha or m²	Listed Activity	Applicable Listing Notice [1]	Description of EIA Listed Activity	Waste Management Authorisation	Description of Waste Management Listed Activity
				wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres;		
			GNR 985 – NEMA Listing Notice 3 of 2014 Activity 4 e. (i) (ee) & (gg)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. e. Limpopo i. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas.		
			GNR 985 – NEMA Listing Notice 3 of 2014 Activity 18 e.	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. e. Limpopo		

Name of Activity	Approximate Aerial Extent of the activity ha or m²	Listed Activity	Applicable Listing Notice [1]	Description of EIA Listed Activity	Waste Management Authorisation	Description of Waste Management Listed Activity
			i. (ee), (gg) & (hh)	i. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.		
Partial backfilling of open pits	74 ha		N/A		X (GNR 921 – NEMWA Category B, Activity 10 & 11)	The construction of a facility for a waste management activity listed in Category B of this Schedule; and The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the MPRDA.
Operation of a Sewerage Treatment Plant (STP) & Water Treatment Plant	STP: 700 m^3/day WTP: 5000 m^3/day		GNR 983 – NEMA Listing Notice 1 of 2014	The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage		

Name of Activity	Approximate Aerial Extent of the activity ha or m²	Listed Activity	Applicable Listing Notice [1]	Description of EIA Listed Activity	Waste Management Authorisation	Description of Waste Management Listed Activity
(WTP)			Activity 25	with a daily throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres.		

5. DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

Lesego Platinum Uitloop (Pty) Ltd (LPU) intends to develop a nickel mining operation near Mokopane in the Limpopo Province of South Africa. The proposed Zebediela Nickel Mine project is located in the Mogalakwena Local, and Waterberg District Municipalities, approximately 9 km north-east of the city centre of Mokopane and approximately 250 km north-northeast of Johannesburg. The project area can be accessed from Johannesburg using the N1 highway to Mokopane and then utilizing the Percy Fyfe road to the project area. The proposed site is mostly located on privately owned land, but also on government owned land and is situated immediately east of the local settlements Mahwelereng and Ga-Madiba near Mokopane in the Limpopo Province. The nearest settlement is Mahwelereng B, about 0.52 km from the western mining right boundary and 1.1 km from the edge of the open pit. The proposed mining right area will be located on farms where LPU currently owns the three prospecting rights namely; Uitloop 3KS (1,925.29 ha), Amatava 41 KS and Bloemhof 4 KS (2620.34 ha), and Piet Potgietersrust Town and Townlands 44 KS (115.26 ha). The Mining Right Area covers a combined area of roughly 4,660.90 ha, measuring approximately 11.9 km from south to north and 7.3 km from east to west. Mine infrastructure is however only planned to be located on approximately 350 ha of the larger Mining Right Area. Approximate coordinates for the center of the proposed open pit are:

Latitude: S - 24°7'17.154"

Longitude: E 29°1'5.63"

The resource limit of the identified nickel resource comprises an intrusive pyroxenite-harzburgite-dunite body, approximately 8 km by 1.5 km in extent at outcrop, previously correlated with the Lower Zone of the Bushveld Complex and called Uitloop II. The intrusion strikes northwest and dips at 40^0 to the south west. It is truncated by the Mahopani Fault and estimated that the body attains a thickness of 600 m. The proposed mine will predominantly mine nickel (Ni) and possibly platinum group minerals (PGM’s) and associated minerals (platinum, palladium, rhodium, gold, ruthenium, iridium, osmium, copper, cobalt and chromite), iron ore and vanadium from magnetite. The Zebediela Ni resource will be exploited by open pit mining methods. Due to the thickness of the ore body, future underground mining is a possibility, however this will be subject to a separate authorisation process.

Mining will be focused on the extraction of 180.02 Mt of sulphide-containing material using an open pit, conventional truck and shovel with partial backfill mining method. The top 40 m to 50 m of the disseminated sulphide material is oxidized (Oxide Zone) and will be stockpiled on an overburden facility. The overburden will be trucked out and hauled to the overburden facility. Concurrent backfilling will take place from year 10 once sufficient capacity exists in the open pit. The entire pit below the oxide zone is developed in mineralised material (Sulphide Zone) and ore would be trucked out and hauled to the processing plant 2.5 km south-east of the open pit. The open pit design has an approximate pit length of 1,150 m, with an average width on surface of 639 m and a depth of 220 m. A 5 m high and 10 m wide berm will be constructed around the entire pit perimeter. The life of mine is planned for 30 years, but with the potential to continue mining due to the size of the deposit. The first 5 years will be used for construction of the access roads, plant infrastructure, fencing and stripping of the open pit.

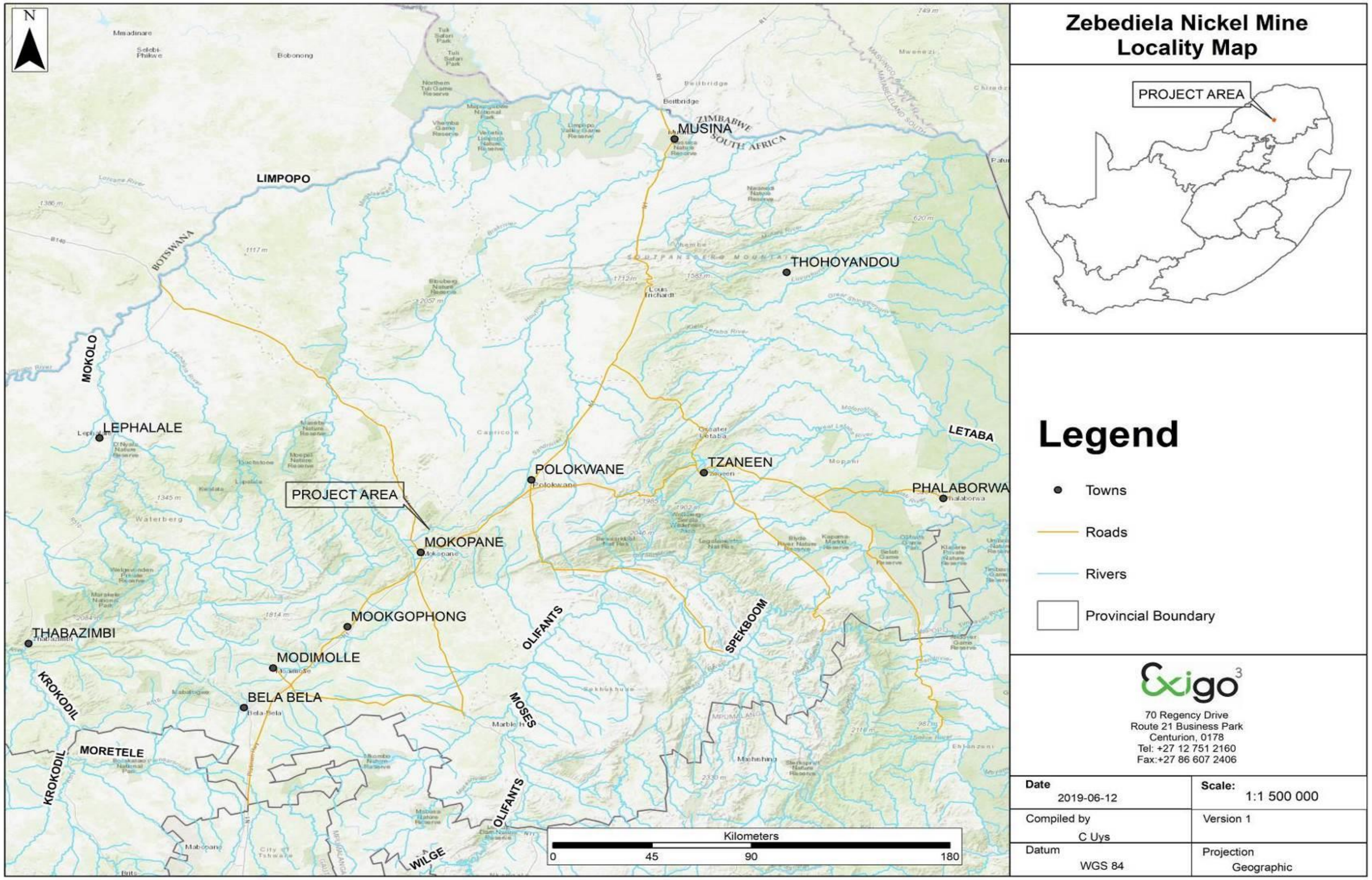


Figure 1: Regional Locality Map of the project area

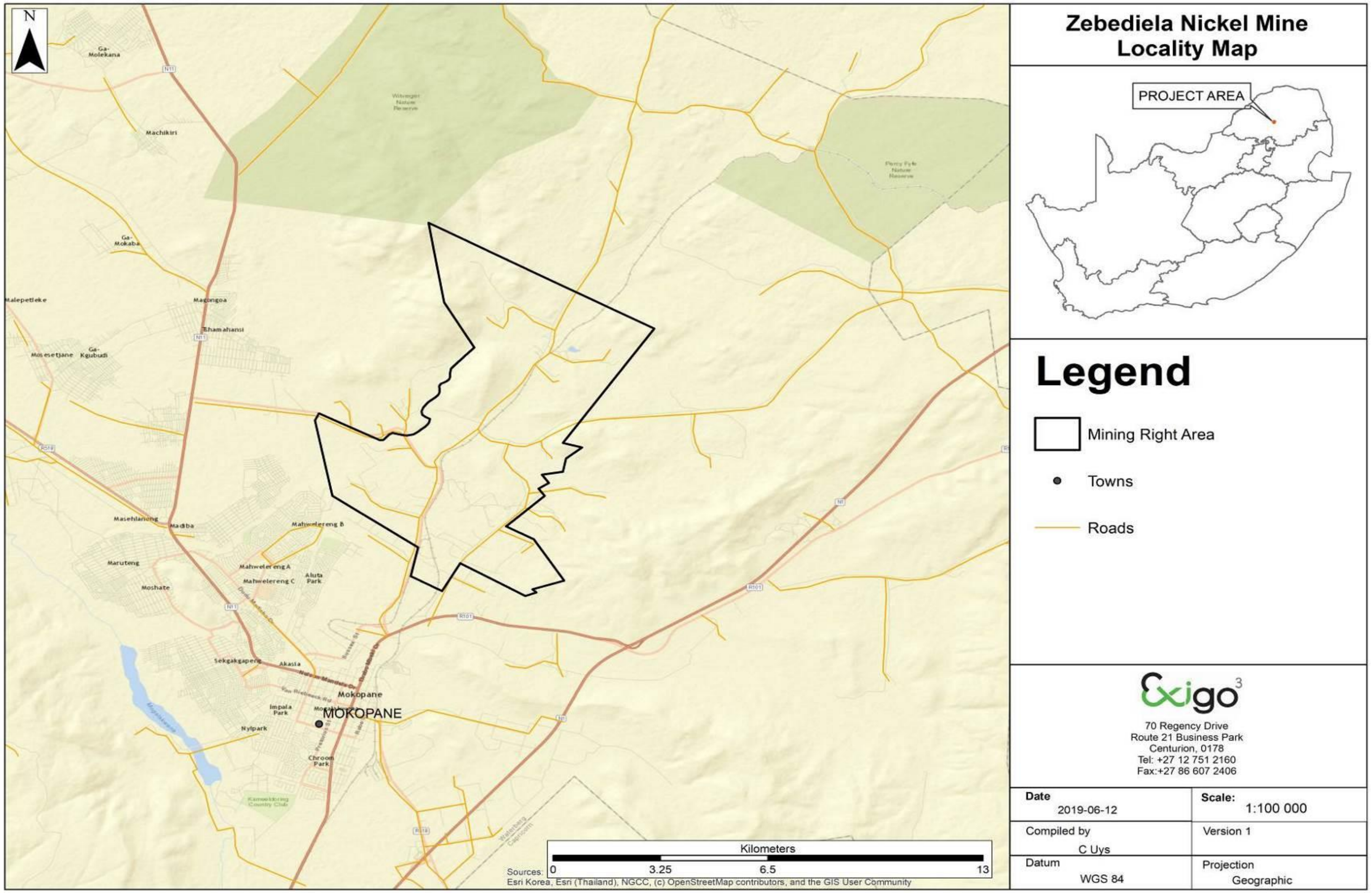


Figure 2: Locality Map of Mining Right Application (MRA) area

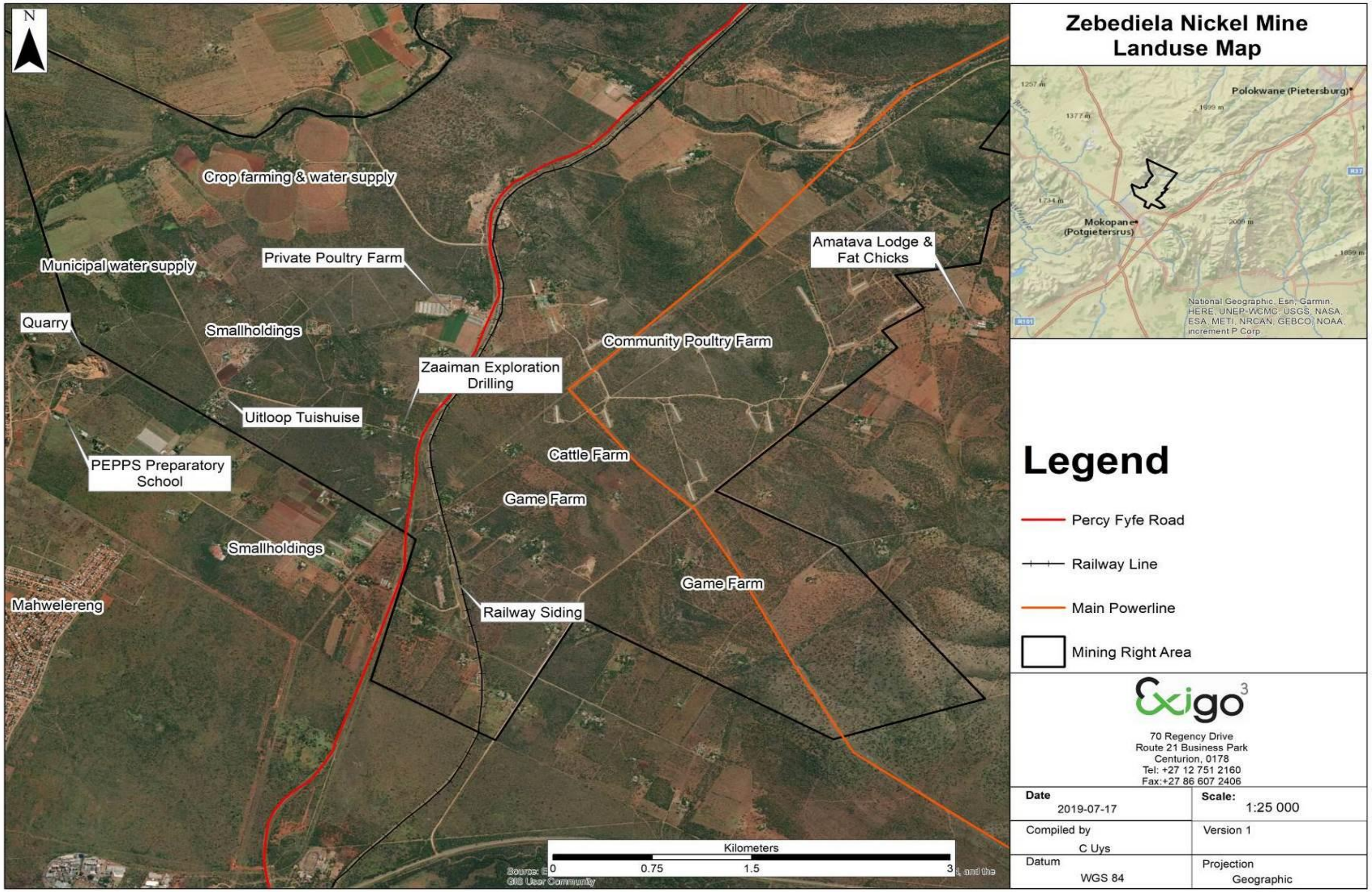


Figure 3:Landuse Map of proposed mine footprint area

5.1. Mining Method

At full production, roughly 300 kilo ton per month (ktpm) Run of Mine (RoM) material will be mined with a 0.75 stripping ratio from year 5 to year 30. The first five years will mainly consist of stripping at a rate of 3,582 kilo ton per annum (ktpa), this will reduce to 2,700 ktpa for the remainder of the life of mine, except for year 5 where a ramp up of 70% will be applied. Overburden stripping is limited to the Oxide Zone which is some 46.5m thick. The designed pit will be mined through conventional truck and shovel with partial backfill mining methods.

Initially, mining will only be from one area of the pit with mining commencing from the north western sector of the mineral resource and will be develop across the full width of the pit in a south easterly direction along strike for a total length of 1,150 m. The overall slope of the sides of the pit will be 45^0. The overburden and mineralised material will be loaded in pit with excavators with 26 m^3 buckets and transported by 225 t rigid body dump trucks to the overburden facility and ROM pad respectively. A 15 m bench height and mining blocks of 100 m by 50 m are planned for the overburden and mineralised material. Ore will be processed at an on-site processing plant and tailings will be disposed of on a Tailings Storage Facility (TSF).

5.2. Life of Mine

The mineral resources included in this project are extensive, giving an overall life of mine of more than 30 years. Although, for the mining right application only 30 years life of mine will be applied for. The geometry of the orebody allows for continuous mining via open pit mining up to a depth of 220 m.

Pre-production overburden stripping of 18.11 Mt takes place in year 0 to year 4 and continues concurrent with production operations between year 5 and year 30 at a stripping ratio of 0.75:1. Overburden removal at the current pit design will only be completed after the 30 years life of mine, after which no further overburden stripping will be required. ROM production ramp up is based on 70% partial ramp of 2.52 Mt of mineralised material (year 5) with full production of 3.6 Mt achieved in year 6 continuing until year 30 to a depth of 220 m below surface.

5.3. Metallurgical Process

During the concentration process, ore is ground to liberate mineral particles. These are then recovered in the form of a concentrate by froth flotation. The ore mineralogy dictates both the fineness of grind required for liberation and the ideal flotation conditions. Very fine particles are difficult to recover, so two or even three milling and flotation stages may be used to minimise losses caused by over-grinding.

The material to be treated is a disseminated nickel sulphide deposit with an average nickel grade of 0.241%, of which ~62% Ni, or 0.15% Ni occurs in sulphide form. The design aims to achieve a minimum nickel recovery of greater than 50% by flotation of nickel sulphide concentrate at an overall mass pull of less than 1% and a concentrate grade of greater than 15% nickel.

The proposed process plant will consist of a standard MF2 circuit (i.e. mill/float followed mill/float of primary tailings) treating run of mine (ROM) ore crushed, by the primary crusher, processing approximately 300 ktpm Sulphide Zone material. The circuit will entail primary and secondary stage mills as well as flotation sections, which will generate primary and secondary concentrate. The generated concentrate will be filtered to 11 – 15% moisture from where it will be transported to a toll smelter.

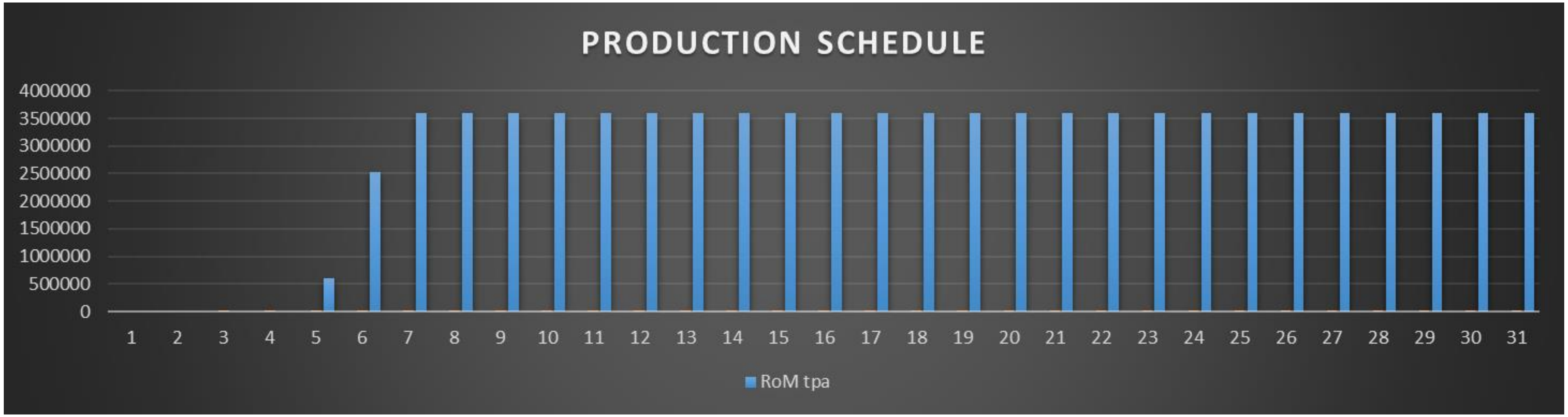


Figure 4: Proposed Run of Mine Plant Feed Schedule

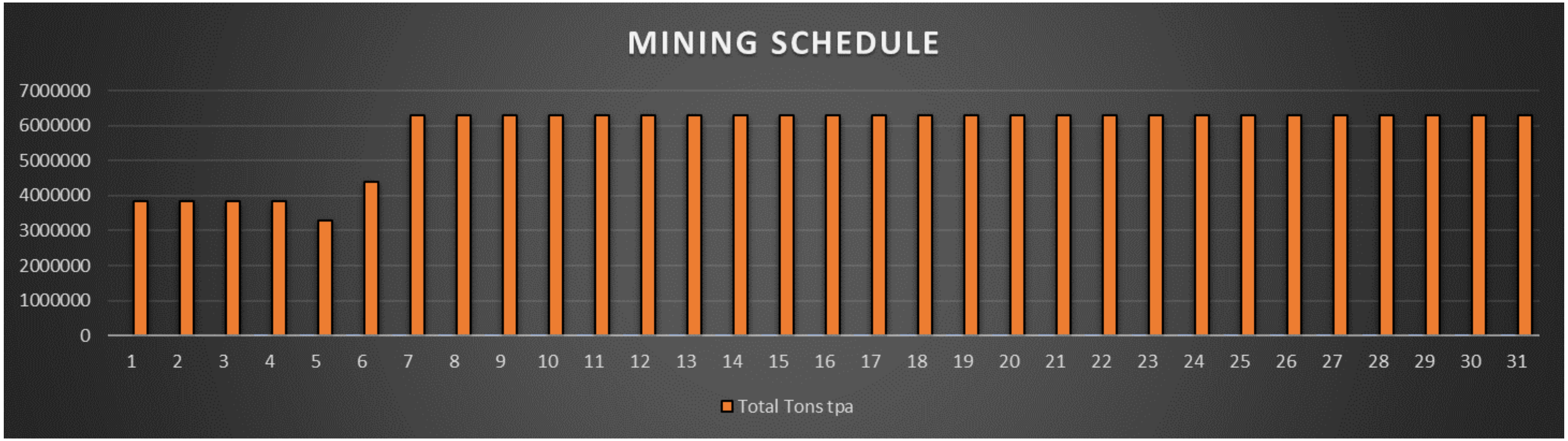


Figure 5: Proposed Mining Schedule

5.4. Surface Infrastructure

The proposed Zebediela Nickel Mine is located within an area with existing mining activities, such as Anglo American's Mogalakwena Mine and Ivanplats Platreef Project which is approximately 22 km and 9 km north west of the proposed site respectively. The infrastructure in the area is fair with the city centre Mokopane located less than 10 km from the project area. Mokopane is a well-serviced town near National roads, the north-south National railway line, electricity, and bulk water supply.

The area is serviced by several provincial roads as well as the N1 national road linking it to Zimbabwe and the rest of South Africa. There is one commercial airport in the region (Polokwane International) as well as a few private airstrips that are mainly used for tourism and private use.

The town of Mokopane, as well as the nearby communities of Mahwelereng, Ga-Madiba, Masodi, Tshamahansi, Phola Park, Sekgakgapeng, Mosate, Maroteng, and Masehlaneng will provide skilled and unskilled labour for future operations. All access roads are mainly existing tar and gravel district roads and will need to be upgraded.

Envisaged infrastructure will comprise of the following:

- Processing Plant
- Ore handling and storage facilities (ROM stockpiles)
- Administration building, security building, change house, messing and canteen facilities, mining and geology offices, maintenance and engineering workshops and offices, warehouse and offices, medical station, fire station, laboratory and satellite ablutions
- Potable water tank (2 ML capacity) and reticulation
    - Pipelines for the Potable water tank are designed for:
        - 155 mm diameter and 725 m length for surface pipes
        - 105 mm diameter and 6400 m for buried pipes.
- Process water dam (20 ML) and process water tanks (two tanks with 5 ML capacity each) and reticulation
    - Pipelines for the process water are designed for:
        - 400 mm diameter and 2350 m surface pipes
- Sewage reticulation
    - Pipelines for the Sewage reticulation are designed for:
        - 155 mm diameter and 725 m length for surface pipes
        - 105 mm diameter and 6400 m for buried pipes
- Electricity distribution facilities (overhead powerlines, transformers and mini substations)
- Hydrocarbon storage facilities (Total Capacity of:607m^3)
- Sewage treatment plant
- Water treatment plant
- Pollution Control Dam (PCD) (90 ML capacity)
- Haul and access roads and bridges

- Perimeter and internal fencing
- Overburden and topsoil storage facilities
- Tailings Storage Facility (TSF) & Return Water Dam
    - Pipelines for the TSF are designed with a:
        - Slurry Flow Rate: 1025 m^3/h
        - Pipeline diameter: 300 mm
        - Pipeline length (max): 3,000 m
- Explosives Store

The open pit and plant footprints are proposed to be 74 ha and 53 ha respectively with an overburden and topsoil footprint of 49 ha and 25 ha respectively, and a proposed TSF footprint of 144 ha, in the larger proposed 4660.90 ha mining right area.

5.5. Services and Supporting Infrastructure

5.5.1. Water Supply

Various water supply options were identified and are included in Section 9.2.3.1. These options will be assessed in a Water Supply Options Analysis Study during the EIA Phase.

5.5.2. Electricity

The proposed mining activities will require an estimated 78 Megawatt (MW), which equates to 608 Megawatt Hours per annum (MWhr/a). Part of Eskom's capacity expansion programme in Limpopo is the Medupi Base Load Coal Power station with linkages into the existing power grids. Two Eskom expansion projects would influence the Zebediela mine area, namely the Mokopane Integration Project and the Medupit Integration (Charlie) Phase 2B project.

One of the reasons for these two expansion projects is the upsurge in demand for electricity in the Mokopane area due to the increased mining activity and that the Witkop substation close to Polokwane cannot support the load growth. The Mokopane integration project includes the recently constructed transmission substation (Borutho substation) near Mokopane. The Borutho substation is located 37 km north of Mokopane and approximately 30 km north of the Zebediela project.

For bulk power reticulation, provision was made for:

- A new 33 kilovolt (kV) 16 panel switchboard at the Borutho substation
- Approximately 30 km of 33kV overhead line
- 11kV switchboards on site (5 assumed with about 40 panels)
- An approximate 9 km of 11kV Overhead line
- 1 off 11 kV ring main systems
- On-load isolators (33 kV and 11 kV)

- Off-load isolators (33 kV and 11 kV)
- Re-closers used as circuit breakers with relays to protect remote transformers
- Surge arrestors
- a Mix of distribution transformers (including 1, 2, 2.5, 3, 6 and 8 Mega Volt Ampere (MVA) transformers at various voltages i.e. 33 kV/11 kV, 33 kV/550 Volt (V), 33 kV/400 V)
- Motor control centres (8 off containerized units)
- Diesel generator sets (including 13 off 1 MVA 525 V generator sets with synchronization units, 1 off 250 Kilo Volt Ampere (kVA) 525 V generator set and 2 off 50 kVA 525 V generator set)
- Mini substations (2 off 315 kVA 33 k V/400 V); and
- Power factor correction (2 off 33 kV banks of 4000 Kilo Volt Ampere Reactive (kVAR's)).

5.5.3. Roads

The proposed site is located approximately 12.5 km north west of the N1 which serves as the main road between Polokwane and Johannesburg. Other roads close to the project area include the R101 (5.5 km south east) and the N11 (6.6 km north west). All three these roads are national roads managed by SANRAL.

The proposed access road (max length of 1.5 km) will consist of a single lane road for traffic in both directions. Each lane is to be 3.6 m wide with a 1.4 m yellow lane shoulder. The district roads proposed for the access are managed by the Limpopo Roads Agency (RAL) and any upgrade and access to it needs to be negotiated in conjunction with this authority. Other roads will include haul roads to the plant and overburden facility with a total width of 16 m for a two-lane haul road, which will form part of the internal road network.

The Percy Fyfe road connects the R101 to the proposed surface infrastructure of the mine to the east of the road. This would be the main access road for the mine site.

5.5.4. Water treatment

A turnkey package water treatment plant with a capacity of 5 ML per day will be constructed. Some of the raw water as well as treated water from the sewage plant will be fed into the water treatment plant for further processing as per the staged water requirements. The water will be treated in two stages within the water treatment plant. Stage 1 of the treated water will be used for the concentrator plant requirements and Stage 2 will be used as make-up for potable water requirements.

The raw feed water will consist of dirty water returned from operations and of top-up water from dewatering the pit.

Treatment methods for ensuring water meet SANS 241 Class I (potable water) can be categorised as follows:

- Chemical removal by precipitation of insoluble salts by chemical treatment

- Flocculation, coagulation and settling of insoluble and large contaminates
- Flocculation, coagulation and filtering of smaller insoluble contaminates
- Chlorination or another suitable sterilisation
- Ultra-filtration to remove microscopic contaminates
- Reverse osmosis to remove remaining undesirable dissolved contaminates.

5.5.5. Sewage treatment

An onsite activated sludge treatment facility will be constructed to treat sewage generated during the operational phase. The sludge treatment plant will be designed to process 700 m^3 per day. This would cater for both mining and plant personnel. All sewage drainage, feeding the sludge plant will be gravity fed. The position of the sewage plant close to the water treatment plant and the pollution control dam allows for easy local distribution of treated water.

Use will be made of temporary chemical sanitary facilities for sewage to be generated by construction workers during the construction phase. Third party waste removal contractors will be responsible for the supplying, servicing, and relocating of temporary chemical sanitary facilities. The contents of the temporary chemical toilets will be disposed of at a registered hazardous waste disposal facility.

5.5.6. Solid waste management

All waste will be collected at the mine salvage yard where it will be sorted. Dedicated bays will be provided for different wastes. Recycling initiatives from the local communities will be investigated. Solid waste will be collected by a contractor and transferred to the closest registered waste facility. Used hydrocarbons will be stored in containers within a bunded area from where it will be collected and removed by an accredited contractor.

5.5.7. Blasting

The bulk emulsion will be stored on the surface in the Explosives Store prior to mixing in the open pit with sensitizer. Anfex will be received at the off-loading bay on the surface. The Anfex will be logged into a register, before being transported to the open pit by the explosives transporter. The combined capacity of the Explosives Store will not exceed 500 cubic metres.

Explosives will be delivered daily and transported to the open pit to be combined with the Anfex for blasting purposes. An explosives disposal facility for the destruction of explosives has been provided for on the surface.

5.5.8. Stormwater management

The proposed water management methodology at the mine should be based on the Best Practicable Environmental Option (BPEO) principle with responsible use and best practices. The impact of development on water quantity, quality and cost should be minimised. According to the GNR 704 of 4 June 1999 clean and dirty water should be separated and process water recycled and re-used. The dirty water will be kept in a closed circuit and spillages minimised.

Note that the term “clean water” refers to water that has not been interfered with and “dirty water” is water that is handled in or precipitated on the mine operations. Dirty water is therefore not necessarily contaminated. The following water management aspects are included in the design of the mine infrastructure and waste facilities:

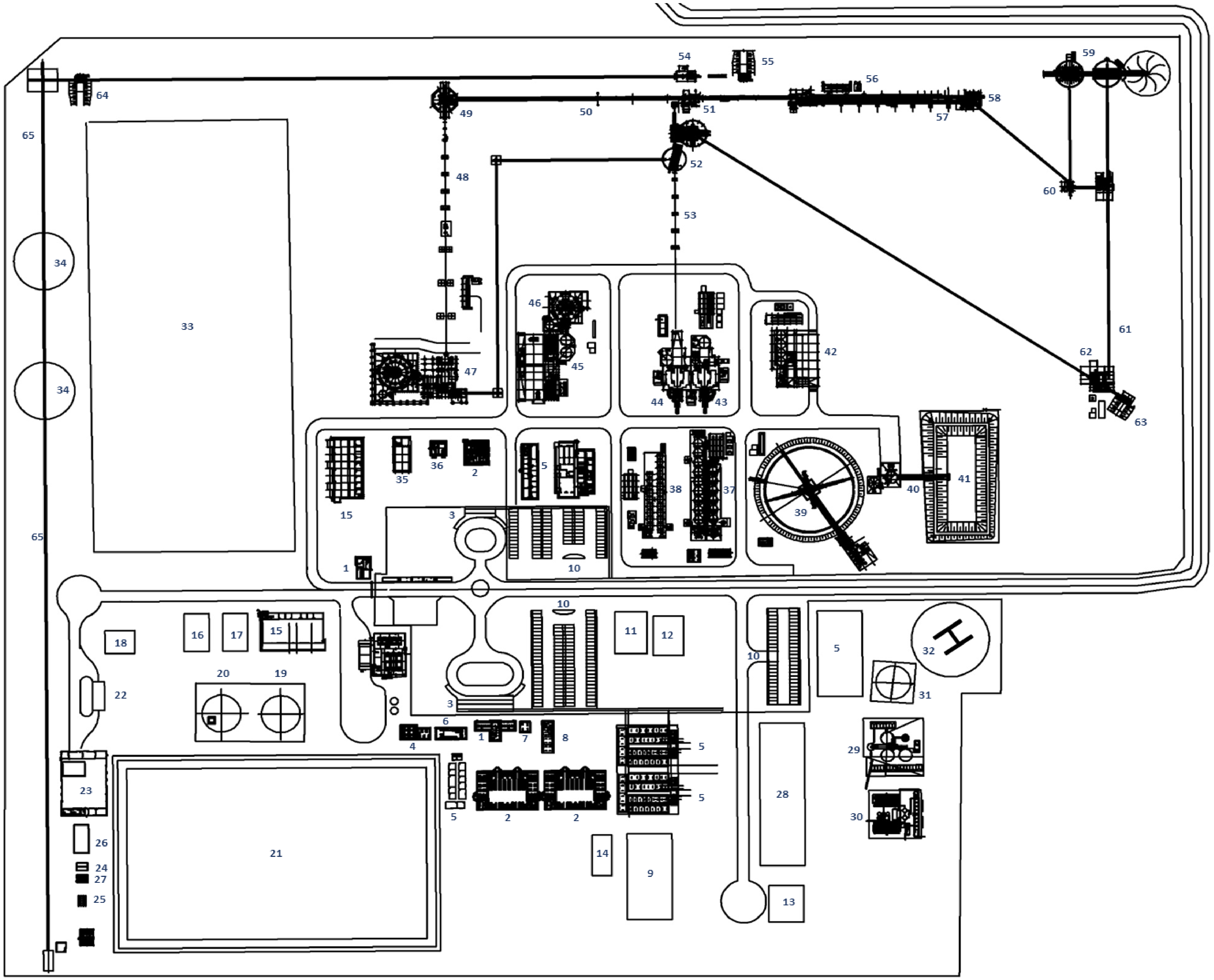
- Clean stormwater will be diverted around the mine areas so that dirty and clean water are separated.
- No infrastructure will be located below the 1:100 year floodline of the Rooisloot River and its tributary.
- Dirty water will be kept in a closed circuit and be re-used in the mining processes.

Make-up process water will also be used in the following order:

- Return water from the tailings facility
- On-site stormwater
- On site Sewerage Treatment Plant

The requirements of regulation GNR704 will be adhered to, especially the requirement for the 90 ML pollution control dam which should be designed to spill not more than once in fifty years.

Evaporation losses should be minimised, unless there is surplus water in the system (e.g. during storm events, the pollution control dam could be used to evaporate surplus water.



ITEM No.	DESCRIPTION
1	GATE HOUSE
2	CHANGE HOUSE
3	BUS SHELTER
4	HEAT PUMP ROOM
5	OFFICE BLOCKS
6	LAUNDRY
7	INDUCTION ROOM
8	TRAINING CENTER
9	CORE YARD
10	CAR PARK
11	FIRE STATION
12	MEDICAL STATION
13	LABORATORY
14	MESSING AND CANTEEN FACILITIES
15	WORK SHOP
16	ELECTRICAL CABLE YARD
17	TRACKLESS CONSIGNMENT YARD
18	HAZARDOUS MATERIAL
19	SERVICE WATER TANK - 5 ML
20	SERVICE WATER TANK c/w PRE-COOLING TOWER
21	POLLUTION CONTROL DAM - 90 ML
22	EXPLOSIVES OFF-LOADING
23	MAIN STORE
24	OIL STORE
25	PLANT STORE
26	GAS BOTTLE STORE
27	CHEMICAL STORE
28	BACKFILL PLANT
29	SEWERAGE PLANT
30	WATER TREATMENT PLANT
31	PROCESS PLANT POTABLE WATER TANK - 2ML
32	HELI PAD
33	PRE-COMM. STOCKPILE
34	TRANSFER STOCKPILES
35	STORE
36	PLANT STORE
37	PRIMARY FLOTATION CIRCUIT
38	SECONDARY FLOTATION CIRCUIT
39	TAILINGS THICKENER
40	PROCESS WATER TANK - 5 ML x 2
41	PROCESS WATER DAM - 20 ML
42	REAGENTS BUILDING
43	PRIMARY MILL BUILDING
44	SECONDARY MILL BUILDING
45	FILTER BUILDING
46	CONCENTRATES THICKENER
47	DMS BUILDING
48	DMS FEED CONVEYOR
49	DMS ORE SILO
50	DMS ORE SILO FEED CONVEYOR
51	SCREENING PLANT
52	MILL FEED SILO
53	MILL FEED SILO CONVEYOR
54	PRIMARY CRUSHING STATION
55	40t EMERGENCY BIN
56	SCREEN FEED CONVEYOR
57	SECONDARY CRUSHER FEED CONVEYOR
58	SECONDARY CRUSHER
59	COARSE ORE SILO
60	FEED CONVEYOR
61	CIRCUIT SCREEN FEED CONVEYOR
62	SECONDARY CRUSHING STATION
63	EMERGENCY LOADING HOPPER
64	LHD TIP
65	REFF/WASTE SILO FEED CONVEYOR

Figure 6: Mine Infrastructure (Processing Plant and associated infrastructure) Layout

6. POLICY AND LEGISLATIVE CONTEXT

The following legislation, policies and guidelines were considered during the compilation of this Scoping Report and will be heeded throughout the EIA process and specialist studies conducted:

- The Constitution of the Republic of South Africa (Act No. 108 of 1996)
- The National Environmental Management Act (Act No. 107 of 1998) read with the Environmental Impact Assessment Regulations, 2014 (as amended on 7 April 2017) and Environmental Impact Assessment Listing Notices 1, 2 and 3
- Limpopo Environmental Management Act No. 7 of 2003 (LEMA)
- DEA Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010 (GNR 891 of October 2014)
- National Environmental Management Act, 1988 (Act No. 107 of 1998) – Financial Provisioning Regulations, 2015 - GNR 1147/2015, as amended
- Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)
- Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002) - Minerals and Petroleum Resources Development Regulations, GNR 527/2004
- National Water Act (Act No 36 of 1998) (NWA)
- Regulations regarding the procedural requirements for Water Use Licence Application and Appeals, GNR 267/2017
- National Water Act, (Act No. 36 of 1998) Section 26(1)(h) & (l) read together with GNR 2834/1985 Regulations 2 promulgated under the Water Act, (Act No. 54 of 1956)
- National Water Act, (Act No. 36 of 1998) Section 123 read together with Regulations regarding the Safety of Dams GNR 139/2012
- The Water Services Act (Act No. 108 of 1997)
- National Heritage Resources Act (Act No. 25 of 1999) (NHRA)
- National Forest Act (Act 84 of 1998) (NFA)
- National Environmental Management: Biodiversity Act (Act 10 of 2004)
- Alien and Invasive Species Lists, GNR 599/2014 read with Alien and Invasive Species Lists, 2016 – GNR 864/2016
- Threatened or Protected Species Regulations, 2007 – GNR 152/2007
- Protected Areas Act (Act No. 57 of 2003)
- National Veld and Forest Fire Act, (Act No. 101 of 1998)
- Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA)
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM:AQA)
- National Greenhouse Gas Emission Reporting Regulations – GNR 336/2016
- National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA)
- Hazardous Substances Act (Act No. 15 of 1973)

- Spatial Planning and Land Use Management Act (Act No. 16 of 2013) (SPLUMA)
- Waterberg District Municipality Final Draft Spatial Development Framework (SDF) 2009
- Mogalakwena Local Municipality Integrated Development Plan (IDP) 2019/20

For more detail on the specific legislation, policies and guidelines considered, as well as reference to where it was applied, **please refer to Appendix 9.**

7. NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

According to Appendix 2 (2) of the EIA Regulations (GNR 982 of 2014 as amended), *(1) A scoping report must contain the information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include—* *(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location*

International conventions, national plans and programmes as well as the relevant Integrated Development Plans (IDP), Spatial Development Frameworks (SDF) and Strategic Environmental Assessments (SEA) were taken into account in assessing the development in a spatial context. Trends in the South African and international nickel markets have also been taken into consideration in this assessment of the need and desirability of the project.

7.1. Need

7.1.1. General

Nickel is a naturally occurring metallic element with a silvery-white, shiny appearance. It has excellent physical and chemical properties (Figure 7), which makes it essential in hundreds of thousands of products (Nickel institute, 2018). It is the finest of the alloy metals and is used in a number of products for consumer, military, transport/aerospace, marine and architectural applications. It is predominantly used in industrial and consumer products, which includes stainless steel, magnets, coinage, and other steel and non-ferrous (including “super”) alloys, plating, batteries, foundry and other (INSG, 2016).

Figure 7: Nickel physical and chemical properties (Nickel institute, 2018)

Nickel occurs naturally, mainly as oxides, sulphides and silicates. Over two million tonnes of new nickel are used annually and mined in more than 25 countries worldwide (Nickel institute, 2018). Currently, the majority of nickel is mined from laterite and magmatic sulphide deposits. In the laterite deposits the nickel is released from weathering of ultramafic rocks and the primary ore minerals are nickeliferous limonite (Fe,Ni)O(OH), and garnierite (Ni-Mg hydrosilicate), whereas in the sulphide deposits, the main ore mineral is pentlandite $(Ni,Fe)_9S_8$ (Balmoral resources, n.d.),

7.1.2. Uses

Nickel is a US$20+ billion per year industry with over two thirds of the metal today going into stainless steel production. Nickel use in electric vehicle (EV) batteries is forecast to grow significantly over the next 10 years and this new nickel use will result in a structural change in the nickel market (Horizonteminerals.com, 2019).

Globally, the nickel value chain supports large numbers of jobs many of which are high-skill manufacturing occupations. The stainless-steel industry demands 70% of the world's nickel resources. Nonferrous alloys, alloy steels and castings consume 15% of the world's nickel resources while the plating industry uses 7%, the foundry and battery industries use 3% each and the other industry uses about 2%.

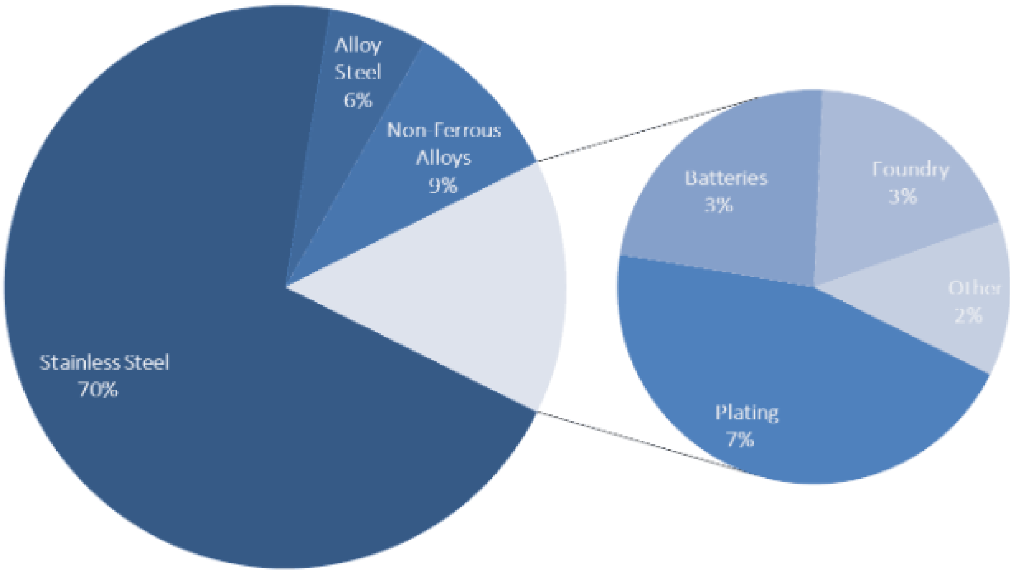


Figure 8: Nickel Usage (INSG, 2016)

Products from the aforesaid industries are widely used across many sectors globally such as engineering, building and construction, transport, metals and electronic sectors *inter alia* (Nickel Institute, 2018). Furthermore, nickel is used in many oil, gas and electricity generation operations and overall reduces the impacts caused by these operations, more so in the electricity generation industry which is driven by the use of coal, oil and natural gases (Nickel Institute, 2018). Nickel-containing materials are frequently selected for their corrosion and heat resistance in electricity generation industries and reduce the impacts of using coal and oil in such industries.

7.1.3. Supply

Currently Africa is not a major contributor to global nickel production. The main producers are the Nkomati mine in South Africa; the Ambatovy mine in Madagascar; and mines in Zimbabwe operated by Africa focused Asa Resources Group and platinum group metals (PGMs) mines on the country's Great Dyke, the world's second largest PGM resource after the Bushveld Igneous Complex in South Africa (Creamer Base Metals Report, 2017).

Nickel is also obtained from other mines in South Africa where it is mined as an associated mineral. Nickel has been obtained from 21 mining operations which include Platinum Group Metals (PGM) operations and Copper mines in South Africa since 2006 (DMR, 2009). Approximately 87% of South Africa's total nickel output is produced from PGM mining operations while 1% arises from copper mining. Primary nickel is mined at only one mining operation in the Mpumalanga Province which indicates a gap in the market for the primary mining of nickel in the country (DMR, 2009).

In South Africa, nickel is considered to be a sought-after mineral in the battery material market, and given the country's good resources of this mineral, several manufacturing job opportunities exist (DTI, 2018). Nickel products such as batteries can also be recycled which indicates the durability of this mineral throughout its life cycle. Ferrous metals, including nickel, vanadium and manganese are consumed primarily by the steel and stainless-steel industry (DMR, 2011). According to the Department of Trade and Industry (DMR, 2018), the Industrial Policy Action Plan (IPAP) 2018/19-2020/21 focuses on the: "promotion of beneficiation and value-addition to the country's minerals and other natural resources and the strengthening of important economic linkages between the primary agriculture, mining and manufacturing sectors". As such, the 2011 Beneficiation Strategy for the Minerals Industry of South Africa thus provides a framework that will enable an orderly development of the country's mineral value chains. Investment into minerals such as nickel therefore is expected to create employment, contribute towards skills development and technology (DMR, 2011). Such investments into the nickel industry ultimately contribute to the country's economic growth.

As nickel is currently only primarily mined at one mining operation in the Mpumalanga Province, there is clearly a need for nickel mines in the country. A 2018 trend analysis by BMI Research explains that the proposed Zebediela Nickel Mine has an estimated 1.5-billion tonnes of both inferred and indicated resources and will be able to produce 20 000 tonnes of nickel annually (Moolman, 2018). The Zebediela Mine stands to create employment opportunities beyond just mining, thus improving the lives of many South Africans and holistically contributing to the country's economic growth. Should the proposed mine not be developed, this will result in the benefits associated with nickel throughout its value chain not being realised.

7.1.4. Demand

Wood Mackenzie estimates the non-stainless steel industry to increase its demand by approximately 5 % a year, from 750 kt in 2019 to 980 kt in 2019 to 980 kt in 2025 and 2.11 Mt in 2040. This sustained period of strong growth is driven by the forecasts of nickel consumption in Li-ion batteries for electric vehicles (EVs) and energy storage (ES), which is anticipated to accelerate from the mid to late 2020s (Figure 9) (Horizonteminerals.com, 2019). Reuters also reported that the demand for nickel is expected to soar as governments, companies, and individual consumers aim to reduce air pollution caused by fumes emitted by fossil-fuelled vehicles (Desai, 2019).

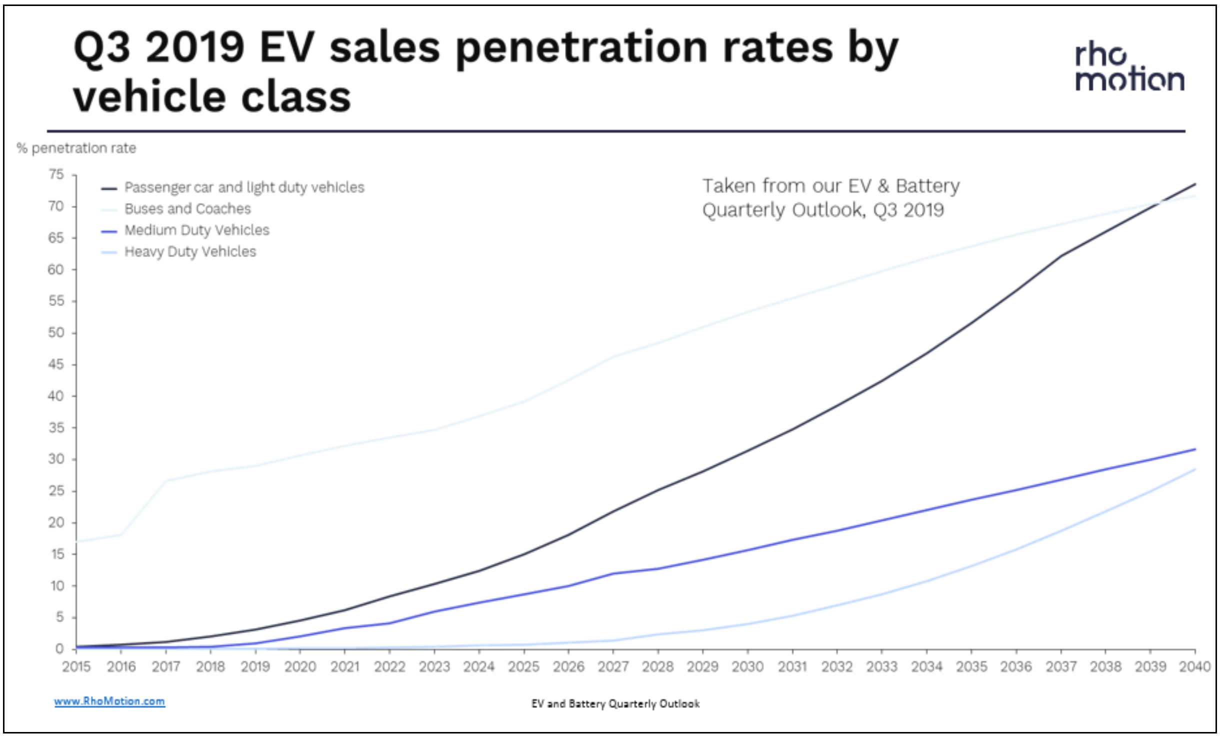


Figure 9: EV Sales penetration rates by vehicle class (Reuters, 2019)

Wood Mackenzie predicts that the increase in nickel demand from EVs will equate to an increase in nickel use from 128 kiloton (kt) in 2019, to 265 kt in 2025 and 1.23 Megaton (Mt) in 2040. Over this period the share of global nickel demand taken by EV/ES will increase from only 4% in 2018 to 31% in 2040 (Horizonteminerals.com, 2019).

7.1.5. Price

Nickel has been one of the best performing base metals of 2019. The price of nickel has increased with more than 70% since the start of the year, moving above $18,000/tonne on the London Metal Exchange (LME) in September and has subsequently retraced back to $16,500/tonne (Figure 10) (Horizonteminerals.com, 2019). Other factors fuelling the price increase are the low stock levels at the LME (Figure 11), some analysts perceive it as critically low, and the increase in demand for EV's. Wood Mackenzie forecasts that a deficit of 60 kt through 2027 will most likely bring nickel prices closer to US$ 25,000/t by 2025 and US$28,000/t by 2027.

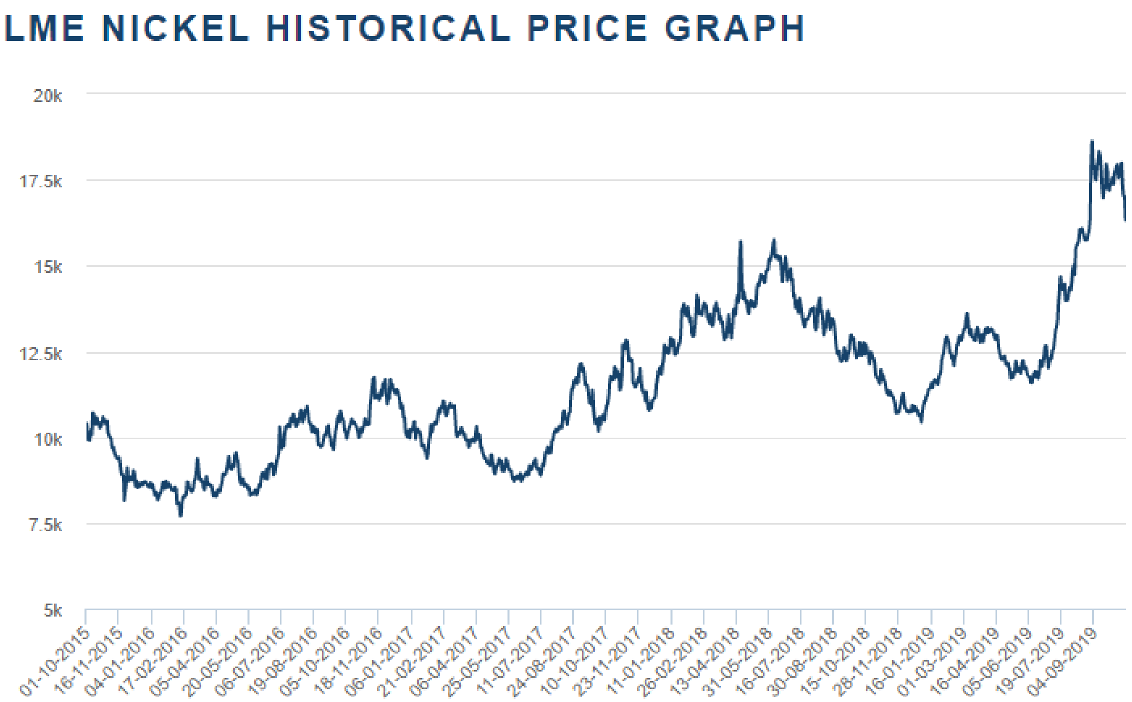


Figure 10: LME Nickel Historical Price Graph (LME, 2019)

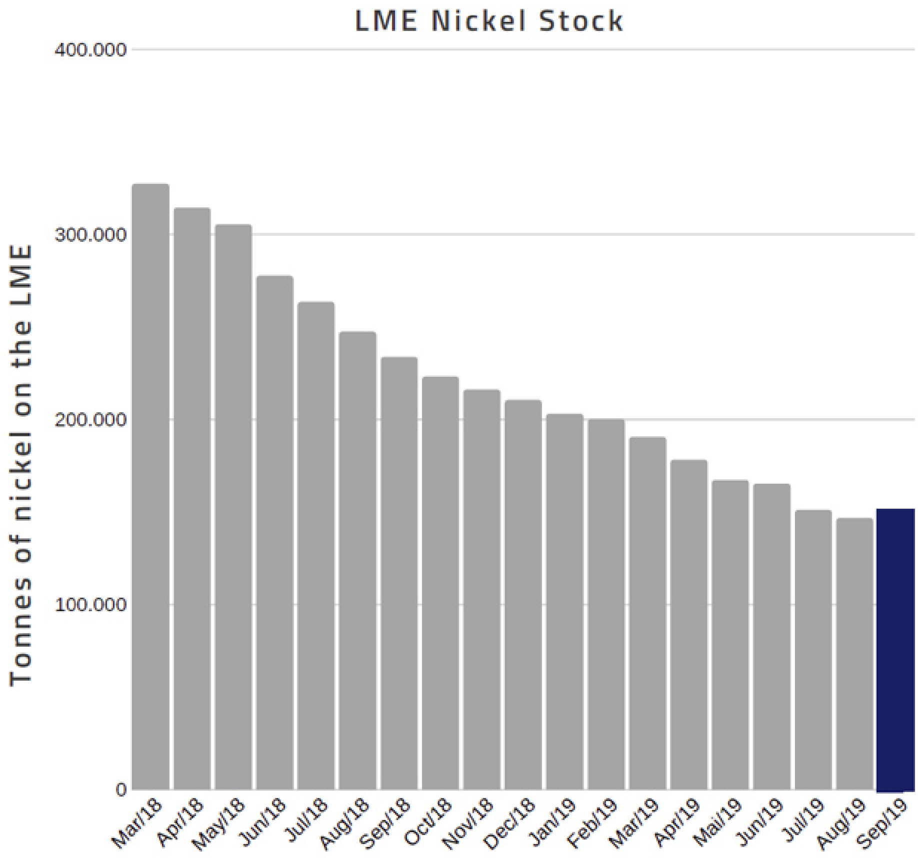


Figure 11: LME Nickel Stock level (LME, 2019)

7.2. Desirability

The national policies and strategies reviewed in the Socio-economic Scoping Report (Appendix 6) speak to creating decent work and economic development and these visions further trickle down to the local level. The reviewed national documents illustrate that the Zebediela Nickel mining project is in alignment with the strategic government priorities because it is a means of creating new employment opportunities. Furthermore, the national policies suggest that stimulation of mining investments along with the development of agriculture and tourism will significantly contribute to the development of rural economies. Nonetheless, the national policies also acknowledge that there remains a divide between regulating development and the environment while fostering economic investment which result from “a design flaw in the planning system, making it difficult to strike a reasonable balance” (National Planning Commission, 2011). This design flaw tends to lead to land-use/spatial conflicts especially between mining, agriculture and tourism.

At a provincial scale, the Limpopo Provincial Government strives to reduce unemployment and inequality and upsurge income levels and economic growth, and the mining sector is one of the sectors that has been identified to assist in achieving these priorities. The proposed project therefore correlates with provincial policy in that the mine will create job opportunities which will contribute to increased income levels in households and economic growth. Nonetheless, The Limpopo Provincial Government also encourages the diversification of the economy to avoid risks associated with mine closures.

Both district and local municipality strategic documents perceive the promotion of mining alongside agriculture and tourism as priorities for the economy. Nonetheless, mining is believed to cause air pollution and offer limited benefits to communities.

The reviewed documents from national to local level reveal that South Africa holds a comparative advantage and further holds large global shares in mineral and natural endowments. The country therefore needs to capitalize on such comparative advantage through projects such as the Zebediela Mine project. Since mining companies are required to participate in local development by means of a Social and Labour Plan (SLP), they tend to contribute to host economies and the nation at large. Therefore, the proposed project is in alignment with the reviewed documents, particularly with regards to job creation (Urban-econ, 2019).

Mining developments are extractive and generally non-renewable in nature. They also result in the loss of natural vegetation (and the associated biodiversity, ecological and ecosystem services) and generates dust and emissions that have additional harmful impacts on the local natural and social environment. On the other hand, the extraction and use of minerals is a fundamental element for socio-economic development processes. The minerals extracted provide some of the primary inputs used and produced by a number of industries as mentioned above. There are therefore tensions and trade-offs between the conservation of the natural environment and the promotion of economic development within the current global technological and economic system.

8. PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

Environmental Authorisation is requested for a period of 30 years as specified in the mining right application.

9. DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED SITE

9.1. Process to assess alternatives

The Department of Environmental Affairs and Tourism's (DEAT's) guidelines for Integrated Environmental Management (IEM)) procedure (information Series 11) requires that an environmental investigation needs to consider feasible alternatives for any proposed development. The EIA Regulations also require that a number of possible proposals or alternatives for accomplishing the same objectives be considered.

Various alternatives have been assessed for the project on scoping level and workshopped by means of specialist, applicant and engineering team interactions. The alternatives were also influenced by means of discussions with authorities, discussions with I&AP's, considering the existing baseline environmental data and specialist input.

Alternatives relevant to this development can be categorized into the following:

5. **Site Location alternatives**
   - Location of the Processing Plant
   - Location of the Tailings Storage Facility (TSF)
   - Location of the Overburden facility and topsoil stockpile
6. **Layout alternatives**
   - Layout of the Processing Plant
   - Layout of the TSF
   - Layout of the Overburden facility and topsoil stockpile
7. **Service alternatives**
   - Water Provision Alternatives
   - Site Access Alternatives
   - Energy Alternatives
   - Technology alternative
8. **The "no-go" alternative**
   - To be assessed per environmental aspect/area

9.2. Details of all alternatives considered

The following alternatives were investigated in the Scoping Phase and/or will be further investigated during the EIA Phase of the project:

9.2.1. Site location alternatives

The opencast sections of the mine are fixed due to the presence of the nickel resource and therefore no site alternatives could be considered.

Site location alternatives were however considered for the following:

A. The Overburden Facility (including the topsoil stockpile area);
B. The Processing Plant; and
C. The Tailings Storage Facility (TSF).

The location alternatives have been assessed against the following criteria:

- Soil and Agricultural Potential
- Biodiversity
- Surface and Groundwater
- Heritage & palaeontology
- Geological aspects
- Ecological sensitivity
- Nuisance factors (including air quality, noise and visual impacts) and subsequent socio-economic impacts
- Engineering considerations, e.g. distance to resource areas and cost implications (economic impact)

A site selection matrix is provided in Table 5 below.

A. OVERBURDEN FACILITY SITE LOCATION ALTERNATIVES:

Four site (location) alternatives were investigated for the Overburden Facility (refer to Figure 12):

1. Overburden Facility Site Alternative Option 1

This site is located directly to the north-east of the proposed Open Pit on Portion 0, 54, 56 and 57 of Uitloop 3 KS. The advantages of this site location alternative are:

- Mining will commence from the north-western sector of the open pit and will develop in a south-easterly direction. This site is situated to the north-east and adjacent to the open pit (approximately 650 m away from the north-western corner of the open pit) which will ensure that the overburden and topsoil won’t need to be hauled long distances, which will lower the operational cost, but will also lower the cost of backfilling and rehabilitation during the later stages of the project. It will also result in a lower carbon footprint.

- The footprint located in close proximity to the open pit will also allow for a more manageable noise solution.

- A large part of the footprint of the proposed overburden location alternative is in a degraded state with low ecological sensitivity.

- Overburden option 1 is not located on any faults, drainages or domestic water supply boreholes.

The disadvantages of this site location alternative are:

- Impacts on natural vegetation with protected trees.
- The proposed overburden footprint option falls within the 1:100 year floodline of the Rooisloot River.
- Impacts on land capability and fertile soils with high compaction potential.
- Overburden option 1 is located on dolomite as well as 2 water supply boreholes used for production and/or irrigation.
- Option 1 impacts on Iron Age sites (sites Exigo-ZNM-IA01 - Exigo-ZNM-IA04) of moderate archaeological significance; and Historical Period sites (sites Exigo-ZNM-HP01 - Exigo-ZNM-HP05) of low heritage significance.
- Option 1 also impacts on burials (burials Exigo-ZNM-BP01 - Exigo-ZNM-BP08) with a high heritage significance.
- Overburden facility site alternative 1 falls over the proposed SANRAL N11 Ring Road.

2. Overburden Facility Site Alternative Option 2

This site is located to the south-west of the proposed Open Pit on Portion1, 15 and 16 of Amatava 41 KS . The advantages of this site location alternative are:

- The footprint of the proposed overburden location alternative is outside any areas of high ecological sensitivity.
- Lower impact on land capability.
- Overburden option 2 is not located on any drainages or water supply boreholes used for production and/or irrigation.

The disadvantages of this site location alternative are:

- The overburden will have to be hauled a long distance from the proposed Open Pit (approximately 3 km from the north-western corner of the open pit), which is not preferred at the beginning of a project. This will significantly increase the operational cost, but will also increase the backfilling and thus rehabilitation cost, and result in a higher carbon footprint.
- Impacts on natural vegetation with protected trees.
- Impacts on fertile soils with high compaction potential.
- Overburden option 2 is located on dolomite, geological faults as well as 3 domestic water supply boreholes.

- Option 2 impacts Historical Period sites (sites Exigo-ZNM-HP01 - Exigo-ZNM-HP05) of low heritage significance.
- Option 2 also impacts on burials (burials Exigo-ZNM-BP01 - Exigo-ZNM-BP08) with a high heritage significance.
- Overburden facility site alternative 2 falls over the proposed SANRAL N11 Ring Road.

3. Overburden Facility Site Alternative Option 3

This site is located directly to the south-east of the proposed Open Pit on Portion 35, 36, 46, 47, 51, 52, 53 and 63 of Uitloop 3 KS. The advantages of this site location alternative are:

- This site is situated to the south-east and adjacent to the open pit (approximately 1,3 km away from the north-western corner of the open pit) which will ensure that the overburden and topsoil won't need to be hauled far, which will lower the operational cost, as well as the cost of backfilling and rehabilitation during the later stages of the project. It will also result in a lower carbon footprint.
- A large part of the footprint of the proposed overburden location alternative is in a degraded state with a medium to low ecological sensitivity.
- Impact on land capability is very low.
- This alternative option is preferred from an air quality impact perspective as this provides for the shortest haul distance and subsequent lower impact from particulate matter on sensitive receptors.
- The footprint located in close proximity to the open pit will also allow for a more manageable noise solution.
- Overburden option 3 is not located on any drainages or geological faults and only partially intersects the dolomite.
- Overburden facility site alternative 3 is not situated over the proposed SANRAL N11 Ring Road or the road reserve.

The disadvantages of this site location alternative are:

- Impacts on natural vegetation with protected trees.
- The proposed location alternative slightly impacts on drainage channels.
- Impacts on fertile soils with high compaction potential. A small section also impacts on high erosion soils in the drainage channel.
- Overburden option 3 is located partially on dolomite and over 2 domestic boreholes as well as 1 water supply borehole for production and/or irrigation.

- Option 3 impacts on Stone Age scatters (site Exigo-ZNM-SA02) of moderate to low archaeological significance.

4. **Overburden Facility Site Alternative Option 4**

This site partly overlies the footprint of Overburden Option 2 and is located to the south-east of the proposed Open Pit on Portion 12, 20 and 61 of Uitloop 3 KS and Portion 1 and 16 of Amatava 41 KS. The advantages of this site location alternative are:

- The footprint of the proposed overburden location alternative is outside any areas of high ecological sensitivity.
- This overburden facility site alternative option is preferred from a visual impact perspective as it avoids 'greenfield' areas and allows for a substantial visual buffer (i.e. 500 m) from sensitive viewing areas to the facilities.
- Impact on land capability is very low.
- Overburden option 4 is not located on any drainages or water supply boreholes used for production and/or irrigation.

The disadvantages of this site location alternative are:

- The overburden will have to be hauled a long distance from the proposed Open Pit (approximately 3 km from the north-western corner to the open pit), which is not preferred at the beginning of a project. This will significantly increase the operational cost, but will also increase the backfilling and thus rehabilitation cost; and result in a higher carbon footprint.
- Impacts on natural vegetation with protected trees.
- Impacts on fertile soils with high compaction potential.
- Overburden option 4 is located partially on dolomite and geological faults as well as 1 domestic water supply borehole.
- Option 4 impacts Historical Period sites (sites Exigo-ZNM-HP01 - Exigo-ZNM-HP05) of low heritage significance.
- Option 4 also impacts on burials (burials Exigo-ZNM-BP01 - Exigo-ZNM-BP08) with a high heritage significance.
- Overburden facility site alternative 4 falls over the proposed SANRAL N11 Ring Road.

Overburden Facility Preferred Site:

A site selection matrix summarising the specialist recommendations and other practical considerations of the different sites are indicated in Table 5 below.

All the alternative sites have positive and negative aspects associated with them. Overburden Facility

Site Alternative Option 3 is preferred from a soil, land capability and agricultural potential; ecological; heritage, air quality and noise perspective. From a hydrogeological viewpoint, the location is only partially underlain by dolomite and does not occur over any geological faults. Overburden Alternative 3 is also preferred due to practical engineering considerations (e.g. shorter hauling distance, lower operational and rehabilitation costs and carbon footprint) and as it is located outside the proposed SANRAL N11 Ring Road and reserve.

B. **TAILINGS STORAGE FACILITY (TSF) SITE LOCATION ALTERNATIVES:**

Four site (location) alternatives were investigated for the Tailings Storage Facility (TSF) (refer to Figure 13):

1. Tailings Storage Facility Site Alternative Option 1

This site is located directly to the south-east of the proposed Open Pit on Portion 12 and 20 of Uitloop 3 KS and Portion 1 of Amatava 41 KS. The advantages of this site location alternative are:

- Moderate impact on land capability.
- TSF Alternative Option 1 is not located over any drainages or production and/or irrigation water supply boreholes.
- TSF site alternative 1 is not situated over the proposed SANRAL N11 Ring Road or the road reserve.

The disadvantages of this site location alternative are:

- Impacts on natural vegetation with protected trees.
- The footprint of this location alternative impacts on a rocky ridge with a high ecological sensitivity.
- Impacts on fertile soils under irrigation with high compaction potential as well as rocky ridge with high erosion potential.
- TSF Alternative Option 1's location overlies dolomite, geological faults as well as 1 domestic water supply borehole.
- Option 1 impacts on Iron Age sites (sites Exigo-ZNM-IA01 - Exigo-ZNM-IA04) of moderate archaeological significance.
- Option 1 also impacts on a single burial (Exigo-ZNM-BP01) with a high heritage significance.

2. Tailings Storage Facility Site Alternative Option 2

This site is located directly to the south-east of the proposed Open Pit on Portion 12, 13 and 14 of Amatava 41 KS. The advantages of this site location alternative are:

- Impact on land capability is very low.

- TSF Alternative Option 2 is not located over any domestic or production and/or irrigation water supply boreholes.

The disadvantages of this site location alternative are:

- Impacts on natural vegetation with protected trees.
- The footprint of this location alternative impacts on a watercourse with a high sensitivity.
- Impacts on soils with high compaction potential; as well as potential impact on sensitive drainage channel soils.
- TSF Alternative Option 2's location overlies dolomite, geological faults and drainages.
- Option 2 impacts on Iron Age sites (sites Exigo-ZNM-IA01 - Exigo-ZNM-IA04) of moderate archaeological significance; and Historical Period sites (sites Exigo-ZNM-HP01 - Exigo-ZNM-HP05) of low heritage significance.
- Option 2 also impacts on a single burial (Exigo-ZNM-BP02) with a high heritage significance.
- TSF site alternative 2 falls over the proposed SANRAL N11 Ring Road and reserve.

3. Tailings Storage Facility Site Alternative Option 3

This site is located directly to the south-east of the proposed Open Pit on Portion 1, 10, 12, 14, 15 and 16 of Amatava 41 KS. The advantages of this site location alternative are:

- Impact on land capability is low.
- TSF Alternative Option 3 is not located over any production and/or irrigation water supply boreholes.

The disadvantages of this site location alternative are:

- The footprint of this location alternative impacts on a watercourse with a high sensitivity.
- Impacts on fertile soils with high compaction potential; with a small section impacting on soils with high erosion potential located in the drainage channel.
- TSF Alternative Option 3's location overlies dolomite, geological faults, drainages and 1 domestic water supply borehole.
- Option 3 impacts Historical Period sites (sites Exigo-ZNM-HP01 - Exigo-ZNM-HP05) of low heritage significance.
- Option 3 also impacts on multiple burials (Exigo-ZNM-BP02 - Exigo-ZNM-BP08) with a high heritage significance.
- TSF site alternative 3 falls over the proposed SANRAL N11 Ring Road and reserve.

4. Tailings Storage Facility Site Alternative Option 4

This site is located directly to the south-east of the proposed Open Pit on Portion 12 of Uitloop 3 KS and Portion 1 of Amatava 41 KS. The advantages of this site location alternative are:

- The footprint of the proposed TSF facility site alternative is preferred from a visual impact perspective as it avoids 'greenfield' areas and allows for a substantial visual buffer (i.e. 500 m) from sensitive viewing areas to the facilities.
- TSF Alternative Option 4 is not located over any drainages and only partially intersects faults and dolomite which dips to the south-west.
- TSF site alternative 4 is not situated over the proposed SANRAL N11 Ring Road or the road reserve.

The disadvantages of this site location alternative are:

- Impacts on natural vegetation with protected trees.
- The footprint of this location alternative impacts on a rocky ridge with a high ecological sensitivity.
- The footprint of the proposed TSF falls within 100 m from the tributary to the Rooisloot River.
- High impact on land capability and soils with high compaction potential, as well as impacting on a rocky ridge with high erosion potential.
- TSF Alternative Option 4 is partially located over dolomite and geological faults and over 2 domestic boreholes and 2 production and/or irrigation water supply boreholes.
- Option 4 impacts on Iron Age sites (sites Exigo-ZNM-IA01 - Exigo-ZNM-IA04) of moderate archaeological significance and historical period homestead (site Exigo-ZNM-HP06) of moderate heritage significance.
- Option 4 also impacts on a single burial (Exigo-ZNM-BP01) with a high heritage significance.

All the options considered have a similar impact in terms of air quality.

Tailings Storage Facility Preferred Site:

A site selection matrix summarising the specialist recommendations and other practical considerations of the different sites are indicated in Table 5 below.

All of the TSF alternative sites have positive and negative aspects associated with them. Tailings Storage Facility Site Alternative Option 4 is preferred from a hydrogeological perspective as it only partially overlies dolomite and geological faults. This site does not impact on any drainage lines. The alternative is also not situated over the proposed SANRAL N11 Ring Road or the road reserve. From a visual impact perspective, the site avoids 'greenfield' areas and allows for a substantial visual buffer (i.e. 500 m) from sensitive viewing areas to the facilities.

The current layout will be optimised in order to avoid the rocky ridge where possible.

Another alternative option is to have no TSF on site and to process the ore at a nearby processing plant on the Northern Bushveld Limb, such as Anglo's Mokopane Mine or Ivanplats' Platinum Mine, and make use of the mine's TSF. This alternative option will however be further investigated during the EIA Phase.

C. MINE INFRASTRUCTURE SITE LOCATION ALTERNATIVES:

Three location alternatives were investigated for the proposed processing plant and associated infrastructure (offices, sewage and water treatment plants, tanks and dams, and ROM stockpiles) (hereafter referred to as "Mine Infrastructure Site Location Alternatives") (refer to Figure 14). A footprint area of approximately 53 hectares will be required for the processing plant and associated infrastructure.

1. Infrastructure Site Alternative Option 1

Infrastructure Location Alternative 1 is located approximately 1,3 km to the east of the proposed Open Pit on Portion 0, 20, 23, 48, 49 and 65 of Uitloop 3 KS. The advantages of this site location alternative are:

- This infrastructure site alternative option is preferred from a visual impact perspective.
- This alternative option is located furthest from the community of Mahwelereng in terms of the noise impact.
- Infrastructure site option 1 is not located over any drainages, geological faults or water supply boreholes used for production and/or irrigation.
- This infrastructure site alternative option is preferred from a visual impact perspective as it avoids 'greenfield' areas and allows for a substantial visual buffer (i.e. 500 m) from sensitive viewing areas to the facilities.
- Infrastructure site alternative 1 is not situated over the proposed SANRAL N11 Ring Road and only partially overlaps the road reserve.

The disadvantages of this site location alternative are:

- The ore will have to be hauled a long distance from the proposed Open Pit (approximately 2,5 km from the north-western corner of the open pit), and across the Percy Fyfe Road which will necessitate the construction of a bridge across the road and railway line. Hauling the material over a long distance will increase the operational cost significantly and result in a higher carbon footprint.
- Impacts on natural vegetation with protected trees.
- Impacts on land capability and fertile soils with high compaction potential.

- This alternative option has a larger number of surrounding receptors in terms of the noise impact.
- Infrastructure site option 1 is located on dolomite and also occurs over 3 domestic water supply boreholes.

2. Infrastructure Site Alternative Option 2

Infrastructure Location Alternative 2 is located to the east-north east of the proposed Open Pit on Portion 0 of Uitloop 3 KS. The advantages of this site location alternative are:

- This site is situated closest to the open pit (approximately 900 m away from the north-western corner of the open pit) which will ensure that the ore won't need to be hauled far, which will lower the operational cost and carbon footprint of the project.
- The footprint of the proposed infrastructure site alternative has a slightly lower impact on ecological sensitivity compared to the other 2 options.
- This alternative option is preferred from an air quality impact perspective due to the lower number and location of potential sensitive receptors to this option.
- The location of this alternative option has the least number of surrounding receptors and has enough distance (over 1000 m) from the town of Mokopane and is located close to road D1231 (Percy Fyfe Road) which will enable a higher noise level rating. The location of the alternative closer to the open pit may also assist in noise management.
- Infrastructure site option 2 is not located over any drainages, geological faults or domestic water supply boreholes.
- Infrastructure site alternative 2 is not situated over the proposed SANRAL N11 Ring Road and only partially overlaps the road reserve.

The disadvantages of this site location alternative are:

- Impacts on natural vegetation with protected trees.
- The proposed mine infrastructure footprint option falls within the 1:100 year floodline of the Rooisloot River.
- Impacts on land capability and fertile soils under irrigation with high compaction potential.
- Infrastructure site option 2 is located partially on dolomite and also occurs on 1 water supply borehole used for production and/or irrigation.

3. Infrastructure Site Alternative Option 3

Infrastructure Location Alternative 3 is located directly to the south-east of the proposed Open Pit on Portion 8, 9, 10, 15, 17 and 18 of Amatava 41 KS and Portion 49, 50, 98 and 100 of Piet Potgietersrust Town and Townlands 44 KS. The advantages of this site location alternative are:

- This alternative option is located further from the community of Mahwelereng than Option 2 above in terms of the noise impact.
- Infrastructure site option 3 is not located over any drainages or water supply boreholes used for production and/or irrigation.
- Infrastructure site alternative 2 is not situated over the proposed SANRAL N11 Ring Road and only partially overlaps the road reserve.

The disadvantages of this site location alternative are:

- This site is situated further away from the proposed Open Pit (approximately 3 km from the north-western corner of the open pit), and across the Percy Fyfe Road which will necessitate the construction of a bridge across the road and railway line. Hauling the material over such a long distance will increase the operational cost significantly and result in a larger carbon footprint.
- Impacts on natural vegetation with protected trees.
- Impacts on land capability and fertile soils with high compaction potential.
- This alternative option has a larger number of surrounding receptors in terms of the noise impact.
- Infrastructure site option 3 is located on dolomite and geological faults as well as 8 domestic water supply boreholes.

Mine Infrastructure Preferred Site:

A site selection matrix summarising the specialist recommendations and other practical considerations of the different sites are indicated in Table 5 below.

All the infrastructure alternative sites have positive and negative aspects associated with them.

Infrastructure Site Location Alternative 1 is preferred as it falls outside 1:100 year floodline of the Rooisloot River. This Alternative is preferred from a visual impact perspective as the site avoids ‘greenfield’ areas and allows for a substantial visual buffer (i.e. 500 m) from sensitive viewing areas to the facilities. No geological faults or geological conduits are intersected on the site alternative however the site is located on dolomite. Alternative 1 is preferred from a heritage resources perspective. The site is located closest to the preferred TSF option therefore requiring a shorter pumping distance for tailings and return water which will have a lower economic cost. Although further away from the proposed open pit, haulage of ore with a conveyor belt to the processing plant to limit the operational cost is being considered and will be further investigated during the EIA Phase.

Both alternative options impact on land capability and fertile soils and are located in areas of medium to low ecological sensitivity, however Infrastructure Site Alternative 2 has a slightly lower ecological impact compared to the other alternatives. Both alternative 1 and 2 are not situated over the proposed SANRAL N11 Ring Road and only partially overlaps the road reserve. Alternative site 2 is preferred from an air quality and noise perspective due to the least number of surrounding receptors and distance (over 1000 m) from the town of Mokopane. The location closest to road D1231 (Percy Fyfe Road) will also enable a higher noise level rating. This site is situated closest to the open pit which will shorten the hauling distances, resulting in a lower operational cost and carbon footprint, and allowing for a more manageable noise solution.

Both alternative site options 1 and 2 are preferred and will be further assessed during the EIA phase. Another alternative option is to have no processing plant and associated infrastructure on site and to process the ore at a nearby processing plant on the Northern Bushveld Limb, such as Anglo's Mokopane Mine or Ivanplats' Platinum Mine. This alternative option will however be further investigated during the EIA Phase.

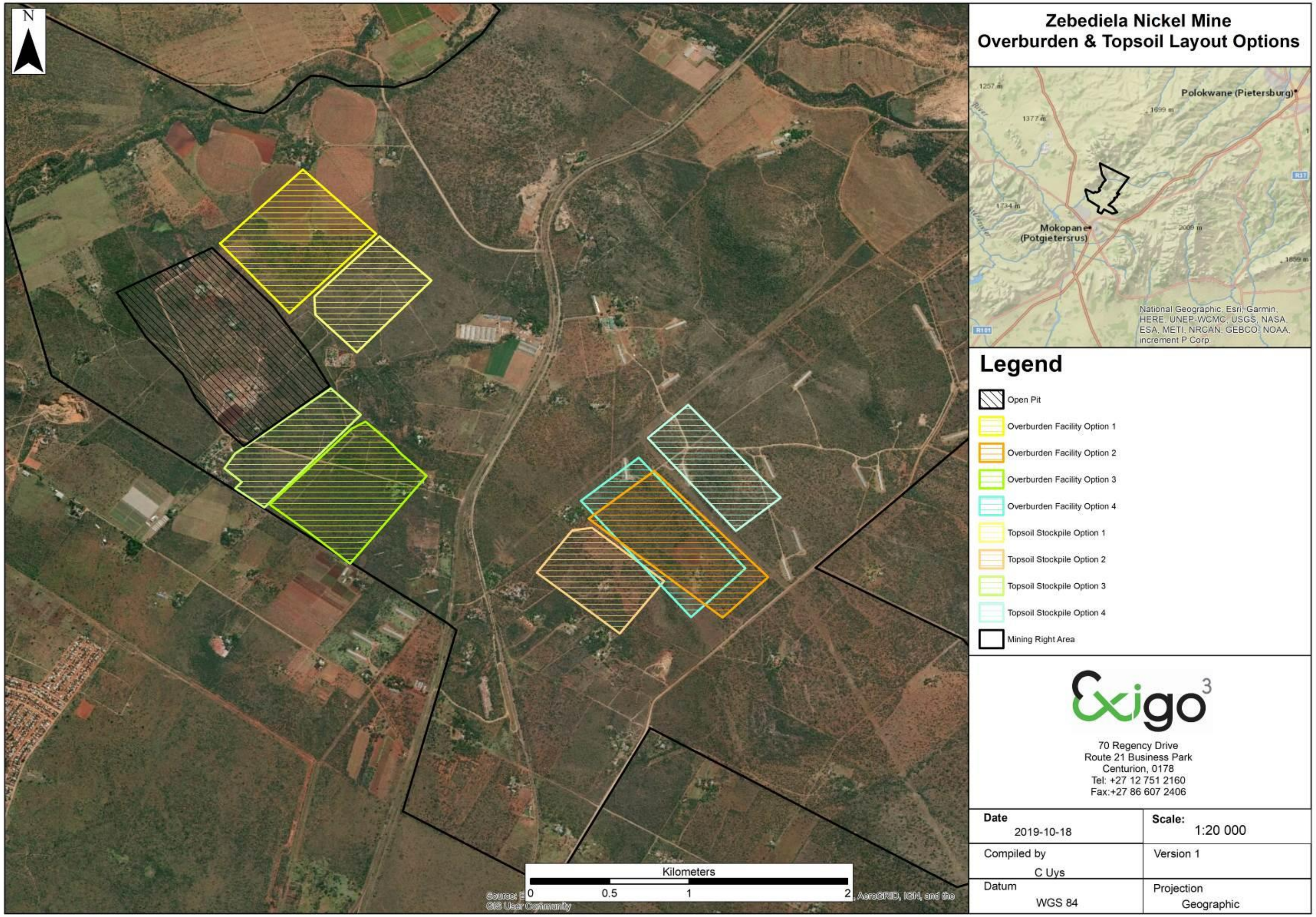


Figure 12: Overburden Facility Site Location Alternatives Map

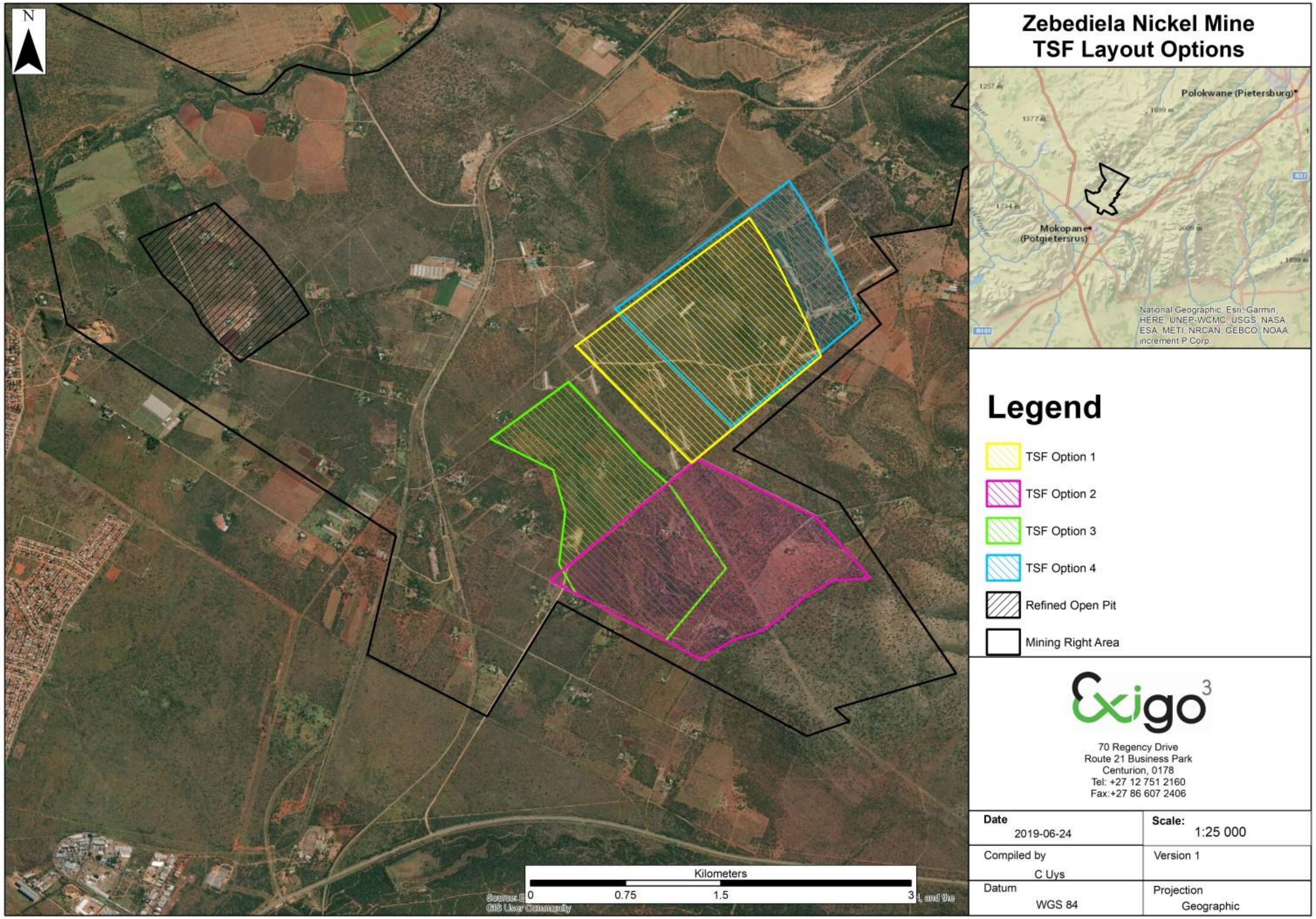


Figure 13: TSF Site Location Alternatives Map

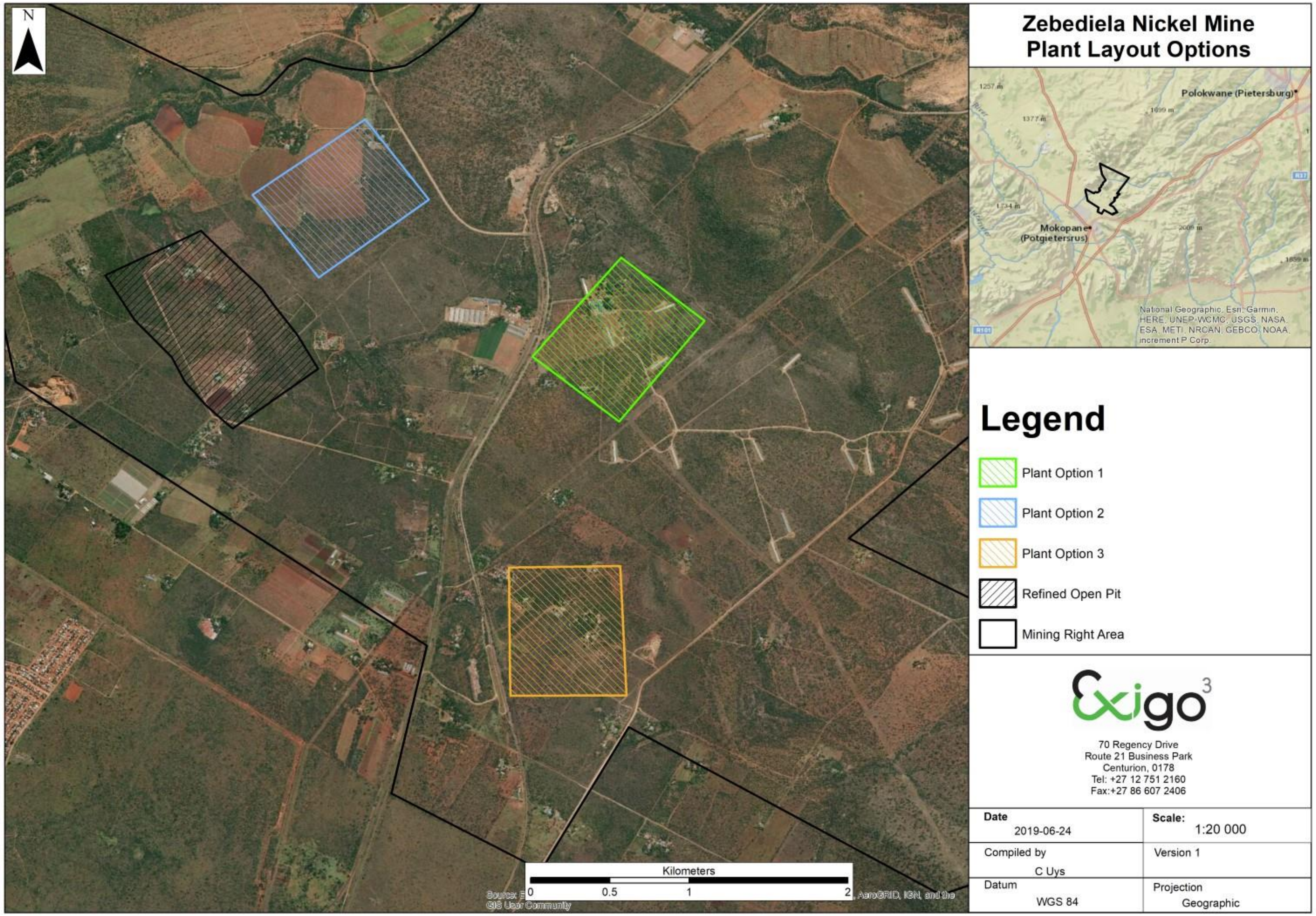


Figure 14: Infrastructure Site Location Alternatives Map

Table 5: Site selection matrix

SITE SELECTION MATRIX	Soil and Agricultural Potential	Biodiversity	Surface and Groundwater	Heritage	Air Quality	Noise	Visual	Geological aspects	Engineering Aspects	Other
Overburden Facility Site Alternative 1 (Not preferred)	*2nd preferred option* Impacts on land capability and fertile soils with high compaction potential (higher compared to Option 2 and 4). 2nd most suitable option from a soil impact point of view.	*2nd preferred option* Site is located in an area with a degraded state and low ecological sensitivity. Impacts on natural vegetation with protected trees. 2nd most suitable option from ecological impact and location point of view.	***Not preferred*** No drainage or domestic water supply boreholes on site. Footprint falls within the 1:100 year floodline of the Rooisloot River and impacts 2 production and/or irrigation water supply boreholes.	*2nd preferred option* Impacts on Iron Age sites of moderate archaeological significance; and Historical Period which can be mitigated.	***Not preferred*** The site is located in close proximity of potential sensitive receptors.	***Preferred*** The site located in close proximity to the open pit which will allow for a more manageable noise solution.	***Not preferred*** The site is located in close proximity of potential sensitive receptors.	*No preference* The site is on dolomite but not located on any faults.	***Preferred*** This site is situated to the north-east and adjacent to the open pit (approximately 650 m away from the north-western corner of the open pit) which will ensure that the overburden and topsoil won't need to be hauled long distances, which will lower the operational cost, but will also lower the cost of backfilling and rehabilitation and result in a lower carbon footprint.	***Not preferred*** The site overlaps the proposed SANRAL N11 Ring Road.
Overburden Facility Site Alternative 2 (Not preferred)	*4th preferred option* Fertile soils with high compaction potential. Lower impact on land capability. 4th option from a soil impact & location point of view.	*3rd preferred option* Site is located outside any areas of high ecological sensitivity, but impacts on natural vegetation with protected trees. 3rd most suitable option from ecological & location point of view.	***Not preferred*** No drainages or production and/or irrigation water supply boreholes on site, however impacts on 3 domestic water supply boreholes.	***Not preferred*** Impacts Historical Period sites of low heritage significance and burials with high heritage significance.	***Not preferred*** The site is located in close proximity of potential sensitive receptors.	***Not preferred*** The site is located further from the open pit.	***Not preferred*** The site is located in close proximity of potential sensitive receptors.	***Not preferred*** Located on dolomite and intersects geological faults.	***Not preferred*** Overburden will have to be hauled a long distance from the proposed Open Pit (3 km) increasing the operational cost, backfilling and rehabilitation cost, and result in a higher carbon footprint.	***Not preferred*** The site overlaps the proposed SANRAL N11 Ring Road.
Overburden Facility Site Alternative 3 (Preferred)	***Preferred*** Very low impact on land capability. Impacts on soils with high	***Preferred*** Site is located in an area with a degraded state with medium to low ecological	***Not preferred*** No drainages but impacts 2 domestic boreholes as	***Preferred*** Option 3 impacts on Stone Age scatters (site Exigo-ZNM-SA02) of	***Preferred*** Taking cognisance of the location of sensitive receptors and	***Preferred*** The site located in close proximity to the open pit which will allow for a	***Not preferred*** The site is located in close proximity of potential sensitive	***Preferred*** No geological faults and only partially intersects the dolomite.	*2nd preferred option* This site is situated to the south-east and adjacent to the	***Preferred*** The site is not located over the proposed SANRAL N11 Ring Road.

SITE SELECTION MATRIX	Soil and Agricultural Potential	Biodiversity	Surface and Groundwater	Heritage	Air Quality	Noise	Visual	Geological aspects	Engineering Aspects	Other
	compaction potential with small section impacting on high erosion soils associated with drainage channel. Overburden layout could be moved slightly more south to avoid drainage channel.	sensitivity. Impacts on natural vegetation with protected trees and slightly on drainage channel.	well as 1 water supply borehole for production and/or irrigation.	moderate to low archaeological significance.	the shorter length of the haul routes associated with this option and the subsequent influence on the extent of PM impacts.	more manageable noise solution.	receptors.		open pit (approximately 1,3 km away from the north-western corner of the open pit) which will ensure that the overburden and topsoil won't need to be hauled long distances, which will lower the operational cost, but will also lower the cost of backfilling and rehabilitation and result in a lower carbon footprint.	
Overburden Facility Site Alternative 4 (Not preferred)	*3rd preferred option* Very low impact on land capability. Impacts on soils with high compaction potential. 3rd option from a soil impact & location point of view.	*4th preferred option* Site is located outside any areas of high ecological sensitivity, but impacts on natural vegetation with protected trees. 4th most suitable option from ecological & location point of view.	***Preferred*** No drainages or production and /or irrigation water supply boreholes but impacts 1 domestic water supply borehole.	***Not preferred*** Impacts Historical Period sites of low heritage significance and burials with high heritage significance.	***Not preferred*** The site is located in close proximity of potential sensitive receptors.	***Not preferred*** The site is located further from the open pit.	***Preferred*** Preferred from a visual impact perspective as site avoids 'greenfield' areas and allows for a substantial visual buffer (i.e. 500 m) from sensitive viewing areas to the facilities.	***Not preferred*** Located partially on dolomite and geological faults.	***Not preferred*** Overburden will have to be hauled a long distance from the proposed Open Pit (3 km) increasing the operational cost, backfilling and rehabilitation cost, and result in a higher carbon footprint.	***Not preferred*** The site overlaps the proposed SANRAL N11 Ring Road.

SITE SELECTION MATRIX	Soil and Agricultural Potential	Biodiversity	Surface and Groundwater	Heritage	Air Quality	Noise	Visual	Geological aspects	Engineering Aspects	Other
Infrastructure Site Location Alternative 1 (Preferred)	*2nd preferred option* Impacts on land capability and fertile soils with high compaction potential. 2nd option from a location point of view.	*2nd preferred option* Impacting on natural vegetation with protected trees. 2nd option from an ecological impact point of view.	***Preferred*** No drainages or production and/or irrigation water supply boreholes on site, but impact on 3 domestic water supply boreholes.	***Preferred*** No heritage resources have been identified within the footprint of this infrastructure component.	***Not preferred*** The site is located in close proximity of potential sensitive receptors.	***Not preferred*** The site is located furthest from the community of Mahwelereng but has a has a larger number of surrounding receptors.	***Preferred*** Preferred from a visual impact perspective as site avoids 'greenfield' areas and allows for a substantial visual buffer (i.e. 500 m) from sensitive viewing areas to the facilities.	***Preferred*** No geological faults on site but located on dolomite. Does not intersect any geological conduits.	***Not preferred*** Ore will have to be hauled a long distance from the proposed Open Pit (2,5 km) and across the Percy Fyfe Road necessitating construction of a bridge across the road and railway line increasing the operational cost and resulting in a higher carbon footprint.	***Preferred*** Site is located closest to preferred TSF option therefore requiring a shorter pumping distance for tailings and return water which will have a lower economic cost. The site is not located over the proposed SANRAL N11 road.
Infrastructure Site Location Alternative 2 (Preferred)	***Preferred*** Impacts on land capability and fertile soils under irrigation with high compaction potential. Most suitable option from soil impact point of view provided that layout is amended to avoid any land under irrigation.	***Preferred*** Slightly lower impact on ecological sensitivity compared to other options.	*Not preferred* No drainages or domestic water supply boreholes on site, but impact on 1 production and/or irrigation water supply boreholes. The proposed mine infrastructure footprint option falls within the 1:100 year floodline of the Rooisloot River.	*2nd Preferred Option* Burials with high significance occur within 100m to 200m of the infrastructure footprint alternative.	***Preferred*** Taking cognisance of the location of sensitive receptors and the shorter length of the haul routes associated with this option and the subsequent influence on the extent of PM impacts.	***Preferred*** Least number of surrounding receptors and has enough distance (over 1000 m) from the town of Mokopane and is located close to road D1231 (Percy Fyfe Road) which will enable a higher noise level rating. He site located in close proximity to the open pit will allow for a more manageable noise solution.	***Not preferred*** The site is located in close proximity of potential sensitive receptors.	***Not preferred*** No geological faults on site but located partially on dolomite. Banded ironstone acts as a conduit for potential mass migration.	***Preferred*** This site is situated closest to the open pit (approximately 900 m away from the north-western corner of the open pit) which will ensure that the ore won't need to be hauled long distances, which will lower the operational cost, and result in a lower carbon footprint.	***Not preferred*** Site is located furthest from preferred TSF option therefore requiring a longer pumping distance for tailings and return water which will have a higher economic cost. ***Preferred*** The site is not located over the proposed SANRAL N11 Ring Road.

SITE SELECTION MATRIX	Soil and Agricultural Potential	Biodiversity	Surface and Groundwater	Heritage	Air Quality	Noise	Visual	Geological aspects	Engineering Aspects	Other
Infrastructure Site Location Alternative 3 (Not preferred)	*3rd preferred option* Impacts on land capability and fertile soils with high compaction potential. 3rd option from a location point of view.	*3rd preferred option* Impacting on natural vegetation with protected trees. 3rd option from an ecological impact point of view.	***Not preferred*** No drainages or production and/or irrigation water supply boreholes on site, but impact on 8 domestic water supply boreholes.	*2nd Preferred Option* Burials with high significance occur within 100m to 200m of the infrastructure footprint alternative.	***Not preferred*** The site is located in close proximity of potential sensitive receptors.	***Not preferred*** The site is located further from the community of Mahwelereng than Option 2 but has a larger number of surrounding receptors.	***Not preferred*** The site is located in close proximity of potential sensitive receptors.	***Not preferred*** Geological faults on site and located on dolomite. Does not intersect any geological conduits. Faults act as a conduit for potential mass migration.	***Not preferred*** Ore will have to be hauled a long distance from the proposed Open Pit (3 km) and across the Percy Fyfe Road necessitating construction of a bridge across the road and railway line increasing the operational cost and resulting in a higher carbon footprint.	***Not preferred*** Site is located further from preferred TSF option than Option 1 therefore requiring a longer pumping distance for tailings and return water which will have a higher economic cost. ***Preferred*** The site is not located over the proposed SANRAL N11 Ring Road.
TSF Site Alternative 1 (Not preferred)	*4th preferred option* Low impact on land capability and fertile soils under irrigation with high compaction potential as well as impacting on rocky ridge with high erosion potential. Partial impact on dolomitic soils.	*4th preferred option* Impacts on natural vegetation with protected trees as well as rocky ridge with high sensitivity.	***Not preferred*** No drainages or production and/or irrigation water supply boreholes but impacts 1 water supply borehole.	***Preferred*** Impacts on Iron Age sites of moderate archaeological significance and a single burial with a high heritage significance.	*No preference* The site is located in close proximity of potential sensitive receptors.	***Preferred*** Location minimises haul routes to preferred processing plant.	***Not preferred*** The site is located in close proximity of potential sensitive receptors.	***Not preferred*** Site is located on dolomite and geological faults.	*2nd preferred option* Located close to preferred plant option 1.	***Not preferred*** From a topographical point of view due to rocky ridge. ***Preferred*** The site is not located over the proposed SANRAL N11 Ring Road.

SITE SELECTION MATRIX	Soil and Agricultural Potential	Biodiversity	Surface and Groundwater	Heritage	Air Quality	Noise	Visual	Geological aspects	Engineering Aspects	Other
TSF Site Alternative 2 (Not preferred)	*2nd preferred option* Low impact on land capability, souls with high compaction potential and impacting on sensitive drainage channel soils. Partial impact on dolomitic soils.	*2nd preferred option* Impacts on natural vegetation with protected trees as well as high sensitivity watercourses. 2nd option from an ecological & location point of view.	***Not preferred*** Located on drainages. No impact on domestic or production and/or irrigation water supply boreholes.	*2nd preferred option* Impacts on Iron Age of moderate archaeological significance; and Historical Period sites of low heritage significance as well as a single burial with a high heritage significance. Will required mitigation of moderate sensitivity Iron Age occurrences,	*No preference* The site is located in close proximity of potential sensitive receptors.	*No preference* Tailings storage facilities are easier to manage (in terms of noise) than other project areas (e.g. pump enclosures for pumping of tailings).	***Not preferred*** The site is located in close proximity of potential sensitive receptors.	***Not preferred*** Overlies dolomite and geological faults.	***Not preferred*** Located furthest from preferred plant option 1.	***Not preferred*** The site overlaps the proposed SANRAL N11 Ring Road.
TSF Site Alternative 3 (Not preferred)	***Preferred*** Low impact on land capability and impacting on fertile soils with high compaction potential with small section impacting on high erosion soils in drainage channel. Partial impact on dolomitic soils. Location of TSF could be moved slightly more north and west to avoid drainage channel.	***Preferred*** Site is located within low sensitivity old fields in between woodland. Impacts on high sensitivity watercourse, however layout of TSF could be moved slightly north in order to avoid drainage channel.	***Not preferred*** Located on drainages and 1 domestic water supply borehole. No impact on production and/or irrigation water supply boreholes.	***Not preferred*** Impacts Historical Period sites of low heritage significance and multiple burials with a high heritage significance.	*No preference* The site is located in close proximity of potential sensitive receptors.	*No preference* Tailings storage facilities are easier to manage (in terms of noise) than other project areas (e.g. pump enclosures for pumping of tailings).	***Not preferred*** The site is located in close proximity of potential sensitive receptors.	***Not preferred*** Overlies dolomite and geological faults.	*3rd preferred option* Located closer to preferred plant option 1 than Option 2.	***Not preferred*** The site overlaps the proposed SANRAL N11 Ring Road.

SITE SELECTION MATRIX	Soil and Agricultural Potential	Biodiversity	Surface and Groundwater	Heritage	Air Quality	Noise	Visual	Geological aspects	Engineering Aspects	Other
TSF Site Alternative 4 (Preferred)	*3rd preferred option* Moderate to low impact on land capability and soils with high compaction potential, as well as rocky ridge with high erosion potential. Partial impact on dolomitic soils.	*3rd preferred option* Impacts on natural vegetation with protected trees as well as rocky ridge with high sensitivity. Lower impact on woodland areas compared with option 1. 3rd option form ecological and location point of view.	***Preferred*** No drainages. Impacts 2 domestic and 2 production and/or irrigation water supply boreholes.	***Preferred*** Impacts on Iron Age of moderate archaeological significance; and Historical Period homestead of moderate heritage significance as well as a single burial with a high heritage significance.	*No preference* The site is located in close proximity of potential sensitive receptors.	***Preferred*** Location minimises haul routes to preferred processing plant option 1.	***Preferred*** Preferred from a visual impact perspective as site avoids 'greenfield' areas and allows for a substantial visual buffer (i.e. 500 m) from sensitive viewing areas to the facilities.	***Preferred*** Only partially intersects dolomite and faults which dips to the south-west.	***Preferred*** Located closest to preferred plant option 1.	***Not preferred*** From a topographical point of view due to rocky ridge. ***Preferred*** The site is not located over the proposed SANRAL N11 Ring Road.

9.2.2. Layout alternatives

Layout alternatives to optimise the following preferred site location alternatives (Figure 15 and Figure 16) will be identified and investigated during the EIA phase:

1. Overburden Site Location Alternative 3
2. Tailings Storage Facility Site Location Alternative 4
3. Mine Infrastructure Site Location Alternative 1 and 2

The preferred layout of the TSF, overburden and topsoil facilities as well as the processing plant infrastructure will be influenced by the detail engineering designs, specialist input during the EIA phase, as well as comments by Interested and/or Affected Parties (I&APs) during and following the Scoping Phase. Therefore, the exact layout of the facilities within the boundaries of the location identified will be finalized during the EIA Phase.

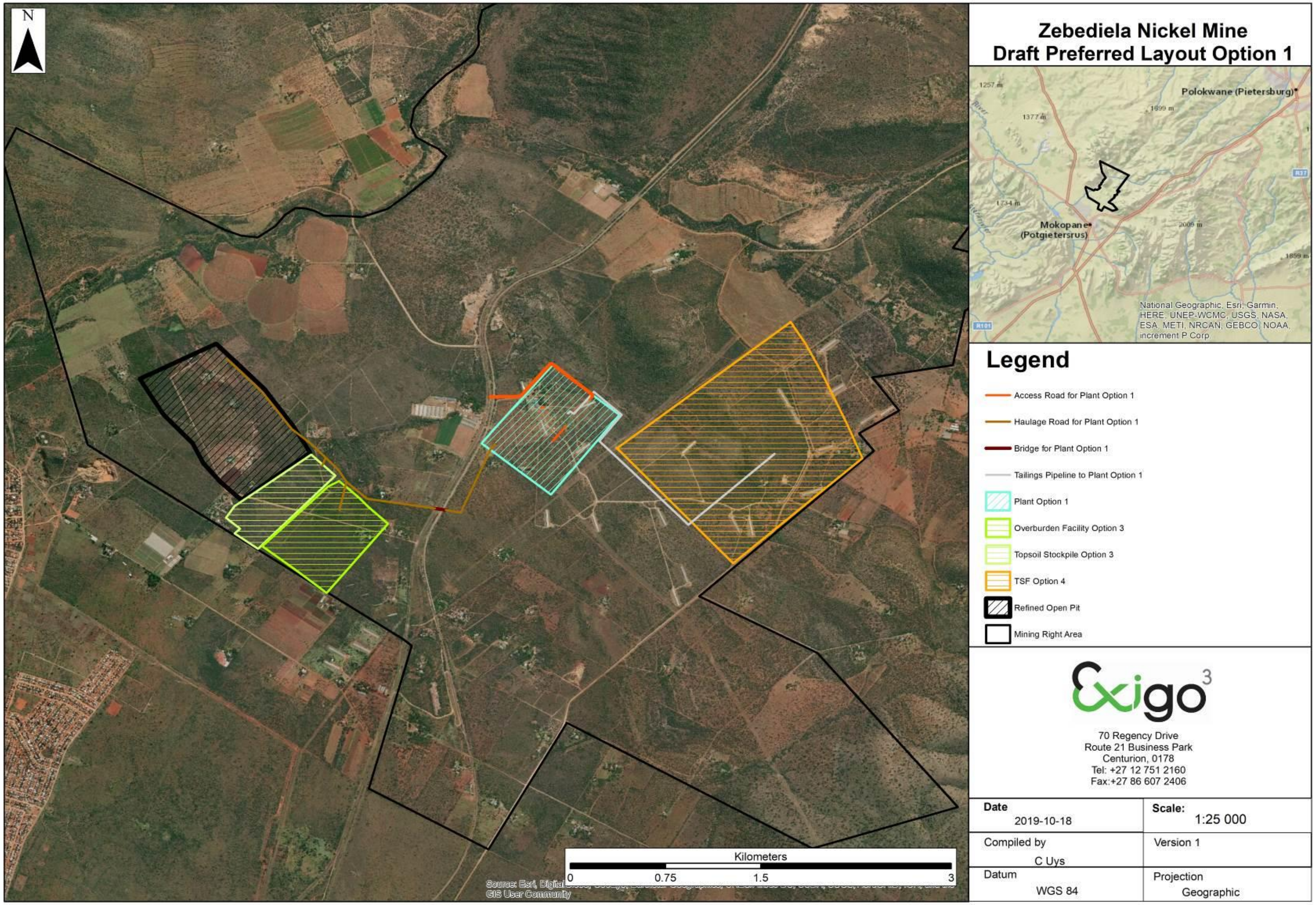


Figure 15: Preferred Site Location Alternatives Layout 1

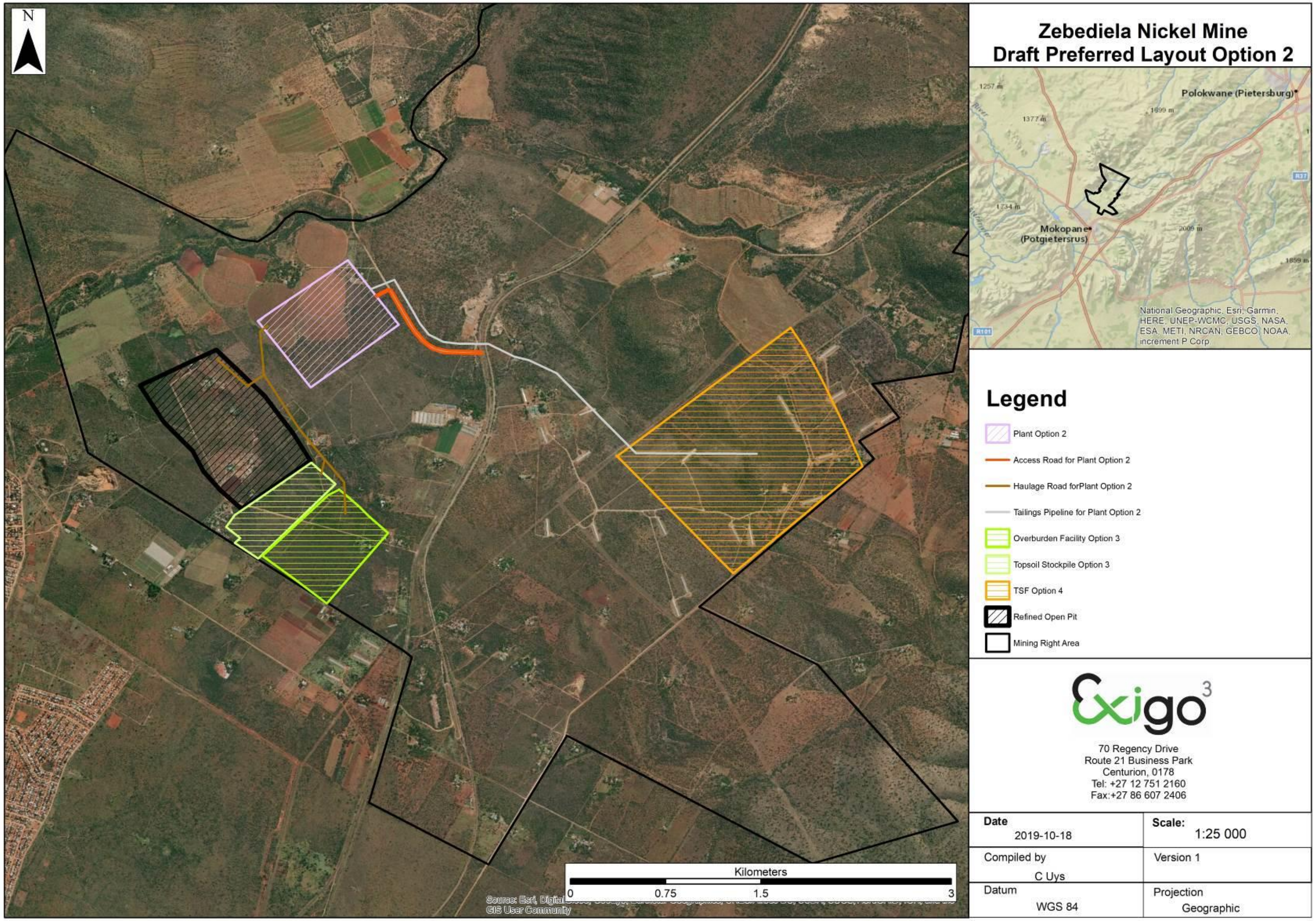


Figure 16: Preferred Site Location Alternatives Layout 2

9.2.3. Service Alternatives

9.2.3.1. Water Provision Alternatives

The following water provision options are being considered and will be further assessed in a Water Supply Options Analysis Study during the EIA Phase of the project:

1. Surface Water Sources Considered

- Doorndraai dam (50 km SW) – currently indicated as overcommitted.
- Sewerage off-take from Mokopane municipality – currently indicated as overcommitted.
- Flag Boshielo dam (100 km SE) – currently indicated as overcommitted.
- Rainfall run-off collection – to be pursued further during the EIA phase.
- Water from the Municipal Waste Water Treatment processes– to be pursued further during the EIA phase.
- Water sourced from existing agricultural allocations – to be pursued further during the EIA phase.
- Net water saving through the clearing of alien vegetation – to be pursued further for possible community participation – cost very high.

2. Groundwater Sources Considered

- Pit dewatering – to be pursued further during the EIA phase.
- Abstraction from groundwater sources – to be pursued further during the EIA phase.

9.2.3.2. Site Access Alternatives

Two alternative access roads were assessed and entail the following:

1) Access route 1 – Amatava gravel road - this proposed access route that will entail access from an existing gravel district road serving the surrounding communities with access to the R101;
2) Access route 2 – Turfspruit gravel road – connects the Percy Fyfe to the N11 north of the proposed open pit. This route is currently used by contractors working at Anglo American's Mogalakwena mine and Ivanplats Platreef Project, wanting to avoid driving the N11 through residential areas.

Refer to Figure 17 below for the location of the two alternative access roads. The above access route alternatives will be assessed during the EIA Phase and the preferred route identified. A Traffic Impact Assessment will also be undertaken.

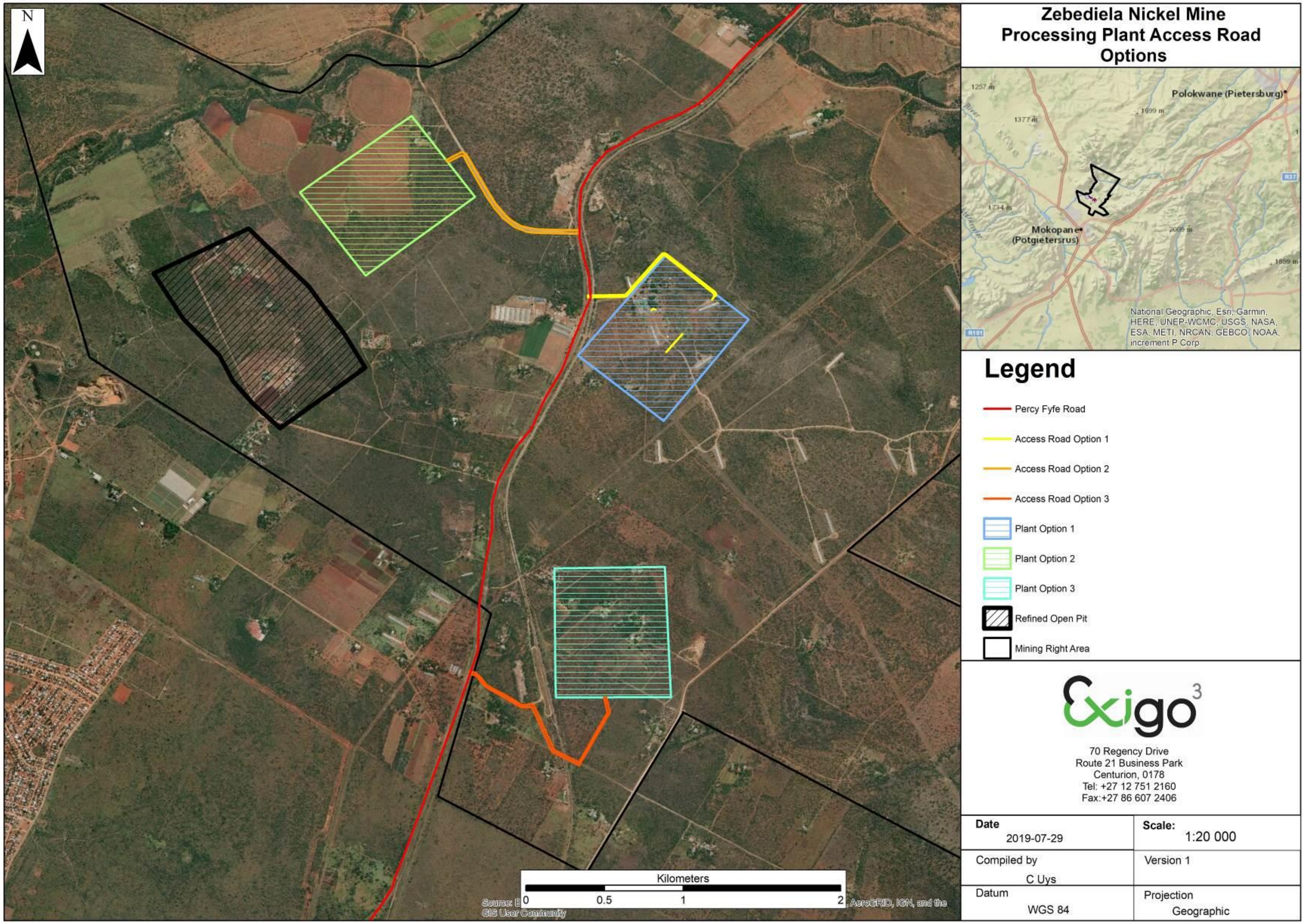


Figure 17: Access Road Alternatives

9.2.4. Energy alternatives

Wind energy was considered as an energy alternative for the proposed project. The construction of a wind farm generating renewable energy could be considered using various funding models including 100% ownership or co-ownership. The option of embedded energy generation entails the generation of wind energy without ESKOM transmission facilities on site and should be considered as an alternative to ESKOM power.

The potential of bio energy as well as solar energy as alternative energy sources was also investigated. The combination of renewable energy sources such as wind, solar and bio energy in combination could offer cost effective energy generation in the future but at present the cost-benefit analysis is still in favour of conventional ESKOM supply. The power requirements of the mine (estimated at 78 MW) and the fact that power constitutes more than 20% of the mine's operational expense mean that the high capital and operational cost associated with a renewable energy make it prohibitively expensive at present.

9.2.5. Technology Alternatives

9.2.5.1. Blasting

Electronic detonators were compared to conventional pyrotechnic detonators and assessed. Electronic detonators provide more accurate timing than the conventional pyrotechnic detonators which rely on the combustion speed of a pyrotechnic composition (Botes, 2001).Due to the proximity (1,500 m) of a built-up neighbourhood it has been decided to use electronic detonators instead of the conventional pyrotechnic initiation systems (shock tube).The benefits of electronic detonators over standard pyrotechnic delay elements are as follows:

- Detonator accuracy;
- Reduced vibration and airblast;
- Improved rock fragmentation and size uniformity;
- Increase in excavation productivity; and
- Reduced explosives cost and cost saving in primary processing, i.e. crushing (Botes, 2001).

In addition, possible reduction of blasthole diameters will further assist in reducing the levels of impact. Smaller diameter blastholes will reduce the charge mass per blasthole and electronic initiation can be used to reduce the number of blastholes firing to single blasthole detonation. The whole drilling and charging process will be reviewed in a detail blast design during the EIA taking into consideration the blast area distance to points of concern to manage levels of influence.

9.2.5.2. Tailings Disposal

The following tailings facility options with regard to tailings disposal will be further investigated and assessed during the EIA Phase:

1. Upstream Tailings Dam
2. Downstream Tailings Dam

3. Centreline Tailings Dam

9.2.6. Conclusion

The following is a summary of the alternatives identified:

4. Overburden Site Location Alternative 3 is preferred above Alternative 1 and 2.
5. Tailings Storage Facility Site Location Alternative 4 is preferred above Alternative 1, 2 and 3.
6. Mine Infrastructure Site Location Alternative 1 and 2 are preferred over Alternative 3.
7. Various water supply options have been identified and the preferred option will be finalized during the EIA Phase once the Water Supply Options Analysis Study has been completed.
8. Two site access road alternatives were identified. The preferred access route alternative will only be finalized during the EIA phase once the Traffic Impact Assessment has been completed, comments from Interested and/or Affected Parties have been obtained and the other relevant specialist studies are complete.
9. The preferred energy alternative is Eskom power supply.
10. The preferred technology alternative with regards to blasting is the use of electronic detonators.
11. Three tailings disposal options will be investigated and assessed during the EIA Phase.

Based on the assessment of these alternatives it is proposed that the EIA&EMPR will focus on further assessing and finalizing the preferred alternatives and providing mitigation measures associated with the preferred alternatives. In addition, the EIA&EMPR will also focus identifying and investigating layout options to optimise the identified preferred site alternatives.

9.2.7. "No-go" Alternative

The assessment of the "no-go" alternative is a legal requirement according to NEMA and the EIA Regulations. In this scenario no development would take place. The environment would be left as is and the impact on the area and potential benefits would remain unchanged.

The no-go alternative will imply that virtually none of the identified impacts of proceeding with the project will be incurred. In addition to the global socio-economic benefits associated with the mine, the Zebediela Mine Project will also provide the local communities with various benefits relating mainly to job creation and skills development. Without the implementation of this project, the mentioned benefits would not be realised. The studies to be undertaken during the impact assessment phase will provide reference to the no-go alternative.

The no-go alternative will be assessed against the following categories, *inter alia*:

- Soil and Agricultural Potential Impacts
- Ecological Impacts
- Surface water Impacts
- Groundwater Impacts
- Heritage Impacts
- Palaeontology Impacts
- Air Quality Impacts
- Noise Impacts

- Visual Impacts
- Blasting and Vibration Impacts
- Traffic Impacts
- Socio-Economic Impacts

10. DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

The following process was undertaken to facilitate the public participation for the proposed project:

10.1. Newspaper Advertisement

An Advertisement, notifying the public of the submission of the Integrated Environmental Authorisation (EA) and Waste Management Licence Application and the Mining Right Application (MRA) as well as the Water Use Licence (WUL) Application to be applied for; the process to be followed; and requesting I&AP's to register as I&AP's with Exigo, were placed in two local newspapers; namely the Daily Sun (English advertisement) and the Bosvelder (Afrikaans advertisement). The advertisements were placed on the 31st of October 2019, in accordance with regulation 41(2)(c) and (d) of the EIA Regulations of 2014 (as amended).

In addition, the availability of the Draft Scoping Report (DSR) for public review as well as the Public Open Day/Public Meeting to be held during the review period of the DSR was also advertised.

10.2. Site notices

In order to inform surrounding communities and adjacent landowners of the proposed development, notice boards (in accordance with regulation 41(2) (a) of the EIA Regulations 2014 (as amended)) were erected at key locations surrounding the project site as well at the Mogalakwena Municipal Offices and public libraries in Mokopane and Mahwelereng on the 31st of October 2019.

10.3. Direct Notification of Identified I&AP's

Identified stakeholders, who included the following sectors, were directly informed by post, email, fax or SMS of the proposed development on the 31st of October 2019:

- The owners and occupiers of the site where the activity is or is to be undertaken or to any alternative site;
- The owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site;
- Waterberg District Municipality;
- Mogalakwena Local Municipality;
- Limpopo Department of Economic Development, Environment and Tourism (LEDET);
- Department of Water and Sanitation (DWS) Limpopo;
- Department of Agriculture, Forestry and Fisheries (DAFF) Limpopo;
- Department of Agriculture and Rural Development: Limpopo;
- Department of Rural Development and Land Reform: Limpopo;
- Limpopo Department of Roads and Transport;
- South African Heritage Resources Agency (SAHRA);

- Limpopo Heritage Resources Authority;
- SANRAL;
- Eskom;
- Transnet;
- Other mines and industries in the area, e.g. Ivanhoe Platreef Project, Anglo Mokopane Mine; and
- Other stakeholders.

A period of 30 days (from 30 August to 30 September 2019) was made available for stakeholders to register on the project as I&AP's and provide initial comments. Comments and registrations forms were still accepted until the Draft Scoping Report was made available for review.

10.4. Public Meetings/Open Days

One public open day/public meeting will be held during the review period of the DSR on 14 November 2019, to provide I&APs with the opportunity to raise issues and comments and ask specific questions in the presence of the relevant consultants on the project as well as explain the authorisation process and associated timelines. The public open day/public meeting was advertised in two local newspapers as per section 10.1 above. All issues raised by the I&APs during the public open day/public meeting will be included in the Final Scoping Report (FSR) to be submitted to the DMRE.

The public open day/public meeting will take place on the following dates:

- **Thursday, 14 November 2019 from 09h00 to 13h00 and 14h00 to 18h00** at the Park Hotel in Mokopane

10.5. Consultation

Focus Group meetings (one on one consultation meetings and telephonic consultation) were held with specific landowners, as well as the relevant Government Departments in order to further ongoing consultations and to consult with key parties, as follows:

1. Landowners who are directly affected by the activity (proposed mine infrastructure footprints) (refer to Appendix 8.9);
2. Waterberg District Municipality (DM) and Mogalakwena Local Municipality (LM) Ward Councillors;
3. Department of Rural Development and Land Reform (DRDLR);
4. SANRAL.

Please refer to Appendix 8.9 for more details of the key issues discussed as well as Appendix 8.6 and 8.7 for results of the consultation meetings.

10.6. Draft Scoping Report

The EIA Regulations 2014 (as amended) specify that the Draft Scoping Report (DSR) must be subjected to a public participation process of at least 30 days. A period of more than 30 days (31 October till 2 December

2019) will be made available for public comment on the DSR. The availability of the DSR was announced via advert, site notices and notification letters as specified above to all the identified potential I&AP's.

In addition, the DSR was distributed for comment as follows:

- Electronic copies were made available on Dropbox; and
- Hard copies were made available at the public libraries in Mokopane and Mahwelereng.

10.7. Final Scoping Report

The Draft Scoping Report (DSR) will be updated following the draft review to incorporate the comments received and issues raised by I&APs. The Final Scoping Report (FSR) will be submitted to the DMRE by the 10th of December 2019.

11. SUMMARY OF ISSUES RAISED BY I&APS

The comments raised by I&APs thus far are specified in the Comments and Response Register table attached as Appendix 8.9. Assessing the comments received during the public participation process, it is evident that the main comments or concerns raised by I&AP's relate to the following issues:

General:

1. Timeline for commencement of mine
2. Uses of nickel
3. Company Directors of URU Limited & BEE companies
4. Plans for existing houses/demolishing of houses
5. Consultation with community with regards to Social and Labour Plan (SLP)
6. Proposed SANRAL N11 Ring Road realignment crosses over MRA area
7. Access arrangements to and from national roads R101 and N11 and the position(s) thereof to be agreed to with SANRAL
8. Eskom powerlines run through the area
9. Electricity supply
10. Ongoing consultation
11. Local drilling company must be used

Biophysical:

12. Water supply for mine. Water resources are limited
13. Impact on groundwater and surface water: water quality and quantity, water levels
14. Stormwater control measures
15. Hydrocarbon contamination
16. Impact on fauna (cattle and game) and flora (Moringa trees and grazing)
17. Dust pollution
18. Impact on soils
19. Impact on fauna (cattle and game) and flora (Moringa trees and grazing)
20. Littering
21. Preservation of the environment
22. Sustainability of mine

Socio-economic:

23. Impact on labour and job creation for locals and unemployment
24. Employment opportunities
25. Directly affected properties will have to be bought. Market related value for properties and property valuations
26. Landowner negotiations and compensation for owners
27. Land expropriation and relocation
28. Loss of income and de-valuing of properties
29. Health impacts and living conditions
30. Blasting resulting in houses cracking
31. Damage to buildings older than 100 years

32. Graves
33. Depopulation of area and increased influx of people and establishment of informal settlements
34. Safety and security
35. Crime and theft
36. Noise
37. Traffic and proposed access routes. Existing roads are in a poor condition
38. Strain on existing infrastructure
39. Impact on aesthetics of area and sense of place

12. THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITE

12.1. Type of environment affected by the proposed activity

12.1.1. Climate

Climate refers to the summation of the daily, weekly and monthly changes of weather over a long period and it is influenced by latitude, altitude, direction and intensity of wind and the presence of large bodies of water such as the ocean, lakes, dams and rivers. Since the industrial revolution, humans have been changing the global climate by emitting high amounts of greenhouse gases into the atmosphere, resulting in higher global temperatures, affecting hydrological regimes and increasing climatic variability. Climate change is projected to have significant impacts on agricultural conditions, food supply, and food security.

The main climatic factors analysed for the site were temperature, wind and rainfall. The climate for the region can be described as warm-temperate. South African Weather Service (SAWS) data from the meteorological station located in Mokopane for the period 2016 to 2018 was used to complete the following sections.

12.1.2. Temperature

Data retrieved from the Mokopane Weather Station (2016 - 2018)2 showed that temperatures ranged between 6.7°C and 29.6°C. During the day, temperatures increase to reach maximum at about 15:00 in the late afternoon. Ambient air temperature decreases to reach a minimum at between 06:00 and 07:00 in the morning. Monthly mean, maximum and minimum temperatures are provided in Table 6 below.

Table 6: Monthly temperature summary (SAWS (Mokopane) data, January 2016 to December 2018)

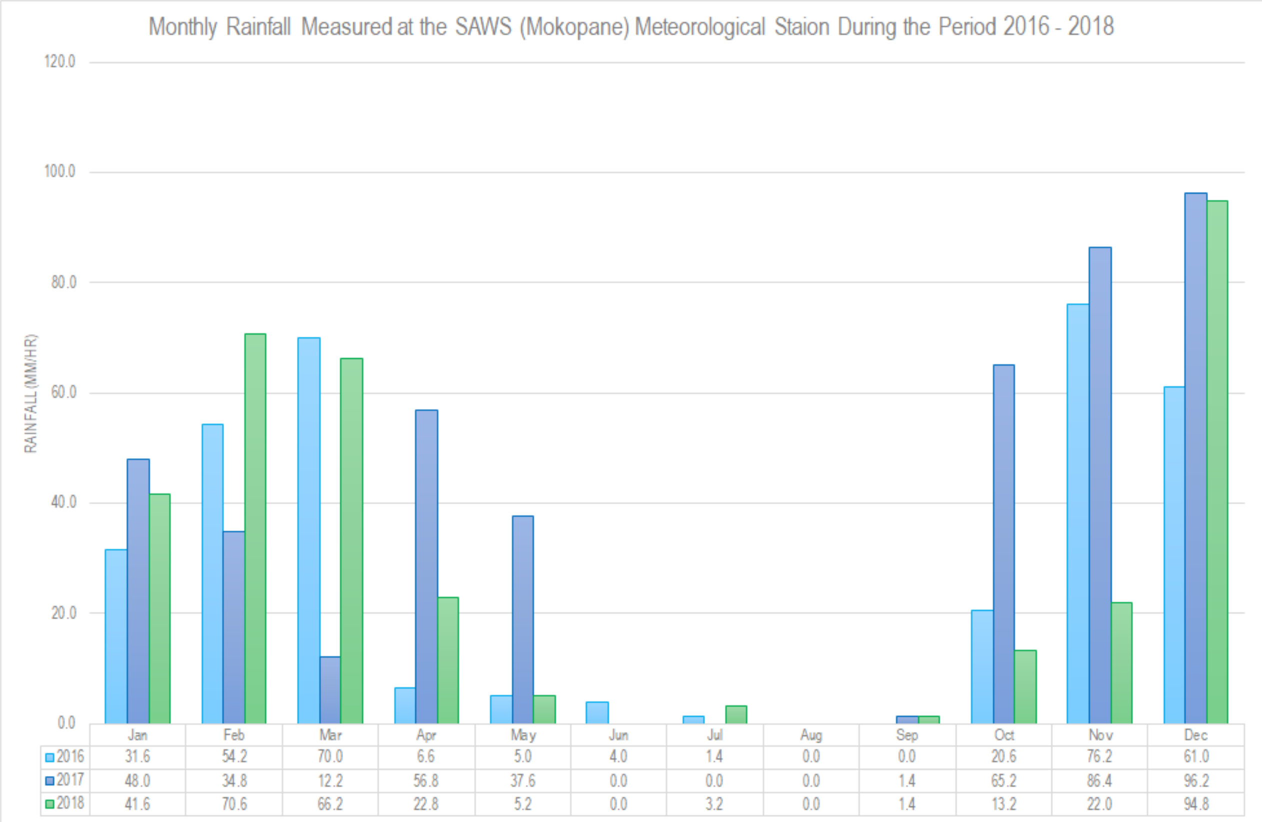
Month	**Temperature (°C)**		
	Minimum	**Maximum**	**Average**
Jan	18.88	29.58	24.12
Feb	19.20	29.10	23.91
Mar	17.07	29.43	22.87
Apr	14.80	27.15	20.43
May	10.01	24.23	16.41
Jun	7.29	23.10	14.33
Jul	6.89	22.60	14.07
Aug	10.33	25.95	17.67
Sep	14.72	29.61	21.85
Oct	16.15	29.29	22.39
Nov	17.47	28.98	23.03
Dec	19.24	29.61	24.27

[2] Source: *South African Weather Service*

12.1.3. Rainfall

Mokopane falls within a summer rainfall region and receives most of its rain during October to March. The rainfall provided by the SAWS (Mokopane) data set for the period 2016 to 2018 ranged between 331 mm and 439 mm per annum. For average monthly rainfall figures refer to Figure 18.

The site has an estimated total annual evaporation loss of 2129 mm per annum (AGES, 2009).



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2016	31.6	54.2	70.0	6.6	5.0	4.0	1.4	0.0	0.0	20.6	76.2	61.0
2017	48.0	34.8	12.2	56.8	37.6	0.0	0.0	0.0	1.4	65.2	86.4	96.2
2018	41.6	70.6	66.2	22.8	5.2	0.0	3.2	0.0	1.4	13.2	22.0	94.8

Figure 18: Monthly rainfall as obtained from the SAWS (Mokopane) meteorological station for the period 2016-2018

12.1.4. Wind

Data for the period January 2016 to December 2018 indicates that the predominant wind direction is from the north-west with calm conditions of approximately 23.9% of the period summarised. During both daytime and night-time, north-westerly winds are common with calm conditions of approximately 15.5% during the day and increasing to approximately 33.9% during night-time.

The period wind roses are shown in Figure 19.

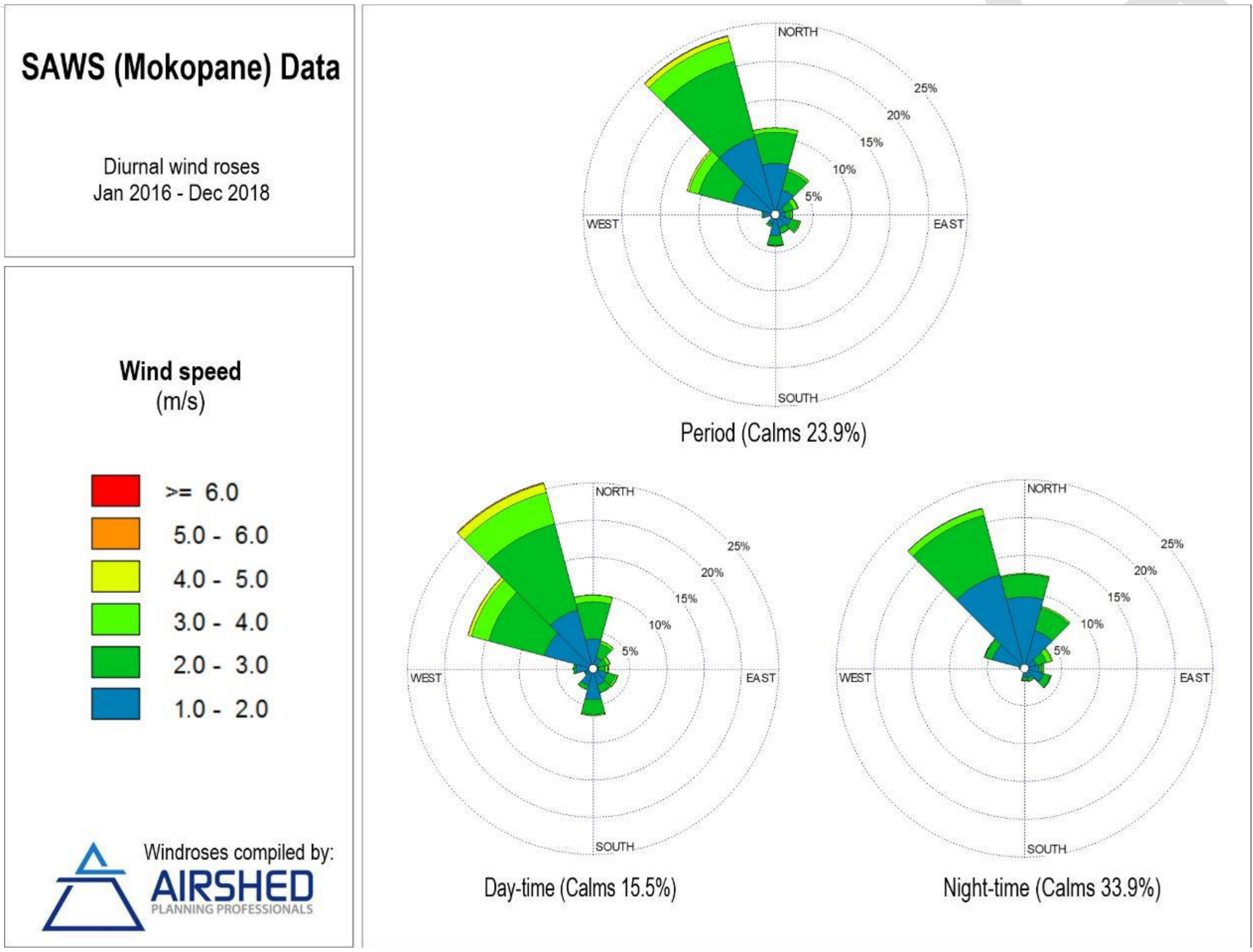


Figure 19: Period, day-, and night-time wind roses (SAWS (Mokopane) data, January 2016 to December 2018)

12.2. Air Quality

The South African Air Quality Information System (SAAQIS) aims to make information available to stakeholders, provide a common system for managing air quality in South Africa (SA) and provide uniformity in the way data; information and reporting are managed in SA. Providing near-real time ambient air quality data is one of the objectives of SAAQIS. This system was consulted for recent ambient air quality measurements in the project area. The nearest air quality monitoring station is in Mokopane managed by the Department of Environmental Affairs (DEA). The data from this station was accessed for 2017 and 2018, as an indication of the air quality of the study area.

No exceedances of the NAAQS were recorded for Nitrogen Dioxide (NO2) or Sulfur Dioxide (SO2) for all applicable averaging periods. Daily PM2.5 exceeded the allowable frequency of exceedance of the daily limit concentration in 2017, however compliance with the NAAQS is noted in 2018. PM10 concentrations were in non-compliance with the NAAQS over both years. Refer to Table 7.

The sources of SO2 and oxides of nitrogen (NOx) that occur in the region include veld burning, vehicle exhaust emissions and household fuel burning. Various local and far-a-field sources are expected to contribute to the suspended fine particulate concentrations (which would include PM10 and PM2.5) in the region. Local sources include wind erosion from exposed areas, fugitive dust from agricultural operations, vehicle entrainment from roadways and veld burning. Long-range transport of particulates, emitted from remote tall stacks and from large-scale biomass burning in countries to the north of South Africa, has been found to contribute significantly to background fine particulate concentrations over the interior (Andreae, et al., 1996) (Garstang, et al., 1996) (Piketh, et al., 1996).

Table 7: Summary of ambient air quality monitoring data at Mokopane (concentration units for SO2 and NO2 are in ppb and for PM10 and PM2.5 in µg/m³)

Period	Availability	Hourly Maximum Concentrations	Annual Average	No of recorded hourly exceedances
NO2				
2017	86%	51	6.8	-
2018	98%	55	7.1	-
SO2				
2017	86%	25.3	1.7	-
2018	90%	33.7	1.8	-
Period	**Availability**	**Daily Maximum Concentrations**	**Annual Average**	**No of recorded daily exceedances**
SO2				
2017	86%	11.3	1.7	-
2018	90%	9.9	1.8	-
PM10				
2017	82%	212.3	61.6	93
2018	96%	343	66.1	116
PM2.5				
2017	80%	74.2	19.3	12
2018	94%	46.7	16	4

12.3. Topography

The topography of the proposed mine footprint area varies from slightly undulating valleys, and plains to moderately undulating hills with a mountain ridge occurring in the northern section of the site. Three non-perennial drainage channels bisect the project area. The landuses on site are mainly crop cultivation, livestock and wildlife grazing, chicken farms and rural developments.

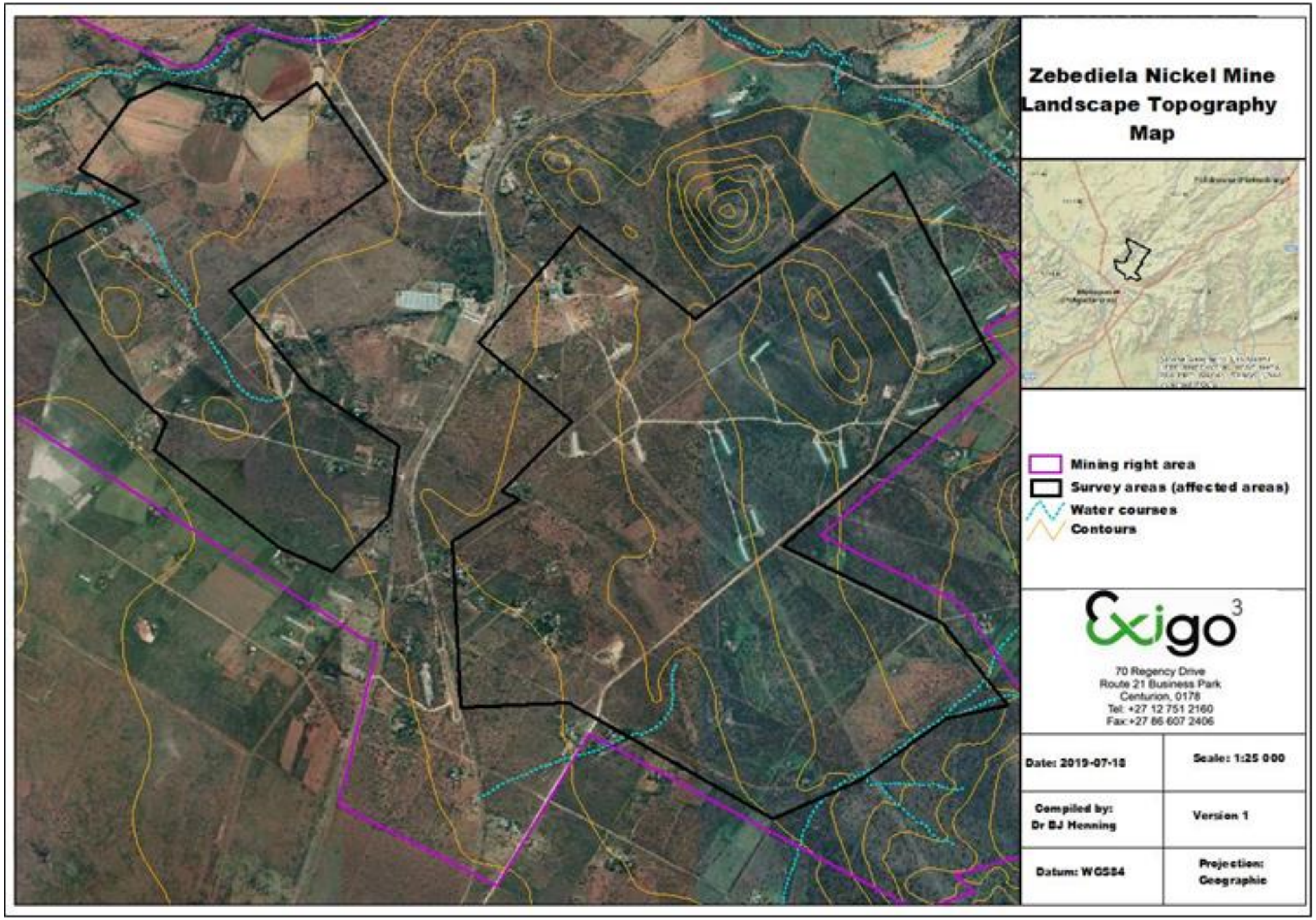


Figure 20: Topographical features (contours & drainage lines of the project area)

12.4. Geology

MSA (2012) describe the geological setting surrounding the proposed mine as mafic-ultramafic Bushveld Complex which are the metasedimentary floor rocks of the Transvaal Supergroup and crystalline granites of the basement complex.

The project area is underlain by the Bushveld-related, serpentinized ultramafic (dunites, harzburgites, and pyroxenites) Uitloop intrusion which discordantly intruded the floor rocks. The majority of the orebody is overlain by a brucite-enriched calcrete cap which extends up to 7m. This calcrete cap has developed from the weathering of the underlying ultramafic body. The main orebody is underlain by calcareous metasediments and overlain by hornfelsed shales which both belong to the Pretoria Group. The orebody in the northeast of the project area is underlain by Archaean granitoids and overlain by the dolomites that form the footwall to the main south-western orebody.

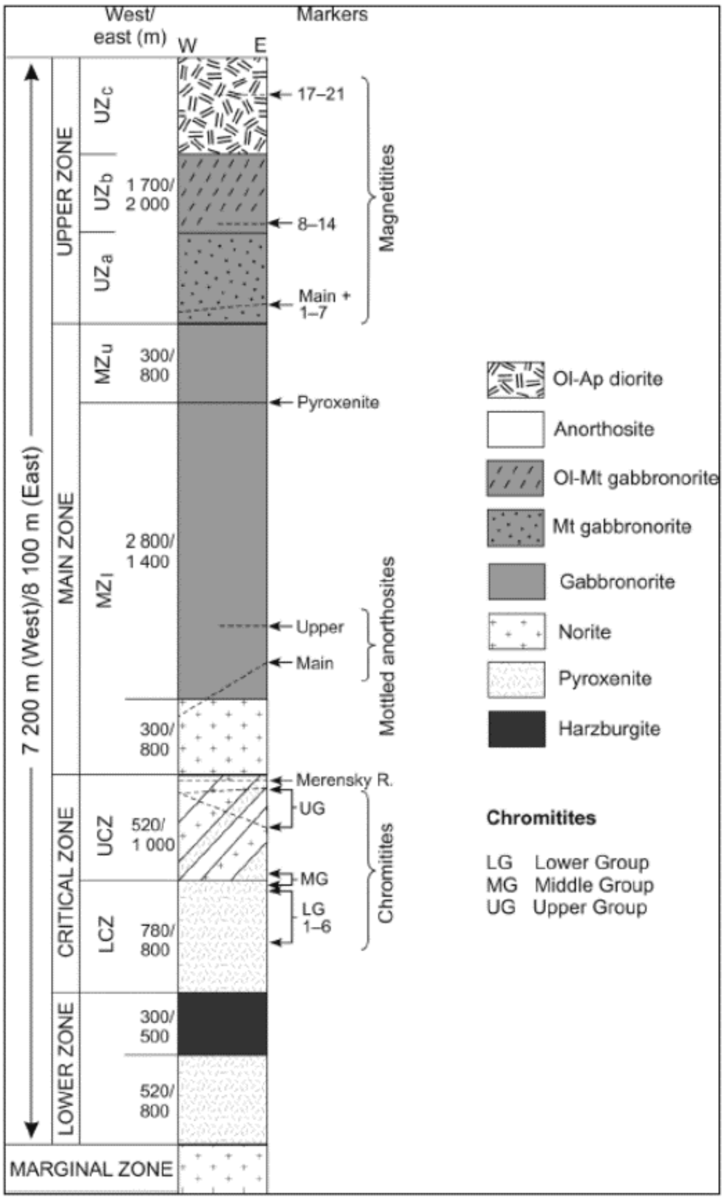


Figure 21: Schematic stratigraphic column for the main Bushveld Complex, showing key geological layers and thicknesses in the Western and Eastern Limbs. (MSA, 2012)

12.5. Soils and Land Capability

A field survey was conducted by Dr Buks Henning in July 2019 in order to assess current soil conditions, agricultural potential and land capability of the site. The land type units represented within the footprint areas of the proposed mining infrastructure are as follows:

Landtype	Soils	Geology
Ah28	Red-yellow apedal, freely drained soils; red and yellow, high base status, usually < 15% clay	Granite and lava of the Randian Erathem.
Ae224	Red-yellow apedal, freely drained soils; red, high base status, > 300 mm deep (no dunes)	Complex; hornfels, shale, quartzite, and conglomerate of the Pretoria Group; basalt Granite, granophyre, ferrogabbro, gabbro, norite and anorthosite of the Bushveld and sandstone of the Karoo Sequence; river alluvium.

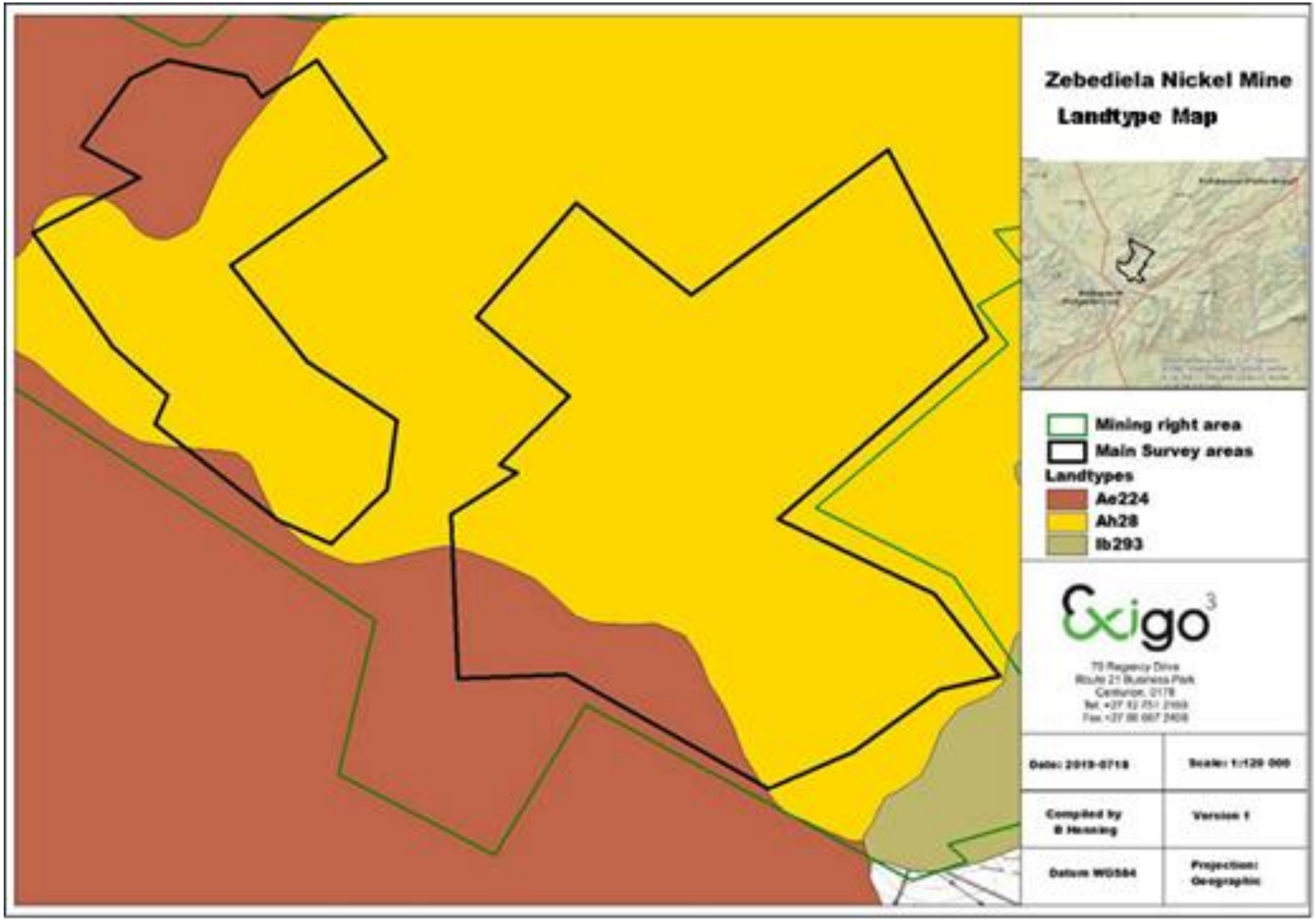


Figure 22: Landtype Map of the project area (footprint areas of main infrastructure)

12.5.1. Soil Types

The soils on site were classified into broad classes according to the dominant soil form and family as follows (the soil forms for the study area are indicated in Figure 23):

12.5.1.1. Shallow Mispah Soils / Exposed Bedrock on steep slopes

- **Binominal Classification S.A.:** Mispah / bedrock soil form
- **Description:** The soils are generally shallow and derived from dolomite or quartzite ridges in the project area. All three these soil forms can be categorised in the international classification group of lithic soil forms. In lithic soil forms the solum is dominated by rock or saprolite (weathered rock). These soils have sandy to sandyloam texture, while topsoil structure is apedal and the profiles are very shallow. Exposed rocks and boulders is spread on the soil surface throughout the area.

  The soil in this area is often weakly structured, sandy to loamy and forms a mosaic of shallow rocky soils (Mispah soil form), with the outcrops mostly consisting of bedrock. The Mispah soils found on this section of the site are widespread and shallow in depth, although it has a medium clay content.
- **Landscape:** Rocky ridges / undulating slopes
- **Depth:** 50-200mm
- **Texture:** Sandy to sandy loam soils
- **Average Clay Content:** 4-10%
- **Agricultural Potential:** Low potential soils, due to the shallow nature of the soils and sloping terrain, making these areas not suitable for crop cultivation under arable conditions. The orthic A-horizon of the lithic soil group is unsuitable for annual cropping or forage plants (poor rooting medium since the low total available moisture causes the soil to be drought prone). These topsoils are not ideal for rehabilitation purposes for they are too shallow and/or too rocky to strip. Topsoil stripping and stockpiling of the "shallow" soils should only be attempted where the surface is not too rocky.
- **Land capability:** The grazing potential of these areas is low. The most suitable and optimal utilization of the area would be grazing by game species (wilderness land).

12.5.1.2. Shallow Gravelly Soils of the Mispah / Glenrosa Soil Form on slightly undulating hills and plains

- **Binominal Classification S.A.:** Mispah / Glenrosa / bedrock soil form
- **Description:** The soils are generally shallow and derived from dolomite or quartzite in the project area. All three these soil forms can be categorised in the international classification group of lithic soil forms. In lithic soil forms the solum

is dominated by rock or saprolite (weathered rock). These soils have sandy to sandyloam texture, while topsoil structure is apedal and the profiles are very shallow. Exposed rocks and boulders is spread on the soil surface throughout the area. Where dolomitic soils occur the soil clay content is higher compared to quartsitic soils.

The soil in this area is often weakly structured, sandy to loamy and forms a mosaic of shallow Glenrosa soils and very shallow rocky soils (Mispah soil form). The Mispah and Glenrosa soils found on this section of the site are widespread and shallow in depth, although it has a medium clay content.

- **Landscape:** undulating plains / hills
- **Depth:** 50-200mm
- **Texture:** Sandy to sandy loam soils
- **Average Clay Content:** 8-20%
- **Agricultural Potential:** Low potential soils, due to the shallow nature of the soils and sloping terrain, making these areas not suitable for crop cultivation under arable conditions. The orthic A-horizon of the lithic soil group is unsuitable for annual cropping or forage plants (poor rooting medium since the low total available moisture causes the soil to be drought prone). These topsoils are not ideal for rehabilitation purposes for they are too shallow and/or too rocky to strip. Topsoil stripping and stockpiling of the “shallow” soils should only be attempted where the surface is not too rocky.
- **Land capability:** The grazing potential of these areas is moderate-low. The most suitable and optimal utilization of the area would be grazing by small livestock or game species.

12.5.1.3. Shallow Red Apedal Soils of the Cartref / Hutton / Glenrosa Soil Form

- **Binominal Classification S.A.:** Hutton soil form; Glenrosa soil form / Cartref soil form (dolomite)
- **Description:** The Hutton soils found on the site occur in pockets throughout the study area on plateaus and slightly undulating plains. The shallow Hutton soil forms are especially dominant in the central and eastern section of the study area where the underlying bedrock is dolomite or quartsite. The Hutton soil form on site varies from shallow to deeper and has a medium to high clay content. The relatively high magnesium and iron content of the parent rocks from which these soils are derived, impart the strong red colours noted. Where it becomes very shallow the soils are classified as Glenrosa soil form.
- **Landscape:** Plains / Plateaus
- **Depth of soil forms:** 100-400 mm
- **Texture:** Sandyloam

- **Average Clay Content:** 10-15% (Hutton); 6-15% (Glenrosa)
- **Agricultural Potential:** Moderate potential soils depending on soil depth and size of land available for sustainable arable agriculture. Soils vary from shallow and sandy in some areas (Glenrosa, Hutton soil form) to deeper with a higher clay content (Hutton soil form). The red apedal Hutton soils with a higher clay content in the topsoil has a high water holding capacity. Under the climatic conditions these soils would sustain arable crop production, although as isolated pockets that cannot be considered economically viable units. The areas with deeper soils represent the most viable options for crop production under arable conditions considering the rainfall and moisture availability in the topsoil. Considering that the amount of land that is needed to economically sustain arable agriculture, the soil type described above cannot be considered as viable for crop production. The many old cultivated fields confirm that crop cultivation over the longer term is not a financially viable option under the prevailing climatic conditions.
- **Land capability:** Livestock and / or game grazing are viable due to the slightly higher nutrient and organic content of the topsoil in grassland areas that support a mixture of palatable and unpalatable species.

12.5.1.4. Deep, Red Apedal Soils of the Hutton Soil Form

- **Binominal Classification S.A.:** Hutton soil form
- **Description:** The Hutton soil form on site is deep and has a medium to high clay content. The Hutton soil forms consist of an orthic A horizon on a red apedal B horizon overlying unspecified material. The red apedal soils B1-horizon has more or less uniform "red" soil colours in both the moist and dry states and has weak structure or is structureless in the moist state. The range of red colours that is a key identification tool in differentiating between a red apedal and yellow-brown apedal is defined by the Soil Classification Working Group Book, 1991. Some of the defining red soil colours identified on the sites are bleached (10R 3/6), while some are bright red. The relatively high magnesium and iron content of the parent rocks from which these soils are derived, impart the strong red colours noted.
- **Landscape:** Plains
- **Depth of soil forms:** 600-1200mm+
- **Texture:** Sandyloam to Loam
- **Average Clay Content:** 10-20%
- **Agricultural Potential:** Soils not under irrigation (arable agriculture) have a Moderate Agricultural Potential, while the soils in the north-western section of the project area are under irrigation (pivots) and classified as having a High

Agricultural Potential. The Hutton soils are deep and often have a sandyloam structure that causes a medium water holding capacity, although the clay content of the soils is sufficient. However, under the prevailing climatic conditions these soils would not sustain arable crop production. The most viable option for crop production on the soil form is under irrigation considering the variable rainfall and moisture availability due to higher day temperatures. Irrigation is practiced in the north-western section of the site, although for other farm portions to utilize crop cultivation under irrigation, it will require the installation of a number of surface water impoundments as storage during the dry months. The availability of groundwater on the dolomitic bedrock is considered High, although high evaporation rates and high water demands by crops would render crop cultivation still a risky venture on some of the farm portions in the study area, with the size of the farm portion in combination with soil form (deep Hutton soils) and water availability for irrigation being the main factors contributing to soils being classified as High Potential Soils under irrigation or not. The many old cultivated fields confirm that crop cultivation without irrigation on small pockets of land over the longer term is not a financially viable option under the prevailing climatic conditions. Sustainable crop cultivation can only be supported on large portions of land under irrigation as seen in the western section of the site.

- **Land capability:** Livestock and / or game grazing are viable due to the slightly higher nutrient and organic content of the topsoil in woodland areas that support a mixture of palatable and unpalatable species. Arable crop cultivation under the current climatic conditions is not considered a viable option.

12.5.1.5. Black or Dark Grey Clayey Soils associated with the drainage channels and floodplains of the Oakleaf, Cartref and Valsrivier Soil Forms

- **Binominal Classification S.A.:** Oakleaf, Cartref and Valsrivier soil forms
- **Description:** The soils are generally dark grey to black in the topsoil horizons, and high in transported clays. These soils occur within the zone of groundwater influence. The soils are alluvial and are deep (>1,2m) with an orthic A and neocutanic B with signs of wetness in the horisons. Brown A horizon and red-brown B horizon. The soils are slightly sensitive to erosion. The subsoil is more sensitive to erosion and should preferably not be exposed.
- **Landscape:** Bottomlands (drainage channel and floodplains)
- **Depth:** >1200mm
- **Texture:** Sandyclay to Sandyclayloam
- **Average Clay Content:** 10-30%

- **Agricultural Potential:** Zero potential soils, due to the soil wetness these areas are not suitable for crop cultivation under arable conditions.
- **Land capability:** The grazing potential of these low-lying areas is high due to the palatable grasses growing throughout the year on these soils. The only limiting factor may be that livestock movement is limited during the wet season when the clay expands, causing livestock to get stuck in the muddy conditions. Soils are very sensitive and prone to erosion. A specific strategy is needed to prevent damage to these soils considering that overgrazing and trampling has already caused some degradation of the floodplains.

12.5.2. Land Capability

12.5.2.1. Climatic conditions

The area is expected to receive an annual total rainfall between 400 and 500mm, of which most fall from October to April. This amount is considered Moderate, although in combination with the high evaporation rate and sandy soil conditions in this section of the Limpopo Province, the climatic conditions are considered unsuitable for crop cultivation under arable conditions (WWF, 2004). Furthermore, the high variability in rainfall distribution within the area could however render dry land farming a risky venture, even under irrigated conditions considering the sandyloam nature of the soils which has a low water holding capacity.

The study area is thus dry which would contribute to moisture stress conditions during crop growth and development. The potential of groundwater is high considering the dolomitic bedrock throughout large parts of the study area, and therefore irrigated cropping is considered a viable option.

12.5.2.2. Crop production

The typical landscape of the study area is dominated by shallow, gravelly to rocky soils associated with rocky ridges or very sandy / gravelly soils associated with plateaus, ridges and footslopes. These soils have a low clay content and water holding capacity, and in combination with the climatic conditions render this section of the proposed development site unfavourable for effective crop production which could result from high moisture demands by planted crops. The isolated pockets of moist grassland and ravines have shallow sandy-clay or clay soils that are seasonally flooded or have a perched water table. These areas are unsuitable for crop cultivation.

The climatic conditions in combination with the shallow nature of the soils often render the study area unfavourable for effective crop production which could result from high moisture demands by planted crops. The study area is also expected to receive an annual total rainfall of about

450 mm which is relatively low and highly variable. In addition, the farms are considered to be located in an area which is marginal for rain-fed arable crop production.

Economically viable farming is thus restrictive to irrigated cropping due to the high risk that could be associated with dry-land farming. Higher day temperatures in summer months may hamper soil moisture storage for crop use. Irrigation is practiced on the Remainder of the Farm Uitloop in the north-western section of the site under pivots.

The land capability classes for the study area are indicated in Figure 24.

12.5.2.3. Livestock production / wildlife grazing

The natural vegetation in the study area has a grazing capacity that varies from low (shallow, rocky or sandy soils) to medium (seasonally wet soils, deeper loamy soils). The different sections of the study area can support grazing according to the soil nutrient content as follows:

- The shallow, rocky soils associated with the slopes of outcrops has low quality grazing and at present game species utilize these areas, especially during the early summer months (September to December) when the grasses resprout in burned areas.
- The deep sandy and gravelly soils associated with the footslopes, valley floors and plateaus has low quality grazing with limited potential for livestock farming. These areas are however suitable grazing for specialized grazers such as sable antelope.
- The red-yellow apedal soils associated with the study area has a medium potential for livestock grazing due to the slightly higher nutrient content of the soil supporting a mixture of palatable and unpalatable grasses. Grazing value decreases as the season changes from summer to winter though, with the lowest grazing potential available to livestock at the end of the season.
- The seasonally wet soils of the study area support palatable grass species and these areas have a medium to high suitability for livestock or game grazing. These soils have a good water holding capacity and grass species that grow in these areas vary from having a medium to high palatability depending on the seasonal changes.

The grazing capacity map of the Department of Agriculture for the study area is presented in Figure 25.

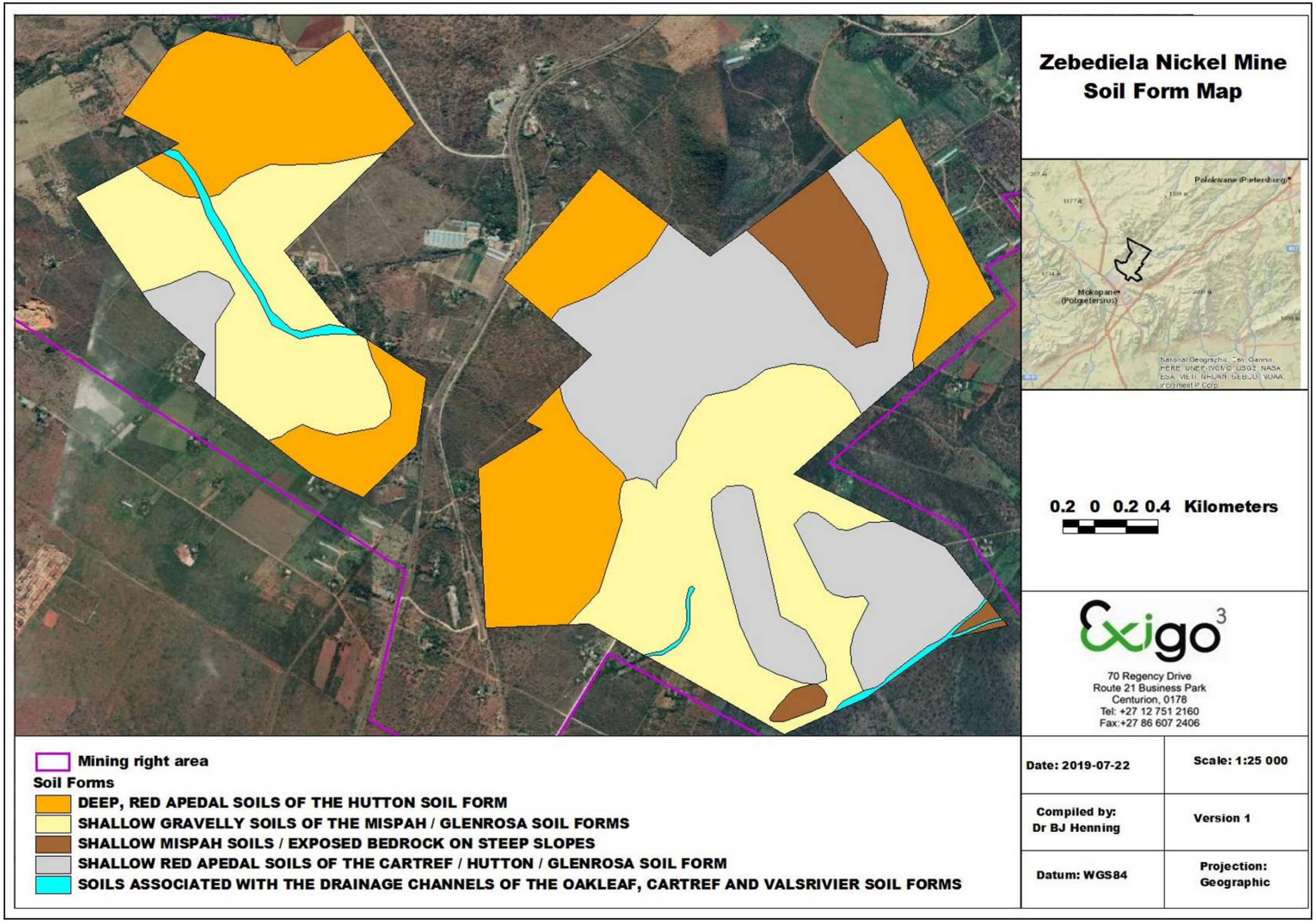


Figure 23: Soil form map for the study area

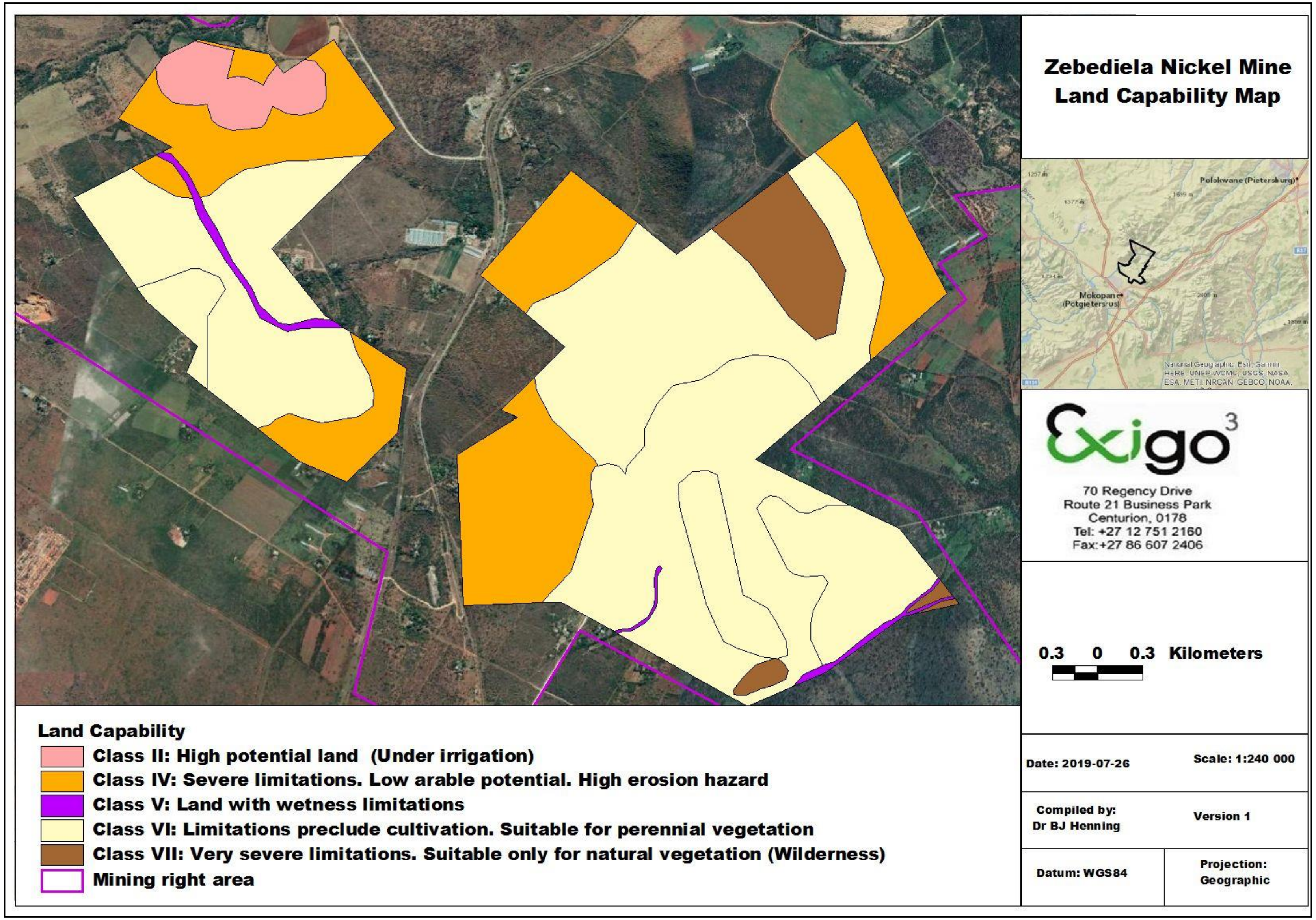


Figure 24: Land capability map for the study area

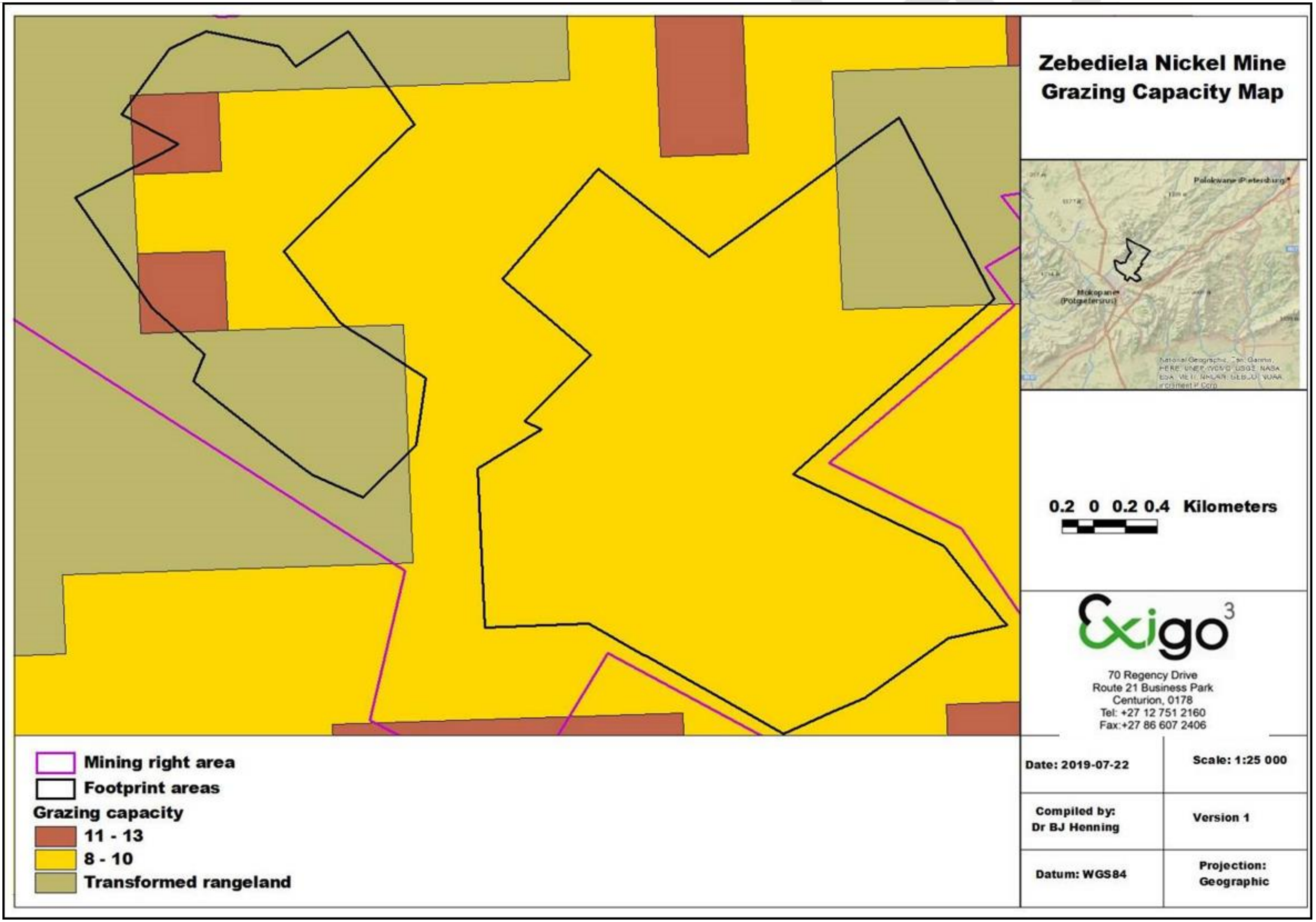


Figure 25: Grazing capacity map of the study area 1993 database Source: [Web] http://www.agis.agric.za/agismap_atlas/AtlasViewer)

12.6. Biodiversity

Dr. Buks Henning a qualified ecologist and wetland specialist, visited the site in July 2019. A summer seasonal survey will be conducted during the EIA Phase in order to obtain a comprehensive understanding of the dynamics of the flora and fauna.

12.6.1. Vegetation Overview

The project area lies within the Savanna Biome, the largest biome in Southern Africa. The biome is characterized by a grassy ground layer and a distinct upper layer of woody plants (trees and shrubs).

The most recent classification of the area by Mucina & Rutherford shows that the proposed development site is classified as Polokwane Plateau Bushveld and Makhado Sweet Bushveld.

The Polokwane Plateau Bushveld occurs on moderately undulating plains with short open tree layer with a well-developed grass layer to grass plains with occasional trees at higher altitudes. Hills and low mountains of the Mamabolo Mountain Bushveld are embedded within this unit. This vegetation type has a Least Threatened conservation status with less than 2% statutorily conserved and some 17% transformed, including about 10% cultivated and 6% urban built up.

The Makhado Sweet Bushveld vegetation type is characterized by slightly to moderately undulating plains sloping to the north, with some hills in the southwest and a short and shrubby bushveld with a poorly developed grass layer. This vegetation type has a vulnerable conservation status with about 1% statutorily conserved and some 27% transformed.

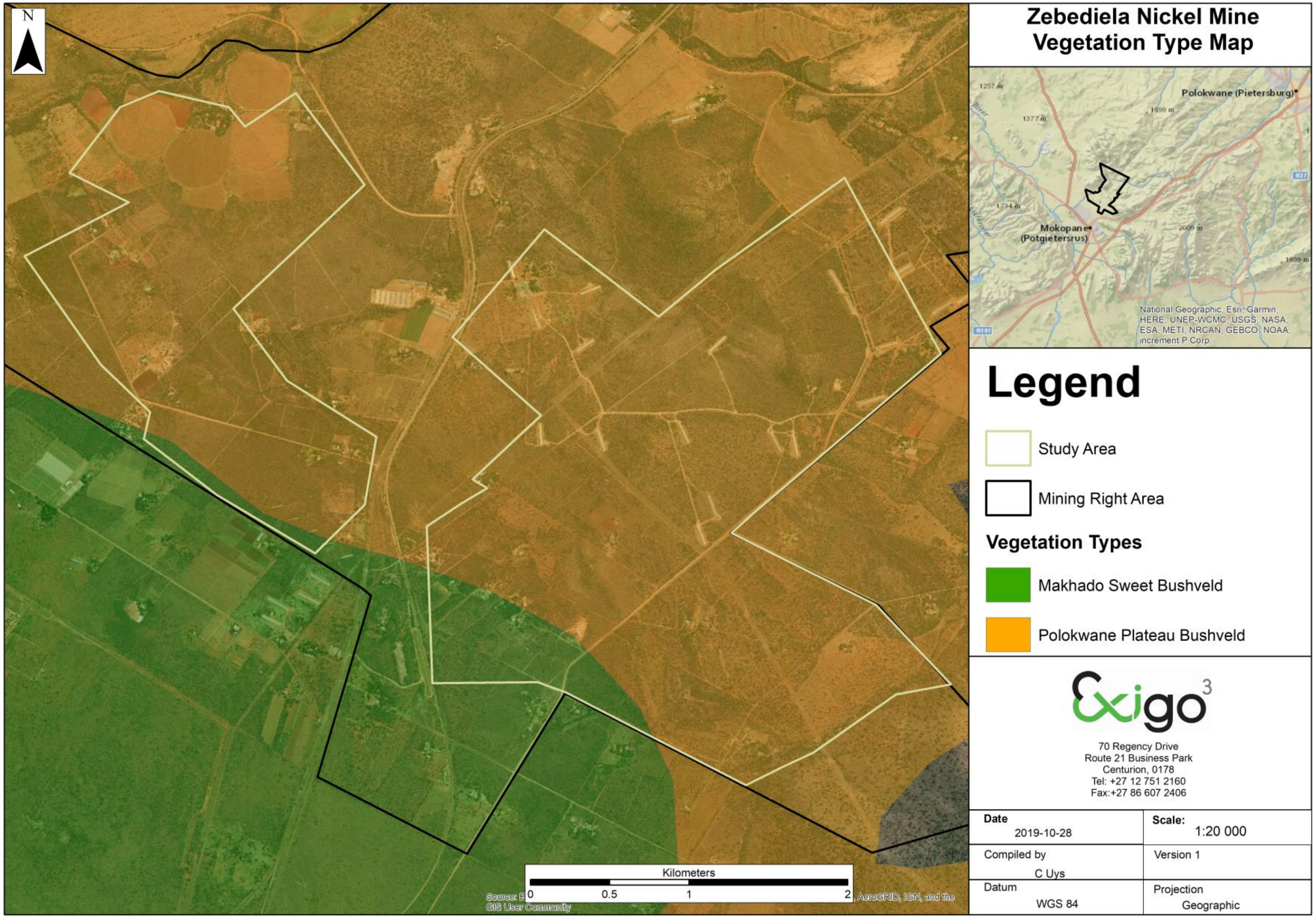


Figure 26: Vegetation Types of the study area (Mucina & Rutherford, 2006)

12.6.2. Vegetation Units

Vegetation units were identified according to plant species composition, previous land-use, soil types and topography. The state of the vegetation of the proposed mining sites varies from being natural to completely degraded. The properties are currently zoned for agriculture.

The following vegetation units were identified on site:

1. *Combretum apiculatum* woodland:
    - Open *Combretum apiculatum* woodland;
    - Denser *Combretum apiculatum – Senegalia caffra* - *Grewia monticola* woodland
    - *Combretum apiculatum – Combretum hereroense* woodland;
    - *Combretum apiculatum – Dodonaea viscosa* woodland;
2. *Combretum hereroense* woodland on dolomitic soils:
    - *Combretum hereroense – Ozoroa spaerocarpa* woodland;
    - *Comberetum hereroense – Grewia vernicosa – Euclea undulata* woodland;
3. Rocky woodland;
4. *Vachellia* - *Grewia* - *Ziziphus mucronata* sweetveld;
5. Old fields / cultivated land
    - Primary old fields;
    - Secondary old fields
    - Cultivated land;
6. Hydrological features:
    - River & riparian woodland (Rooisloot);
    - Drainage channels & riparian woodland;
    - Riparian flat channel.

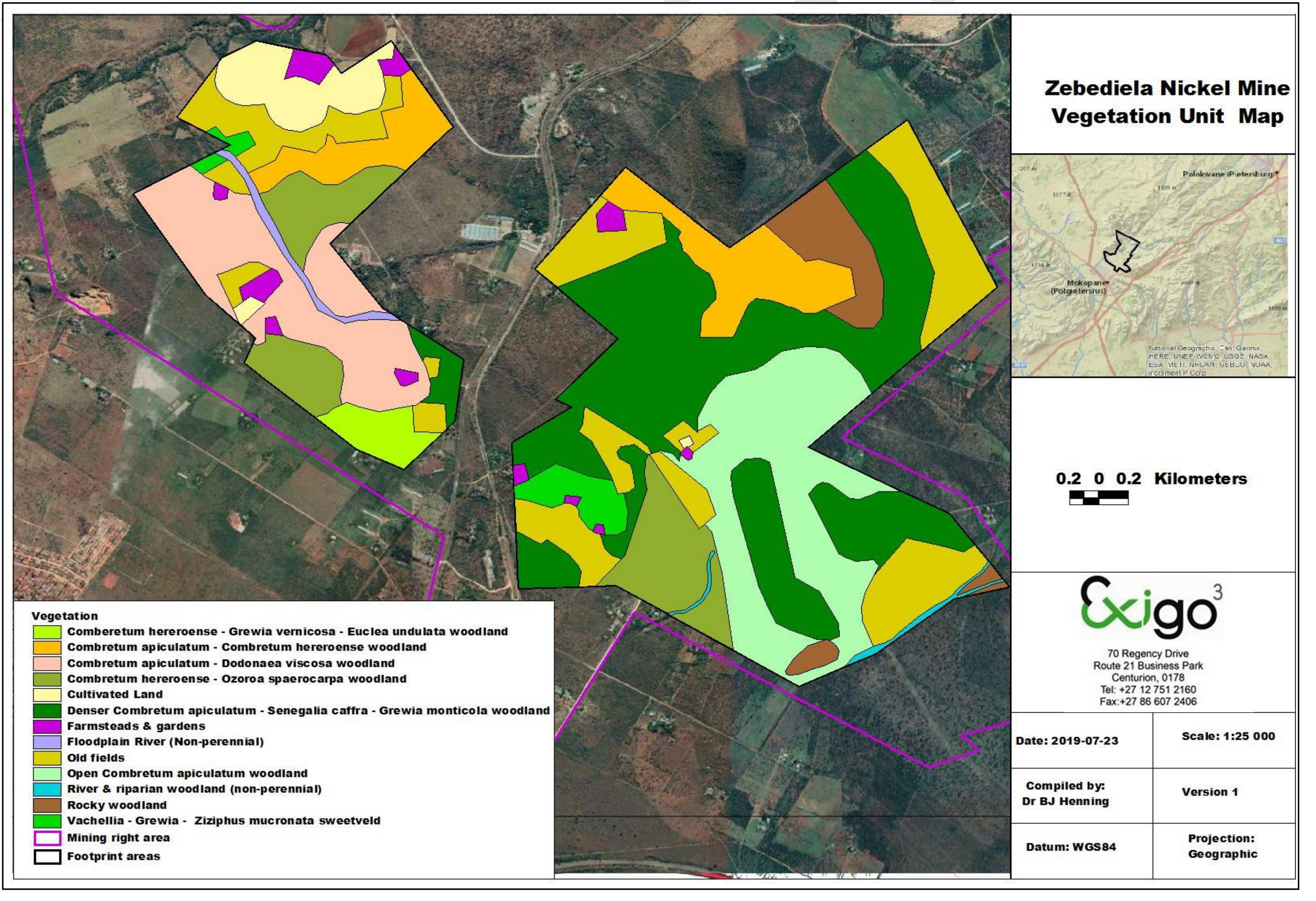


Figure 27: Vegetation Map of the study area

12.6.2.1. Combretum apiculatum woodland

The *Combretum apiculatum* woodland has several variations as identified during the survey. The variations were identified according to the soil depth, soil type and the state of degradation.

The open *Combretum apiculatum* woodland variation (

Figure **28**) occurs on shallow gravelly soils in the eastern section of the proposed mine infrastructure footprint areas. The woody layer is dominated by *Combretum apiculatum*, although the herbaceous layer is sparse as a result of overgrazing in several areas. The vegetation unit occurs on a slightly undulating landscape and the habitat type can be considered slightly degraded, classified as having a Medium Sensitivity.

The denser *Combretum apiculatum – Senegalia caffra - Grewia monticola* woodland variation (Figure 29) occurs on shallow red-yellow apedal soils of the Hutton or Glenrosa soil forms. The woody layer forms a mosaic of denser and more open structure with a mixture of sweetveld and sourveld woody species observed. The woody layer is dominated by *Combretum apiculatum, Grewia monticola, Euclea undulata, Senegalia caffra, Dichrostachys cinerea* and *Dombeya rotundifolia*. The grass layer is slightly denser due to the more fertile soils and dominated by species such as *Heteropogon contortus* and *Eragrostis rigidior*. The habitat type can be considered slightly degraded and classified as having a Medium Sensitivity.

The *Combretum apiculatum – Combretum hereroense* woodland variation (Figure 30) occur mostly on dolomitic soils with a higher clay content, although the shallow nature of the soils causes a more open, stunted woody structure. Dolomite bedrock is often exposed on the surface. *Combretum hereroense* is a definite indicator species of more fertile soils, while *Combretum apiculatum* is indicative of shallow, gravelly soils. The landscape is slightly undulating plains acting as an ecotone between the quartzite and dolomitic soils. The habitat type can be considered slightly degraded and classified as having a Medium Sensitivity.

The *Combretum apiculatum – Dodonaea viscosa* woodland variation occurs largely in the western section of the proposed mine infrastructure footprint area on moderately undulating plains and hills. The woody layer forms dense stands of *Dodonaea viscosa* in between the broadleaf components. The dominance of *Dodonaea viscosa* is a clear indication of habitat disturbance, probably as a result of overgrazing in the past. The habitat type can be considered degraded and classified as having a Medium-low Sensitivity.

No red data species were found during the survey in this vegetation unit. Two protected tree species was documented namely *Boscia albitrunca* (shepherds tree) and *Sclerocarya birrea* (marula).

Figure 28: Open *Combretum apiculatum* woodland in the study area

Figure 29: Denser *Combretum apiculatum* – *Senegalia caffra* - *Grewia monticola* woodland

Figure 30: ***Combretum apiculatum* – *Combretum hereroense* woodland in the study area**

Figure 31: ***Combretum apiculatum* – *Dodonaea viscosa* woodland in the study area**

12.6.2.2. Combretum hereroense woodland on dolomitic soils

The *Combretum hereroense* woodland occurs mostly on dolomitic soils and therefore the soils have a slightly higher clay content compared to other vegetation units. The two variations were identified according to the soil depth.

The *Combretum hereroense – Ozoroa spaerocarpa* woodland variation (Figure 32) occurs on shallow, rocky soils in the western and eastern sections of the site and show clear dominance of species such as *Combretum hereroense, Ozoroa sphaerocarpa; Euclea crispa* and *Senegalia caffra*. The vegetation unit occurs on a slightly undulating landscape and the habitat type can be considered slightly degraded, classified as having a Medium Sensitivity. The woody layer forms an open woodland structure.

The *Comberetum hereroense – Grewia vernicosa – Euclea undulata* woodland variation (occurs on deeper, dolomitic soils and the woody layer is dominated by sweetveld species such as *Combretum hereroense, Euclea undulata, Searsia lancea, Grewia vernicosa* and *Vachellia tortilis*. The vegetation unit occurs on a slightly undulating landscape and the habitat type can be considered slightly degraded due to encroachment and overgrazing in the past, while being classified as having a Medium Sensitivity. The woody layer forms a closed woodland structure with a well-developed shrub layer.

No red data species were found during the survey in this vegetation unit.

Figure 32: *Combretum hereroense – Ozoroa spaerocarpa* woodland variation in the study area

Figure 33: *Combretum hereroense – Grewia vernicosa – Euclea undulata* woodland variation in the study area

12.6.2.3. Rocky woodland

Rocky outcrops and ridges in the Savanna biome of South Africa are often habitats for red data and endemic species of an area, while also supporting a unique floral and faunal species composition. The vegetation unit occurs in two areas of the project area namely a small outcrop in the south-eastern section and a ridge in the northern section of the proposed mining infrastructure footprint areas. The rocky outcrops and ridges provide suitable habitat to protected plants, small mammals and reptiles. The rocky outcrops function as islands within the landscape and are characterized by unique microclimates in which rare species thrive. They are therefore of High Ecological Function and of High Conservational Value for the biodiversity that they support.

The landscape geomorphology represents moderately steep slopes derived from quartzite. The soils of this landscape are mainly lithosols or solid rock with a thin layer of soil (Mispah) in the hollow places. Gertenbach (1987) describes rainfall as the single most important component of climate determining vegetation patterns, while Bothma (1996) stated that northern slopes are warmer than south facing slopes in South Africa, and subsequently drier, causing plants to have a higher rate of evapotranspiration. Therefore, plants that are adapted to drier conditions will grow on these slopes. Furthermore, aspects like the degree of slope will also determine the amount of surface runoff after precipitation and direct sunlight having direct effects on water availability and sunlight for plants. The factors will all play a determining role in plant species composition on outcrops of this nature.

The woody layer on the outcrops forms a woodland structure that varies from a more open woodland in areas where soil formation occurs on flatter terraces, to a denser woodland in ravines and fissures in the landscape. The woody layer is often dominated by various *Combretum* species, although other species typical of these outcrops include *Kirkia wilmsii, Senegalia caffra, Faurea saligna, Vangueria infausta* and *Lannea discolor* are also prominent.

No red data species were found during the survey in this vegetation unit. The state of the vegetation variations is indicated in Figure 34.

Figure 34: Vegetation associated with rocky ridge in the study area

12.6.2.4. Vachellia – Grewia - Ziziphus mucronata sweetveld

This vegetation unit forms dense woodland in low-lying areas and dominated by various sweetveld species in the western section of the site. Typical woody species include *Vachellia karroo, Vachellia tortilis, Euclea undulata, Ziziphus mucronata* and *Dichrostachys cinerea*. The area is underlain by red apedal Hutton soils or greyish clayey soils of the Cartref soil form with medium to high clay content. The herbaceous layer is characterised by grass species such as *Heteropogon contortus, Panicum maximum, Urochloa mosambicensis* and *Eragrostis curvula*. The state of the vegetation is indicated in Figure 35. The vegetation unit is classified as having a Medium sensitivity due its widespread occurrence in the Savanna Biome.

Figure 35: ***Vachellia – Grewia - Ziziphus mucronata*** **sweetveld in the study area**

12.6.2.5. Old fields / Cultivated land

The areas that are currently in a largely degraded state as a result of crop cultivation or old fields in different stages of succession are discussed as one vegetation unit based on the low sensitivity of the area and common state of degradation. The degraded areas occur throughout large areas of the low-lying plains and valleys of the study area and are characterised by three main variations namely:

- Cultivated land (
- Figure **36**)
- Primary old fields (Figure 37)
- Secondary old fields (Figure 38)

The cultivated land occurs as pockets of commercial farming, especially in the irrigated land in the western section of the site. These areas do not represent a vegetation entity other than homogenous stands of crops and some exotic weeds and pioneer grasses. Therefore, no further discussion follows on the cultivated land considering that these areas represent low sensitivity areas that is highly suitable for any development from an ecological perspective.

The old cultivated fields occur throughout the area and vary between primary and secondary old fields. When cultivated fields are left fallow, it results in a landscape mosaic of patches of secondary vegetation varying in age and dominated by various grass species (Moll, 1965). Different stages of succession occur in the old fields, and the most common old fields in the Savanna Biome and surroundings are the young old fields of 1-5 years old (Smits et al., 1999) dominated by the pioneer grass species of disturbed areas, *Cynodon dactylon* (Van Oudtshoorn, 1999). Secondary grassland communities may develop from this old field variation, dominated by the secondary grassland species directly related to man-made disturbances, *Hyparrhenia hirta*. These fields are still in an early successional state, although somewhat older (older than 5 years) with several grass species like *Hyperthelia dissoluta, Aristida junciformis, Aristida congesta s. congesta* and *Eragrostis rigidior.* The landscape and vegetation features of the primary old on the proposed mining development site include slightly undulating plains with a low tree cover (< 1%) and dense (60-70%) grass layer. The dominant species include *Aristida* species, *Heteropogon contortus, Eragrostis lehmanniana* and *Cenchrus ciliaris*, indicating previous agricultural/utilising activities within these areas, while typical herbs/weeds include *Tagetes minuta* and *Bidens bipinnata*. The shrub layer (1 - 1,5m.) on the primary old fields covers 1 – 2%, while the forb layer covers 15-20% of the area. The soil in the area is red Hutton soils.

The outer successional stage of old fields only starts after several years of abandonment when woody species start to invade. These secondary old fields are usually dominated by species such as *Dichrostachys cinerea, Vachellia tortilis, Combretum apiculatum* and *Ziziphus mucronata*. Where overgrazing occurs the encroacher *Dichrostachys cinerea* becomes dominant as is evident on certain areas of the site. The landscape and vegetation features of this unit include slightly undulating plains with Hutton soils. The tree layer (> 3m) covers 5 -10%, while the shrub layer covers 20-30% (different variants) of the area. The grass layer is moderately developed with a 40-50% cover, while the forb layer (0.2m) covers 5 – 10% of the area. This vegetation unit is defined as a secondary old field variant/modified land which is evident from the higher tree cover/diversity as well as the higher shrub cover/diversity. **No red data species were found as a result of the degraded state of the vegetation. The old fields and cultivated land have a low sensitivity due to the modified state of the vegetation; unlimited development can be supported in these areas.**

Figure 36: Cultivated land in the study area

Figure 37: Primary old fields in the study area

Figure 38: Secondary old fields in the study area

12.6.2.6. Drainage channel & riparian woodland

All rivers and streams with their associated riparian vegetation in the project area are considered to be ecologically sensitive, forming important, limited and specialised habitats for several flora and fauna species. The species composition is unique and relatively limited in distribution and coverage. These habitats also form linear corridors linking different open spaces. The riparian zone varies from being completely removed in some areas, to approximately 30-40m wide as identified from the aerial photograph. A more open riparian zone of thornveld is locally associated with some of the smaller non-perennial river system in the western section of the site and classified as a floodplain river. Here the vegetation is dominated by tall *Vachellia karroo* and *Searsia lancea* trees with some scattered grasses and weeds (Figure 39).

All the drainage channels are non-perennial. The narrow band of trees that occurs along the channel can be classified as riparian vegetation (Figure 40). This vegetation is very important for connectivity with adjacent vegetation as well as a migratory route for riparian animals. The most abundant and most conspicuous trees in the tall riparian woodland are *Vachellia nilotica, Vachellia karroo, Searsia lancea, Berchemia zeyheri* and *Gymnosporia senegalensis*. Typical grasses include *Panicum maximum*, *Eragrostis rotifer* and *Cenchrus ciliaris*. Unfortunately, the river provides a distribution route for weeds and invading trees. Many of the usual exotic weeds were recorded together with *Xanthium strumarium* (Large cocklebur) *Ricinus communis* (Caster-oil) and *Datura stramonium*. Weeds and invaders should be removed, as well as destruction of such plants in a safe place and manner. The riparian woodland still plays many essential roles in the functioning of the ecosystem, including:

- Flow regulation: the riparian vegetation slows the flow of water, both by physically blocking the passage of water, and by absorbing the water into its root systems. This moderates the impacts of flooding on surrounding areas.
- Water quality regulation: the riparian vegetation acts as a buffer or filter between nutrients, sediments, contaminants, and bacteria from the surrounding land and air, and the river channel itself. The riparian vegetation therefore prevents soil, pesticides, fertilizers and oil from entering the river and impacting on in-stream communities.
- Habitat provision: The riparian zone is an important habitat for many plants and animals, because it is an area of transition between the land and the river. These relatively steep environmental gradients (moisture, temperature, topography, and soil) generally support higher levels of biodiversity than more homogeneous areas.
- Corridor functions: because it follows the river, the riparian zone serves as a corridor, connecting two or more habitats that may otherwise be isolated by land transformation of areas in between. Many species of animals use corridors to disperse, and find food and mates.

The vegetation is largely still considered natural habitat, with all areas in the floodline classified as a high sensitivity area with a high conservation priority.

Figure 39: Riparian Flat Drainage Channel in the western section of the study area

Figure 40: Non-perennial channel and riparian woodland in the eastern section of the study area

12.6.3. Plant Species of Conservation Concern

A list of red data plant species previously recorded in the study area in which the proposed development is planned was obtained from the Plants of Southern Africa (POSA) database of SANBI. The following red data species are listed for the specific Quarter Degree Grid Square (QDS):

Table 8: Red data species potentially occurring in the project area according to the POSA database

Genus	Sp1	IUCN
Drimia	*elata*	Data deficient
Aloe	*vryheidensis*	Data deficient
Indigofera	*leendertziae*	Data deficient
Aloe	*bergeriana*	Data deficient
Myrothamnus	*flabellifolius*	Data deficient
Adenia	*fruticosa*	Near Threatened
Brachystelma	*hirtellum*	Near Threatened
Aloe	*reitzii*	Near Threatened
Dicliptera	*fruticosa*	Near Threatened
Argyrolobium	*velutinum*	Vulnerable

None of these species were documented during the survey considering that the habitat is completely different from that which these species usually occur in. In addition, no listed protected plant species occur on the proposed development sites. However, the following protected trees occur on the proposed development sites:

- *Sclerocarya birrea* (marula);
- *Boscia albitrunca* (shepherds tree);
- *Combretum imberbe.*

12.6.4. Fauna

A survey was conducted during July 2019 to identify specific fauna habitats, and to compare these habitats with habitat preferences of the different fauna groups (birds, mammals, reptiles, amphibians) occurring in the quarter degree grid. During the site visits mammals, birds, reptiles, and amphibians were identified by visual sightings through random transect walks. In addition, mammals were also recognized as present by means of spoor, droppings, burrows or roosting sites.

The area has been settled for an extensive period of time, and the fauna are therefore considered impoverished due to the degradation caused by mining activities, built-up land and other man-induced impacts. Four major fauna and bird habitats were observed in the area namely:

- Degraded grasslands / old fields / cultivated land;
- Savanna woodland (mixed);
- Riparian woodland and open water habitats;
- Rocky habitats.

The majority of the habitat types on the respective study sites are fragmented. Therefore, the expected mammalian richness on these areas are considered low, although slightly higher richness values are expected from the more intact mountain habitats. Predators that still roam freely in the area include larger predators such as leopard and brown hyena, while smaller predators such as caracal, serval, honey badger and cape clawless otter are common throughout the area. Antelope species such as klipspringer, kudu, bushbuck and duiker will roam freely through the area and are not restricted by game fences. Smaller mammal species such as honey badgers and serval can become habituated to anthropogenic influences, while other species such as brown hyena will rather move away from the construction activities and will seldom use the area. Many of the bat species of conservation concern in the study area are cave-dependant for roosting. Any individuals that utilize the area would therefore either be foraging or migrating and would not be affected by the localized loss of habitat due to the development. The dominant species composition therefore comprises of widespread taxa with unspecialised life history traits. The most important corridors that need to be preserved for free-roaming mammal species in the area include the natural vegetation associated with the woodland and riparian zones.

According to Birdlife South Africa, the study area does not fall within any Important Bird Area (IBA), identified within South Africa (www.birdlife.org.za). The following avifaunal species may occur in the different habitat types:

Habitat Type	Bird species
Degraded grassland (old fields)	Crowned plovers, Crested guineafowls, Francolin species as well as the birds of prey that prey on smaller bird species
Grassland	Bald Ibis, Redwing Francolin, Whitewinged Flufftail, Blackwinged Plover, Rudd's Lark, Botha's Lark, Blue Swallow, Buffstreaked Chat, Palecrowned Cisticola and Yellowbreasted Pipit. Melodious Lark and South African Cliff Swallow
Woodland	Rollers, bee eaters and waxbills, as well as large birds of prey such as vultures and eagles.
Rocky habitats	Chats, Pipits and Larks
Riparian woodland	Icterine Warbler, Olivetree Warbler, Garden Warbler, Whitethroat and African Finfoot

Some bird species such as the redbilled oxpeckers and vulture species that occur in the area are primarily dependant on the presence of their food source.

There is a potential presence of some toads and sand frogs in the non-perennial channels on site, as they only need temporary pools for reproduction and the watercourses may provide suitable habitat. Amphibian species potentially occurring in the area include Common River Frog, Natal Sand Frog, Gutteral Toad, Raucous Toad and Bubbling Kassina. These species are non-threatened and widespread species, and as such the development will not have any impact on amphibian conservation within the region.

The general habitat type for reptiles consists of open to dense bushveld, with limited available habitat for diurnally active and sit-and-wait predators, such as terrestrial skinks and other reptiles. Arboreal species are the more prominent components of the local herpetofauna.

The mountainous habitat and riverine woodland represent the most suitable habitat for a variety of reptile species. The reptiles of the study area include snakes, lizards, geckos and tortoises. Species such as the southern rock python, puff adder, black mamba, boomslang, vine snake, spotted bush snake and several members of the green snakes (Philothamnus spp.) is expected to occur in the study area, although the presence of these snakes is dependent on the presence of their prey species (rodents, frogs etc.). All the aforementioned reptile species are common and widespread, and as such the development will not have any impact on reptile conservation within the region.

An insect and spider desktop survey was done in addition to the field observations. All of the potential invertebrate habitats are well represented by a high family richness of insects and spiders.

12.6.5. Red data fauna species

According to the existing databases and field survey the following number of fauna species included in the IUCN red data lists can potentially be found in the study area (Table 9):

Table 9: Red data list of potential fauna for the study area

English Name	Conservation Status	Probability of occurrence
MAMMALS		
Roan Antelope	Endangered (2016)	Zero – restricted to game reserves
Rusty Pipistrelle	Near Threatened	Moderate
Brown Hyena	Near Threatened (2016)	Moderate
Serval	Near Threatened (2016)	High
Smithers' Horseshoe Bat	Near Threatened (2016)	Moderate
Tsessebe	Vulnerable (2016)	Zero – restricted to game reserves
Leopard	Vulnerable (2016)	Moderate
BIRDS		
Roller, European	Near Threatened	High
Falcon, Lanner	Vulnerable	Moderate
Vulture, White-backed	Endangered	Moderate – dependant on carcasses
Vulture, Cape	Endangered	Moderate – dependant on carcasses
Eagle, Martial	Endangered	Moderate
Secretarybird	Vulnerable	Moderate
HERPETOFAUNA		
Northern Crag Lizard	Near Threatened (SARCA 2014)	Low
Granite Dwarf Gecko	Near Threatened (SARCA 2014)	Low
Giant Bull Frog	Near Threatened	Moderate

None of the above red data species were documented during the survey.

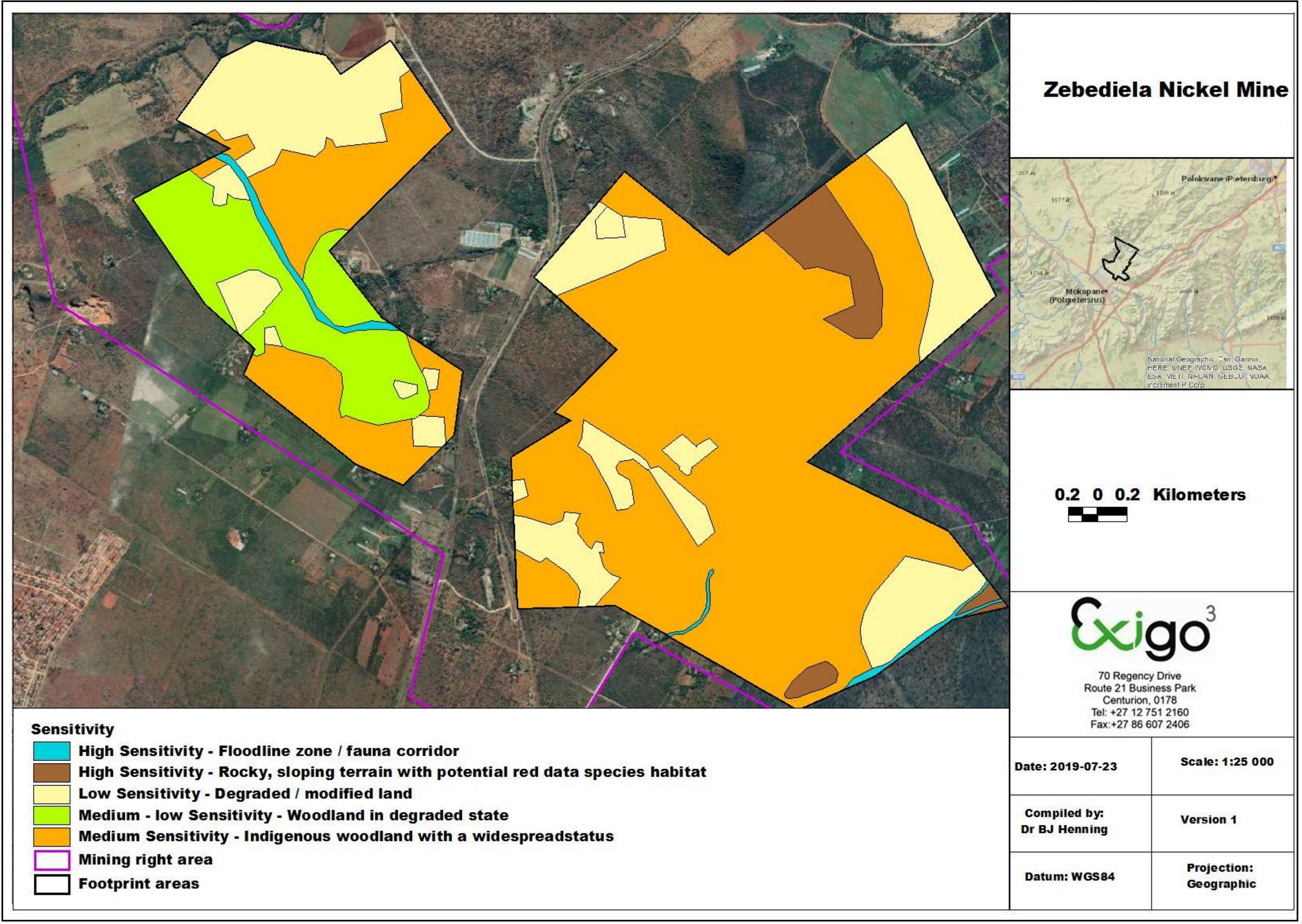


Figure 41: Map of the botanical sensitivity in the study area

12.6.6. Protect Areas and National Protected Areas Expansion Strategy (NPAES)

The Witvinger Nature Reserve is located directly north of the proposed Mining Right (MR) area while the Percy Fyfe Nature Reserve is located slightly north-east of the MR area. A small section of the Limpopo Central Bushveld NPAES falls within the MR area, although none of the footprint areas for the mining development are located close to any NPAES. Refer to Figure 42 below.

12.6.7. Critical Biodiversity and Ecological Support Areas

The Limpopo Conservation Plan categories for the proposed mining area are presented in Figure 43 below. Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) are found on site. The mining project study area is located in the following areas:

- CBA2;
- ESA1;
- ESA2; and
- Other Natural Areas.

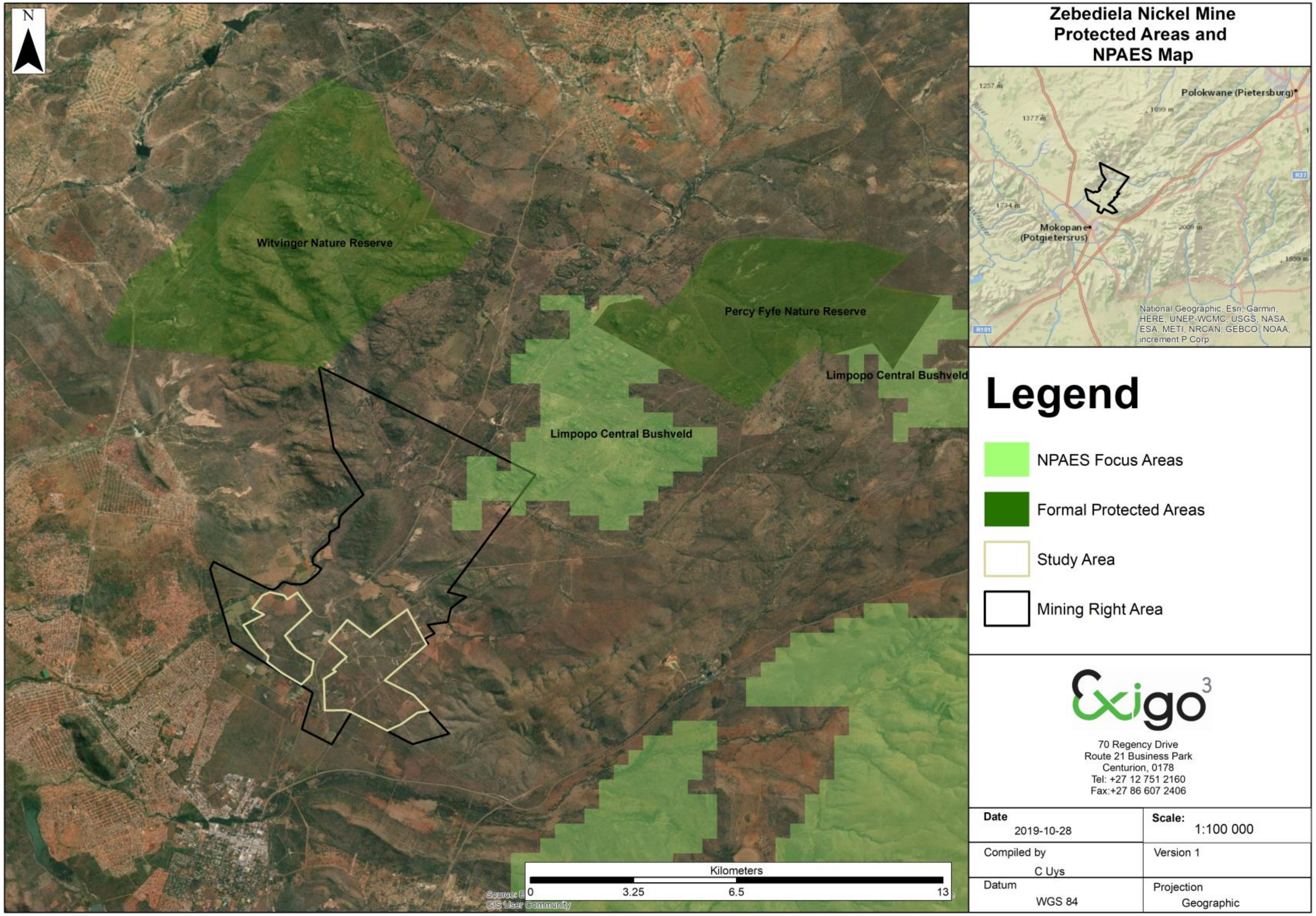


Figure 42: Protected areas in close proximity to the project area

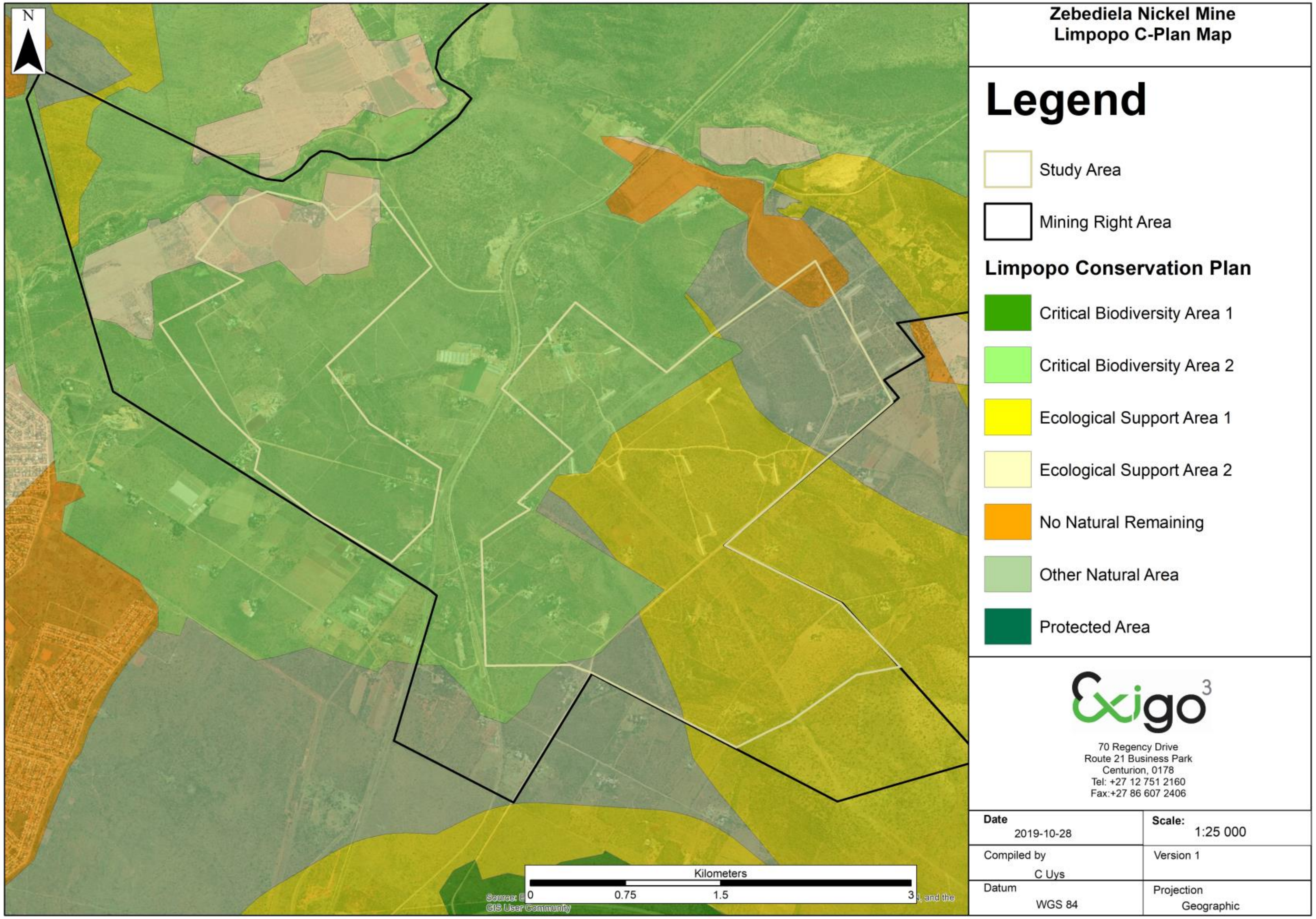


Figure 43: Terrestrial CBA areas of the study area (Limpopo Conservation Plan version 2, 2013)

12.7. Surface Water

The study area is located in the Limpopo Water Management Area (WMA), and is located mainly in Quaternary Catchment Area (QCA) A61F. The study area is drained by means of surface run-off (sheetflow) with stormwater collecting along roads and footpaths cutting through the area, to drain into the non-perennial channels and subsequently into the Rooisloot and its tributaries.

The Rooisloot (a NFEPA River) traverses the proposed mining right area and is located approximately 700 m to the north north-west of the proposed open pit boundary. A tributary of the Rooisloot occurs approximately 3 km to the north-east of the proposed open pit.

The 1:50 and 1:100 floodlines were determined for the above river as well as its tributary using Civil 3D and HEC-Ras (2D) 5.0.7 watercourse analysis programs (MEB, 2019). A 100 m restriction line from the centre point of the watercourses was also established. Refer to Figure 44.

In addition, the RATIONAL method was used to derive the surface run-off for the study area and to calculate the sizes of the pollution control dams required for the processing plan and overburden facility as well as the location of stormwater canals. The method was also used to calculate the size of the Return Water Dam and location of stormwater canals required at the TSF. Refer to Table 4 for the dam sizes.

Two types of hydrological systems were identified on the mine footprint sites as follows:

- Riparian Flat Drainage Channel;
- Non-perennial channel & riparian woodland.

These systems constitute channels which are not “true” wetlands as stipulated in the National Water Act due to the soils not indicating wetness in the top 50cm and therefore represent watercourses.

The watercourses on the site are non-perennial channels representing tributaries of the main rivers, e.g. the Rooisloot. It forms shallow channels in some areas where it bisects rocky areas, although in the lower lying areas it often diverts into deeper ravines with well-defined banks. The channels have sandy riverbeds with some small pebbles and rocks along its the bottom. No herbaceous vegetation grows in the deeper ravines other than woody riparian species. The two drainage channels in the eastern section of the site are classified as drainage channels with riparian woodland. Riparian Habitat are described by the National Water Act (1998) Section 1.1 (xxi) as follows*: “riparian habitat includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas”*. The most abundant and most conspicuous trees in the tall riparian woodland are *Vachellia nilotica, Vachellia karroo, Searsia lancea, Berchemia zeyheri* and *Gymnosporia senegalensis*. Typical grasses include *Panicum maximum, Eragrostis rotifer* and *Cenchrus ciliaris*.

The non-perennial channel in the western section of the site often forms a flatter area round the drainage channel and can be classified as a riparian flat drainage channel. In the case of the study area, the area has some areas with patchy riparian woodland dominated by the woody species *Vachellia karroo* and *Searsia lancea*, as well as the alien species *Melia azedarach*.

The channels in the eastern section of the site on the Farm Amatava can still be considered as pristine with little impact from surrounding areas. These drainage channels are classified as Class B: Largely Natural with few Modifications. The riparian flat channel in the western section of the site on the Farm Uitloop is still considered functional and has a PES of Class C (Moderately modified). The state of degradation from its original state was caused by impacts such as alien invasion, sedimentation, erosion and flow impediment caused by roads.

The EIS of the drainage channels is 'Moderate' and considered to be ecologically important and sensitive at least on a local scale. The biodiversity of these watercourses is not usually sensitive to flow and habitat modifications and may play a small role in moderating the quantity and quality of water entering downstream areas.

Table 10 indicate the PES and EIS as determined for the watercourses on site. The secondary roads, impoundments and alien invasion had a definite impact on downstream areas.

Table 10: Present Ecological State and Ecological Importance & Sensitivity of the watercourses and riparian systems on the proposed development site

Hydrogeomorphic Unit	PES	EIS
Western Riparian Flat Drainage Channel (Uitloop)	Class C: Moderately modified	Moderate
Eastern Non-perennial channel & riparian woodland (Amatava)	Class B: Largely Natural	Moderate

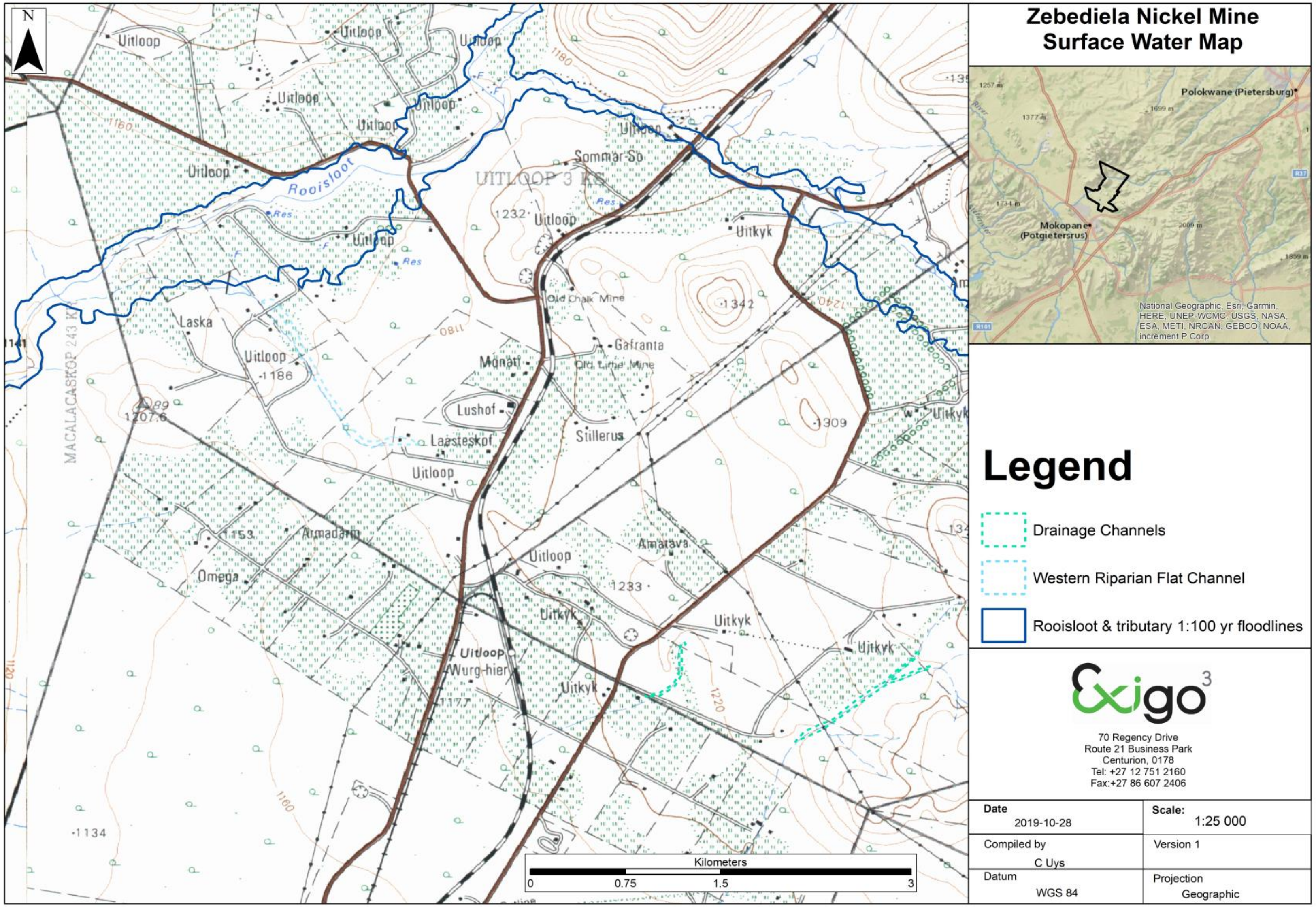


Figure 44: Surface Water Map

12.8. Groundwater Baseline

A Geohydrological Baseline Assessment and hydrocensus was conducted by Exigo in June and August 2019 to obtain all of the groundwater level information for the area surrounding the proposed open pit mine and mine infrastructure. The data from the hydrocensus was analysed statistically for the purposes of the environmental baseline and scoping assessment.

The sections below are derived from the baseline assessment provided by Exigo (referenced below as Exigo, 2019).

12.8.1. Hydrogeological setting

The study area falls within the Mogalakwena river catchment. The area is dominated by deeply weathered and fractured mafic rocks where the groundwater yield potential can be regarded as low with 81% of boreholes recording yields < 2 ℓ/s (DWAF, 2000). Boreholes within the dolomitic rocks are expected to have a higher yield as evident by the municipal water supply boreholes drilled in this unit. The Rooisloot River to the north of the proposed mining area may also contribute to the groundwater environment.

The study area is underlain by fractured norite and pyroxenite and covered by a thin (1 – 35 m thick) black silt clay cover which is weathered from the bedrock. Areas where the unsaturated and saturated zones may occur, are found beneath the weathered zones that consists of slightly weathered and fractured hard rocks (SRK, 2019). There are southwest-northeast trending faults to the northwest and southeast of the proposed pit which offset the dolomitic zone located to the east of the proposed pit. The dolomitic formation dips to the west may be intersected at depth by the pit. Springs are not prevalent in the area surrounding the proposed mine.

The semi-confined weathered aquifer id located above the weathered pyroxenite which extends to a depth of approximately 20 m (SRK, 2019). The presence of open fractures within the main portion of the weathered zone indicates that this zone is more permeable than the upper zone. Deep weathering, appears to create unconfined zones as the dolerite dykes cannot confine the system containing major fault blocks which are hydraulically connected.

Fresh fractured norites and pyroxenites have similar hydrogeological characteristics with a low primary porosity and permeability and permits groundwater to mainly flow through fractures and joints. Major shear zones, that have a higher storage component, would provide higher yields with some groundwater seepage contribution from the overlying weathered zone (SRK, 2019).

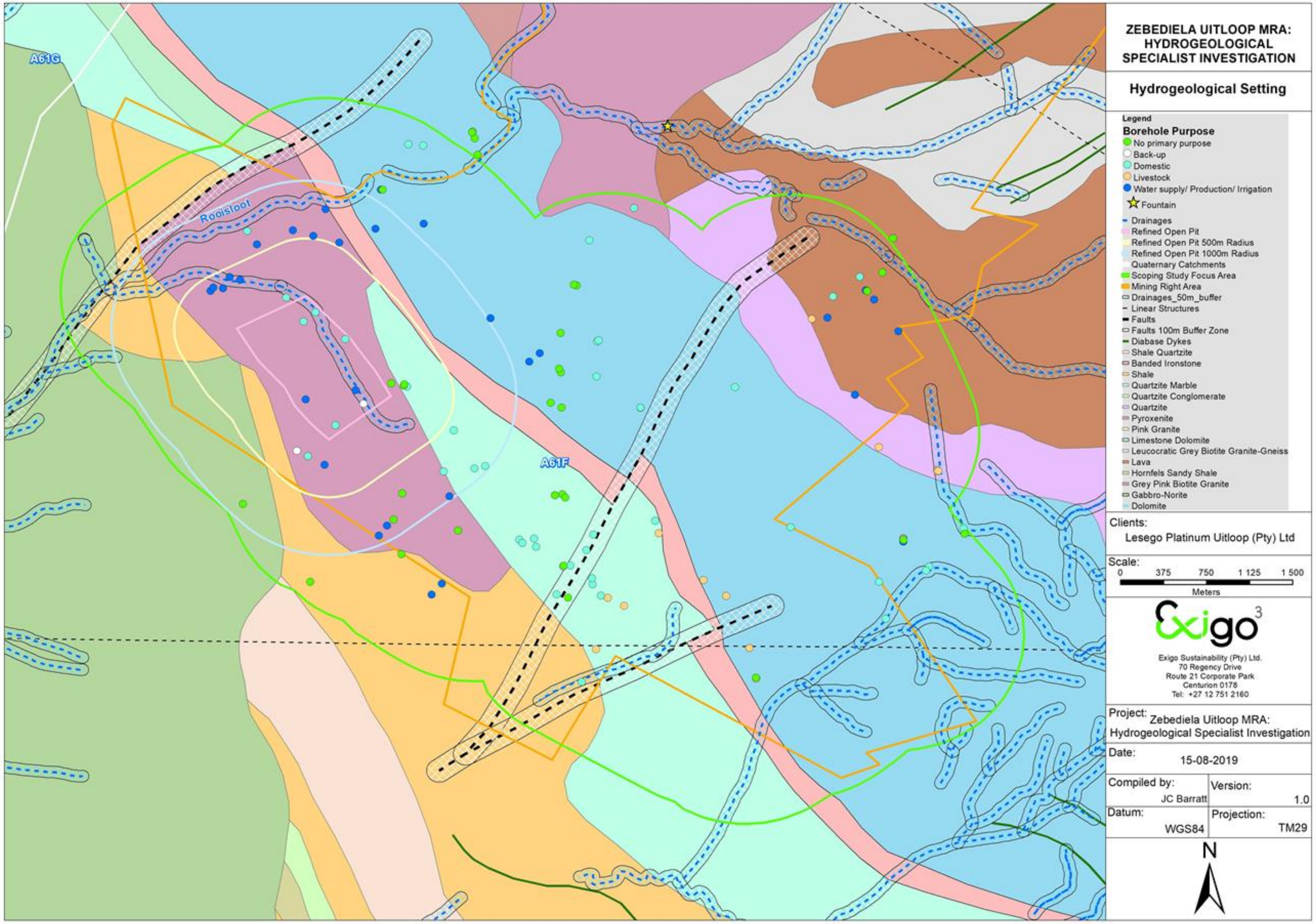


Figure 45: Hydrogeological setting of study area

12.8.2. Boreholes and groundwater users

The hydrocensus yielded the following findings on groundwater levels:

- 124 boreholes were visited during the survey.
- 76 (61%) of the visited boreholes were in use during the survey with 48 (39%) classified as not in use during the survey.
- 91 (73%) of the boreholes have a primary purpose as listed in Table 11.

Table 11: Boreholes purposes during hydrocensus user survey

Boreholes Purpose	Total Boreholes	Total Boreholes (%)
Water supply/ Production/ Irrigation	30	24%
Domestic	45	36%
Livestock	14	11%
Back-up	2	2%
No primary purpose	33	27%

The borehole density within the scoping study focus area (≈ 30 km^2) is approximately 4.1 boreholes per km^2 (0.04 boreholes per ha). There are approximately 20 boreholes within a 500 m radius from the proposed open pit and approximately 37 boreholes with a 1000 m radius from the proposed open pit. Eight (40%) of the boreholes within the 500 m radius, and 17 (46%) of the boreholes within a 1000 m radius from the proposed open pit are utilised as either water supply, production, or irrigation boreholes indicating a high availability and reliance on groundwater in the vicinity of the proposed open pit.

12.8.3. Groundwater levels

The hydrocensus yielded the following findings on groundwater levels (Figure 48):

1. Water levels were obtained from 58 (47%) boreholes as the remaining boreholes were equipped or locked.
2. The mean static water level is 27.1 m with the shallowest water level being measured at 11.7 m and the deepest at 51.8 m.
3. 90% of the water levels measured range between 14.5 and 40.2 m for the entire scoping focus area.
4. 90% of the water levels measured within 500 m of the proposed pit range between 22.4 and 32.6 m while the mean water level for the same area was calculated at 28.1 m.
5. 90% of the water levels measured within 1000 m of the proposed pit range between 22.3 and 37.2 m while the mean water level for the same area was calculated at 29.5 m.
6. Statistical analysis of the hydrocensus's water levels is presented in
7.

8. Table 12.

Table 12: Statistics of the measured water levels within the entire scoping focus are during the 2019 hydrocensus

	Water Level (m)
Boreholes	57
Mean	27.1
Min	11.7
Max	51.8
P5	14.5
P50	26.0
P95	40.2

An analysis was completed of the correlation between topography and hydraulic head. In order to determine whether groundwater levels follow topography, a correlation had to be determined between elevation and water level by plotting the variables on a graph. Data from the hydrocensus was been plotted as is shown in Figure 46 below. The graph indicates a very good correlation (R2=0.99), which reflects a very good relationship between groundwater level and topography.

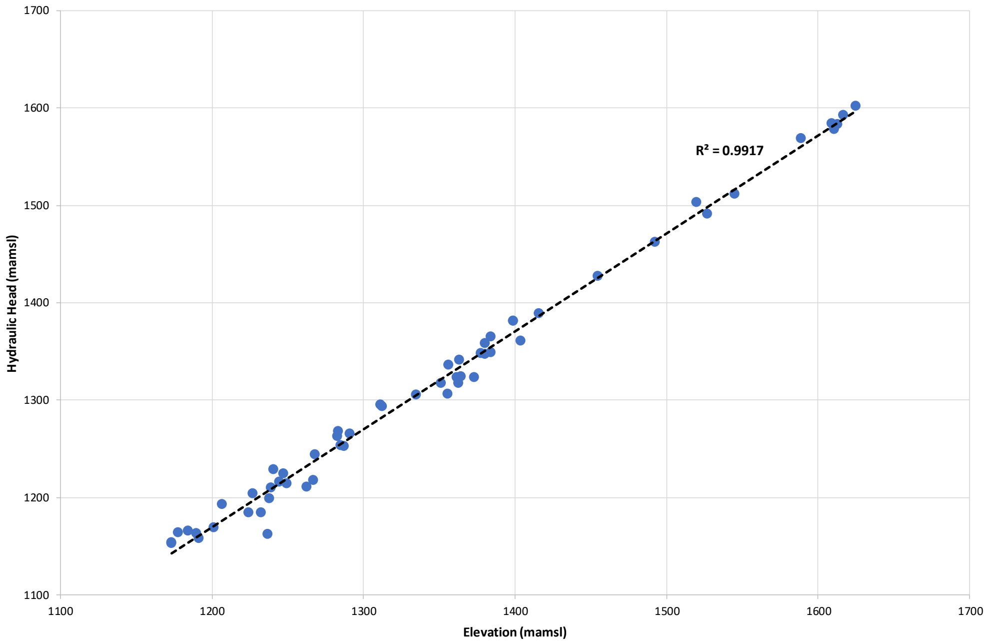


Figure 46: Linear relationship between surface topography and groundwater elevation of all measured boreholes

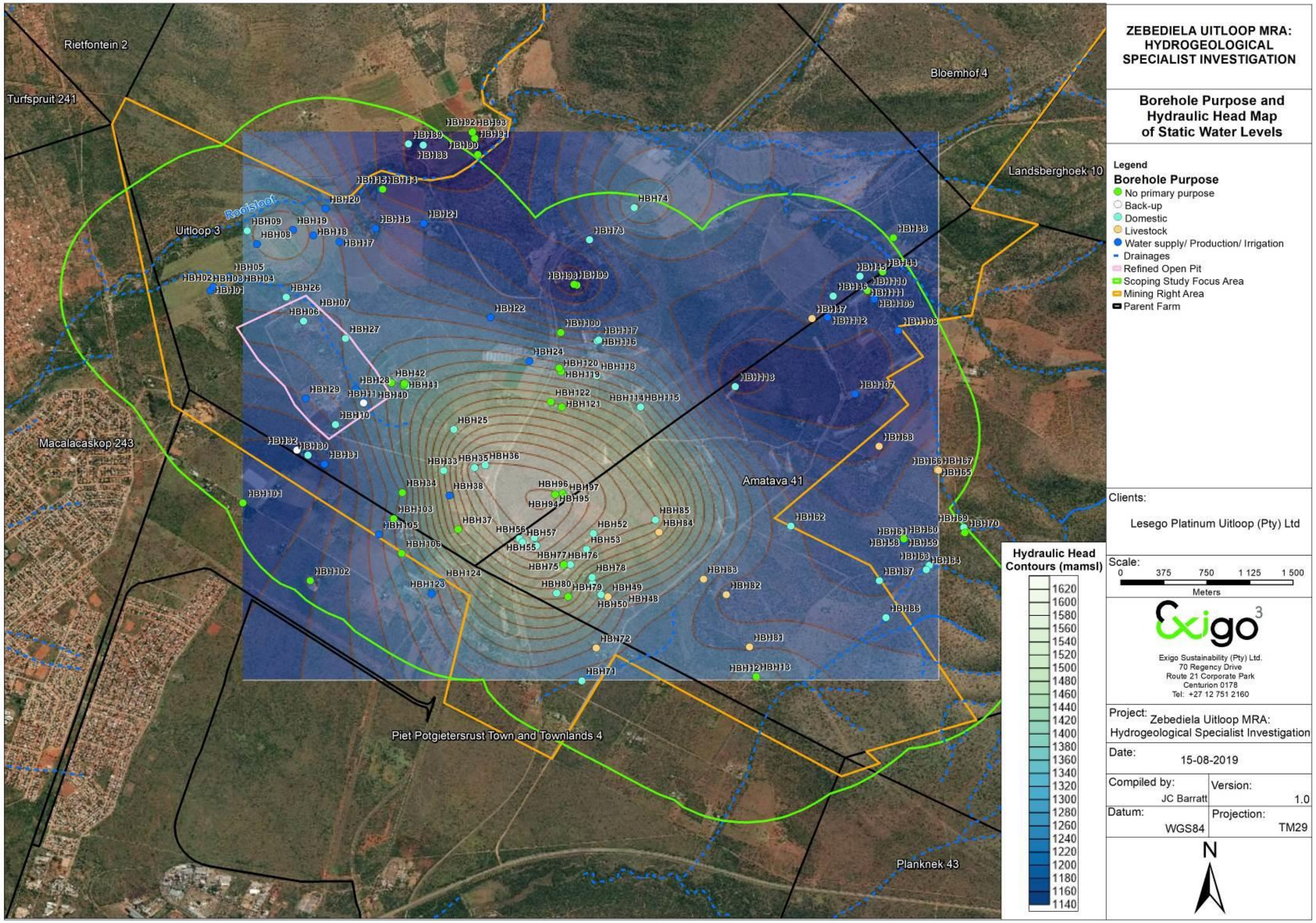


Figure 47: Boreholes purpose and hydraulic head map of static water levels

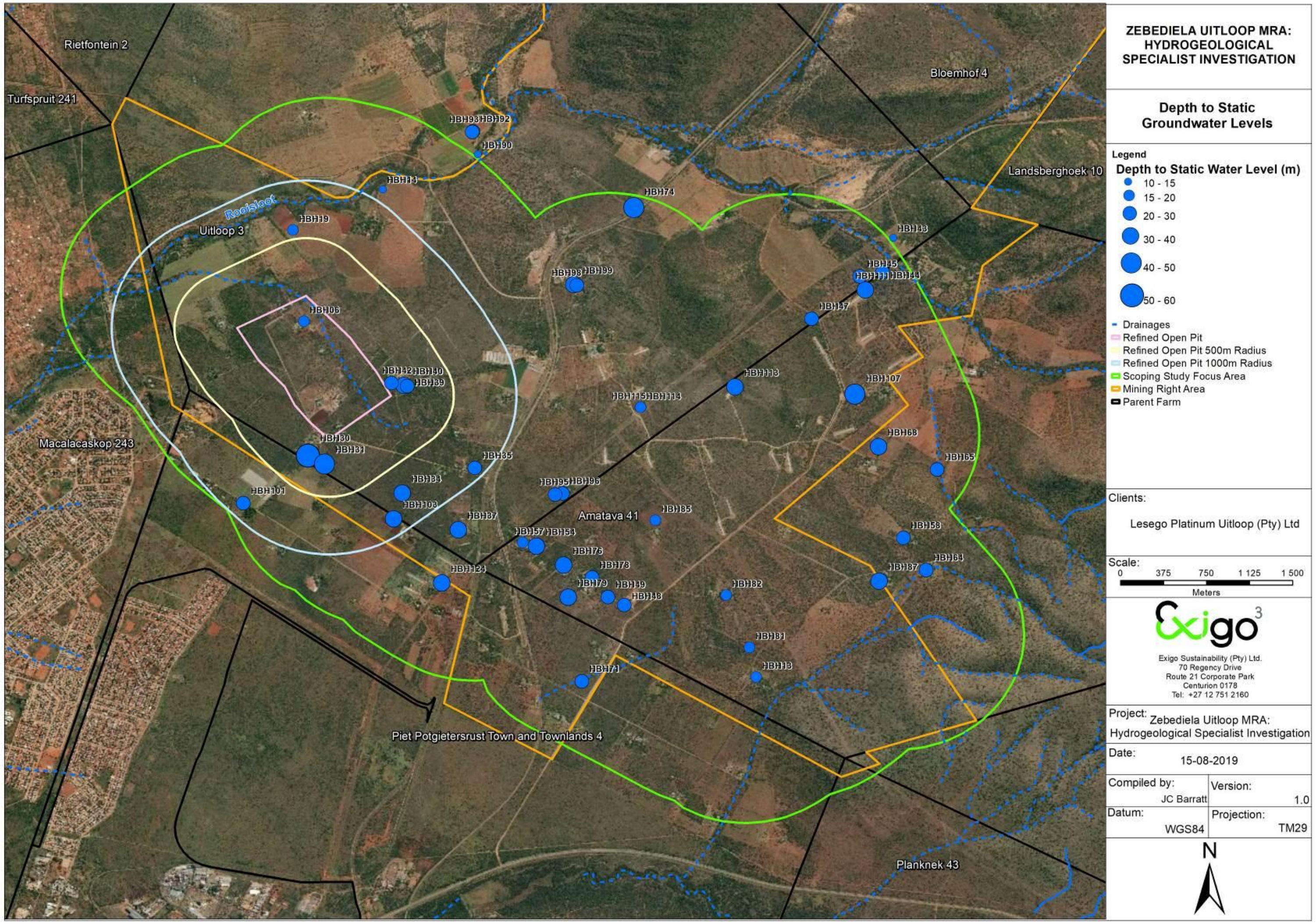


Figure 48: Depth to static groundwater levels

12.8.4. Groundwater flow and yield

The hydraulic head and general groundwater flow direction of the area surrounding the proposed mining area is illustrated in Figure 49. Considering the borehole purposes (Figure 47), the groundwater flow appears to be directed towards areas were groundwater abstraction occurs. Even though only the static water levels were used to create the hydraulic head map and associated flow vectors, the groundwater environment's water levels may be dynamic as pumping seems to regularly occur at numerous boreholes.

As 24% of the boreholes within the scoping focus area are utilised for water supply, production, or irrigation (Table 11), an assumption can be made that the area has sufficient quantities of water for these purposes. These aforementioned boreholes along with those in the dolomitic zone, provides a good indication that the area is viable for groundwater use activities. Preliminary pit inflow estimation range between 500 and 3000 m3/d.

On-site data obtained during the EIA phase of the study including surface geophysics, and drilling and testing of boreholes will provide improved estimates of the potential inflows.

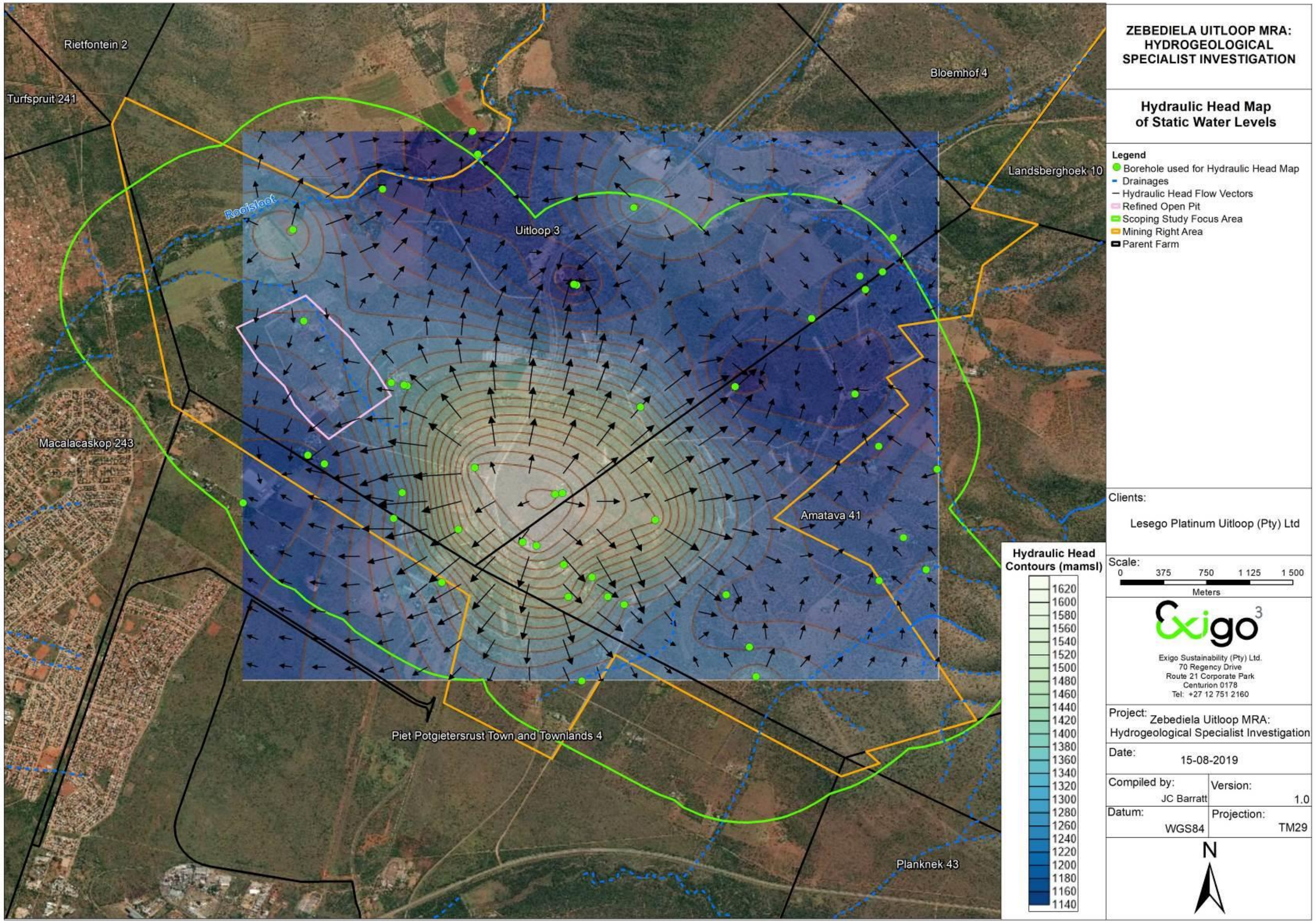


Figure 49: Hydraulic head map with flow direction vectors for the area surrounding the proposed mining area

12.8.5. *Groundwater quality*

Groundwater samples were collected at 16 sites as part of the 2019 hydrocensus. Water samples from 10 sites were spatially selected and submitted to Aquatico in Irene, Gauteng, (a SANAS accredited laboratory) for cation and anion analysis. Based on this data, statistical analysis was done to determine the regional groundwater quality (Table 13). Only two constituents that were measured exceed the SANS 241:2015 drinking water limit. Total chromium and arsenic both exceed the SANS 214:2015 limit in only one (10%) sample. The sample exceeding the total chromium SANS 241:2015 limit (Sample HGH10 which is located at the open pit perimeter) exceeds this limit by approximately 50% while the sample exceeding the arsenic SANS 241:2015 limit (Sample HBH61 which is located outside th mining right area) exceeds this limit by approximately double the amount of the limit. As only two individual sampling locations which are spatially spread apart, exceed but two of the SANS 241:2015 determinant's limits, the significance of the exceedances can be considerate low. The groundwater environment cannot therefore be classified as a non-aquifer and can be considered a viable water source, if quantities warrant it.

The hydrochemical data is presented on a tri-linear piper diagram (Figure 50) for the characterisation of hydrochemical facies. The piper diagram indicates that the area is predominantly characterised by calcium-magnesium-bicarbonate type waters, which is due to the dolomitic environment. Figure 50 serves as a confirmation that the groundwater reliance is due to the dolomitic environment which are characterised as high yielding areas. As previously discussed, on-site flow data will need to be collected as part of the EIA phase to confirm. The major macro constituents are presented in Figure 51 where the elevated Ca- and Mg- concentrations are evident at the sampled boreholes along with each sampled borehole's TDS-concentration.

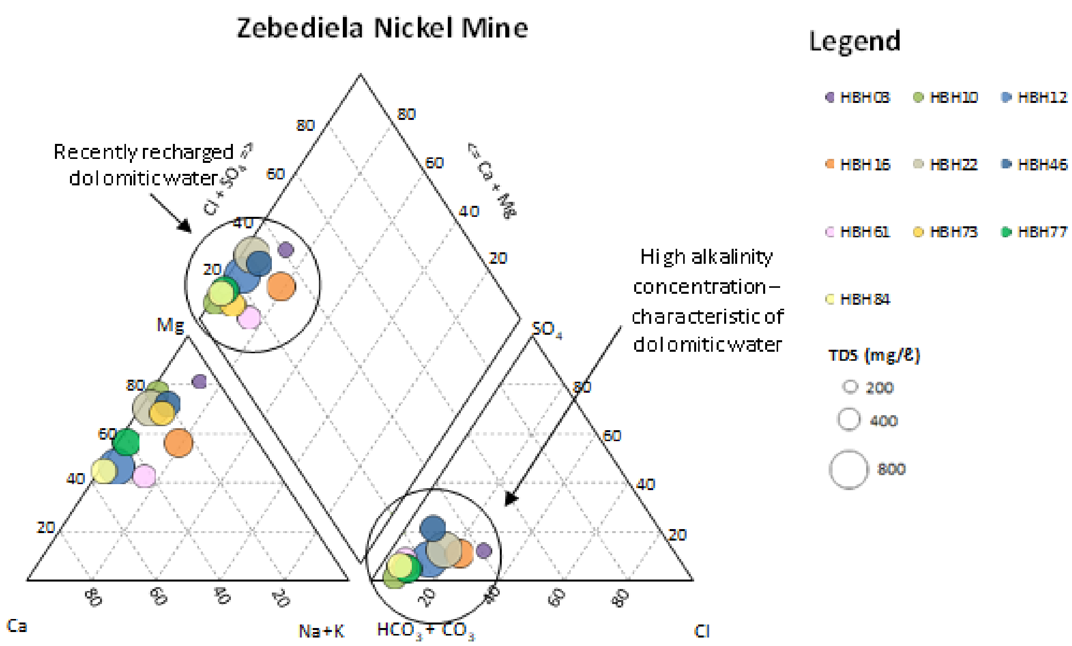


Figure 50: Tri-linear piper diagram of the hydrocensus borehole groundwater samples

Table 13: Statistical analysis of hydrochemistry of all samples with the SANS 241:2015 drinking water limit

Constituent	pH	EC	TDS	Cl	SO_4	NO_3	NH_4	PO_4	F	Ca	Mg	Na	K	Al	Fe	Mn	Cr	Cr^{6+}	Cu
Unit	[]	mS/m	mg/ℓ																
% Detected	100%	100%	100%	100%	100%	100%	100%	0%	90%	100%	100%	100%	100%	20%	0%	0%	10%	10%	0%
SANS 241 Limit	**5 - 9.7**	**170**	**1200**	**300**	**500**	**11**			**2**			**200**		**0.3**	**2**	**0.4**	**0.05**		**2**
Average	7.8	105	576	33	32	6.6	0.17		0.45	83	94	20	3.1	0.003			**0.073**	0.04	
Min	7.3	61	344	16	3.5	0.37	0.023		0.29	8.3	56	6.2	1.2	0.002			**0.073**	0.04	
Max	8.8	123	754	68	79	26	0.86		0.95	157	123	62	7.2	0.003			**0.073**	0.04	
P5	7.3	74	422	16	9.9	0.67	0.029		0.29	28	62	6.3	1.2	0.002					
P50	7.8	109	565	25	26	5.3	0.077		0.33	73	97	17	3.0	0.003					
P95	8.5	123	753	60	65	18	0.59		0.87	153	122	50	5.7	0.003					

Constituent	Ni	Zn	Co	Cd	Pb	As	Se	U	Alkalinity	Bicarbonate Alkalinity	Carbonate Alkalinity	Total Hardness
Unit									mg CaCO3/ℓ			
% Detected	0%	100%	0%	0%	0%	10%	0%	0%	100%	100%	100%	100%
SANS 241 Limit	**0.07**	**5**		**0.003**	**0.01**	**0.01**	**0.04**	**0.03**				
Average		0.070				**0.021**			575	570	4.7	595
Min		0.012				**0.021**			262	247	0.9	306
Max		0.226				**0.021**			672	671	15	722
P5		0.026							384	375	1.1	377
P50		0.053							592	587	3.3	614
P95		0.161							671	670	11	719

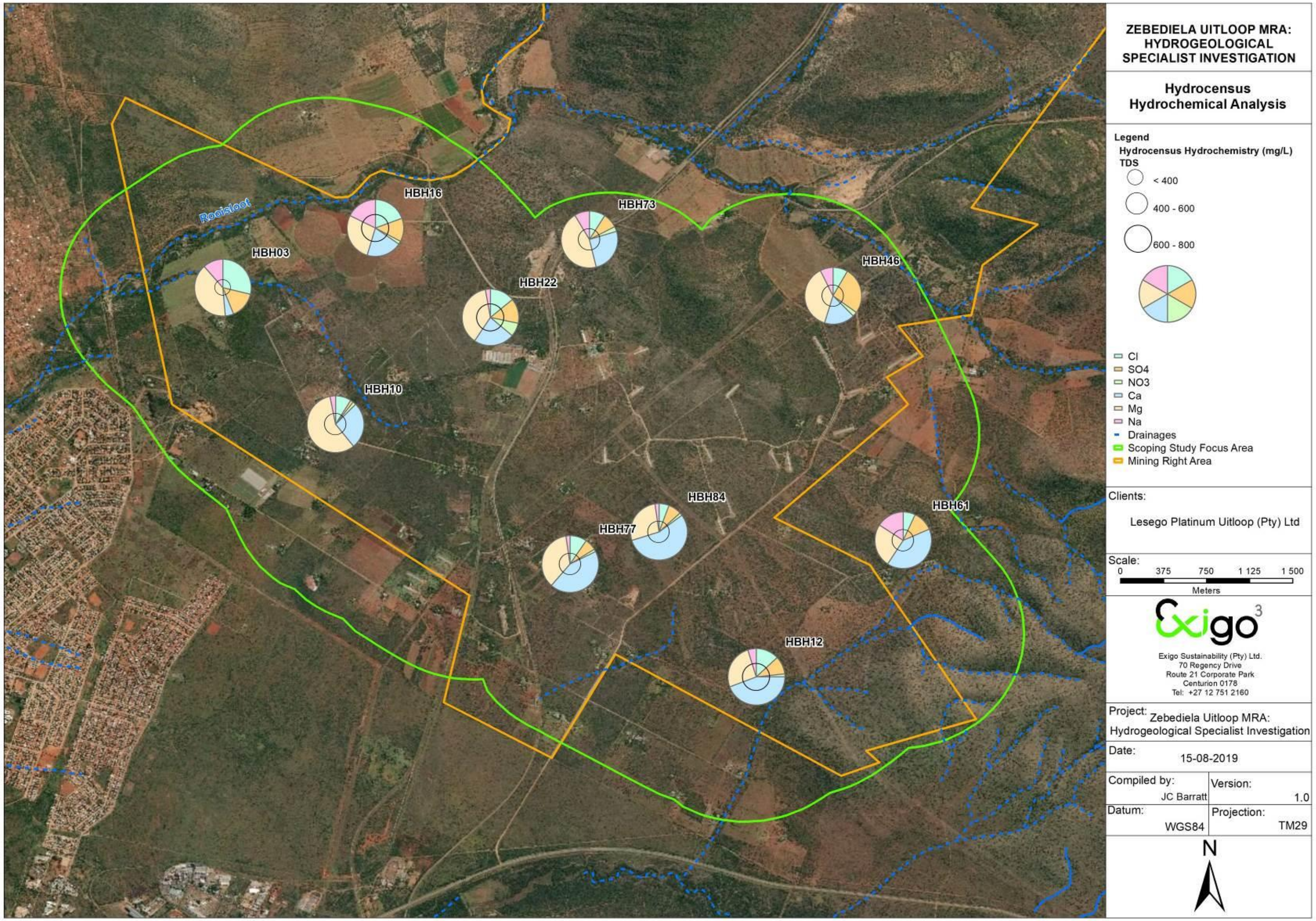


Figure 51: Spatial pie chart of selected macro constituents

12.8.6. Nearest potential groundwater receptors

Based on the site layout options, a 1 km buffer zone was used to identify potential groundwater receptors as part of the scoping study focus area. Figure 52 illustrates the different site layout options along with potential groundwater receptor identification and the potential receptors. A total of 56 potential receptors were identified, which need to be individually examined during the EIA phase of the project.

As previously eluded to, 24% of the area's boreholes are utilised for water supply, production, or irrigation purposes. Dewatering is expected from the mine's open pit which may impact these potential receptors. 49% of the total boreholes visited also provide water as a domestic, livestock, or back-up source. Approximately 75% of the area's boreholes have a purpose associated with groundwater abstraction illustrating the area's reliance on groundwater resources.

Depending on the open pit's zone of influence, layout of the infrastructure, and alternative water resources available to the area's groundwater users, the impact from the proposed mining activity can be mitigated and managed.

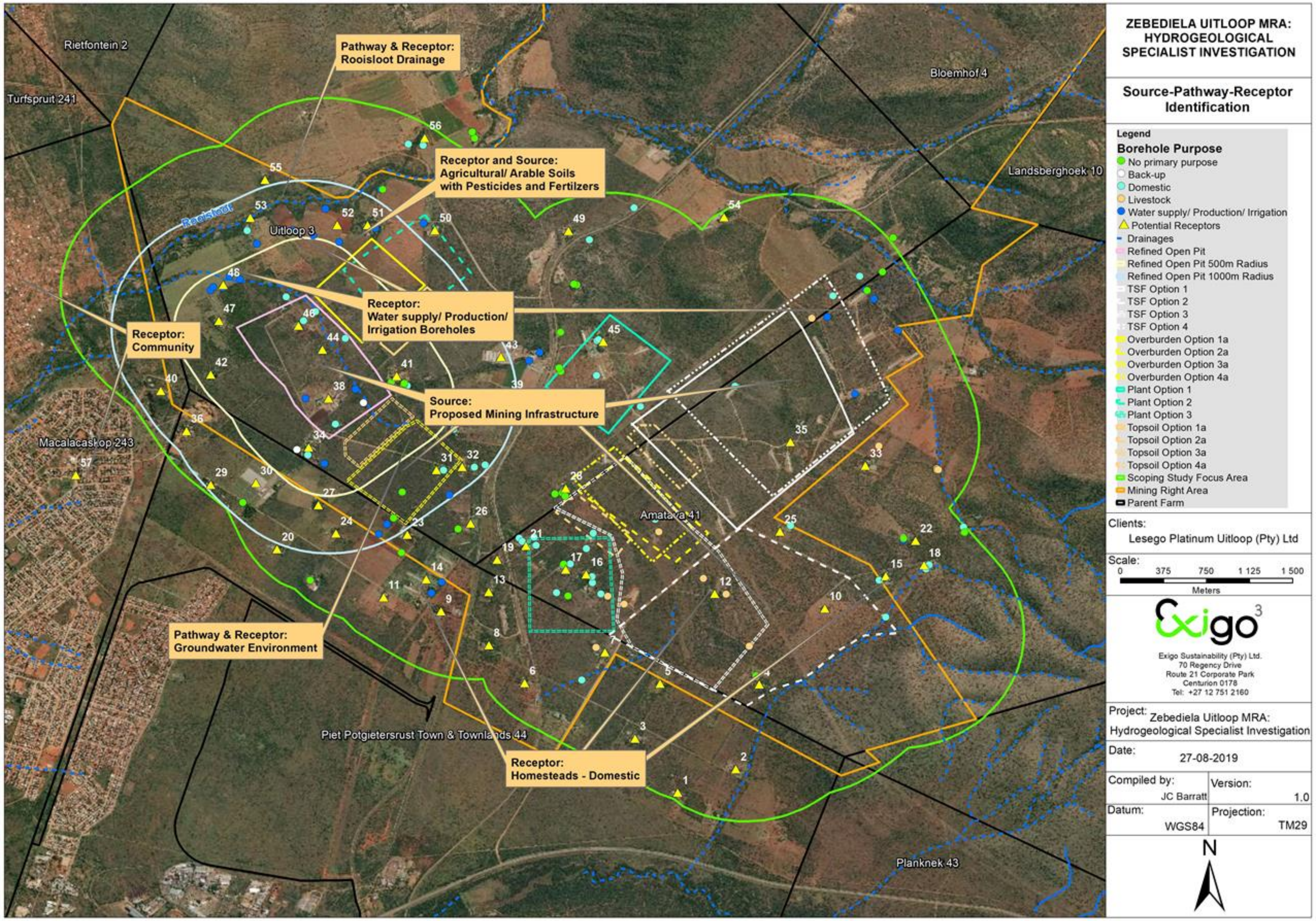


Figure 52: Nearest potential groundwater receptors identification zone

12.8.7. *Aquifer classification and vulnerability*

Based on the groundwater quantities and qualities, the localised aquifer can be classified as the following (Parsons 1995, Table 14):

- Sole Source Aquifer for areas that does not have bulk water supply.
- Major and Minor Aquifer based on the assumption that the numerous water supply, production, and irrigation boreholes yield sufficient groundwater to warrant yields between 1 and 20 ℓ/s.
- Major and Minor Aquifer based on the groundwater quality that is suitable for human consumption based on SANS 241 drinking water standard with exception to only two measured locations that each have one guideline exceedance.

Table 14: South African Aquifer Classification System (Parsons, 1995)

Aquifer System	Defined by Parsons (1998)	Defined by DWAF Minimum Requirements (1995)
Sole Source Aquifer	An aquifer which is used to supply 50 % or more of domestic water for a given area, and for which there are no reasonably available alternative sources should the aquifer be impacted upon or depleted. Aquifer yields and natural water quality are immaterial.	An aquifer, which is used to supply 50% or more of urban domestic water for a given area for which there are no reasonably available alternative sources should this aquifer be impacted upon or depleted.
Major Aquifer	High permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good (<150 mS/m).	High yielding aquifer (5-20 l/s) of acceptable water quality.
Minor Aquifer	These can be fractured or potentially fractured rocks, which do not have a high primary permeability or other formations of variable permeability. Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large quantities of water, they are important both for local supplies and in supplying base flow for rivers.	Moderately yielding aquifer (1-5 l/s) of acceptable quality or high yielding aquifer (5-20 l/s) of poor quality water.
Non-Aquifer	These are formations with negligible permeability that are generally regarded as not containing ground water in exploitable quantities. Water quality may also be such that it renders the aquifer as unusable. However, ground water flow through such rocks, although imperceptible, does take place, and need to be considered when assessing the risk associated with persistent pollutants.	Insignificantly yielding aquifer (< 1 l/s) of good quality water or moderately yielding aquifer (1-5 l/s) of poor quality or aquifer which will never be utilised for water supply and which will not contaminate other aquifers.
Special Aquifer	An aquifer designated as such by the Minister of Water Affairs, after due process.	An aquifer designated as such by the Minister of Water Affairs, after due process.

The flow assumptions will need to be verified with on-site data in the EIA phase of the project.

12.9. Heritage Resources

The following section was completed with the assistance of the heritage practitioner Mr Neels Kruger (refer to Appendix 8 for the Archaeological Scoping Assessment Report).

An analysis of historical aerial imagery and archive maps of areas subject to this assessment suggests a landscape which has been subjected to historical farming activities possibly sterilising the area of any heritage remains. This inference was confirmed during an archaeological site assessment in July 2019 during which no in situ archaeological or heritage remains were encountered.

However, out of context Stone Age archaeological material, Iron Age sites and some graves were noted in transformed areas of the project footprint. Infrastructure such as the remains of dwellings, cattle pens and a concrete dam occur in the larger project area and has been constructed in the last 60 years during the Contemporary Period and is not protected under the National Heritage Resources Act (NHRA 1999).

The following heritage findings were made during the site survey.

12.9.1. The Stone Age

- **Site Exigo-ZNM-SA01 Stone Age Scatter**
  Uitloop 3 KS Ptn 63
- **Site Exigo-ZNM-SA02 Stone Age Scatter**
  Uitloop 3 KS Ptn 51

Stone Age remains occur abundantly in the larger Mokopane landscape where locally available raw material for the manufacture of stone tools is available in the geological landscape. Similarly, scatters of Stone Age artefacts were observed in low densities in the project area. Most of the artefacts are Middle Stone Age lithics such as blades and scrapers indicating various degrees of weathering and patination on the surface of the lithics. This might imply that they have been transported by water and have lain on the surface of the landscape for varying lengths of time. Hornfels is the predominant raw material used but quartzite and banded sandstone are also evident. No evidence of any factory or workshop site, or the result of any human settlement was identified in any of the project areas. The fairly small numbers and disturbed context in which they were found means that the archaeological remains in the study area have been rated as having moderate-low archaeological significance. It is highly likely that Earlier, Middle and possibly Later Stone Age scatters will occur in the area, specifically along drainage lines. The Stone Age sites are located within the demarcated footprint for the mine development and impact on the sites can be anticipated.

Figure 53: View of compacted and cleared surfaces where lithics were found

Figure 54: A view of debitage and flakes on the surface in the study area

Figure 55: Highly weathered MSA tools from the study area

Figure 56: A selection of weathered broken blades dating to the MSA from the study area

Figure 57: Weathered ESA handaxes (left and right) and a core (middle) from the study area

12.9.2. The Iron Age Farmer Period

- **Site Exigo-ZNM-IA01 Stone Terracing**

  Amatava 41 KS Ptn 1

A number of small stone terraces were documented on the southern slopes of a small ridge in a central portion of Portion 1 of the Farm Amatava. The stone structures follow the densely vegetated slopes along contours to form a series of terraces and they probably indicate Later Iron Age Farmer Period Occupation / activity area. Preservation of the features is generally poor and associated Iron Age farmer Period material culture is absent from this site. The site might be significant in terms of its regional and local representation in the Iron Age Farmer Period landscape of the area and it is rated as of moderate significance. The site is located within the demarcated footprint for the mine development and impact on the site can be anticipated.

Figure 58: View of densely overgrown stone terracing at Site Exigo-ZNM-IA01

- **Site Exigo-ZNM-IA02 Possible Smelting Site**

  Uitloop 3KS Ptn 54

Indications of metal smelting were noted near an agricultural field on a portion of the farm Uitloop 3 KS Ptn 54. The site, measuring approximately 10m x 10m displays a surface scatter of artefacts associated with copper smelting and smiting such as ore fragments and smelting residues such as slag and bloom. A clear soil difference is also visible in this area where the associated geomorphologic matrix has a distinct dark / black colour. Considering regional histories pertaining to historical metal working in the Waterberg region, the site probably dates to the Later Iron Age. The site is significant in terms of its regional representation in the Iron Age Farmer Period landscape but artefact densities are low and the site is rated as of moderate significance. The site is located within the demarcated footprint for the mine development and impact on the site can be anticipated.

Figure 59: View of iron ore fragments at Site Exigo-ZNM-IA02

- **Site Exigo-ZNM-IA03 Possible Iron Age occupation site**
  Amatava 41KS Ptn 14
- **Site Exigo-ZNM-IA04 Possible Iron Age occupation site**
  Amatava 41KS Ptn 13

A number of grain bin stands and stone cairns were noted on two adjacent portions of the farm Amatava. No other signs of occupational debris or artefacts were noted here but the features might indicate a Later Iron Age Farmer Period agriculture zone. Preservation of the features is generally poor and associated Iron Age Farmer Period material culture is absent from this site. The sites might be significant in terms of their regional and local representation in the Iron Age Farmer Period landscape of the area and are rated as of moderate significance. The sites are located within the demarcated footprint for the mine development and impact on the sites can be anticipated.

Figure 60: View of irregular stone features at a possible Iron Age settlement at Site Exigo-ZNM-IA03

12.9.3. The Historical / Colonial Period

- **Site Exigo-ZNM-HP01 Old Agricultural Landscapes**

  Amatava 41KS Ptn 16

- **Site Exigo-ZNM-HP02 Old Agricultural Landscapes**

  Amatava 41KS Ptn 16

A study of historical aerial images and topographic maps indicate extensive agricultural activities in the project area during the last century. Similarly, old agricultural landscapes were noted in various locations where piles of rock and stones were removed from fields and stacked on stone cairns. In addition, rough stone walls were constructed from these stones along agricultural fields, the remains of which are still evident in the landscape. Generally, these sites might be associated with the early phases of settlement of the respective farms, which was proclaimed during the first part of the 19th century. However, the sites are probably not of heritage significance as such historical agricultural landscapes occur frequently and throughout the landscape of the Limpopo Province and the Waterberg.

- **Site Exigo-ZNM-HP03 Historical Period Settlement Area**

  Amatava 41KS Ptn 16

A settlement area dating to the mid-20th century occurs on a portion of the farm Amatava. Here, foundation remains of stone, brick and mud houses, ash middens and stone stock enclosures occur in association with Acacia and Euphorbia Trees. Even though the settlement is not indicated on historical maps of the area, the owner of the property indicated that the area was occupied by farm labourers during the middle of the 20th century. This is supported by the fact that material in middens such as glass, metal, enamel, plastic and wood indicate a late Historical temporality for the site. According to indications, the site might be older than 60 years and generally protected under the National Heritage Resource Act (NHRA 1999), but the feature is poorly preserved and any notable heritage or historical association could not be established. As such, it is rated as of low significate.

- **Site Exigo-ZNM-HP04 Historical Period Settlement Area**
  Amatava 41KS Ptn 14

The dilapidated remains of a square stone dwelling were noted along the border of Portion 14 and Portion 13 of the farm Amatava in the project area. The feature measures approximately 3m x 3m and it is made up of stones cemented with mud and concrete. A temporal context for the structure could not be ascertained and it is neither indicated, nor visible on historical topographical maps and aerial photographs. According to indications, the structure might be older than 60 years and generally protected under the National Heritage Resource Act (NHRA 1999), but the feature is poorly preserved and any notable heritage or historical association could not be established. As such, it is rated as of low significate.

- **Site Exigo-ZNM-HP05 Historical Period Calcrete Quarry**
  Uitloop 3KS Ptn 56

A large open-air calcrete quarry probably dating to the recent Historical Period occurs on a portion of the farm Uitloop. The quarry is approximately 20m long and in places more than 2m deep. It seems that the quarry has been used until relatively recently based on excavations and material culture still visible at the site. The site probably has limited research potential and it is rated as of low heritage significance.

- **Site Exigo-ZNM-HP06 Historical Period Farmhouse (-24.140938 29.058098)**
  Uitloop 3KS Ptn 13

A Historical Period farmhouse was noted on Portion 13 of the Farm Amatava. The multi room building was constructed out of brick with plastered up walls and a pitched corrugated iron roof, metal window frames and wooden doors. The structure is currently occupied and sections thereof seem to have been transformed and altered in recent years. An analysis of historical aerial photographs indicates the presence of the farmstead and the building by at least 1954 and the dwelling is older than 60 years - and generally protected under the National Heritage Resource Act (NHRA 1999). The farmhouse might afford a better understanding of architectural, industrial and social developments in the Mokopane farming landscape and the site is rated as of moderate heritage significance. The farmstead is located within the demarcated footprint for the mine development and impact on the site can be anticipated.

Figure 61: View of a line of stones removed from old agricultural lands at Site Exigo-ZNM-HP01

Figure 62: View of Historical Period occupation site at Site Exigo-ZNM-HP04

Figure 63: View of a Historical Period farmhouse at Site Exigo-ZNM-HP06

12.9.4. The Contemporary Period

- **Site Exigo-ZNM-CP01 Contemporary Period Structures**

  Uitloop 3KS Ptn 54

The walls of three concrete brick structures occur near an agricultural field on the farm Uitloop. According to indications, the structures are not older than 60 years - and they are not protected under the National Heritage Resource Act (NHRA 1999).

- **Site Exigo-ZNM-CP02 Contemporary Period Structures**

  Amatava 41KS Ptn 15

The dilapidated remains of a compound of buildings constructed out of stone and cement occurs on a small hill on the farm Amatava. According to indications, the structures are not older than 60 years - and they are not protected under the National Heritage Resource Act (NHRA 1999).

Figure 64: View of a Contemporary Period structures at Site Exigo-ZNM-CP02

12.9.5. Graves and Burials

At least 9 graves or potential burial sites were identified across the project area. The burial places hold various numbers of graves, a number of which are older than 60 years or unmarked. In many instances, burial locations in this area follow a general (and fairly common) pattern where graves occur around the remains of historical house structures and homestead complexes.

- **Site Exigo-ZNM-BP01 Cemetery**
  Amatava 41KS Ptn 1

A small family cemetery occurs directly south of chicken sheds in a central portion of the farm Amatava Portion 1. Two of the burials are marked with modern granite headstones and two other graves are indicated by elongated stone cairns. The marked graves belong to relatives of the Thindisa family and the cemetery has apparently been frequented by families in recent years. The burials area positioned in an east-west orientation, the site is not fenced off and its condition of preservation is fair. Material culture such as enamel and glass containers were noted on the surface in association with the grave. The burial site, which is of high heritage significance, occurs within the demarcated footprint for the mine development and impact on the site can be anticipated.

- **Site Exigo-ZNM-BP02 Stone Cairn Burials**
  Uitloop 3KS Ptn 0

A number of graves occur in a densely vegetated section of the farm Uitloop 3KS. The burials, which were first identified by Roodt in 2008[3] are indicated by crudely stacked stone cairns. The site is not fenced off and its condition of preservation is poor. No material culture were noted on the surface in association with the graves. The burial site, which is of high heritage significance, occurs within the demarcated footprint for the mine development and impact on the site can be anticipated.

- **Site Exigo-ZNM-BP03 Stone Cairn Burials**
  Uitloop 3KS Ptn 39
- **Site Exigo-ZNM-BP04 Stone Cairn Burials**
  Amatava 41KS Ptn 12
- **Site Exigo-ZNM-BP05 Stone Cairn Burials**
  Uitloop 3KS Ptn 57
- **Site Exigo-ZNM-BP06 Stone Cairn Burials**
  Amatava 41KS Ptn 16
- **Site Exigo-ZNM-BP07 Stone Cairn Burials**
  Amatava 41KS Ptn 16
- **Site Exigo-ZNM-BP08 Stone Cairn Burials**
  Amatava 41KS Ptn 15

[3] Roodt. F. 2008. Heritage Resources Scoping Report N11 road re-alignment Mokopane : Limpopo. R&R Consultants

A number of graves or presumed graves occur on various portions of Uitloop and Amatava in densely vegetated sections of the project area. The possible burials are indicated by crudely stacked stone cairns. The sites are not fenced off and the condition of preservation of the burials is generally poor. The burial sites, which are of high heritage significance, occur within the demarcated footprint for the mine development apart from Site Exigo-ZNM-BP08 which occurs in the larger project area and impact on the sites can be anticipated. Sites Exigo-ZNM-BP03 and Exigo-ZNM-BP05 occur within the proposed open pit footprint and impact on these sites are therefore anticipated.

Figure 65: View of a burials at Site Exigo-ZNM-BP01

Figure 66: View of a burials at Site Exigo-ZNM-BP01

12.9.6. Other sites / features

- **Site Exigo-ZNM-FT01 Stone Features / Structures**
  Uitloop 3KS Ptn 56
- **Site Exigo-ZNM-FT02 Stone Features / Structures**
  Amatava 41KS Ptn 15

- **Site Exigo-ZNM-FT03 Stone Features / Structures**
  Amatava 41KS Ptn 16
- **Site Exigo-ZNM-FT04 Stone Features / Structures**
  Amatava 41KS Ptn 13
- **Site Exigo-ZNM-FT05 Stone Features / Structures**
  Uitloop 3KS Ptn 56
- **Site Exigo-ZNM-FT06 Stone Features / Structures**
  Amatava 41KS Ptn 16
- **Site Exigo-ZNM-FT07 Stone Features / Structures**
  Amatava 41KS Ptn 16

A large number of irregular stone structures, rock heaps and stone cairns were documented on various portions of Uitloop and Amatava in densely vegetated sections of the project area. The function of these features is not known but some of the structures might indicate prehistoric or Historical Period burials. As such, the heritage significance of these features remains to be established and are therefore unknown. In most instances, the sites are not located within the demarcated footprint for the mine development but in the larger project area (apart from Site Exigo-ZNM-FT02, Site Exigo-ZNM-FT04 and Site Exigo-ZNM-FT06) Impact on these sites can be anticipated.

Figure 67: View of an unidentified stone feature in the project area

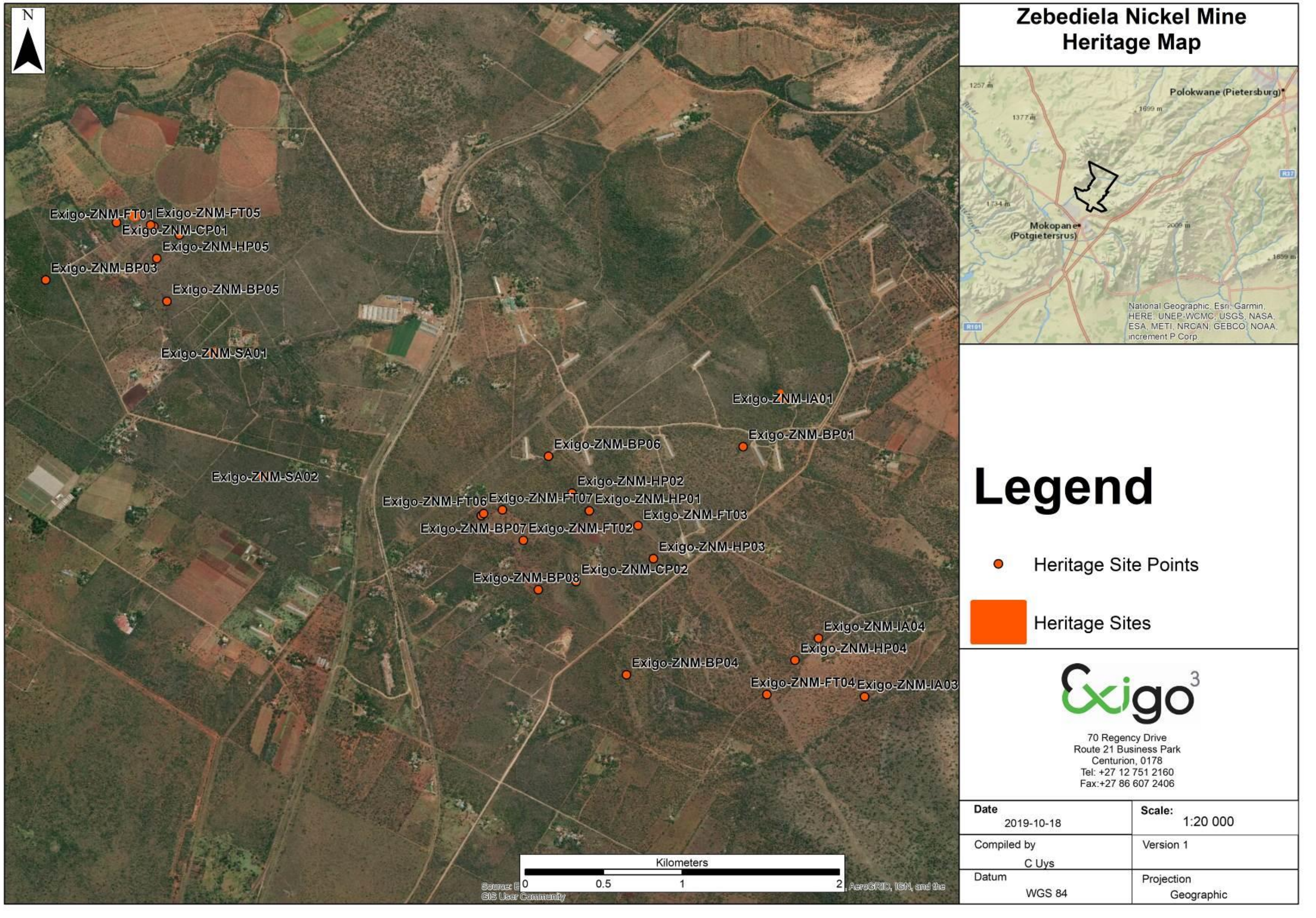


Figure 68: Map of heritage sites in the study area

12.9.7. Palaeontology

A palaeontological impact assessment was performed by Dr Heidi Fourie. The sections below were provided by Dr Fourie and offer an overview of the possible palaeontological resources that could be found at the proposed mine site.

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of sedimentary rock strata the palaeontological sensitivity is generally low to very high.

The Transvaal Supergroup fills an east-west elongated basin in the south-central part of the old Transvaal (now North–West, Gauteng and Mpumalanga) as far south as Potchefstroom. It is Vaalian in age, approximately 2600 (Mega-annum) Ma to 2100 Ma. A maximum thickness of the Transvaal Supergroup reaches 2000 m in the north-eastern section. The east-west elongated basin is filled with clastic, volcanic and chemical sedimentary rocks. Three groups based on lithological differences have been established: they are the Rooiberg, Chuniespoort, and Pretoria Groups as well as other smaller groups (Kent 1980, Snyman 1996). It is the Bushveld Complex that is responsible for the tilting of the Transvaal sediments and the heat of its intrusion having created andalusite crystals (Norman and Whitfield 2006). This Supergroup is underlain by the Ventersdorp, Witwatersrand and Pongola Supergroups, and the Dominion Group. Three prominent ridges are present from the oldest to the youngest, the Time Ball Hill, Daspoort and Magaliesberg Formations (Norman and Whitfield 2006).

The Pretoria Group consists predominantly of quartzite and shale, together with a prominent volcanic unit, minor conglomerate, chemical and volcanic members. It comprises the Hekpoort Andesite, Dullstroom Basalt, Time Ball Hill, Silverton, and Magaliesberg Quartzite Formations as well as several smaller formations (in total 15) and overlies the Chuniespoort Group (Kent 1980). The Time Ball Hill shale Formation is known to contain ‘algal microfossils’ diagenetic in origin. Stromatolites as they are known are preserved in the subordinate carbonate rocks (Kent 1980). The Pretoria Group is clastic sedimentary in nature (Eriksson 1999). The pile of sedimentary rocks, mainly mudstones and quartzites with some basalt can collectively reach a thickness of up to 5 km (Visser 1989). The Rooihoogte Formation sits at the base of the Pretoria Group and is quite thin (10 – 150 m). The chert is present as boulders or a breccia. It is often lumped with the Time Ball Hill Formation (Visser 1989).

The Chuniespoort Group is made up of chemical and biochemical sediments such as dolomite, chert, limestone and banded iron formation, carbonaceous shale is also present. At the top of the Malmani Subgroup is the Duitschland Formation underlain by the Penge and Monte Christo Formations. Sandstone is mostly absent. It is this formation that has great economic value for its lead, zinc, dolomite, and manganese (Kent 1980, Snyman 1996). Fluorspar, concrete aggregate, iron ore and manganese is also mined from this formation. Cave formation in the dolomite is a major concern in developing areas, especially in the 1500 m thick dolomite of the Malmani Subgroup. Chemical sediments such as fine-grained limestone and dolomite is made up of deposits of organically derived carbonate shells, particles or precipitate. Dolomite is magnesium-rich limestone formed from algal beds and stromatolites.

The Black reef Formation of the Transvaal Supergroup consists of quartzite with lenses of grit and conglomerate. Shale is always present, particularly near the top close to the contact with the overlying dolomite (Kent 1980). It is Vaalian in age and not very thick, only up to 500 m in the north-east. It contains a fair amount of gold and the limestone is mined (Snyman 1996). The Black Reef Formation is known for stromatolite carbonates and fossiliferous Late Cenozoic cave breccias similar to the Malmani dolomite. Algal microfossils are reported from shales and are probably from diagenetic origin. Stromatolites are preserved in the subordinate carbonate rocks.

Legend to Map and short explanation.

Vl – Melanorite, pyroxenite, serpentinized harzburgite, chromite layer (green). Lower zone, Rustenburg Layered Suite, Bushveld Complex. Vaalian.

Vt – Shale, hornfels, subordinate schist: Nooitgedacht Quartzite Member (brown). Time Ball Hill, Pretoria Group, Transvaal Supergroup. Vaalian.

Vd – Limestone, dolomite, chert, shale, quartzite, diamictite, hornfels, and conglomerate (purple). Duitschland Formation, Chuniespoort Group, Transvaal Supergroup. Vaalian.

Vmd – Dolomite, chert (blue), Malmani Subgroup, Chuniespoort Group, Transvaal Supergroup. Vaalian.

Vbr – Quartzite, shale, sandstone, volcanic rocks (dark blue). Black Reef Formation. Vaalian.

Rg – Leucocratic grey biotite granite-gneiss, leucocratic granite and pegmatite (pink). Randian.

Zp – Acid to intermediate lava, pyroclasts (dark purple). Zwazian.

---f--- – (black) Fault.

---f--- – (black) Fault.

┴ 30 - Strike and dip of bed.

------ - Concealed geological boundary.

□ – Approximate position of development (in white on the Figure).

Figure 69: The geology of the development area

Chemical sediments such as fine-grained limestone and dolomite is made up of deposits of organically derived carbonate shells, particles or precipitate. Dolomite is magnesium-rich limestone formed from algal beds and stromatolites. These Early Proterozoic Transvaal stromatolitic dolomites formed and released free oxygen at around 2900 – 2400 Ma. Stromatolites are common in the Malmani dolomites, accepted to be the fossil remnants of the simplest single-celled organisms. They are finely layered, concentric, mound-like structures formed by microscopic algal organisms (Norman and Whitfield 2006). Chert may contain fossils such as echinoids or sponges if nodular, although not common and is rated unlikely.

Figure 70: Example of a stromatolite present in dolomite (Photograph: E. Butler).

Stromatolites are significant indicators of palaeoenvironments and provide evidence of algal growth between 2640 and 2432 million years ago (Groenewald and Groenewald 2014). The Malmani dolomites are home to most of the cave systems that has yielded hominin fossils such as those at Mokopane's cave. Caves in the Malmani dolomite (Vmd) of the Transvaal Supergroup provided a refuge for man's distant ancestors (Norman and Whitfield 2006). These caves are also home to Middle and Late Stone Age cultures. The cave breccia in the Cradle of Humankind, near Johannesburg, yielded internationally renowned hominins such as Australopithecus africanus and robustus and extinct mammals and other fauna. The cave of Makapansgat is also close by (+/-20 km).

In the rocks overlying the Black Reef Formation there is evidence for life on an abundant scale as cyanobacteria came to dominate the shallow sea forming stromatolites of varying shapes. Large, elongate stromatolite domes can be seen at Boetsap in the North West Province (McCarthy and Rubidge 2005) and the algal microfossils reported from the Time Ball Hill Formation shales are probably of diagenetic origin (Eriksson 1999).

The Time Ball Hill Formation (Vt), Transvaal Supergroup is present in the Pretoria Group. Nixon et al. (1988) described the black shales south-west of Potchefstroom as consisting of overlapping laminated basal mounds which are stromatolitic as well as spheroidal possible planktonic fossil algae. These can range in size from 3.5 - 17 mm in height and up to 10 mm in diameter and can be present in the development area.

There are significant fossil resources of high significance for the Chuniespoort Group, Transvaal Supergroup that may be impacted by the development and if destroyed are no longer available for scientific research or other public good.

The above aspects will be expanded upon during the EIA phase of the project.

12.10. Visual Aspects

Graham Young from Graham A Young Landscape Architect (GYLA) was commissioned to undertake a Visual Impact Assessment and he visited the site on 28 and 29 June 2019. In order to identify the study area, the Visual Impact Assessment identified receptors within a 10km radius surrounding the site as the zone of potential influence (refer to Figure 71). Receptors that are located within the zone of potential influence could potentially be visually impacted and require further investigation. The project area is characterised by urban development (communities of Mahwelereng, Ga-Madiba, Masodi, Tshamahansi, Phola Park, Sekgakgapeng, Mosate, Maroteng, and Masehlaneng) in the west and south west (Mokopane), general farmland and a number of chicken farms in the central areas, and dominated by savannah cover hills in the northern, eastern and south eastern sections. It's in these areas where game farm breeding and other tourist facilities occur. In the south-east, immediately south of the R101 and up against the Makapan mountain is the Mokopane Biodiversity Centre's property, approximately 1300ha in extent. The Makapansgat World Heritage site does not fall within the study area. It's located approximately 5km directly east of the eastern extremity of the study area.

Hills pass through the centre of the mining right area in an east west direction, thereby blocking sensitive views from farmsteads and tourist locations to the north of the study area. Sensitive viewing sites are located to the east of the study area and would experience visual exposure to all the proposes mine infrastructure layout options. Views from residential areas in Mokopane would mostly be blocked by other buildings (mainly industrial), vegetation ant topography.

12.10.1. Visual Resource Value and Sense of Place

The area is characterised by three distinct landscape types: the urban / industrial character in the west and southern areas; the farmland/rural landscape (within which the project site occurs), central to the study area; and the hills and mountains, which dominate the eastern half of the study area.

The value of the visual resource for the study area has an overall rating of moderate, as the once natural landscape has been compromised with the intrusion of urban/industrial/infrastructure and agriculture related activities but is still potentially sensitive to change that would occur given the scale and nature of the proposed mining activities.

Landscape types most sensitive to change and with a low visual absorption capacity, are the mountains and hills north and east of the study area. Change in these landscape types, specifically caused by the proposed mining activities will negatively impact on the scenic quality of the area.

The lower plains associated with the agricultural lands central to the study area, are less sensitive to change but these areas for the most part will be displaced by the TSF, overburden facility and plant and other infrastructure, thereby causing a negative impact on the landscape.

The landscape types least sensitive to change are the degraded plains and open areas denude of vegetation, and urban and infrastructural areas immediately north of Mokopane. This is due to the damage already done to the original landscape through the spread of urban and industrial activities and therefore these areas have the highest capacity to absorb change in the landscape. However, no project activities are proposed in these areas.

The eastern section of the study area has a greater natural sense of place dominated by the hills and mountains, whereas the western sections are mostly urban and have a weaker sense of place.

Refer to Appendix 10 for photographic panoramas illustrating the character and nature of the study area and Figure 84, which indicates the location of the viewing points.

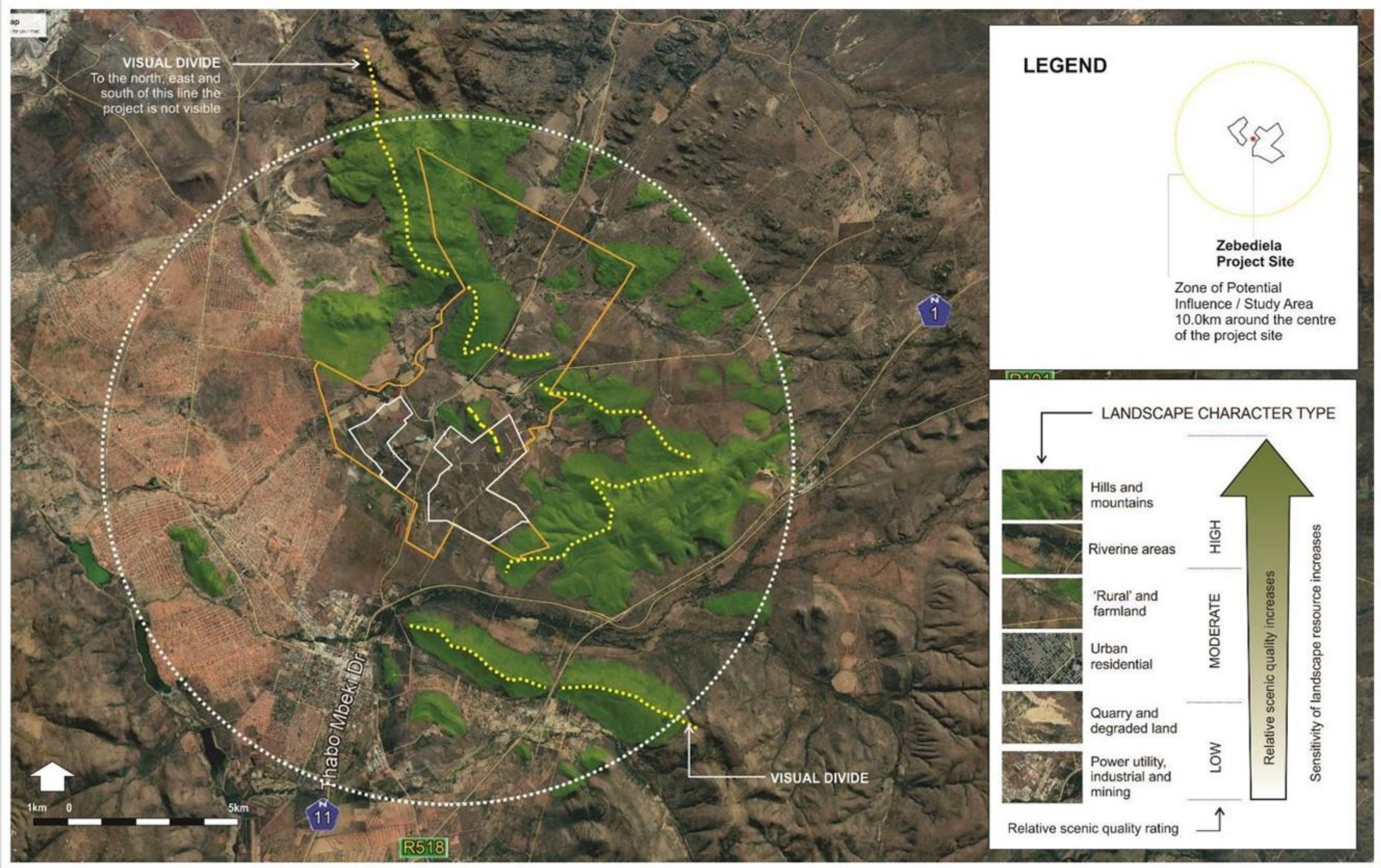


Figure 71: Visual Impact Assessment Study Area indicating landscape type and sensitivities within a 10 km radius surrounding the site (GYLA, 2019)

12.10.2. Visual Receptors

Visual receptors include people living in or visiting farmsteads located in the northern, central and eastern sections of the project area, residents from the various communities west of the study area, as well as people living in Mokopane. Other receptors include people travelling along the N1, N11, the Percy Fyfe road and other local roads traverse the study area.

Within the context of the study area and the region, the following receptors were identified as potentially sensitive to the proposed mining activities:

Table 15: Potential Sensitivity of Visual Receptors

High	Moderate	Low
People visiting farms and tourist facilities to the north, east (game farms) and south (Mokopane Biodiversity Centre) of the project site. Residents living on farms located within the study area, especially for viewer locations within the middleground of views (i.e. up to a 5.0km zone of influence). Locals and visitors travelling through the study area on the Percy Fyfe road. Residents living along the eastern edge of the communities immediately west of the project site.	Locals and visitors travelling through the study area on the N11 and N1.	People working within the study area and travelling along local roads whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view.

12.10.3. Visual aspects to investigate in the EIA Phase

The visual impact of the proposed development will be further assessed in the EIA Phase using computer modelling techniques that establish visibility (viewshed analyses) and visual intrusion (simulations). Typical issues associated with industrial/mining projects:

- Who will be able to see the new development?
- What will it look like and will it contrast with the receiving environment?
- Will the development affect sensitive views in the area and if so how?
- What will be the impact of the development during the day and at night?
- What will the cumulative impact be?

These issues will be investigated in detail during the EIA Phase of the project and will include responses to public concerns raised. The following visual aspects will be considered as part of the EIA Phase:

- Establish public concern for Project specifically as it concerns visual issues (results of the public participation process);
- Establish management measures (mitigation) to reduce the impact of the Project where appropriate.

12.11. Noise

SANS 10103:2008, the Measurement and Rating of Environmental Noise with Respect to Annoyance, and to Speech Communication, is used by the Noise Regulations as limits of noise in the various areas. A desktop assessment was conducted to determine the SANS10103:2008 rating level for the study area receptors in the project area. Based on a preliminary desktop assessment, receptors within the study area fall within a lightly developed area with transportation networks, businesses, and communities etc; and therefore, fall within a Suburban Rating as follows:

Type of District	**Equivalent Continuous Rating Level for Noise (LReq,T) (dBA)**					
	Outdoors			**Indoors with open windows**		
	Day-night (LReq,dn)	**Daytime (LReq,dn)**	**Night-time (LReq,dn)**	**Day-night (LReq,dn)**	**Daytime (LReq,dn)**	**Night-time (LReq,dn)**
b) Suburban districts	50	50	40	40	40	30

The assessment of the noise impact of the proposed mine development on the surrounding receptors is based on a worst-case approach. The modelled scenario is a preliminary desktop noise contour assessment which took the following into consideration:

- Corrections for ground conditions (online resources);
- Noise modelling based on a potential future predicted noise climate;
- The methodologies of ISO 9613-2 and SANS 10357:2008 was used.

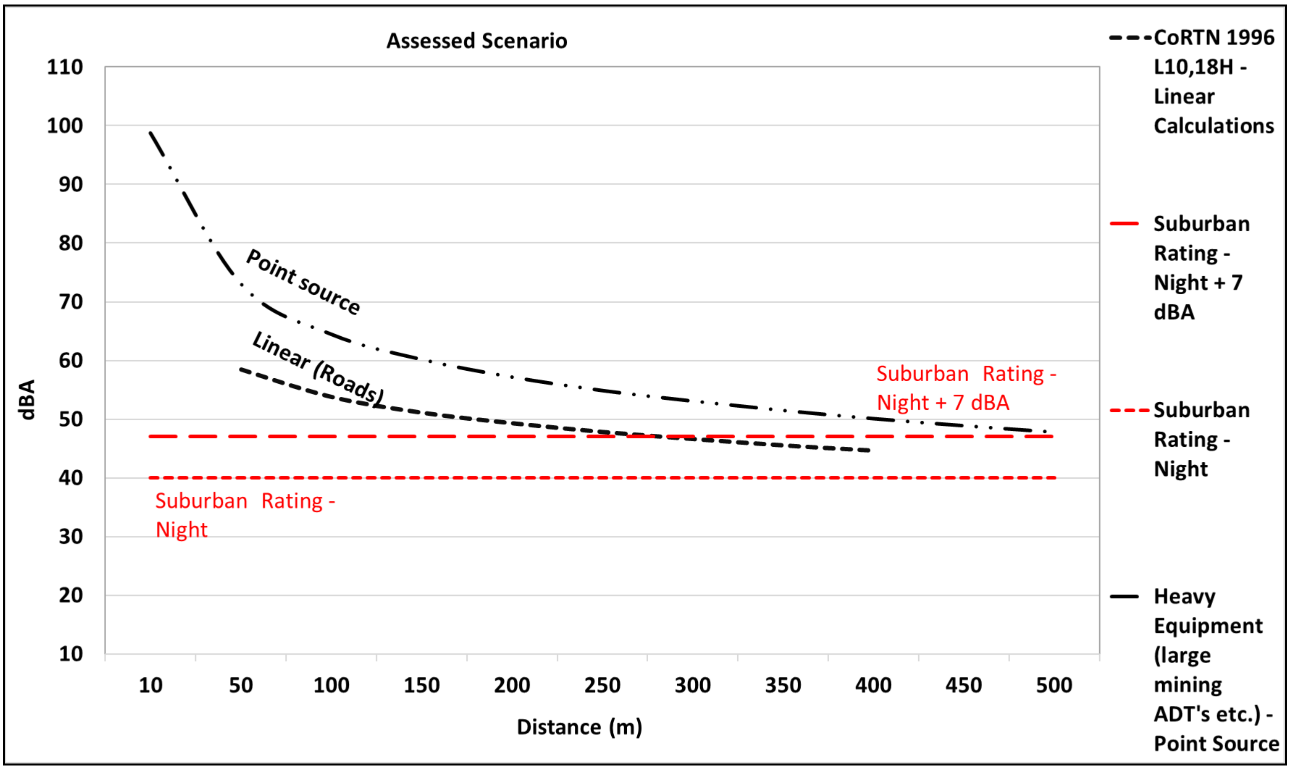


Figure 72: Equivalent Continuous Rating Level $L_{Req,T}$ – Linear Assessment

Based on the noise calculations in Figure 72; receptors will be above the 40 dBA suburban rating level. A full Environmental Noise Impact Assessment will be undertaken during the EIA phase in order to ensure compliance in line with the Noise Control Regulations (GN R154).

12.12. Socio-Economic Environment

12.12.1. Spatial context and regional linkages

The proposed project site is located in the Mogalakwena Local Municipality (LM) which is one of five (5) LM's of the larger Waterberg District Municipality (DM) in the Limpopo Province of South Africa (Waterberg District Municipality, 2017). The seat of the Mogalakwena LM is Mokopane, which is located approximately 60 km south-west of Polokwane, the capital of the province and 200 km north-east of Pretoria (Figure 73). The province shares international borders with Zimbabwe, Botswana and Mozambique. The proposed project site is located in Ward 12 of the Mogalakwena LM (Figure 74).

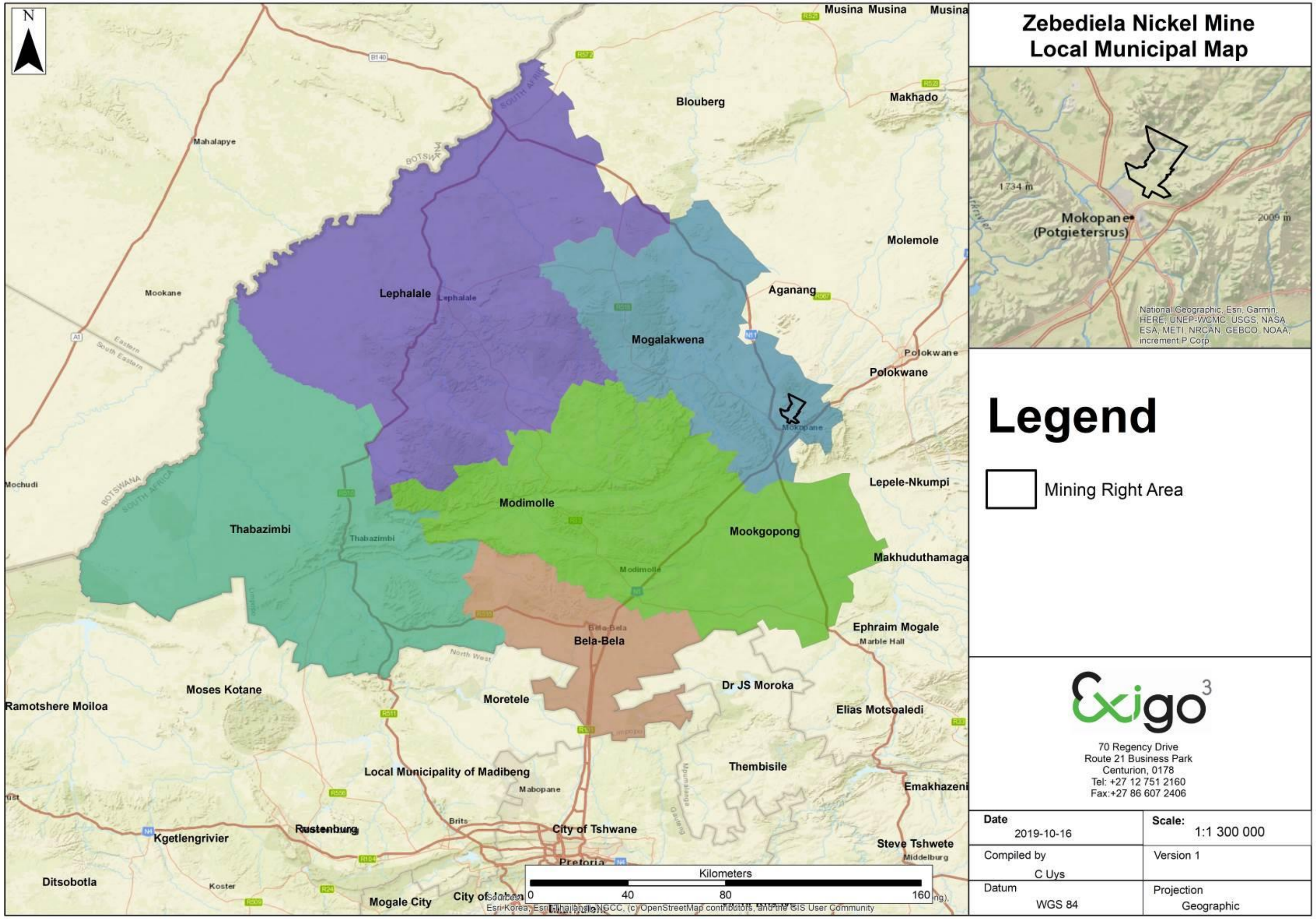


Figure 73: Location of the proposed Mining Right Area in the Mogalakwena Local Municipality

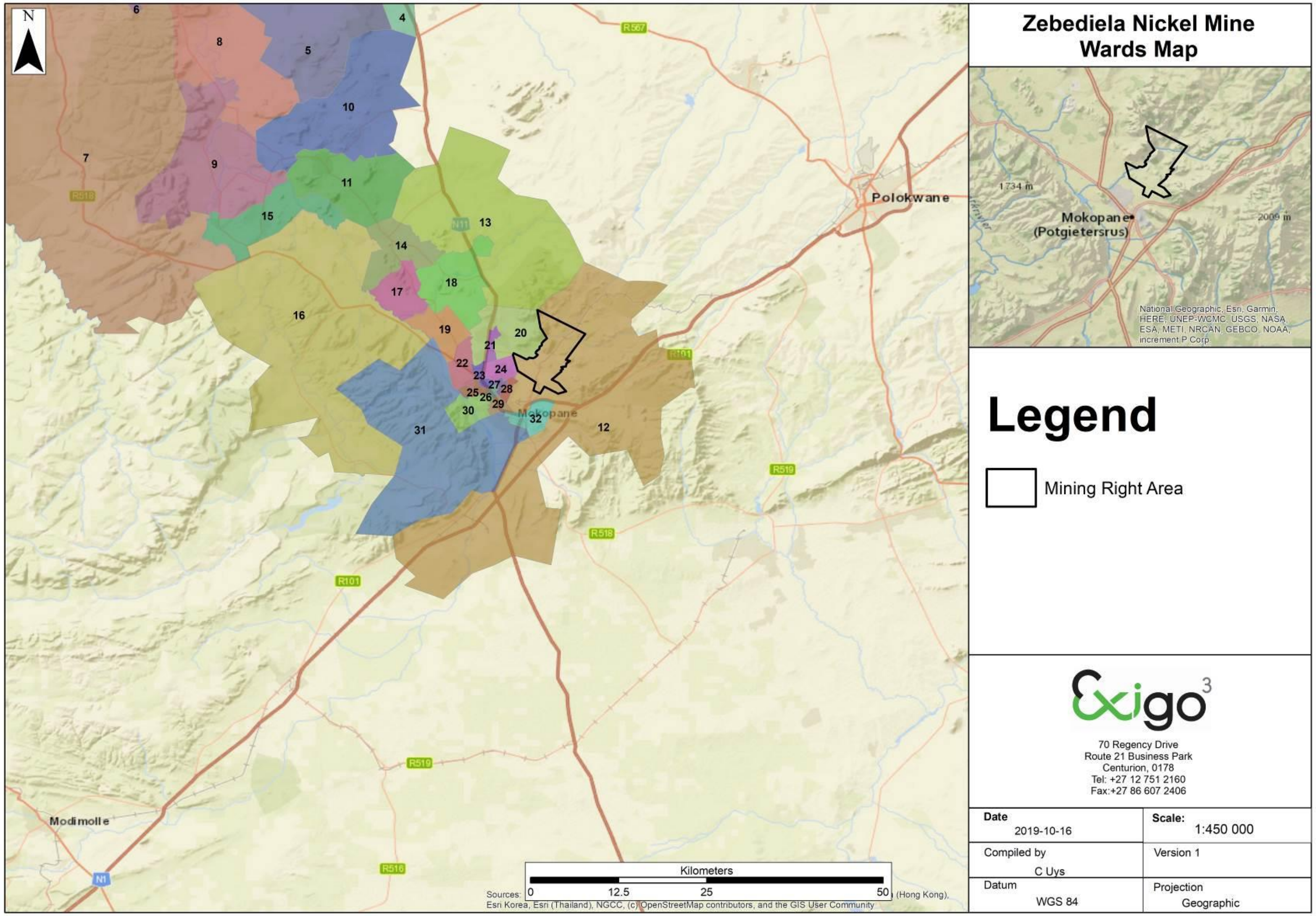


Figure 74: Location of the proposed Mining Right Area in Ward 12

The Waterberg DM is a Category C municipality, which denotes that the municipality has a municipal executive and legislative authority in an area that includes more than one municipality. The DM is one of five district municipalities in Limpopo and is the biggest district in the province. It is comprised of five local municipalities, namely Bela-Bela, Lephalale, Modimolle-Mookgophong, Mogalakwena and Thabazimbi (Mogalakwena Local Municipality, 2019).

The Mogalakwena LM was established on the 5th of December 2000 through the merging of various municipalities and councils that had previously served Potgietersrus and surrounding areas. These local authorities included Greater Potgietersrus, Bakenberg and Koedoesrand/Rebone. The Mogalakwena LM is a Category B municipality, which means it shares a municipal executive and legislative authority with a Category C municipality within whose area it falls (Mlilo, 2019).

12.12.2. Major towns and settlements

This project will be situated near Mokopane, previously called Potgietersrus after a voortrekker leader Piet Potgieter. The town is now named in honour of the Ndebele chief of the Tlou tribe, chief Mgombane Gegana, whose Northern Sotho translation is Mokopane (Mogalakwena LM, 2018). Close to the project site is the township, Mahwelereng-B, which is approximately 2km from Mokopane and is bordered by Sekgakgapeng, Ga-Michele, Moshate and Madiba townships. From Mokopane, the project site may be accessed via the R101 as well as the Percy Fyfe Road.

The Mogalakwena LM is largely situated in a bushveld environment and in a multicultural community (Mogalakwena LM, 2018). The area is rich in minerals – primarily platinum, diamonds and granite, and together with the rich agricultural produce of wheat, tobacco, cotton, beef, maize, peanuts and citrus, these sectors drive the local economy. Notably is the Zebediela Citrus estate which is one of the largest citrus farms in the southern hemisphere (Mogalakwena LM, 2018).

12.12.3. Sense of place, history and cultural aspects

Mokopane, as with Lephalale and Thabazimbi, is the result of mining activities around the minerals found in these areas. The area also boasts various tourism sites such as the Makapan's valley which is located 15 km north of Mokopane town (Mogalakwena LM, 2018). In the caves of Makapan's valley, notable sediments, fossils, bones and artefacts were found and are persevered as a unique record of hominid habitation and evolution which dates back to 3.3 million years (Mogalakwena LM, 2018). Additionally, a museum and various game and nature reserves are observed as tourist sites in the area offering outdoor activities ranging from hiking, fishing, water sports, game viewing, camping and birdwatching.

The most widely spoken language in the Mogalakwena LM is Sepedi (73%), followed by Xitsonga (9%) and IsiNdebele (7%). In the district, a similar pattern is observed as the majority (55%) of the population speaks Sepedi however, the second predominant language is Setswana (11%), followed by Xitsonga (8%) and Afrikaans (7%). At provincial level, Sepedi is the most widely spoken language (52%), followed by Xitsonga (17%) and Tshivenda (17%).

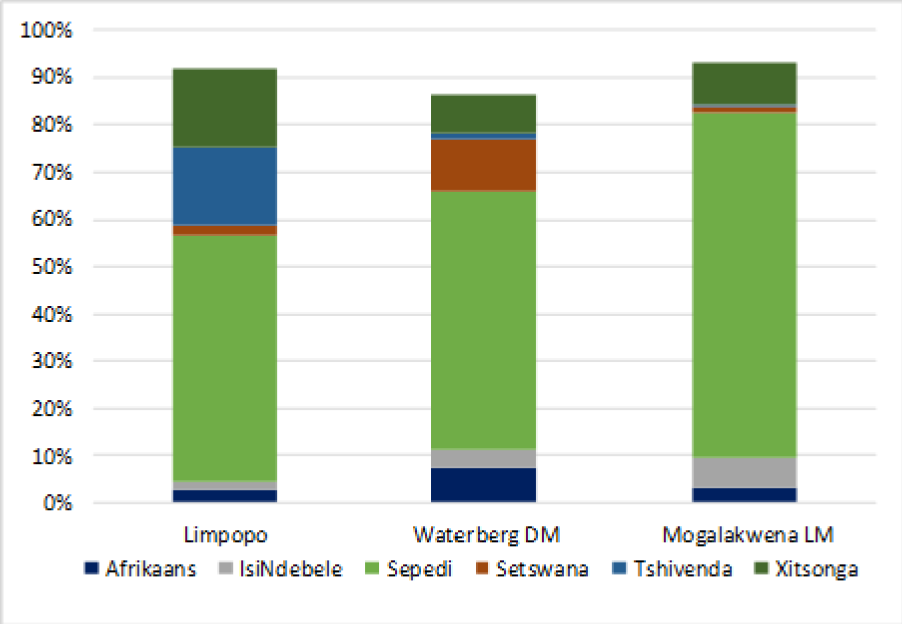


Figure 75: Most spoken languages in the study area (Stats SA, 2012)

12.12.4. Demographics, health and crime profiles

The population of any geographical area is the cornerstone of the development process, as it affects the economic growth through the provision of labour and entrepreneurial skills and determines the demand for the production output. Examining population dynamics is essential in gaining an accurate perspective of those who are likely to be affected by any prospective development or project.

The Mogalakwena LM has a population of approximately 337 107 people, with a total of 85 679 households (Quantec, 2019). The Mogalakwena LM constitutes approximately 44% of the Waterberg DM population, thus having the highest population in the Waterberg DM. Furthermore, approximately 42% of the total households in the Waterberg DM are located in the Mogalakwena LM. The average household size of the Mogalakwena LM is 3.9 as shown in the table below which also displays similar trends on a district, provincial and national level.

Table 16: Demographic profile, 2018 (Quantec, 2019)

Location	Area (km^2)	Population	Household Total	Average Household size	Household density per km^2
Mogalakwena LM	6 166,1	337 107,4	85 679	3,9	13,9
Waterberg DM	4 4913,4	758 798,5	202 066	3,8	4,5
Limpopo	125 753,9	5 797 275	1 500 027	3,9	11,9
South Africa	1 220 813	57 725 606	16 092 377	3,6	13,2

(Quantec, 2019)

The Mogalakwena municipal area recorded an annual population growth rate of 0.9% per annum between 2013 and 2018, which was on par with the district's population growth rate (Quantec, 2019).

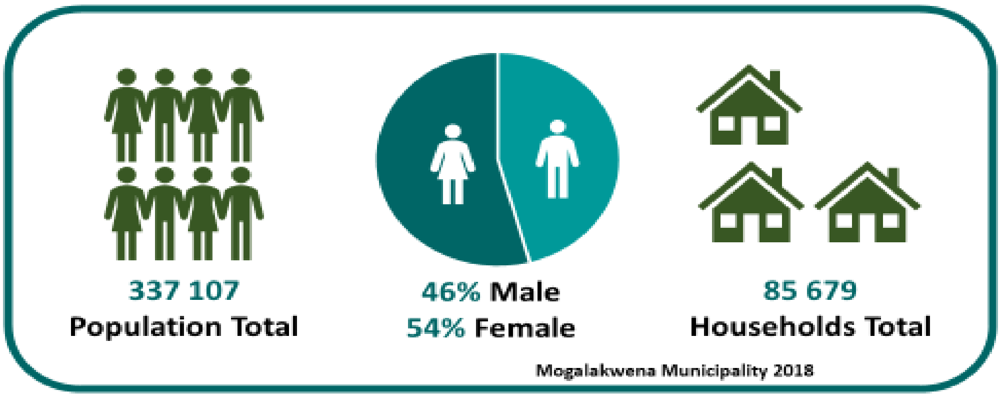


Figure 76: Population demographics in the Mogalakwena LM (Quantec, 2019)

A greater proportion of the population is comprised of females who make up 54% of the total population as shown in the figure above. Furthermore, the majority (57.3%) of the population are aged between 15 and 64 followed by those below 15 years with just over 35%, and the minority of the population are aged over 65 years making up approximately 7% of the total population (Quantec, 2019). This denotes that the working age group dominates and that the majority of the population is productive.

Approximately 7% of the population of the Mogalakwena are infected with HIV and of this group 60.9% of the infected people are females, while the males account for 39.1% of the infected population. The number of people infected has been increasing for the past five years (Mogalakwena Local Municipality, 2019).

Statistics related to crime in the Mogalakwena LM revealed that while serious crime levels had increased between 2013 and 2015, it significantly decreased in 2016 as shown in the figure below. Nevertheless, the municipality experienced a sharp increase in crime in 2017, which was higher than ever before. A further increase in crime incidents was witnessed in 2018. Crime detected as a result of police action increased between 2017 and 2018. According to the Mogalakwena LM IDP, the crime categories with the highest crime level include community reported serious crime, assault, theft, drug-related crimes and burglaries (Mogalakwena Local Municipality, 2019).

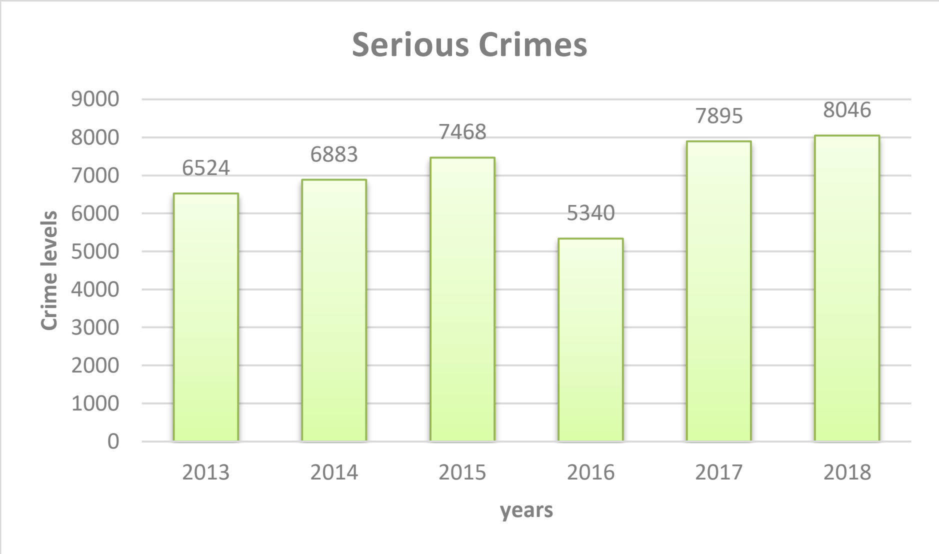


Figure 77: Mogalakwena LM: Serious Crime Levels (Quantec, 2019)

12.12.5. Income and educational levels

The average income of an economy is used to measure its standard of living and it also speaks to an economy's development status. Income distribution is one of the most important indicators of social welfare, as income is a primary means by which people are able to satisfy their basic needs such as food, clothing, shelter, health, services, etc. Changes in income inflict changes in the standard of living, more specifically: a positive change in income can assist individuals, households, communities and countries to improve living standards.

The table below shows the various statistics for the Mogalakwena LM. The table demonstrates that just over 15% of the population did not earn an income. Based on the table, 38.9% of the population are in the low-income category, while 43.1% are in the middle-income category and the minority are in the upper-income category.

Table 17: Income levels of Mogalakwena LM (2011) (Statistics SA, 2012)

Annual household income	Percentage
No income	15,40%
R1 - R4,800	5,20%
R4,801 - R9,600	10,60%
R9,601 - R19,600	23,10%
R19,601 - R38,200	22,10%
R38,201 - R76,4000	10,20%
R76,401 - R153,800	6,40%
R153,801 - R307,600	4,40%
R307,601 +	2,50%

In terms of educational levels, the graph below depicts that the highest education level attained by many people is Grade 12. However, the minority group are those who have obtained higher degrees (Master's, Doctorate) constituting 511 people while 41 785 people make up for the other or unspecified educational level (Quantec, 2019). Educational level trends of those aged above 20, show that those with functional literacy account for 69% and functional illiteracy account for 30% while the remaining 1% is unspecified. The biggest group are those who reached grade 7 level, making up 21% of the entire adult group.

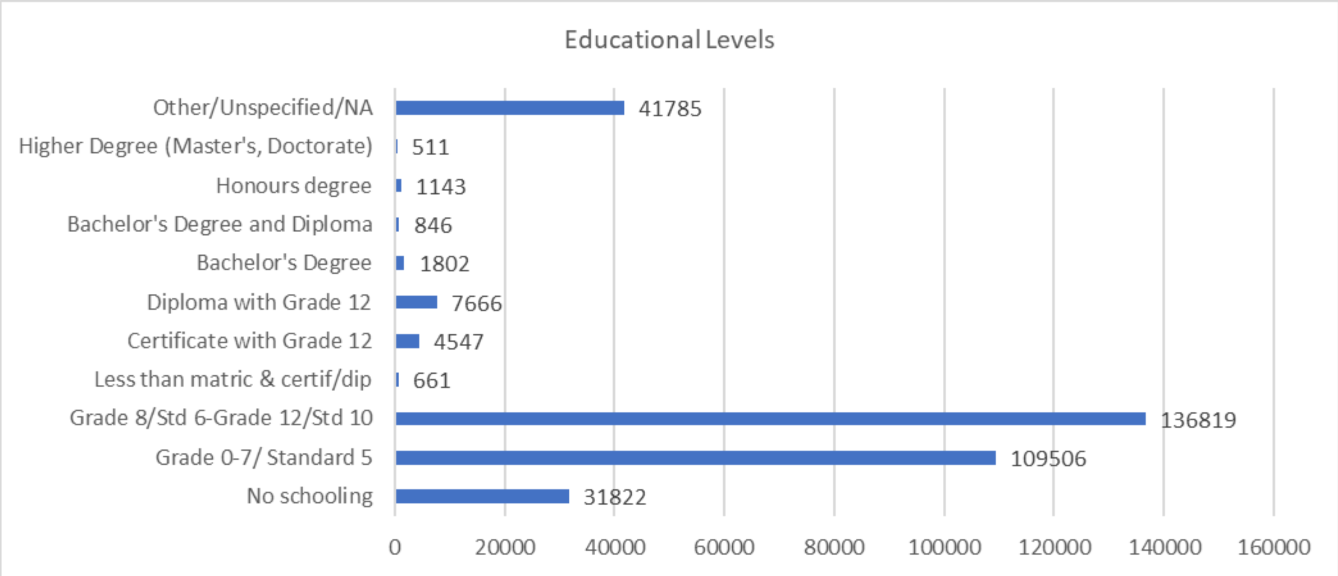


Figure 78: Educational levels in Mogalakwena LM (Quantec, 2019)

12.12.6. Economy

The structure of the economy and the composition of its employment provide valuable insight into the dependency of an area on specific sectors and its sensitivity to fluctuations of global and regional markets. Knowledge of the structure and the size of each sector are also important for the economic impact results' interpretation, as it allows the assessment of the extent to which the proposed activity would change the economy, its structure, and trends of specific sectors.

Mokopane is the biggest commercial centre of the district. The Gross Value Added (GVA) of the Mogalakwena LM was valued at R14 169 million in current prices for 2018. This constitutes approximately 4.5% of the GVA of Limpopo and 16.3% of the GVA of the Waterberg DM, making it the third highest contributor to the DM following Thabazimbi and Lephalale consecutively as shown in the table below. Additionally, it is important to note that between 2013 and 2018, the Mogalakwena LM's economy grew at an average rate of 7% per year, similar to the Limpopo province. In the same period, the Waterberg DM and the nation as a whole, grew at an average rate of 6% per annum. The below figure illustrates these trends.

Table 18: Municipality contributions to Waterberg DM and Limpopo province (Urban-Econ calculations based on Quantec, 2019)

	GVA	GVA Contributions	
	R (millions)	Waterberg DM	Limpopo
Limpopo Province	316792	-	100%

Waterberg District	86959	100%	27,45%
Thabazimbi LM	39034	44,89%	12,32%
Lephalale LM	21661	24,91%	6,84%
Mookgopong LM	2236	2,57%	0,71%
Modimolle LM	5033	5,79%	1,59%
Bela-Bela LM	4826	5,55%	1,52%
Mogalakwena LM	14169	16,29%	4,47%

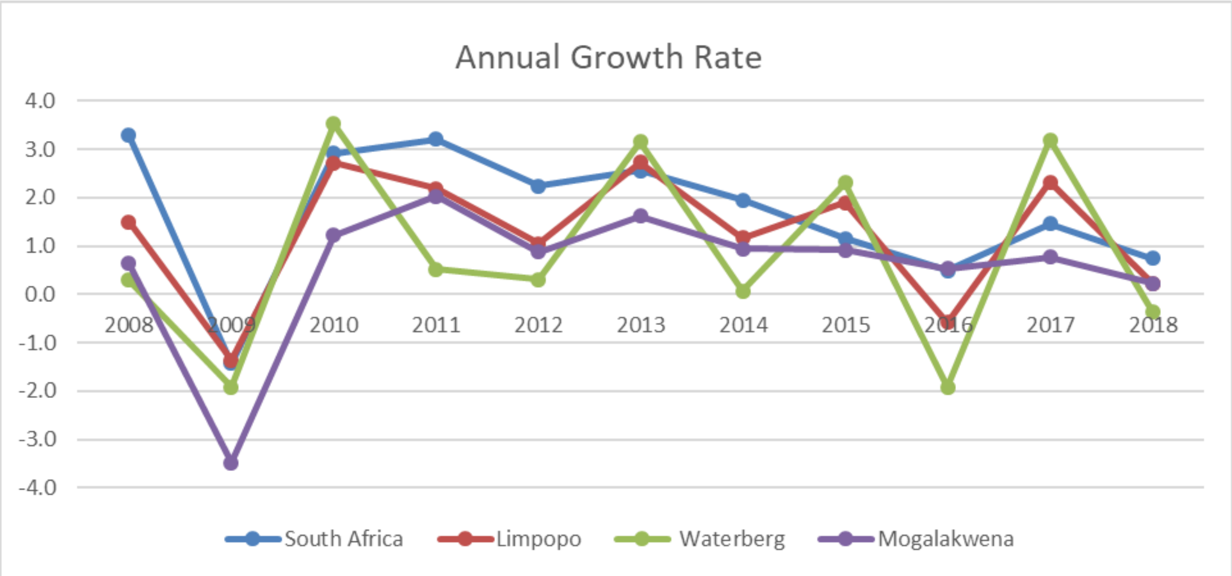


Figure 79: GVA growth trends for study areas (Urban-Econ calculations based on Quantec, 2019)

The figure above illustrates that, from 2008 to 2009, all areas witnessed a sharp decline into negative growth rates and similar trends were experienced between 2015 and 2016 in Limpopo and Waterberg DM. Mogalakwena LM and South Africa on the other hand experienced declines in their growth rates but remained slightly above 0.5%.Although, all study areas observed increases in their growth rates in 2017, they experienced declines in 2018, while Waterberg experienced negative growth.

Table 19 shows that the tertiary sector is the highest contributor to the LM. The highest contributing sectors of the municipal area include transport, storage and communication; finance and business services; government services; and agriculture. While mining now contributes less to the LM's GVA, it was previously considered a major sector in the economy, with most of its activities taking place in "rural landscapes where biodiversity corridors occur" (Mogalakwena Local Municipality, 2019). Nonetheless, according to Municipalities of South Africa, mining and agriculture remain key economic sectors of the municipality. Furthermore, the IDP suggests that Mogalakwena is one of the main production areas of platinum in the province and platinum mining in Mokopane serves as an engine to the LM economic development, employment creation and community skills development and prosperity. The majority of Mogalakwena households are dependent on agriculture for their livelihoods, especially livestock farming.

Table 19: Sector contributions to the Mogalakwena economy (Urban-Econ calculations based on Quantec, 2019)

Mogalakwena LM RGVA	GVA	Contribution
	R Millions	**%**
Primary Sector	**1789**	**12,63%**
Mining and Quarrying	232	1,64%
Agriculture, forestry and fishing	1557	10,99%
Secondary Sector	**1457**	**10,28%**
Manufacturing	604	4,26%
Electricity, gas and water	408	2,88%
Construction	445	3,14%
Tertiary Sector	**10923**	**77,09%**
Finance, insurance, real estate and business services	3067	21,65%
Wholesale and retail trade, catering and accommodation	913	6,45%
General government	2650	18,70%
Transport, storage and communication	3495	24,67%
Community, social and personal services	798	5,63%

12.12.7. Labour force and employment structure

Employment is the primary means by which individuals who are of working age may earn an income that will enable them to provide for their basic needs and improve their standard of living. As such, employment and unemployment rates are important indicators of socio-economic well-being.

As at 2017, the Working Age Population (WAP) constituted 56.7% of the Mogalakwena LM population, which translates into 189 372 people (Quantec, 2019). The figure below further illustrates the labour force profile in which over half of the WAP is not economically active (NEA) while just under a third of the WAP is employed. The rest of the WAP is unemployed and this accounts for 33 619 people. Majority of the employed population has formal employment and almost a third of this population are semi-skilled. Furthermore, the Mogalakwena LM employs approximately 7% of the Waterberg district. The Mogalakwena Labour force participation rate is 46.4% and the unemployment rate is 38.3%. Over the past 10 years, the number of unemployed persons has been increasing relative to the WAP, while the employment trends have varied over the years. According to the Mogalakwena IDP, women, and especially rural women, constitute the greatest number affected by the lack of job opportunities as well as other social problems (Mogalakwena Local Municipality, 2019).

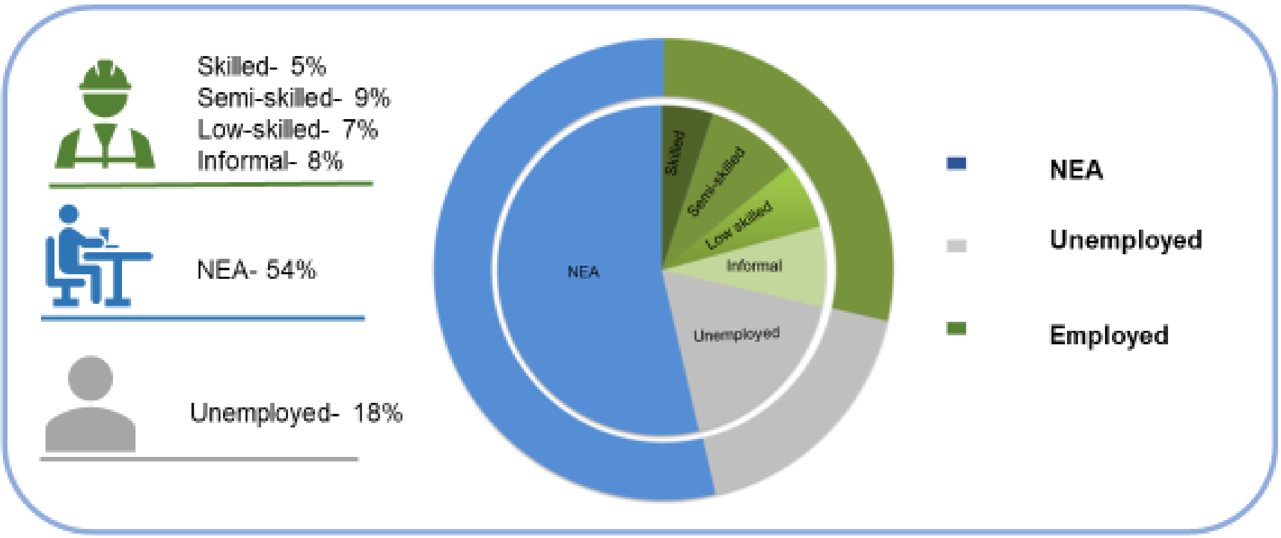


Figure 80: Labour-force Profile for Mogalakwena local Municipality

While the figure above indicates the total employment figures for all economic sectors in the Mogalakwena LM, the table below indicates employment per economic sector. The tertiary sector is the highest employer in the Mogalakwena area, constituting almost 78% of the employed population with the wholesale and retail trade, catering and accommodation industries employing 13 935 people (approx. 25% of the LM's employed population). Mining on the other hand is the second smallest employer in the area, accounting for 1% of total employment. The table below also highlights that there has been an increase in employment figures for most of the sectors except mining and general government between 2013 and 2018.

Table 20: Mogalakwena Employment Distribution by Sector

Mogalakwena LM Employment	2013	2018	Changes
Primary sector	**3813**	**4060**	↑
Agriculture, forestry and fishing	3208	3471	↑
Mining and quarrying	605	589	↓
Secondary sector	**7002**	**7809**	↑
Manufacturing	3909	4208	↑
Electricity, gas and water	187	196	↑
Construction	2906	3405	↑
Tertiary sector	**39869**	**42948**	↑
Wholesale and retail trade, catering and accommodation	12690	13935	↑
Transport, storage and communication	1890	1897	↑
Finance, insurance, real estate and business services	6208	6956	↑
General government	8434	8428	↓

Community, social and personal services	10647	11732	↑
TOTAL	**50684**	**54817**	↑

(Quantec, 2019)

12.12.8. Access to Services and State of Local Built Environment

Access to shelter, water, electricity, sanitation, and other services are indicators that assist to determine the standard of living of the people in the area under investigation. Infrastructure and the state of local infrastructure is another indicator to contemplate when considering living standards. The availability of social and economic infrastructure including roads, educational facilities, and health facilities further indicates the nature of the study area, which is valuable in developing a complete profile of the circumstances in which communities are living. These measurements create a baseline against, which the potential impacts of the proposed project can be assessed.

12.12.8.1. Settlement profile

The household density of Mogalakwena LM is 13.9 households/km^2 and the population density is 54.7 persons/km^2 (Urban-Econ Calculations based on Quantec, 2019). Village settlements in the Mogalakwena LM are relatively small with an average 506 stands per village while the urban core has settlements that are large and clustered (Mogalakwena Local Municipality, 2019). Mokopane is one of the three proclaimed townships within the municipality together with Mahwelereng and Rebone.

12.12.8.2. Access to Housing and Basic Services

As of 2018, 91.4% of the Mogalakwena LM houses are brick structured dwellings on separate yards; 5.1% are informal dwellings; 1,1% are traditional dwellings, almost 2% are flats, complexes and backyard dwellings and the remaining 0.4% are unspecified (Quantec, 2019). This shows that over 90% of the households are formal dwellings. Nonetheless, the LM experiences challenges in the provision of adequate housing. Among these challenges are insufficient land for development; the LM is not accredited to perform housing delivery; and lack of an Integrated Human Settlement Plan or Housing Plan for future planning.

The majority of the households in Mogalakwena LM have access to electricity and comprise of just over 92% of the households while approximately 7% of the households use candles and a relatively small percentage - 1% - uses alternative energy sources such as solar, gas, paraffin and other unspecified sources. The LM is serviced by both Eskom and the Municipality, with the majority of the rural area being serviced by Eskom while the municipality services the areas in town and farming areas surrounding town. The municipality services a total area of 2800 km^2 which is approximately 45% of the area of the LM. Amongst its key challenges is insufficient funding to maintain and service infrastructure.

Approximately 21% of the LM households have piped water within their dwellings; 42% have piped water within yards; 29% has access to piped water on community stands; almost 8% rely on other sources such as water carriers/tankers, borehole, rain-water tanks, dams, and springs amongst others. Mogalakwena is a Water Service Authority (WSA) and also a Water Service Provider (WSP) meaning that the LM has an obligation to progressively ensure efficient, affordable, economical and sustainable access to water services (Mogalakwena Local Municipality, 2019). Among the challenges experienced by the LM in providing water are: water quality and reliability, especially in rural areas; operation and maintenance costs are economically unsustainable; and inadequacy to address the growing demand due to un-planned settlements.

With regards to sanitation over half (66%) of the households use pit latrines; 28% of the houses have access to flush toilets or chemical toilets; almost 1% use bucket latrines; and approximately 5% of the households use unspecified toilet systems (Quantec, 2019). While sanitation services have improved over the years, there remains a need “to adopt service levels in respect of basic services and ultimately the development of a comprehensive sanitation plan in order to meet the national target” (Mogalakwena Local Municipality, 2019).

Approximately 63% of households have their own refuse dumps; 27.6% have their waste removed by local authorities, of which just over 27% is removed at least once a week and 0.4% is removed less often (Quantec, 2019). About 1.3% households use communal refuse dumps, while approximately 7.5% of the households have no rubbish disposal or use unspecified means of waste removal. The municipality experiences challenges in providing this service due to obsolete machinery and equipment.

The Mogalakwena local municipality is responsible for the provision of all the above services and does so with the necessary infrastructure. The municipality has backlogs in the provision of the basic services which they believe is linked to the increasing number of households. The LM further seeks to advance services even where they are adequately provided. The figure below is a summary of access to basic services within the Mogalakwena LM.

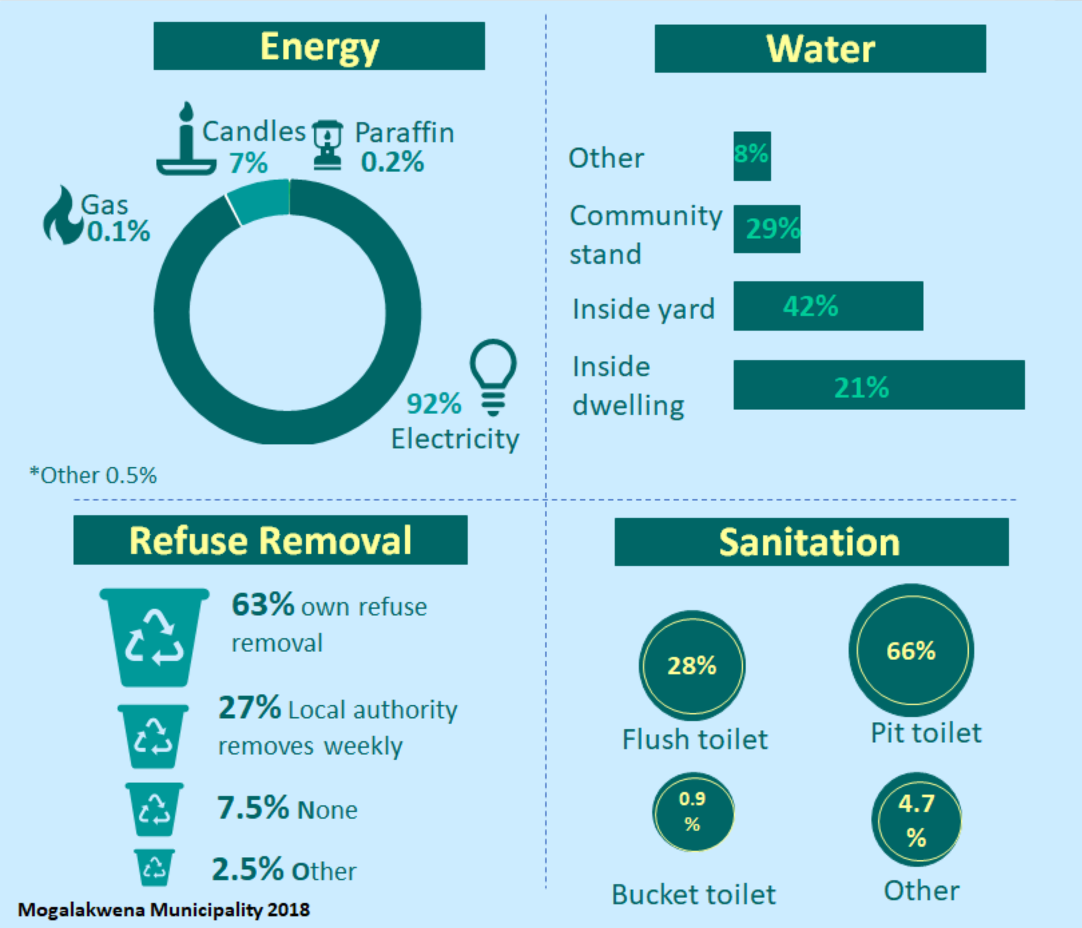


Figure 81: Access to services in the Mogalakwena LM (Stats SA, 2012)

13. DESCRIPTION OF THE CURRENT LAND USES

13.1. Description of specific environmental features and infrastructure on the site

The land where the proposed activity is planned to be developed is currently mostly used for commercial agricultural activities comprising of crop farming, game farming, livestock farming and poultry farming.

In terms of the Department of Environmental Affairs and Tourism (DEAT) guidelines for Integrated Environmental Management (IEM), sensitive landscapes are a broad term applying to: Nature conservation or ecologically sensitive areas – indigenous plant communities (particularly rare communities or forests), wetlands, rivers, river banks, lakes, islands, lagoon, estuaries, reefs, inter-tidal zones, beaches and habitats of rare animal species; Unstable physical environments - such as unstable soil and geo-technically unstable areas; Important nature reserves – river systems, groundwater systems, high potential agricultural land; Sites of special scientific interest; Sites of social significance or interest – including sites of archaeological, historic, cultural spiritual or religious importance and burial sites; and Green belts or public open space in municipal areas.

Sensitive landscapes in terms of the above definition are illustrated in Figure 83 below and include:

- Heritage features:
  - Heritage features of low to moderate archaeological significance as well as graves and potential

burial sites occur in the area as indicated in Figure 68.

- Ecologically Sensitive areas:
  - Most of the habitat types in the study area can be considered as having a Medium Botanical Sensitivity.
  - Rocky outcrops and ridges occur in the study area and are often habitats for red data and endemic species of an area, while also supporting a unique floral and faunal species composition. This vegetation unit occurs in two areas of the project area namely a small outcrop in the south-eastern section and a ridge in the northern section of the proposed mining infrastructure footprint areas. The rocky outcrops and ridges provide suitable habitat to protected plants, small mammals and reptiles and are therefore of High Ecological Function and of High Conservational Value for the biodiversity that they support.
  - All of the drainage channels on the project site area are non-perennial. The narrow band of trees that occurs along the channel can be classified as riparian vegetation. The vegetation is largely still considered natural habitat, with all areas in the floodline classified as a high sensitivity area with a high conservation priority.
  - The Rooisloot (a NFEPA River) traverses the proposed mining right area and is located approximately 700 m to the north north-west of the proposed open pit boundary. A tributary of the Rooisloot occurs approximately 3 km to the north-east of the proposed open pit.
  - No red data species were documented during the ecological survey and no listed protected plant species occur on the proposed development sites. However, the following protected trees were found:
    - Sclerocarya birrea (marula);
    - Boscia albitrunca (shepherds tree);
    - Combretum imberbe.
  - Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) are found on site (refer to Figure 43). The mining project study area is located in the following areas specified in the Limpopo Conservation Plan:
    - CBA2;
    - ESA1;
    - ESA2; and
    - Other Natural Areas.
- Areas with Agricultural Potential
  - Soils in the study area have low to moderate or no agricultural potential. Only the soils in the north-western section of the project area which are under irrigation (pivots) are classified as having a High

Agricultural Potential.

- Unstable physical environments
  - Dolomitic bedrock occurs throughout large parts of the study area as well as geological faults as indicated in Figure 83.

Refer to the baseline environmental chapter (Section 12) for more information.

13.2. Description of specific environmental features and infrastructure surrounding the site

The project area is characterised by urban development (communities of Mahwelereng, Ga-Madiba, Masodi, Tshamahansi, Phola Park, Sekgakgapeng, Mosate, Maroteng, and Masehlaneng) in the west and south west (Mokopane), general farmland and a number of chicken farms in the central areas, and dominated by savannah cover hills in the northern, eastern and south eastern sections. It's in these areas where game farm breeding and other tourist facilities occur. In the south-east, immediately south of the R101 and up against the Makapan mountain is the Mokopane Biodiversity Centre's property, approximately 1300ha in extent. The Makapansgat World Heritage site does not fall within the study area. It's located approximately 5km directly east of the eastern extremity of the study area.

A number of hills are located in the centre of the mining right area in an east west direction. The dominant land uses in the study area is agriculture and grazing. The study area is characterised by a number of smallholdings with some poultry, game and cattle farming. These is also some crop farming to the north-east of the proposed open pit and a preparatory school and urban township to the south-west. The Percy Fyfe tarred road transects the study area from south-west to north-east with various gravel access roads off of this road. A Transnet Railway line runs parallel to the tarred road.

14. ENVIRONMENTAL AND CURRENT LAND USE MAP.

Refer to Figure 82 to Figure 83 below.

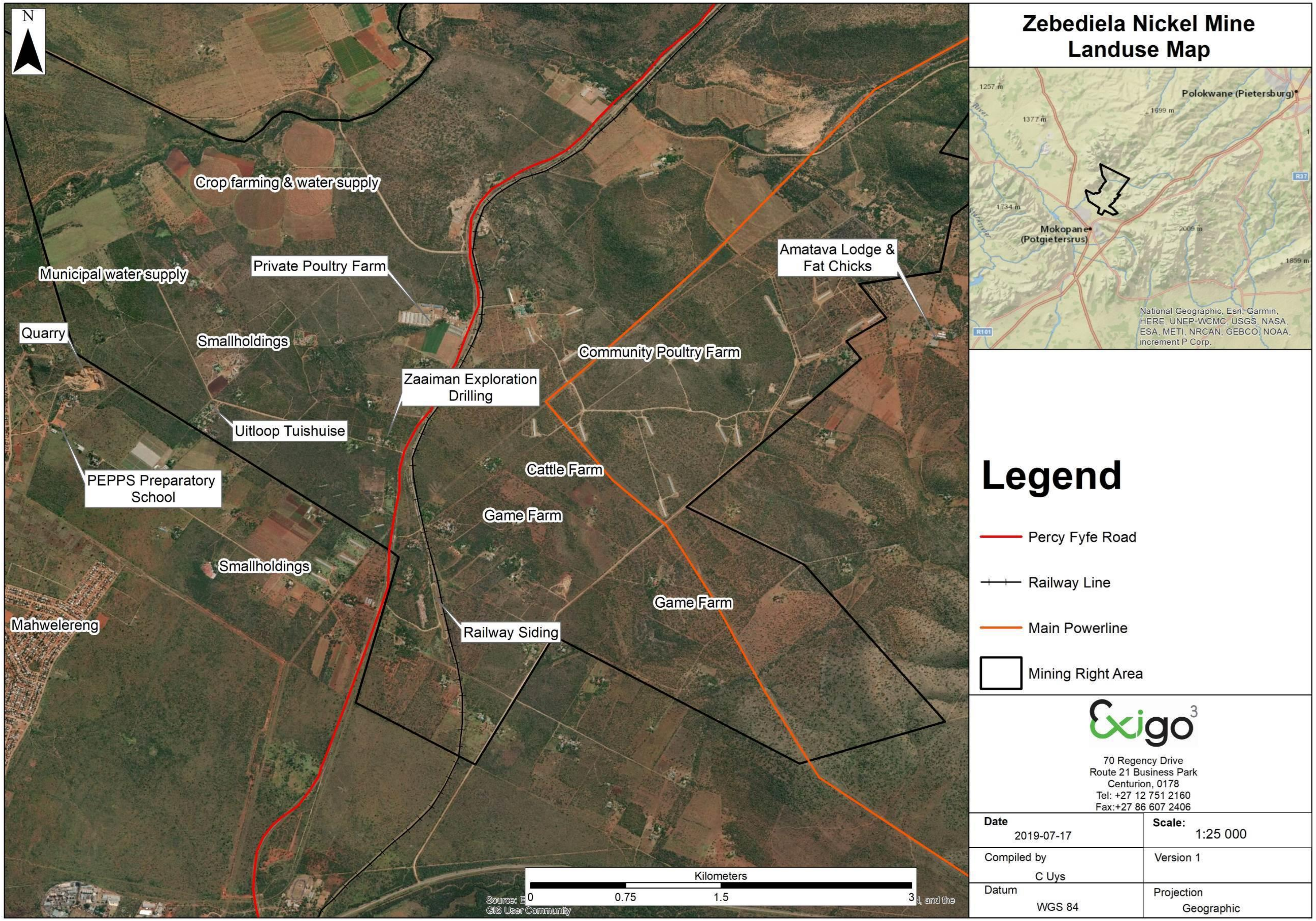


Figure 82: Current Land Use Map for the study area

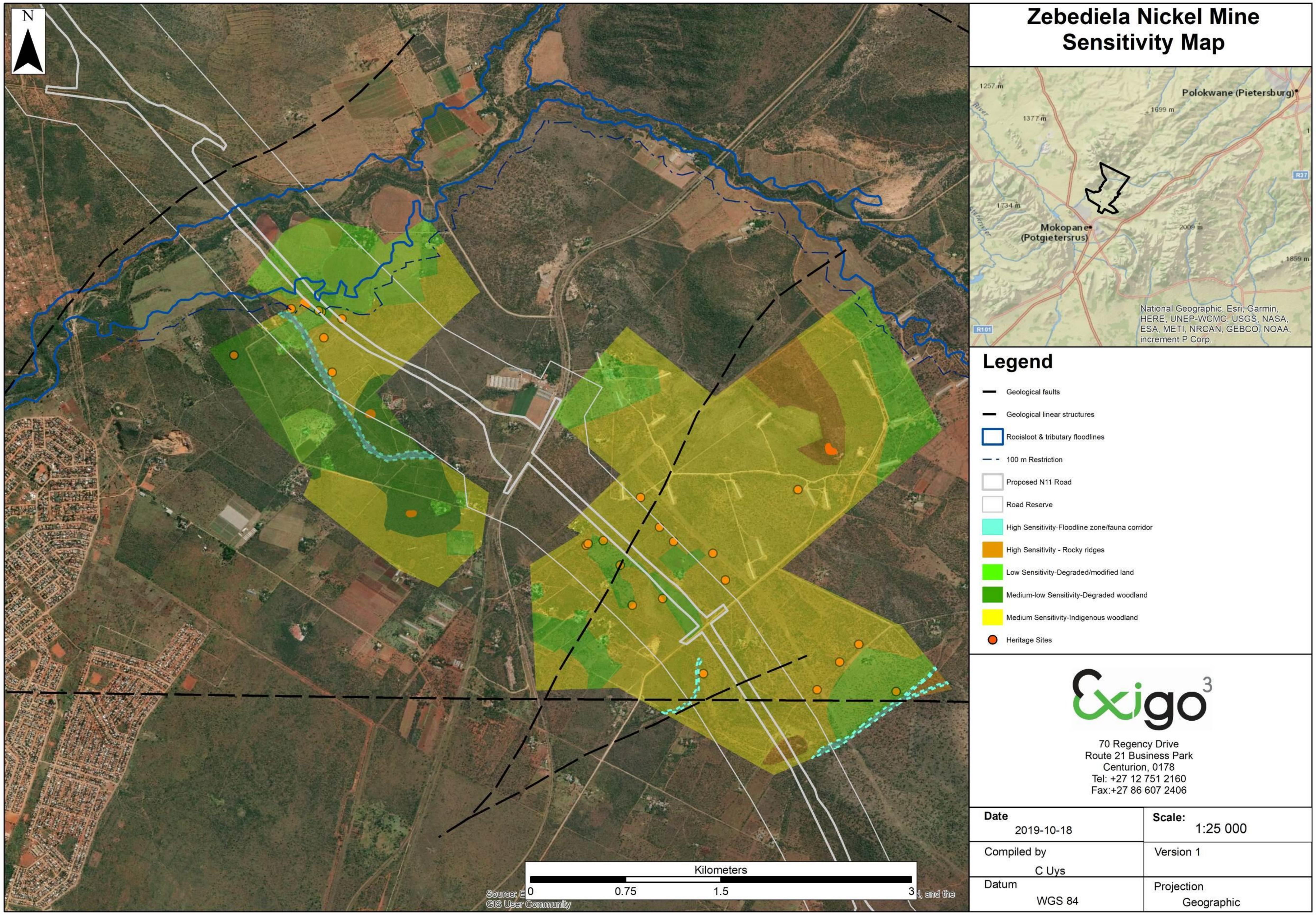


Figure 83: Sensitivity Map

15. PRELIMINARY IMPACTS IDENTIFIED

Appendix 2 of the EIA Regulations of 2014 (as amended) and the template as provided by the DMRE requires that the impacts and risk of each alternative including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these can be reversed; may cause irreplaceable loss of resources; and can be avoided, managed or mitigated, be included to the Scoping Report. It is Exigo's view that it is the purpose of the EIA Phase to determine impact significance.

<u>TAKE NOTE</u> – the preliminary impacts, mitigation measures and associated reporting are subject to being updated during the EIA phase subsequent to further and more detailed specialist studies being conducted as may be required or as new information becomes available (these being for scoping purposes at present).

The impacts below were stated <u>without mitigation</u> measures being taken into account. The potential for residual risk with mitigation will only be established during the EIA Phase once all the specialist studies have been completed. The reason for including an impact statement is to identify which aspects need to be investigated further in the EIA Phase by means of specialist studies and to identify mitigation measures in order to reduce the significance of the impacts identified during the Scoping Phase.

Table 21 Preliminary Impact Assessment Table

No	Activity	Impact	Without Mitigation	Nature (Negative or Positive Impact)	Probability		Duration		Scale		Magnitude/ Severity		Significance	
					Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Score	Magnitude
Soils, Agricultural Potential and Land Capability Impacts														
Planning Phase														
1	Obtaining of IWUL for crossings and mining through water courses	Delay of mining onset	WOM	Negative	Definite	5	Short term	1	Local	1	High	8	50	Moderate
2	Obtaining permits for the eradication of protected trees / flora	Delay of plant construction	WOM	Negative	Definite	5	Short term	1	Local	1	Low	2	20	Negligible
Construction Phase														
3	Clearing of vegetation for open pit, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	Habitat destruction / fragmentation of fauna habitats	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High
4	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation	Soil erosion and sedimentation	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High
5	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	High	8	60	Moderate
6	Vegetation clearing / vehicle movement	Habitat degradation due to dust	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High
7	Heavy machinery and vehicle movement on site	Spillages of harmful substances	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate

8	Clearing of vegetation for open pit through water courses as well as road crossings	Impediment of flow patterns	WOM	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	
9	Heavy machinery and vehicle movement on site; Construction of infrastructure, roads etc. on site	Road mortalities of fauna / impact of human activities on site	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	
Operational Phase															
10	Storage of tailings, laydown areas of overburden dumps and stockpiles	Habitat destruction / fragmentation of fauna habitats	WOM	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	
11	Increased hardened surfaces around infrastructure and exposed areas around open pits, laydown areas of overburden dumps and stockpiles as well as TSF	Soil erosion and sedimentation	WOM	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	
12	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Medium	6	52	Moderate	
13	Heavy machinery and vehicle movement on site	Habitat degradation due to dust	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	
14	Heavy machinery and vehicle movement on site	Spillages of harmful substances	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	
15	Heavy machinery and vehicle movement on site; poaching, wood collection, fires etc.	Road mortalities of fauna / impact of human activities on site	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	
Closure and Decommissioning Phase															
16	Rehabilitation of mining site	Improvement of habitat through revegetation / succession over time	WOM	Positive	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low	
17	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	WOM	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate	
18	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Spreading and establishment of alien invasive species	WOM	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate	
19	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site / vehicle movement on site	Habitat degradation due to dust	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate	
20	Heavy machinery and vehicle movement on site	Spillages of harmful substances	WOM	Negative	Highly Probable	4	Medium term	3	Regional	3	Medium	6	48	Moderate	
21	Heavy machinery and vehicle movement on site	Road mortalities of fauna / impact of human activities on site	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	
Post-Closure & Rehabilitation Phase															
22	Natural Successional processes	Improvement of habitat through revegetation / succession over time	WOM	Positive	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low	
23	Exposed surfaces / unrehabilitated areas on site post closure / poor	Soil erosion and sedimentation	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	Medium	6	44	Moderate	

	monitoring during LoM													
24	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	Medium	6	44	Moderate
Ecological Impacts														
Planning Phase														
25	Obtaining of IWUL for crossings (watercourses) and mining layout on sensitive soils	Delay of mining onset	WOM	Negative	Probable	2	Long term	4	Local	1	High	8	26	Low
Construction Phase														
26	Topsoil & subsoil stripping	Soil destruction and sterilization	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High
27	Heavy machinery and vehicle movement on site	Soil compaction	WOM	Negative	Definite	5	Permanent	5	Local	1	High	8	70	High
28	Topsoil & subsoil stripping, exposure of soils to wind and rain during construction causing erosion and sedimentation in watercourses	Soil erosion and sedimentation	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High
29	Heavy machinery and vehicle movement on site	Spillages of harmful substances	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate
30	Topsoil & subsoil stripping	Loss of land capability	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High
Operational Phase														
31	Topsoil & subsoil stripping, opencast mining	Soil destruction and sterilization	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High
32	Heavy machinery and vehicle movement on site, laydown areas of TSF	Soil compaction	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High
33	Increased hardened surfaces around infrastructure, laydown areas of WRDs and stockpiles as well as TSF, pipeline crossings	Soil erosion and sedimentation of water courses	WOM	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High
34	Heavy machinery and vehicle movement on site	Spillages of harmful substances leading to water pollution in water courses	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate
35	Topsoil & subsoil stripping	Loss of land capability	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High
Closure and Decommissioning Phase														
36	Rehabilitation of mining site	Improvement of eroded soils and compaction	WOM	Positive	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low
37	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate
38	Heavy machinery and vehicle movement on site	Soil compaction	WOM	Negative	Definite	5	Permanent	5	Local	1	Medium	6	60	Moderate

39	Heavy machinery and vehicle movement on site	Spillages of harmful substances	WOM	Negative	Highly Probable	4	Medium term	3	Regional	3	Medium	6	48	Moderate
Post-Closure & Rehabilitation Phase														
40	Natural processes	Improvement of soil compaction and erosion	WOM	Positive	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low
41	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	Medium	6	44	Moderate
Heritage Impacts														
Planning Phase														
42	Siting of Open Pit	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible
43	Siting of Overburden Facility	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible
44	Siting of Overburden Facility and Tailings Storage Facility	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	WOM	Negative	Improbable	1	Short term	1	Local	1	Medium	6	8	Negligible
45	Siting of Overburden Facility and Tailings Storage Facility	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible
46	Siting of , Open Pit, Overburden Facility and TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	WOM	Negative	Improbable	1	Short term	1	Local	1	High	8	10	Negligible
Construction Phase														
47	Stripping of Open Pit footprint	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low
48	Stockpiling of overburden	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low
49	Stockpiling of overburden and construction of TSF	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Medium	6	52	Moderate
50	Stockpiling of overburden and construction of TSF	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low
51	Stripping of Open Pit footprint, stockpiling of overburden and construction of TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	WOM	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High
Operational Phase														
52	Opencast mining activities	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low
53	Stockpiling of overburden	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low

54	Stockpiling of overburden and deposition of tailings in TSF	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Medium	6	52	Moderate
55	Stockpiling of overburden and deposition of tailings in TSF	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low
56	Opencast mining activities, stockpiling of overburden and deposition of tailings in TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	WOM	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High
Closure and Decommissioning Phase														
57	Backfilling of Open Pit	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	WOM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible
58	Backfilling of overburden into Open Pit	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	WOM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible
59	Backfilling of overburden into Open Pit & decommissioning of TSF	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	WOM	Negative	Improbable	1	Short term	1	Site	2	Medium	6	9	Negligible
60	Backfilling of overburden into Open Pit & decommissioning of TSF	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	WOM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible
61	Backfilling of overburden into Open Pit & decommissioning of TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	WOM	Negative	Improbable	1	Short term	1	Site	2	High	8	11	Negligible
Post-Closure & Rehabilitation Phase														
62	Rehabilitation of Open Pit footprint	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	WOM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible
63	Rehabilitation of Overburden footprint	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	WOM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible
64	Rehabilitation of Overburden footprint & TSF	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	WOM	Negative	Improbable	1	Short term	1	Site	2	Medium	6	9	Negligible
65	Rehabilitation of Overburden footprint & TSF	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	WOM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible
66	Rehabilitation of Open Pit and Overburden footprint & TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	WOM	Negative	Improbable	1	Short term	1	Site	2	High	8	11	Negligible
Palaeontological Impacts														
Construction Phase														
67	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of fossils.	WOM	Negative	Highly Probable	4	Permanent	5	Local	1	High	8	56	Moderate
Hydrogeological Impacts														
Construction Phase														
68	Contamination to ground- and surface water systems from oil, grease and diesel spillages from construction vehicles	Contamination to ground- and surface water systems	WOM		Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low
69	On-site sanitation	Contamination to ground- and surface water systems	WOM		Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low

70	Storage of chemicals and building materials during construction of mine residue facilities	Contamination to ground- and surface water systems	WOM		Highly Probable	4	Medium term	3	Site	2	Medium	6	44	Moderate
Operational Phase														
71	Mine dewatering	Increased abstraction/inflows from groundwater resource with possible impact on surrounding groundwater users	WOM		Definite	5	Long term	4	Regional	3	High	8	75	High
72	Mass transport and seepage from new mine residue facilities at the proposed mine along surface drainages and groundwater pathways	Contamination to ground- and surface water systems	WOM		Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate
Closure and Decommissioning Phase														
73	Re-watering and decanting of open pits	Oxidation of backfilled material & contamination to ground- and surface water systems	WOM		Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate
74	Seepage and mass transport from mine residue facilities impacting on groundwater quality	Contamination to ground- and surface water systems	WOM		Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate
Post-closure and Rehabilitation Phase														
75	Re-watering and decanting of open pits	Oxidation of backfilled material & contamination to ground- and surface water systems	WOM		Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate
76	Seepage and mass transport from mine residue facilities impacting on groundwater quality	Contamination to ground- and surface water systems	WOM		Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate
Air Quality Impacts														
Planning Phase														
77	Detailed engineering taking existing ambient baseline into account	PM10 and PM2.5	WOM	Negative	Probable	2	Long term	4	Regional	3	High	8	30	Low
Construction Phase														
78	Transport and general construction activities	Gaseous and particulate emissions; fugitive dust	WOM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate
79	Clearing of groundcover and levelling of area	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate
80	Materials handling	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate
81	Wind erosion from open areas	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate
Operational Phase														
82	Vehicle activity on paved and unpaved roads	Gaseous and particulate emissions; fugitive dust	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate
83	Materials handling	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate
84	Wind erosion	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate
Closure and Decommissioning Phase														
85	Dust generated during rehabilitation activities	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate
86	Demolition of infrastructure	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate
87	Tailpipe emissions from the vehicles used during the closure phase	Gaseous and particulate emissions; fugitive dust	WOM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate
Post-Closure & Rehabilitation Phase														
88	Wind erosion from open areas	PM10 and PM2.5	WOM	Negative	Probable	2	Medium	3	Site	2	Mediu	6	2	Low

							term				m		2	
Noise Impacts														
Construction Phase														
89	Construction of roads	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Medium term	3	Local	1	Medium	6	40	Low
90	Construction of Tailings Storage Facility	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	High	8	52	Moderate
91	Stripping of Open Pit footprint	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	High	8	52	Moderate
92	Stockpiling of overburden and topsoil and establishment of berms around open cast	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	High	8	52	Moderate
93	Construction of Processing Plant	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	High	8	52	Moderate
Operational Phase														
94	Deposition of tailing to Tailings Storage Facility	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate
95	Vehicular movement on roads	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate
96	Open Cast mining activities: blasting and drilling	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate
97	Stockpiling of overburden and topsoil	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate
98	Processing activities: crushing and screening	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate
Closure and Decommissioning Phase														
99	Decommissioning of roads, vehicular movement on roads	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Medium term	3	Local	1	Medium	6	40	Low
100	Backfilling of Open pit	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	High	8	52	Moderate
101	Backfilling of overburden to Open Pit and spreading topsoil	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	High	8	52	Moderate
102	Decommissioning of processing plant	Noise impact on surrounding landowners	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	High	8	52	Moderate
Post-Closure & Rehabilitation Phase														
103	Rehabilitation of roads, vehicular movement on roads	Noise impact on surrounding landowners	WOM	Negative	Probable	2	Short term	1	Local	1	Medium	6	16	Negligible

104	Rehabilitation of Open pit footprint	Noise impact on surrounding landowners	WOM	Negative	Probable	2	Short term	1	Local	1	Medium	6	16	Negligible
105	Rehabilitation of Overburden/Topsoil footprints	Noise impact on surrounding landowners	WOM	Negative	Probable	2	Short term	1	Local	1	Medium	6	16	Negligible
106	Rehabilitation of processing plant footprint	Noise impact on surrounding landowners	WOM	Negative	Probable	2	Short term	1	Local	1	Medium	6	16	Negligible
Blasting & Vibration Impacts														
Operational Phase														
107	Open cast mining activities: blasting	Ground vibration	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High
108	Open cast mining activities: blasting	Air blast	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High
109	Open cast mining activities: blasting	Fly rock	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High
110	Open cast mining activities: blasting	Fumes	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate
Visual Impacts														
Construction Phase														
111	Preparation of earthworks for pit area and the construction of the offices, plant and infrastructure. Construction of earth berm around pit area	Build access roads to site, exposure of earth to create place for the construction activities - the building of the plant and offices. Pre-strip site to establish open pit area. The exposure of earth and rock (contrast with existing landscape character) results in the altering of the visual quality and sense of place of the study area. These activities which will also generate dust which be visible from nearby residential areas and farmstead/tourist accommodation (considered to be sensitive receptor areas) and public roads. Night lighting during this phase.	WOM	Negative	Definite	5	Medium term	3	Regional	3	High	8	70	High
Operational Phase														
112	Removal of vegetation, topsoil and overburden from mining areas.	Exposure of earth and rock (contrast with existing landscape character) resulting in the altering of the visual quality and sense of place of the study area. These activities which will also generate dust will be visible from nearby residential areas (considered to be sensitive receptor areas) and public roads.	WOM	Negative	Definite	5	Medium term	3	Regional	3	Medium	6	60	Moderate
113	Excavation of the mining areas using drill rigs, blasting, excavators and dozers	Exposure of rock through blasting that would contrast with the existing natural landscape in the immediate vicinity of the open pit as the mining operation advances along with the movement of trucks and excavators that would generate dust. The result is the altering of the visual quality and sense of place of the study area. These activities will be visible from nearby residential and tourist areas (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe).	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High

114	Trucks moving overburden to the Overburden Facility, graders maintaining the haul roads and water tankers wetting the roads	Dust generated by moving trucks that is visible from surrounding residential areas and public roads will result in the altering of the visual quality and sense of place of the study area. These activities will be visible from nearby residential and tourist areas (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe).	WOM	Negative	Definite	5	Long term	4	Site	2	Medium	6	60	Moderate
115	Growth of the Overburden Facility as the mining progresses. Backfilling of overburden back into the pit	Physical presence of the Overburden Facility that alters the visual quality and sense of place of the study area. This activity will be visible from nearby residential and tourist areas (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe).	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High
116	Growth of the Tailings Storage Facility (TSF) as the mining progresses	Physical presence of the TSF that alters the visual quality and sense of place of the study area. This activity will be visible from nearby residential areas (considered to be sensitive receptor areas) and public roads.	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High
117	Lighting of the plant and office areas including security and any other lighting associated with the movement of vehicles at night	Light pollution resulting in the alteration of the baseline visual quality and sense of place of the study area. These activities will be visible from nearby residential and tourist areas (considered to be sensitive receptors areas) and public roads (N11 and Percy Fyfe).	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate
Closure and Decommissioning Phase														
118	Rehabilitation of disturbed areas	Improvement of the visual quality and sense of place of the project area visible from nearby residences and tourist facilities (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe).	WOM	Positive	Probable	2	Medium term	3	Site	2	Medium	6	22	Low
119	Backfilling and closure of open pit areas and final grading (shaping with graders) laying of topsoil in selected areas and hydroseeding. TSF remains as a residual effect of the mine	The final shaping (dust creation) and rehabilitation process that alters the visual quality and sense of place of the study area. These activities and the residual final excavation and TSF will be visible from nearby residential and tourist areas (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe)	WOM	Negative	Definite	5	Permanent	5	Regional	3	Medium	6	70	High
Post-Closure Phase														
120	Rehabilitation of exposed areas and growth of grasses and vegetation	Improvement of the visual quality and sense of place of the project area visible from nearby residences and tourist facilities as well as public roads (N11 and Percy Fyfe).	WOM	Positive	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible
Socio-economic Impacts														
Construction Phase														
121	Construction activities	Temporary stimulation of economy and growth of the GDP	WOM	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate

122	Construction activities	Temporary creation of jobs	WOM	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate
123	Construction activities	Temporary increase in government earnings	WOM	Positive	Definite	5	Short term	1	Regional	3	Low	2	30	Low
124	Construction activities	Temporary increase in household income during construction	WOM	Positive	Definite	5	Short term	1	Regional	3	Low	2	30	Low
125	Construction activities	Loss of commercial activities - agriculture and tourism	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate
126	Construction activities	Change to the sense of place	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High
127	Construction activities	Temporary increase in crime and social conflicts associated with influx of people	WOM	Negative	Highly Probable	4	Medium term	3	Regional	3	Medium	6	48	Moderate
128	Construction activities	Deterioration of quality of life due to noise, visual and other environmental impacts	WOM	Negative	Probable	2	Short term	1	Regional	3	Medium	6	20	Negligible
129	Construction activities	Impact on property values	WOM	Negative	Probable	2	Long term	4	Regional	3	Medium	6	26	Low
130	Construction activities	Physical displacement and potential loss of family ties	WOM	Negative	Highly Probable	4	Permanent	5	Regional	3	Medium	6	56	Moderate
131	Construction activities	Economic displacement of disadvantaged communities	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate
132	Construction activities	Increased pressure on local services and infrastructure	WOM	Negative	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate
Operational Phase														
133	Mining and processing activities	Stimulation of economy and growth of the GDP	WOM	Positive	Definite	5	Long term	4	Regional	3	High	8	75	High
134	Mining and processing activities	Creation of jobs	WOM	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High
135	Mining and processing activities	Increase in government earnings	WOM	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High
136	Mining and processing activities	Increase in household income during operation	WOM	Positive	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate
137	Mining and processing activities	Improved living standards of positively affected households	WOM	Positive	Probable	2	Long term	4	Regional	3	Medium	6	26	Low
138	Mining and processing activities	Skills development of permanently employed workers	WOM	Positive	Definite	5	Long term	4	Regional	3	Low	2	45	Moderate
139	Mining and processing activities	Local economic development benefits derived through mine's social responsibility programme	WOM	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High

140	Mining and processing activities	Deterioration of quality of life due to noise, visual and other environmental impacts	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate
Closure and Decommissioning Phase														
141	Decommissioning of mine	Temporary stimulation of economy and growth of the GDP	WOM	Positive	Probable	2	Short term	1	Regional	3	Low	2	12	Negligible
142	Decommissioning of mine	Temporary employment	WOM	Positive	Probable	2	Short term	1	Regional	3	Medium	6	20	Negligible
143	Decommissioning of mine	Temporary increase in government earnings	WOM	Positive	Probable	2	Short term	1	Regional	3	Low	2	12	Negligible
144	Decommissioning of mine	Deterioration of quality of life due to noise, visual and other environmental impacts	WOM	Negative	Probable	2	Short term	1	Regional	3	Medium	6	20	Negligible
Traffic Impacts														
Construction Phase														
145	Vehicular operation and usage of roads	Increase in traffic	WOM	Negative	Definite	5	Medium term	3	Site	2	High	8	65	High
146	Construction of access roads and road upgrades	Improved access points	WOM	Positive	Highly Probable	4	Medium term	3	Site	2	High	8	52	Moderate
147	Construction of access roads and road upgrades	Impeded access	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	Medium	6	44	Moderate
148	Construction of access roads and road upgrades	Improved road quality	WOM	Positive	Highly Probable	4	Medium term	3	Site	2	High	8	52	Moderate
149	Use of existing gravel roads	Deterioration of road quality	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	High	8	52	Moderate
150	Traffic accidents	Traffic accidents	WOM	Negative	Probable	2	Medium term	3	Site	2	High	8	26	Low
Operational Phase														
151	Vehicular operation and usage of roads	Increase in traffic	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High
152	Use of existing gravel roads	Deterioration of road quality	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate
153	Traffic accidents	Traffic accidents	WOM	Negative	Probable	2	Long term	4	Site	2	High	8	28	Low

16. METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. Assessment of impacts will be based on the Department of Environmental Affairs Integrated Environmental Management (IEM) Information Series 5: Impact Significance. The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004)[4], that was adapted to fit this process and in line with the EIA Regulations of 2014 (as amended in 2017). These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the impacts will be determined through a synthesis of the criteria below:

Probability. This describes the likelihood of the impact actually occurring.

Improbable:	The possibility of the impact occurring is very low, due to the circumstances, design or experience.
Probable:	There is a probability that the impact will occur to the extent that provision must be made therefore.
Highly Probable:	It is most likely that the impact will occur at some stage of the development.
Definite:	The impact will take place regardless of any prevention plans, and there can only be relied on mitigatory actions or contingency plans to contain the effect.

Duration. The lifetime of the impact

Short term:	The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.
Medium term:	The impact will last up to the end of the phases, where after it will be negated.
Long term:	The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.
Permanent:	Impact that will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

Scale. The physical and spatial size of the impact

Local:	The impacted area extends only as far as the activity, e.g. footprint

[4] Plomp, H. A process for assessing and evaluating environmental management risk and significance in a gold mining company. Conference Papers-Annual National Conference of the International Association for Impact Assessment: South African Affiliate. 2004

Site: The impact could affect the whole, or a measurable portion of the above mentioned properties.

Regional: The impact could affect the area including the neighbouring residential areas.

Magnitude/ Severity. Does the impact destroy the environment, or alter its function.

Low: The impact alters the affected environment in such a way that natural processes are not affected.

Medium: The affected environment is altered, but functions and processes continue in a modified way.

High: Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

Significance. This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.

Negligible: The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.

Low: The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.

Moderate: The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.

High: The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

The following weights will be assigned to each attribute:

Aspect	Description	Weight
Probability	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
Duration	Short term	1
	Medium term	3

	Long term	4
	Permanent	5
Scale	Local	1
	Site	2
	Regional	3
Magnitude/Severity	Low	2
	Medium	6
	High	8
Significance	Sum (Duration, Scale, Magnitude) x Probability	
	Negligible	<20
	Low	<40
	Moderate	<60
	High	>60

The significance of each activity will be rated without mitigation measures and with mitigation measures for both construction, operational and closure phases of the mine development.

The mitigation effect of each impact will be indicated without and with mitigation measures as follows:

- Can be reversed
- Can be avoided, managed or mitigated
- May cause irreplaceable loss of resources

17. THE POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY (IN TERMS OF THE INITIAL SITE LAYOUT) AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY THAT MAY BE AFFECTED

Refer to the Alternatives Assessment discussion in Section 9.2 for the advantages and disadvantages of the site layout alternative options considered. An assessment of preliminary impacts identified for the proposed mining development was undertaken in

Table 21.

18. THE POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND THE LEVEL OF RISK

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/ discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

Note that the preliminary mitigation measures below are subject to being updated during the EIA phase subsequent to further and more detailed specialist work being conducted as may be required or as new information becomes available (these being for scoping purposes at present).

Monitoring is listed as part of the mitigation measures; however, it must be noted that monitoring in itself is not a mitigation measure. Monitoring is important to quantify and verify impacts against pre-development baseline and must be used to pro-actively determine when mitigations should be required.

Table 22 Preliminary Mitigation Measures[5]

No	Activity	Impact/Risk	Size and Scale of Activity (not impact)	Typical Mitigation Measures	Compliance with Standards
Soils, Agricultural Potential and Land Capability Impacts					
Planning Phase					
1	Obtaining of IWUL for crossings and mining through water courses	Delay of mining onset	±150 ha	Apply and obtain IWUL from DWS after liaison with relevant officials and site visit to the area.	National Water Act (Act No 36 of 1998) (NWA)

[5] Note that the above mitigation measures are subject to being updated during the EIA phase subsequent to further and more detailed work being conducted as may be required or as new information becomes available (these being for scoping purposes at present). Monitoring is listed as part of the mitigation measures; however, it must be noted that monitoring in itself is not a mitigation measure. Monitoring is important to quantify and verify impacts against pre-development baseline and must be used to pro-actively determine when mitigations should be required.

2	Obtaining permits for the eradication of protected trees / flora	Delay of plant construction	±350 ha	Apply and obtain permits from DAFF after liaison with relevant officials and follow-up site visit to the area.	National Forest Act (Act 84 of 1998) (NFA)
Construction Phase					
3	Clearing of vegetation for open pit, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	Habitat destruction / fragmentation of fauna habitats	±350 ha	• The removal of the isolated indigenous trees and shrubs should only occur on the construction footprint area of the development and not over the larger area. Where possible, vegetation should be retained in between infrastructural elements associated with the project. • Conduct flora species search and rescue efforts before ground clearing begins in order to reduce negative impacts on species of concern. • Remove and relocate any plants of botanical or ecological significance as indicated by the ecologist or Mine Environmental Control Officer (ECO). • No activity must take place within the 1:100 year floodline or the delineated riparian habitat, whichever is the greatest, or within 500 m radius from the boundary of any wetland unless authorised by a water use licence. • No activities that negatively affect catchment yield, hydrology and hydraulics must be practised unless authorised. • All construction activities should be conducted in such a way that minimal damage is caused to the water courses riparian zone. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. Where impacts are unavoidable a water use licence application should be submitted to Department of Water & Sanitation. • Work in water courses and riparian zones should preferably be done during the low flow season. • The construction camp must be located outside the extent of the watercourse(s) and must be recovered and removed within one (1) month after construction has been completed. • Construction should preferably take place in winter to reduce disturbance to breeding fauna and flowering flora;	National Environmental Management Act No. 107 of 1998 (NEMA); National Environmental Management: Biodiversity Act No. 10 of 2004 (NEMBA); Limpopo Environmental Management Act No. 7 of 2003 (LEMA)

				• Clearly demarcate the entire development footprint prior to initial site clearance and prevent construction personnel from leaving the demarcated area. • Monitoring should be implemented during the construction activities to ensure that minimal impact is caused to the watercourses of the area; • Vegetation to be removed as it becomes necessary – do not clear the entire footprint simultaneously. • The Mine ECO should advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment. The Mine ECO should enforce any measures that he/she deem necessary. Regular environmental training should be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation. • Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches during construction. • Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. Poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist. • Use existing facilities (e.g., access roads, parking lots, graded areas) to the extent possible to minimize the amount of new disturbance. • Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance. All possible efforts must be made to ensure as little disturbance as possible to the sensitive habitats such as ravines and moist grassland pockets during construction. • During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, in order to reduce potential impacts. Only necessary damage	

				must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • Construction activities must remain within defined construction areas and the road servitudes. No construction / disturbance will occur outside these areas.	
4	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation	Soil erosion and sedimentation	±350 ha	• Sediment trapping, erosion and stormwater control should be addressed by a hydrological engineer in a detailed stormwater management plan. • The overall macro-channel structures and mosaic of cobbles and gravels must be maintained by ensuring a balance (equilibrium) between sediment deposition and sediment conveyance maintained. A natural flooding and sedimentation regime must thus be ensured as far as reasonably possible. • Steps must be taken to ensure that stormwater does not result in bank instability and excessive levels of silt entering the watercourse(s). • Stormwater must be diverted from construction works, access roads, linear infrastructure and must be managed in such a manner as to disperse runoff and to prevent the concentration of stormwater flow. • The velocity of stormwater discharges must be attenuated and the banks of the watercourses protected. • Cover disturbed soils as completely as possible, using vegetation or other materials. • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas. • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth. • Structures must be non-erosive, structurally stable and must not induce any flooding or safety hazard. • Structures must be inspected regularly for accumulation of debris, blockage, erosion of abutments and overflow areas -	NEMA, NEMBA

				debris must be removed and damages must be repaired and reinforced immediately. • Existing flood terraces and deposition of sediments on these terraces to ensure optimum growth, spread and recruitment of these species must be maintained. • Necessary erosion prevention mechanisms must be employed to ensure the sustainability of all structures and activities and to prevent in-stream sedimentation. • Stockpiling of removed soil and sand must be stored outside of the 1:100 floodline and/or delineated riparian habitat and/or the regulated area of a watercourse, whichever is the greater, to prevent being washed into the river and must be covered to prevent wind and rain erosion. • Slope/bank stabilisation measures must be implemented with a 1:3 ratio or flatter and vegetated with indigenous vegetation immediately after the shaping. • As much indigenous vegetation growth as possible should be promoted within the proposed development area in order to protect soil and to reduce the percentage of the surface area which is paved, hardened and/or compacted. • Care must be taken to avoid excess silt entering the rivers; silt traps such as drift fences must be installed to intersect drainage by means adjacent to the workings of each of the bridges to contain silt. • All material works (such as tar, sand and gravel) that are left unused or spilled adjacent to the roadway should be immediately removed during the proposed crossing development.	
5	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species	±350 ha	• Control involves killing the alien invasive plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. The control of these species could even begin prior to the construction phase considering that small populations of the Alien Invasive Species occur around the sites. • Institute strict control over materials brought onto site, which should be inspected for seeds of noxious plants and steps	NEMA, NEMBA, Alien and Invasive Species Lists, GNR 599/2014 & GNR

				taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual herbicides prior to transport to site or in a quarantine area on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase. • Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish. • Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. • Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented. • A detailed plan should be developed for control of noxious weeds and invasive plants that could colonize the area as a result of new surface disturbance activities at the site. The plan should address monitoring, weed identification, the manner in which weeds spread, and methods for treating infestations.	864/2016
6	Vegetation clearing / vehicle movement	Habitat degradation due to dust	±350 ha	• Daily dampening of dust areas or other dust suppression methods such as dust-aside or more environmentally friendly methods. • Re-vegetation of impacted areas is to be conducted on an on-going basis. • Place dust generating activities where maximum protection can be obtained from natural features. • Locating dust generating activities where prevailing winds will blow dust away from users. • Minimize the need to transport and handle materials by placing adequate storage facilities close to processing areas. • Minimize the re-handling of material which obviously has cost benefits as well. • Exposed material should be protected from the wind by keeping it within voids or protecting it with topographical	NEMA, NEMBA, National Dust Control Regulations (GNR 827/2013), National Ambient Air Quality Standards (GNR 1210/2009)

				features where possible. • Reduce the drop heights wherever practicable. • Protect activities from wind by erecting a screen or using a natural barrier. • All roads on site should be dampened or treated with a binding agent. • The general vehicle speed should be restricted as there is a direct relationship between the speed and vehicle entrained emissions. • Monitoring, modelling and emission measurements should be regarded as complementary components in any integrated approach to exposure assessment or determining compliance against air quality criteria.	
7	Heavy machinery and vehicle movement on site	Spillages of harmful substances	±350 ha	• Ensure that mining related waste or spillage and effluent do not affect the sensitive habitat boundaries and associated buffer zones. • This risk of spillages of reagents and hydrocarbons on the soil during transportation can be reduced with proper maintenance of vehicles. This would include a rigorous and proactive maintenance program. • This risk can be further reduced through an adequate program of training of drivers and crews. This would include defensive driver training, basic vehicle maintenance, and emergency control of spills. In order for the vehicle crews to be adequately able to control any spills at an early stage, the vehicles must be properly equipped with spill containment equipment (booms, sandbags, spades, absorbent pads, etc.). Responsibility for training lies with the transport contractor. Adequate training, maintenance, and equipment of transport crews should be included as a requirement for transport contracts. • All relevant employees will be trained in cleaning up of a spillage. The necessary spill kits containing the correct equipment to clean up spills will be made available at strategic points. • Pollution of and disposal/spillage of any material into the	Hazardous Substances Act (Act No. 15 of 1973)

				watercourse must be prevented, reduced, or otherwise remediated through proper operation, maintenance and effective protective measures. • Vehicles and other machinery must be serviced well outside the 1:100 year floodline or delineated riparian habitat, whichever is the greatest. • Oils and other potential pollutants must be disposed of at an appropriate licenced site, with the necessary agreement from the management of such a site. • Vehicles must be checked for oil leaks and all maintenance must take place at a designated site further than 32 meters from the boundary of the watercourse(s). • Any hazardous substances must be handled according to the relevant legislation relating to transport, storage and use of the substance and all storage facilities must be equipped with large, clearly readable material safety data sheets (MSDS). • All reagent storage tanks and reaction units must be supplied with a bunded area built to contain sufficient capacity of the facility and provided with sumps and pumps to return the spilled material back into the system. The system must be maintained in a state of good repair and standby pumps must be provided. • Silt, litter and hydrocarbon (oil) traps must be installed to minimise the risk of pollutants entering the natural drainage system of the area. A register must be in place to indicate that oils are recovered/recycled or alternatively disposed at a licenced facility. • Activities (including spill clean-up) must start up-stream and proceed into a down-stream direction, so that the recovery processes can start immediately, without further disturbance from upstream works.	
8	Clearing of vegetation for open pit through water courses as well as road crossings	Impediment of flow patterns	±74 ha	• Unless authorised by a water use licence, access and haul roads must not encroach into the extent of the watercourse(s). • No structures to be placed within the 1:100 year floodline and/or the delineated riparian areas unless authorised in a water use licence.	NEMA, NWA

				• Appropriate design and mitigation measures must be developed and implemented to minimise impacts on the natural flow regime of the watercourse i.e. through placement of structures/supports and to minimise turbulent flow in the watercourse. • The diversion and impeding structures may not restrict river flows by reducing the overall river width or obstructing river flow. Any water course crossing must minimise its impacts on the water course and must be assessed and documented as such and be available for review. • The indiscriminate use of machinery within the in-stream and riparian habitat will lead to compaction of soils and vegetation and must therefore be strictly controlled. • The clear incision of the banks of the drainage channel in the eastern section of the site indicates that this feature is highly erodible. The installation of energy dissipating structures, such as gabion wingwalls, to protect the banks of the feature is required. • Perform scheduled maintenance to be prepared for storms. Insure that culverts have their maximum capacity, ditches are cleaned, and that channels are free of debris and brush than can plug structures. • Work in rivers, streams and riparian zones should preferably be done during the low flow season. • The construction camp must be located outside the extent of the watercourse(s) and must be recovered and removed within one (1) month after construction has been completed • During the construction phase vehicles must not be allowed to indiscriminately drive through any watercourse(s)/riparian areas. • Indigenous riparian vegetation, including dead trees, outside the limits of disturbance indicated in the site plans must not be removed from the area.	

9	Heavy machinery and vehicle movement on site; Construction of infrastructure, roads etc. on site	Road mortalities of fauna / impact of human activities on site	±350 ha	• More fauna are normally killed the faster vehicles travel. A speed limit should be enforced as determined by the mine environmental manager. It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also lessen the probability of road accidents and their negative consequences). • Travelling at night should be avoided or limited as much as possible. No travelling at night should be allowed without approval by the mine manager. • Lights should be positioned 5m from the roads or paved areas.	NEMA
Operational Phase					

10	Storage of tailings, laydown areas of overburden dumps and stockpiles	Habitat destruction / fragmentation of fauna habitats	±218 ha	• Concurrent rehabilitation should occur during the operational phase on all exposed areas created by construction as well as roads, stockpiles and the overburden facility. Only indigenous species should be used for rehabilitation. The following programmes should be implemented as part of the operational phase of the mine:
				  o Concurrent rehabilitation programme
				  o Alien invasive eradication programme
				  o Fire management programme
				  o Educational and training programme on conservation and ecological systems
				• Final profile lines of rehabilitated areas must fit in with the character of the topography in the area.
				• Refer to mitigation measures needed during the operational phase that are similar to the mitigation measures for impacts during the construction phase.
					NEMA, NEMBA

11	Increased hardened surfaces around infrastructure and exposed areas around open pits, laydown areas of overburden dumps and stockpiles as well as TSF	Soil erosion and sedimentation	±350 ha	• Rehabilitation: revegetate or stabilise all disturbed areas as soon as possible. Indigenous trees can be planted in the buffer zone of the proposed development to enhance the aesthetic value of the site and stabilize soil conditions. • The vegetative (grass) cover on the soil stockpiles (berms) must be continually monitored in order to maintain a high basal cover. Such maintenance will limit soil erosion by both the mediums of water (runoff) and wind (dust).	NEMA, NEMBA

				• Conservation of topsoil should be prioritized on site and done as follows:
				  ○ Topsoil should be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify;
				  ○ Stockpile topsoil separately from subsoil;
				  ○ Stockpile in an area that is protected from stormwater runoff and wind;
				  ○ Topsoil stockpiles should be protected by a mulch cover where possible;
				  ○ Maintain topsoil stockpiles in a weed free condition;
				  ○ Topsoil should not be compacted in any way, nor should any object be placed or stockpiled upon it;
				  ○ Stockpile topsoil for the minimum time period possible i.e. strip just before the relevant activity commences and replace as soon as it is completed.
				• Refer to mitigation measures needed during the operational phase that are similar to the mitigation measures for impacts during the construction phase.	

12	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species	±350 ha	Refer to mitigation measures needed during the operational phase that are similar to the mitigation measures for impacts during the construction phase.	NEMA, NEMBA, Alien and Invasive Species Lists, GNR 599/2014 & GNR 864/2016
13	Heavy machinery and vehicle movement on site	Habitat degradation due to dust	±350 ha	• Dampening of disturbed areas as required. • Re-vegetation of mined areas is to be conducted on an ongoing basis. • Dust fallout monitoring to be conducted according to the requirements of the legislation. • Place dust generating activities where maximum protection can be obtained from natural features. • Locating dust generating activities where prevailing winds will	NEMA, NEMBA, National Dust Control Regulations (GNR 827/2013), National

				blow dust away from surrounding landowners. • Minimize the need to transport and handle materials by placing adequate storage facilities close to processing areas. • Exposed material should be protected from the wind by keeping it within voids or protecting it with topographical features where possible. • Reduce the drop heights wherever practicable. • Protect activities from wind by erecting a screen or using a natural barrier. • Fine spray or fog suppression can also be used in loading bays. • All roads on site should be dampened or treated with a binding agent. • The general vehicle speed should be restricted as there is a direct relationship between the speed and vehicle entrained emissions. • Monitoring, modelling and emission measurements should be regarded as complementary components in any integrated approach to exposure assessment or determining compliance against air quality criteria. • Refer to mitigation measures needed during the operational phase that are similar to the mitigation measures for impacts during the construction phase.	Ambient Air Quality Standards (GNR 1210/2009)
14	Heavy machinery and vehicle movement on site	Spillages of harmful substances	±350 ha	• Vehicle maintenance only done in designated areas – spill trays, sumps to be used and managed according to the correct procedures. • Vehicles and machines must be maintained properly to ensure that oil spillages are kept to a minimum. • Fuel and oil storage facilities should be bunded with adequate stormwater management measures. • Operational and Maintenance plan and schedule for management of sewage facilities should be compiled. An emergency plan should be compiled to deal with system failures and should include a down-stream notification procedure. • Routine checks should be done on all mechanical instruments	Hazardous Substances Act (Act No. 15 of 1973)

				for problems such as leaks, overheating, vibration, noise or any other abnormalities. All equipment should be free of obstruction, be properly aligned and be moving at normal speed. Mechanical maintenance must be according to the manufacturer's instructions. • Refer to mitigation measures needed during the operational phase that are similar to the mitigation measures for impacts during the construction phase.	
15	Heavy machinery and vehicle movement on site; poaching, wood collection, fires etc.	Road mortalities of fauna / impact of human activities on site	±350 ha	Refer to mitigation measures needed during the operational phase that are similar to the mitigation measures for impacts during the construction phase.	NEMA
Closure and Decommissioning Phase					
16	Rehabilitation of mining site	Improvement of habitat through revegetation / succession over time	±350 ha	• Plant vegetation species for rehabilitation that will effectively bind the loose material and which can absorb run-off from the mining areas. • Rehabilitate all the land where infrastructure has been dismantled. • Diversion trenches and stormwater measures must be maintained. • Water management facilities will stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. • The mining areas will be shaped to make it safe. • All the monitoring and reporting on the management and rehabilitation issues to the authorities will continue till closure of the mine is approved.	NEMA, NEMBA, NEMA Financial Provisioning Regulations GNR 1147/2015, as amended
17	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	±350 ha	Refer to mitigation measures for the construction and operational phases needed during the decommissioning phase that are similar.	NEMA, NEMBA
18	Demolition of mining infrastructure / cessation of mining / rehabilitation of	Spreading and establishment of alien invasive species	±350 ha	Refer to mitigation measures for the construction phase needed during the decommissioning phase that are similar.	NEMA, NEMBA, Alien and

	mining site				Invasive Species Lists, GNR 599/2014 & GNR 864/2016
19	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site / vehicle movement on site	Habitat degradation due to dust	±350 ha	Refer to mitigation measures for the construction and operational phases needed during the decommissioning phase that are similar.	NEMA, NEMBA, National Dust Control Regulations (GNR 827/2013), National Ambient Air Quality Standards (GNR 1210/2009)
20	Heavy machinery and vehicle movement on site	Spillages of harmful substances	±350 ha	Refer to mitigation measures for the construction and operational phases needed during the decommissioning phase that are similar.	Hazardous Substances Act (Act No. 15 of 1973)
21	Heavy machinery and vehicle movement on site	Road mortalities of fauna / impact of human activities on site	±350 ha	Refer to mitigation measures for the construction phase needed during the decommissioning phase that are similar.	NEMA
Post-Closure & Rehabilitation Phase					
22	Natural Successional processes	Improvement of habitat through revegetation / succession over time	±350 ha	• Plant vegetation species for rehabilitation that will effectively bind the loose material and which can absorb run-off from the mining areas. • Rehabilitate all the disturbed areas and footprints. • Monitor the establishment of the vegetation cover on the rehabilitated sites to the point where it is self-sustaining. • Protect rehabilitation areas until the area is self-sustaining. • Diversion trenches and stormwater measures must be	NEMA, NEMBA, NEMA Financial Provisioning Regulations GNR 1147/2015,

				maintained. • Water management facilities will stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. • The mining areas will be shaped to make it safe. • All the monitoring and reporting on the management and rehabilitation issues to the authorities will continue till closure of the mine is approved.	as amended
23	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	±350 ha	• Diversion trenches and stormwater measures must be maintained. • Water management facilities will stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. • Refer to mitigation measures for the construction and operational phases needed during the decommissioning phase that are similar.	NEMA, NEMBA
24	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species	±350 ha	Monitor and manage invader species and alien species on the rehabilitated land until the natural vegetation can outperform the invaders or aliens.	NEMA, NEMBA, Alien and Invasive Species Lists, GNR 599/2014 & GNR 864/2016
Ecological Impacts					
Planning Phase					
25	Obtaining of IWUL for crossings (watercourses) and mining layout on sensitive soils	Delay of mining onset	±150 ha	• Apply and obtain IWUL from DWS after liaison with relevant officials and site visit to the area. • Siting of mine infrastructure on least sensitive areas.	National Water Act (Act No 36 of 1998) (NWA)
Construction Phase					

26	Topsoil & subsoil stripping	Soil destruction and sterilization	±350 ha	• No specific mitigation can be applied during the construction phase of the mine to prevent soil destruction, although important measures should be the correct handling and stockpiling of topsoil as follows: o Topsoil must only be used for rehabilitation purposes and not for any other use example i.e. construction of roads.	NEMA, NEMBA
27	Heavy machinery and vehicle movement on site	Soil compaction	±350 ha	• Soil should be handled when dry during removal and placement to reduce the risk of compaction. • Vegetation (grass and small shrubs) should not be cleared from the site prior to mining activities or construction (except if vegetation requires relocation as determined through an ecology assessment). This material is to be stripped together with topsoil as it will supplement the organic and possibly seed content of the topsoil stockpile depending on the time of soil stripping (whether plants are in seed or not. • During construction, sensitive soils with high risk of compaction (e.g. clayey soils) must be avoided by construction vehicles and equipment, wherever possible, in order to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • Rip and/or scarify all compacted areas. Do not rip and/or scarify areas under wet conditions, as the soil will not loosen. Compacted soil can also be decompacted by "Rotary Decompactors" to effectively aerate soils for vegetation establishment.	NEMA, NEMBA
28	Topsoil & subsoil stripping, exposure of soils to wind and rain during construction causing erosion and sedimentation in watercourses	Soil erosion and sedimentation	±350 ha	• When possible, topsoil stripping and excavation activities should be scheduled for the low rainfall season (winter). • Cover disturbed soils as completely as possible, using vegetation or other materials. • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Sediment trapping, erosion and stormwater control should be addressed by a hydrological engineer in a detailed stormwater management plan.	NEMA, NEMBA

				• All aspects related to dust and air quality should be addressed by an air quality specialist in a specialist report. • Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas. • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth. • Gravel roads must be well drained in order to limit soil erosion.	
29	Heavy machinery and vehicle movement on site	Spillages of harmful substances	±350 ha	• Ensure that mining related waste or spillage and effluent do not affect the sensitive habitat boundaries and associated buffer zones. • This risk of spillages of reagents and hydrocarbons on the soil during transportation can be reduced with proper maintenance of vehicles. This would include a rigorous and proactive maintenance program. • This risk can be further reduced through an adequate program of training of drivers and crews. This would include defensive driver training, basic vehicle maintenance, and emergency control of spills. In order for the vehicle crews to be adequately able to control any spills at an early stage, the vehicles must be properly equipped with spill containment equipment (booms, sandbags, spades, absorbent pads, etc.). Responsibility for training lies with the transport contractor. Adequate training, maintenance, and equipment of transport crews should be included as a requirement for transport contracts. • Hydrocarbons should be stored in a concrete lined and bermed facility that has been designed to contain 110% of the volume of the tanks in the event of a spill. This eliminates the potential impacts to soils from spills of hydrocarbons. • All employees will be trained in cleaning up of a spillage. The necessary spill kits containing the correct equipment to clean up spills will be made available at strategic points in the plant area.	Hazardous Substances Act (Act No. 15 of 1973)

30	Topsoil & subsoil stripping	Loss of land capability	±350 ha	No specific mitigation can be applied during the construction phase itself to prevent loss of land capability, considering that the land use will change to industrial. This however, does not prevent the mine from ensuring that disturbance and clearing should be confined to the footprint areas of the mine infrastructure and not over the larger area. This can be done in the following ways: • Corridors should be secured around the mining footprint areas to ensure the current land use (grazing and agriculture) can continue in a functional way during mining. • Clearly demarcate the entire development footprint prior to initial site clearance and prevent construction personnel from leaving the demarcated area. This could be done through the fencing off of the entire development footprint and institute strict access control to the portions of the owner-controlled property that are to remain undisturbed as soon as possible after initial site clearance. The fence should preferably be impermeable (for example a solid wall) to discourage invertebrates and small animals from entering the site. [Normally solid perimeter walls are not recommended in order to facilitate the movement of invertebrates, but in this case restriction of their movement into the area will be advantageous.] • All development activities should be restricted to specific recommended areas and strict buffer zones should be applied around the sensitive areas. The Environment Control Officer (ECO) should demarcate and control these areas. Unnecessary bulldozing through the veld should be avoided.	Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA), Spatial Planning and Land Use Management Act (Act No. 16 of 2013) (SPLUMA)
Operational Phase					
31	Topsoil & subsoil stripping, opencast mining	Soil destruction and sterilization	±350 ha	• The most desired approach during all of the mining phases is to continually rehabilitate the soils to the best possible state – taking into account the current technology and knowledge available as well as the financial means to conduct such rehabilitation. • Construction staging and progressive/concurrent rehabilitation is important. • Soil loss from the site is proportionally related to the time the	NEMA, NEMBA

				soils are exposed, prior to rehabilitation. The time from commencement of rehabilitation activities to finalization thereof should be limited. Rehabilitation efforts should commence as soon as practical. • Retain natural indigenous grass and shrubs and re-vegetate bare areas as soon as possible. Plant species that have been rescued or removed and relocated to the temporary nursery could be used in replanting rehabilitation areas. • Additional plant material (indigenous trees) as required should be sourced from local indigenous nurseries and specifications regarding plant sizes, heights and the installation process of these plants should be developed by the On Site ECO and Rehabilitation Specialist. Standard horticultural best practice would apply, with specific reference to the fact that the plant material would have to be in good condition, free from pests and diseases (any such plant would have to be removed from the site), well-formed and well rooted, potting materials are weed free and with sufficient root cover. Groundcovers and sedges are often supplied in trays, and the same standards would apply. • Re-grassing should be undertaken (as far as possible) during the summer months, as germination and establishment is best at this time of year. Spring rains are also conducive to good germination results, and as such rehabilitation programmes should take these factors into consideration. • There are two methods for seeding, hand broadcasting and hydro-seeding. The methods utilised will be site specific and the On Site ECO and Rehabilitation Specialist will determine them. • In certain areas grass runners may be required, and grass sods where instant cover is necessary. • A typical grass seed mixture (hand sowing) that could be implemented for rehabilitation activities will include: (specification 4-5kg/ha) o *Eragrostis tef* (Tef);	

				○ *Eragrostis curvula* (Weeping Love Grass); ○ *Digitaria eriantha* (Smutsvinger); ○ *Cynodon spp.* (Bermuda kweek); ○ *Panicum maximum* (Witbuffel); ○ *Chloris gayana* (Rhodes grass); ○ *Paspalum notatum* (Bahia Grass) • Refer to mitigation measures needed during the operational phase that are similar to the mitigation measures for impacts during the construction phase.	
32	Heavy machinery and vehicle movement on site, laydown areas of TSF	Soil compaction	±350 ha	• During operation, sensitive soils with high risk of compaction (e.g. clayey soils) must be avoided by construction vehicles and equipment, wherever possible, in order to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. Vehicles should also stick to haul roads when dumping of overburden and topsoil are done. • Rip and/or scarify all compacted areas on a continuous basis. Do not rip and/or scarify areas under wet conditions, as the soil will not loosen. Compacted soil can also be decompacted by “Rotary Decompactors” to effectively aerate soils for vegetation establishment. • Refer to mitigation measures needed during the construction phase that are similar to the mitigation measures for impacts during the operational phase.	NEMA, NEMBA
33	Increased hardened surfaces around infrastructure, laydown areas of WRDs and stockpiles as well as TSF, pipeline crossings	Soil erosion and sedimentation of water courses	±350 ha	• To protect drainage areas and small streams as well as erosion prone areas, brush could be cut and used to “brush pack” these problem areas to protect it. This will also restrict movement of animals and humans over sensitive erosion prone areas until pioneer vegetation has established. On steeper slopes rehabilitation measures may include systems such as soil terracing, berm creation, grass blocks, fascine work, gabion basket work, reno mattresses, retaining block mechanisms, sand bags, boulder and rock placement, stone pitching, and grading. • Erosion control netting or matting (Geo-Jute or Bio-Jute) may	NEMA, NEMBA

				be utilised on steep slopes to assist with soil retention, weed control and vegetation establishment. The netting material helps protect the soil from wind and water erosion, and the required rehabilitation plant material can be installed by making small incisions for planting. The netting is biodegradable and will eventually break down and form a mulch layer. • Avoid over-wetting, saturation and unnecessary run-off during dust control activities and irrigation.	
34	Heavy machinery and vehicle movement on site	Spillages of harmful substances leading to water pollution in water courses	±350 ha	• Vehicle maintenance only done in designated areas – spill trays, sumps to be used and managed according to the correct procedures. • Vehicles and machines must be maintained properly to ensure that oil spillages are kept to a minimum. • Fuel and oil storage facilities should be bunded with adequate stormwater management measures. • Operational and Maintenance plan and schedule for management of sewage facilities should be compiled. An emergency plan should be compiled to deal with system failures and should include a down-stream notification procedure • Routine checks should be done on all mechanical instruments for problems such as leaks, overheating, vibration, noise or any other abnormalities. All equipment should be free of obstruction, be properly aligned and be moving at normal speed. Mechanical maintenance must be according to the manufacturer's instructions • Refer to mitigation measures needed during the operational phase that are similar to the mitigation measures for impacts during the construction phase	Hazardous Substances Act (Act No. 15 of 1973)
35	Topsoil & subsoil stripping	Loss of land capability	±350 ha	• Refer to mitigation measures needed during the operational phase that are similar to the mitigation measures for impacts during the construction phase. • Only a small area of the land should be used for mining at a time. Rehabilitation should take place on a continuous basis where after the land would become partially available again as	Conservation of Agricultural Resources Act (Act No. 43 of 1983)

				grazing/agricultural use.	(CARA), Spatial Planning and Land Use Management Act (Act No. 16 of 2013) (SPLUMA), NEMA Financial Provisioning Regulations GNR 1147/2015, as amended
Closure and Decommissioning Phase					
36	Rehabilitation of mining site	Improvement of eroded soils and compaction	±350 ha	• Plant vegetation species for rehabilitation that will effectively bind the loose material and which can absorb run-off from the mining areas. • Rehabilitate all the land where infrastructure has been demolished. • Monitor the establishment of the vegetation cover on the rehabilitated sites to the point where it is self-sustaining. • Protect rehabilitation areas until the area is self-sustaining. • Diversion trenches and stormwater measures must be maintained. • Water management facilities will stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. • The mining areas will be shaped to make it safe. • All the monitoring and reporting on the management and rehabilitation issues to the authorities will continue till closure of the mine is approved. • Refer to mitigation measures for the construction and	NEMA, NEMBA, NEMA Financial Provisioning Regulations GNR 1147/2015, as amended

				operational phases needed during the decommissioning & closure phase that are similar.	
37	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	±350 ha	Refer to mitigation measures for the construction and operational phases needed during the decommissioning phase that are similar.	NEMA, NEMBA
38	Heavy machinery and vehicle movement on site	Soil compaction	±350 ha	• During closure, sensitive soils with high risk of compaction (e.g. clayey soils) must be avoided by vehicles wherever possible, in order to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • Rip and/or scarify all compacted areas on a continuous basis. Do not rip and/or scarify areas under wet conditions, as the soil will not loosen. Compacted soil can also be decompacted by “Rotary Decompactors” to effectively aerate soils for vegetation establishment. Other soil rehabilitation measures are discussed in section 11. • Soil should be sampled and analysed prior to replacement during rehabilitation. If necessary, and under advisement from a suitably qualified restoration ecologist, supplemental fertilisation may be necessary. • Refer to mitigation measures for the construction and operational phases needed during the decommissioning & closure phase that are similar	NEMA, NEMBA
39	Heavy machinery and vehicle movement on site	Spillages of harmful substances	±350 ha	Refer to mitigation measures for the construction and operational phases needed during the decommissioning phase that are similar	Hazardous Substances Act (Act No. 15 of 1973)
Post-Closure & Rehabilitation Phase					
40	Natural processes	Improvement of soil compaction and erosion	±350 ha	• Once mining activities have ceased, disturbed areas should be rehabilitated and the grazing/agricultural capacity restored as far as possible. • Refer to mitigation measures for the other mining phases needed during the closure phase that are relevant	NEMA, NEMBA, NEMA Financial Provisioning

					Regulations GNR 1147/2015, as amended
41	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	±350 ha	• Rehabilitation.	NEMA, NEMBA, NEMA Financial Provisioning Regulations GNR 1147/2015, as amended
Heritage Impacts					
Planning Phase					
42	Siting of Open Pit	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	±74 ha	No mitigation.	National Heritage Resources Act (Act No. 25 of 1999) (NHRA)
43	Siting of Overburden Facility	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	±74 ha	No mitigation.	
44	Siting of Overburden Facility and Tailings Storage Facility	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	±218 ha	• Plan a heritage conservation buffer of at least 50m around the heritage receptor. • Redesign project layout and road alignments to avoid the heritage resource and the proposed conservation buffer.	
45	Siting of Overburden Facility and Tailings Storage Facility	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	±218 ha	No mitigation.	
46	Siting of Open Pit, Overburden Facility and TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and	±292 ha	• Plan a heritage conservation buffer of at least 100m around the grave. • Redesign project layout and road alignments to avoid the burial sites and the proposed conservation buffer.	

		TSF Alt 1, 2, 3, 4			
Construction Phase					
47	Stripping of Open Pit footprint	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	±74 ha	No mitigation. General site monitoring by informed ECO.	NHRA
48	Stockpiling of overburden	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	±74 ha	No mitigation. General site monitoring by informed ECO.	
49	Stockpiling of overburden and construction of TSF	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	±218 ha	• Implement a heritage conservation buffer of at least 50m around the heritage receptor. • Full Phase 2 Specialist Assessment of sites and apply for destruction permits if impacted upon. General site monitoring by informed ECO.	
50	Stockpiling of overburden and construction of TSF	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	±218 ha	No mitigation. General site monitoring by informed ECO.	
51	Stripping of Open Pit footprint, stockpiling of overburden and construction of TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	±292 ha	• Implement a heritage conservation buffer of at least 100m around the grave. • Erect a fence around the burial site and apply access control with signage to indicate visitation contacts. implementation of a site management plan detailing site management conservation measures. • Strict and continuous monitoring of the heritage site during construction. • Grave relocation subject to permitting if impacted upon. • General site monitoring by informed ECO.	
Operational Phase					

52	Opencast mining activities	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	±74 ha	No mitigation. General site monitoring by informed ECO.	NHRA
53	Stockpiling of overburden	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	±74 ha	No mitigation. General site monitoring by informed ECO.	
54	Stockpiling of overburden and deposition of tailings in TSF	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	±218 ha	• Implement a heritage conservation buffer of at least 50m around the heritage receptor. • Full Phase 2 Specialist Assessment of sites and apply for destruction permits if impacted upon. • General site monitoring by informed ECO.	
55	Stockpiling of overburden and deposition of tailings in TSF	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	±218 ha	No mitigation. General site monitoring by informed ECO.	
56	Opencast mining activities, stockpiling of overburden and deposition of tailings in TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	±292 ha	• Implement a heritage conservation buffer of at least 100m around the grave. • Erect a fence around the burial site and apply access control with signage to indicate visitation contacts. implementation of a site management plan detailing site management conservation measures. • Strict and continuous monitoring of the heritage site during construction. • Grave relocation subject to permitting if impacted upon. • General site monitoring by informed ECO.	
Closure and Decommissioning Phase					
57	Backfilling of Open Pit	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	±74 ha	No mitigation. General site monitoring by informed ECO.	NHRA
58	Backfilling of overburden into Open Pit	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	±74 ha	No mitigation. General site monitoring by informed ECO.	

59	Backfilling of overburden into Open Pit & decommissioning of TSF	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	±292 ha	No mitigation. General site monitoring by informed ECO.	
60	Backfilling of overburden into Open Pit & decommissioning of TSF	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	±292 ha	No mitigation. General site monitoring by informed ECO.	
61	Backfilling of overburden into Open Pit & decommissioning of TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	±292 ha	No mitigation. General site monitoring by informed ECO.	
Post-Closure & Rehabilitation Phase					
62	Rehabilitation of Open Pit footprint	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	±74 ha	No mitigation. General site monitoring by informed ECO.	NHRA
63	Rehabilitation of Overburden footprint	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	±74 ha	No mitigation. General site monitoring by informed ECO.	
64	Rehabilitation of Overburden footprint & TSF	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	±218 ha	No mitigation. General site monitoring by informed ECO.	
65	Rehabilitation of Overburden footprint & TSF	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	±218 ha	No mitigation. General site monitoring by informed ECO.	
66	Rehabilitation of Open Pit and Overburden footprint & TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	±292 ha	No mitigation. General site monitoring by informed ECO.	

Palaeontological Impacts					
Construction Phase					
67	Exploration for mining, construction of processing plant complex, pipelines and roads	Destruction of fossils.	±140 ha	• Palaeontological site visit must be done in areas earmarked for construction. • Palaeontologist must be appointed if fossils are exposed.	NHRA
Hydrogeological Impacts					
Construction Phase					
68	Contamination to ground- and surface water systems from oil, grease and diesel spillages from construction vehicles	Contamination to ground- and surface water systems	±134 ha	Road compaction and service facilities for mine vehicles with spillage sumps	NWA, NEMWA, Hazardous Substances Act (Act No. 15 of 1973)
69	On-site sanitation	Contamination to ground- and surface water systems	±0.6 ha	Monitoring systems to detect leaking and as well as visual observations of facilities conditions	NWA, NEMWA
70	Storage of chemicals and building materials during construction of mine residue facilities	Contamination to ground- and surface water systems	±0.6 ha	Monitoring systems to detect leaking and as well as visual observations of facilities conditions	NWA, NEMWA, Hazardous Substances Act (Act No. 15 of 1973)
Operational Phase					
71	Mine dewatering	Increased abstraction/inflows from groundwater resource with possible impact on surrounding groundwater users	±74 ha	• Abstraction volume monitoring and observations if geological fractures are intersected at depth during construction. • Groundwater level monitoring.	NEMA, NWA
72	Mass transport and seepage from new mine residue facilities at the proposed mine along	Contamination to ground- and surface water systems	±193 ha	Water quality monitoring and seepage capturing from non-perennial drainages.	NEMA, NWA, NEMWA

	surface drainages and groundwater pathways				
Closure and Decommissioning Phase					
73	Re-watering and decanting of open pits	Oxidation of backfilled material & contamination to ground- and surface water systems	±74 ha	Water quality monitoring and seepage capturing from non-perennial drainages.	NEMA, NWA
74	Seepage and mass transport from mine residue facilities impacting on groundwater quality	Contamination to ground- and surface water systems	±193 ha	Water quality monitoring and seepage capturing from non-perennial drainages.	NEMA, NWA, NEMWA
Post-closure and Rehabilitation Phase					
75	Re-watering and decanting of open pits	Oxidation of backfilled material & contamination to ground- and surface water systems	±74 ha	Evaporation ponds, water treatment, or re-use.	NEMA, NWA
76	Seepage and mass transport from mine residue facilities impacting on groundwater quality	Contamination to ground- and surface water systems	±193 ha	Water quality monitoring and seepage capturing from non-perennial drainages.	NEMA, NWA, NEMWA
Air Quality Impacts					
Planning Phase					
77	Detailed engineering taking existing ambient baseline into account	PM10 and PM2.5	N/A	Best engineering practices to minimise impact on surrounding environment where feasible.	National Environment Managemen t: Air Quality Act No. 39 of 2004 (NEM:AQA), Ambient Air Quality Standards
Construction Phase					

78	Transport and general construction activities	Gaseous and particulate emissions; fugitive dust	±350 ha	Maintenance of vehicles and wet suppression or chemical treatment on unpaved road surfaces.	National Environment Management: Air Quality Act No. 39 of 2004 (NEM:AQA), Ambient Air Quality Standards, National Dust Control Regulations
79	Clearing of groundcover and levelling of area	PM10 and PM2.5	±350 ha	• Wet suppression where feasible. • Minimise extent of disturbed areas. • Reduction of frequency of disturbance. • Early re-vegetation • Stabilisation (chemical, rock cladding or vegetative) of disturbed soil.	
80	Materials handling	PM10 and PM2.5	±74 ha	Wet suppression where feasible on materials handling activities and reducing drop height.	
81	Wind erosion from open areas	PM10 and PM2.5	±350 ha	• Wet suppression where feasible. • Minimise extent of disturbed areas. • Reduction of frequency of disturbance. • Early re-vegetation • Stabilisation (chemical, rock cladding or vegetative) of disturbed soil.	
Operational Phase					
82	Vehicle activity on paved and unpaved roads	Gaseous and particulate emissions; fugitive dust	±7 ha	Maintenance of vehicles and wet suppression or chemical treatment on unpaved road surfaces.	National Environment Management: Air Quality Act No. 39 of 2004 (NEM:AQA), Ambient Air Quality Standards, National Dust Control Regulations
83	Materials handling	PM10 and PM2.5	±102 ha	• Wet suppression where feasible on materials handling activities and reducing drop height. • Enclosure or wet suppression on crushing activities.	
84	Wind erosion	PM10 and PM2.5	±350 ha	• Wet suppression where feasible. • Stabilisation (chemical, rock cladding or vegetative) of tailings facility.	
Closure and Decommissioning Phase					
85	Dust generated during rehabilitation activities	PM10 and PM2.5	±350 ha	Wet suppression where feasible.	National Environment

86	Demolition of infrastructure	PM10 and PM2.5	±53 ha	Wet suppression where feasible.	Managemen t: Air Quality Act No. 39 of 2004 (NEM:AQA), Ambient Air Quality Standards, National Dust Control Regulations
87	Tailpipe emissions from the vehicles used during the closure phase	Gaseous and particulate emissions; fugitive dust	±350 ha	Maintenance of vehicles and wet suppression on unpaved road surfaces.	
Post-Closure & Rehabilitation Phase					
88	Wind erosion from open areas	PM10 and PM2.5	±350 ha	Vegetation of disturbed areas.	National Environment Managemen t: Air Quality Act No. 39 of 2004 (NEM:AQA), Ambient Air Quality Standards, National Dust Control Regulations
Noise Impacts					
Construction Phase					
89	Construction of roads	Noise impact on surrounding landowners	±7 ha	• A representative should inform receptors of any daytime related construction activities to be conducted within 250m of them, highlighting the times and dates that construction activities are to occur and the extent of noise to be generated. • Any night-time construction works (22:00 – 06:00) that should be required within 500m proximity of receptors should be discussed with them, highlighting the potential disturbing	NEMA, National noise-control regulations (GNR154), SANS 10103:2008,

				noises.	SANS 10210:2004, SANS 10328:2008, SANS 10357:2004
90	Construction of Tailings Storage Facility	Noise impact on surrounding landowners	±144 ha	Construction of the Tailings storage facility should occur during the daytime.	
91	Stripping of Open Pit footprint	Noise impact on surrounding landowners	±74 ha	• Construction of open pit should occur during the daytime. • Berms should be constructed in relation to receptors (specifications to be defined in ENIA). • SPL (Sound Power Levels) generated by equipment should not exceed 85 dBA. • Contractors should install acoustical mufflers are recommended on the exhaust outlets of all heavy vehicles.	
92	Stockpiling of overburden and topsoil and establishment of berms around open cast	Noise impact on surrounding landowners	±74 ha	• Construction of stockpiles/berms should occur during the daytime. • SPL (Sound Power Levels) generated by equipment should not exceed 85 dBA.	
93	Construction of Processing Plant	Noise impact on surrounding landowners	±53 ha	• A representative should inform receptors of any daytime related construction activities to be conducted within 250m of them, highlighting the times and dates that construction activities are to occur and the extent of noise to be generated. • Any night-time construction works (22:00 – 06:00) that should be required within 500m proximity of receptors should be discussed with them, highlighting the potential disturbing noises.	
Operational Phase					
94	Deposition of tailing to Tailings Storage Facility	Noise impact on surrounding landowners	±144 ha	• The design and layout of the tailings storage facility will play a vital role on whether there is a potential disturbing noise or noise nuisance. • Water reticulation pump localities play a vital part of the potential for these impacts. Should pumps be situated within proximity of a receptor, equipment should be enclosed (e.g. a building). • An acoustical specialist should be sought to ensure required	NEMA, National noise-control regulations (GNR154), SANS 10103:2008, SANS

				frequencies are screened correctly.	10210:2004, SANS 10328:2008, SANS 10357:2004
95	Vehicular movement on roads	Noise impact on surrounding landowners	±7 ha	Traffic during the night-time would be required to be kept minimal. If not feasible, an alternative route that does not traverse bordering (50m) to a property should be sought.	
96	Open Cast mining activities: blasting and drilling	Noise impact on surrounding landowners	±74 ha	• Construction of open pit should occur during the daytime. • Berms should be constructed in relation to receptors	
97	Stockpiling of overburden and topsoil	Noise impact on surrounding landowners	±74 ha	• If a stockpile is to be sloped, it should be done with the slope gradient facing away from a receptor. • If night-time work is to occur, the night-time work should be limited (e.g. to within 500m of a receptor without any berm/barrier or acoustical screening)	
98	Processing activities: crushing and screening	Noise impact on surrounding landowners	±53 ha	• Ensure all equipment is well maintained and functioning optimally. Equipment with maintenance issues could potentially generate more noise (e.g. broken fan-belt on a motor etc.). Equipment to be checked regularly include: o Conveyor belt rollers (squeaking/tonal noises); o Rotational elements (engine revolution areas); o Gas or air leaks (ultrasound elements); and o Parts that require frequent replacement (belts etc.). Equipment operating outdoors and not behind a berm/acoustical shield (in relation to a receptor) and within 500m of a receptor should not generate a noise level higher than 85dBA. o Equipment should where feasible operate indoors or in an enclosure (e.g. a building). o Enclosures should not have any surface equipment ventilation stack outlets facing receptors nor point upwards (due to the night-time temperature inversion layers). Stacks have the potential to extend to higher heights obtaining a direct line-of-sight to receptors. Stack areas may include: ▪ Cooling systems for equipment; and ▪ Ventilation systems for equipment etc.	

Closure and Decommissioning Phase					
99	Decommissioning of roads, vehicular movement on roads	Noise impact on surrounding landowners	±7 ha	• A representative should inform receptors of any daytime related construction activities to be conducted within 250m of them, highlighting the times and dates that construction activities are to occur and the extent of noise to be generated. • Any night-time construction works (22:00 – 06:00) that should be required within 500m proximity of receptors should be discussed with them, highlighting the potential disturbing noises.	NEMA, National noise-control regulations (GNR154), SANS 10103:2008, SANS 10210:2004, SANS 10328:2008, SANS 10357:2004
100	Backfilling of Open pit	Noise impact on surrounding landowners	±123 ha	Closure of open pit should occur during the daytime.	
101	Backfilling of overburden to Open Pit and spreading topsoil	Noise impact on surrounding landowners	±148 ha	Closure of the overburden/topsoil should occur during the daytime.	
102	Decommissioning of processing plant	Noise impact on surrounding landowners	±53 ha	• A representative should inform receptors of any daytime related closure activities to be conducted within 250m of them, highlighting the times and dates that construction activities are to occur and the extent of noise to be generated. • Any night-time closure works (22:00 – 06:00) that should be required within 500m proximity of receptors should be discussed with them, highlighting the potential disturbing noises.	
Post-Closure & Rehabilitation Phase					
103	Rehabilitation of roads, vehicular movement on roads	Noise impact on surrounding landowners	±7 ha	N/A	NEMA, National noise-control regulations (GNR154), SANS 10103:2008, SANS 10210:2004,
104	Rehabilitation of Open pit footprint	Noise impact on surrounding landowners	±74 ha	N/A	
105	Rehabilitation of Overburden/Topsoil footprints	Noise impact on surrounding landowners	±74 ha	N/A	

106	Rehabilitation of processing plant footprint	Noise impact on surrounding landowners	±53 ha	N/A	SANS 10328:2008, SANS 10357:2004
Blasting & Vibration Impacts					
Operational Phase					
107	Open cast mining activities: blasting	Ground vibration	±74 ha	Specific blast design and planning to be considered, use of specialist to assist with drilling and blasting mitigation	Minerals and Petroleum Resources Development Act No. 28 of 2002 (MPRDA)and Regulations (GNR 527/2004), NEMA, Explosives Act No. 26 of 1956 and Regulations (GNR 1604/1972), Mine Health and Safety Act No. 29 of 1996 and Regulations (GNR 93/1997)
108	Open cast mining activities: blasting	Air blast	±74 ha	Specific blast design and planning to be considered, use of specialist to assist with drilling and blasting mitigation	
109	Open cast mining activities: blasting	Fly rock	±74 ha	Specific blast design and planning to be considered, use of specialist to assist with drilling and blasting mitigation	
110	Open cast mining activities: blasting	Fumes	±74 ha	Specific blast design and planning to be considered, use of specialist to assist with drilling and blasting mitigation	
Visual Impacts					
Construction Phase					
111	Preparation of earthworks for pit area and the	Build access roads to site, exposure of earth to	±350 ha	• Topsoil stockpiles and earth berm around the pit should be	NEMA, NHRA,

	construction of the offices, plant and infrastructure. Construction of earth berm around pit area	create place for the construction activities - the building of the plant and offices. Pre-strip site to establish open pit area. The exposure of earth and rock (contrast with existing landscape character) results in the altering of the visual quality and sense of place of the study area. These activities which will also generate dust which be visible from nearby residential areas and farmstead/tourist accommodation (considered to be sensitive receptor areas) and public roads. Night lighting during this phase.		shaped and vegetated (hydroseeded) in order to blend with the existing natural grass areas. • Dust suppression techniques must be implemented along the access and haul roads. • Ensure lighting is directed away from sensitive viewing areas	Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)
Operational Phase					
112	Removal of vegetation, topsoil and overburden from mining areas.	Exposure of earth and rock (contrast with existing landscape character) resulting in the altering of the visual quality and sense of place of the study area. These activities which will also generate dust will be visible from nearby residential areas (considered to be sensitive receptor areas) and public roads.	±350 ha	• Topsoil stockpiles should be shaped and vegetated (hydroseeded) in order to blend with the existing natural grass areas. • Dust suppression techniques must be implemented along the haul and access roads.	NEMA, NHRA, Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and

113	Excavation of the mining areas using drill rigs, blasting, excavators and dozers	Exposure of rock through blasting that would contrast with the existing natural landscape in the immediate vicinity of the open pit as the mining operation advances along with the movement of trucks and excavators that would generate dust. The result is the altering of the visual quality and sense of place of the study area. These activities will be visible from nearby residential and tourist areas (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe).	±74 ha	• Remove vegetation in sections or as excavation proceeds. • Implement dust suppression techniques.	Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)
114	Trucks moving overburden to the Overburden Facility, graders maintaining the haul roads and water tankers wetting the roads	Dust generated by moving trucks that is visible from surrounding residential areas and public roads will result in the altering of the visual quality and sense of place of the study area. These activities will be visible from nearby residential and tourist areas (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe).	±56 ha	Apply effective dust suppression techniques and restrict night driving	
115	Growth of the Overburden Facility as the mining	Physical presence of the Overburden Facility that	±123 ha	• Only remove vegetation within the mining footprint. • Dust suppression techniques should be implemented.	

	progresses. Backfilling of overburden back into the pit	alters the visual quality and sense of place of the study area. This activity will be visible from nearby residential and tourist areas (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe).			
116	Growth of the Tailings Storage Facility (TSF) as the mining progresses	Physical presence of the TSF that alters the visual quality and sense of place of the study area. This activity will be visible from nearby residential areas (considered to be sensitive receptor areas) and public roads.	±144 ha	• Only remove vegetation within the mining footprint. Dust suppression techniques should be implemented. • Grass the side slopes as they rise.	
117	Lighting of the plant and office areas including security and any other lighting associated with the movement of vehicles at night	Light pollution resulting in the alteration of the baseline visual quality and sense of place of the study area. These activities will be visible from nearby residential and tourist areas (considered to be sensitive receptors areas) and public roads (N11 and Percy Fyfe).	±53 ha	• Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the mining activities. • Light public movement areas (pathways and roads) with low level 'bollard' type lights and avoid post top lighting. • Avoid high pole top security lighting. • Use security lighting at the periphery of the site that is activated by movement and are not permanently switched on. • Restrict movement of trucks at night.	
Closure and Decommissioning Phase					
118	Rehabilitation of disturbed areas	Improvement of the visual quality and sense of place of the project area visible from nearby residences	±350 ha	Apply effective dust suppression techniques and no work to occur at night.	NEMA, NHRA, Western Cape

		and tourist facilities (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe).			Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)
119	Backfilling and closure of open pit areas and final grading (shaping with graders) laying of topsoil in selected areas and hydroseeding. TSF remains as a residual effect of the mine	The final shaping (dust creation) and rehabilitation process that alters the visual quality and sense of place of the study area. These activities and the residual final excavation and TSF will be visible from nearby residential and tourist areas (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe)	±292 ha	Final grading of the excavation to avoid harsh excavated lines and mimic nearby hills and to blend with the slope of the surrounding topography.	
Post-Closure Phase					
120	Rehabilitation of exposed areas and growth of grasses and vegetation	Improvement of the visual quality and sense of place of the project area visible from nearby residences and tourist facilities as well as public roads (N11 and Percy Fyfe).	±350 ha	Effective management of rehabilitated areas such that the grassed (hydroseeded) areas are established and permanently sustainable.	NEMA, NHRA, Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA

					Processes Edition 1 (CSIR, 2005)
Socio-economic Impacts					
Construction Phase					
121	Construction activities	Temporary stimulation of economy and growth of the GDP	N/A	In order to optimise the stimulation of the local economy through direct, indirect and induced effects, the following should be applied where possible: • Procure construction materials, goods, and products from local and domestic suppliers if feasible • Employ local contractors where possible. The proposed mitigation measures will possibly increase the positive impact in the local economy; however, this will not affect the weighting thereof.	Employment Equity Act (No. 55 of 1998) and the Labour Relations Act (No. 66 of 1995)
122	Construction activities	Temporary creation of jobs		The following is recommended to increase the employment opportunities created in the local communities, where feasible: • Employ labour-intensive methods in construction, where feasible. • Employ local residents and communities, where possible. • Sub-contract to local construction companies, where possible. • Utilise local suppliers, where possible. • Organise local community meetings to advise the local labour on the project that is planned to be established and the jobs that can potentially be applied for. The proposed mitigation measures could increase the positive impact on the local economy but would not change the total impact; therefore, the ratings assigned for the impact before mitigations will not be affected.	Employment Equity Act (No. 55 of 1998) and the Labour Relations Act (No. 66 of 1995)
123	Construction activities	Temporary increase in government earnings		No mitigation measures are required.	N/A

124	Construction activities	Temporary increase in household income during construction		No mitigation measures are required.	N/A
125	Construction activities	Loss of commercial activities - agriculture and tourism		• Where feasible and not affected by the footprint of mine's infrastructure, the existing agricultural activities should be retained. • Rehabilitation of land should take place at the end of the project's life to allow for the land to be used for grazing/farming after the project's closure.	NEMA Financial Provisioning Regulations GNR 1147/2015 (as amended), CARA
126	Construction activities	Change to the sense of place		No mitigation measures are required.	N/A
127	Construction activities	Temporary increase in crime and social conflicts associated with influx of people		• Employ local residents and communities, where possible to avoid social conflicts. • Train unemployed local community members with insufficient skills and increase absorption of local labour thereby decreasing in-migration.	Employment Equity Act (No. 55 of 1998) and the Labour Relations Act (No. 66 of 1995), Skills Development Act (No. 97 of 1998), Skills Development Levies Act (No. 9 of 1999)
128	Construction activities	Deterioration of quality of life due to noise, visual and other environmental impacts		Adhere to specialist's recommendations.	NEMA, NHRA, NEMA, National

					noise-control regulations (GNR154), SANS 10103:2008, SANS 10210:2004, SANS 10328:2008, SANS 10357:2004
129	Construction activities	Impact on property values		• Devise and implement awareness campaigns around impacts of mining activities on property values. • Organise information sharing forums/talks for property owners and interested property investors attended by property specialists and real estate agents.	N/A
130	Construction activities	Physical displacement and potential loss of family ties		• Communication and collaboration with the Mogalakwena Municipality in ensuring that additional housing is planned in areas close by and making provision for those who will be affected by the mine activities.	Mogalakwena Local Municipality Integrated Development Plan (IDP) 2019/20
131	Construction activities	Economic displacement of disadvantaged communities		Develop and adhere to a Social and Labour Plan that will establish mitigation measures for such instances.	MPRDA
132	Construction activities	Increased pressure on local services and infrastructure		• Clearly inform the local municipality of the potential impact of the proposed project in order for the necessary preparations to take place. • Provide public transportation service for workers in order to reduce congestion on roads. • Partner with local municipalities and other prominent users of the local roads to upgrade them to meet the required capacity and intensity of the vehicles related to the planned construction activities.	Mogalakwena Local Municipality Integrated Development Plan (IDP) 2019/20

Operational Phase					
133	Mining and processing activities	Stimulation of economy and growth of the GDP	N/A	Where feasible, procure goods and services required for the operation of the mine from the local economy.	N/A
134	Mining and processing activities	Creation of jobs		Where feasible, aim to fill all the positions by labour from the local community.	Employment Equity Act (No. 55 of 1998) and the Labour Relations Act (No. 66 of 1995)
135	Mining and processing activities	Increase in government earnings		No mitigation measures are required.	N/A
136	Mining and processing activities	Increase in household income during operation		Where feasible, aim to fill all the positions by labour from the local community,	Employment Equity Act (No. 55 of 1998) and the Labour Relations Act (No. 66 of 1995)
137	Mining and processing activities	Improved living standards of positively affected households		Employing locally will increase benefit to local households and the local area.	Employment Equity Act (No. 55 of 1998) and the Labour Relations Act (No. 66 of 1995)
138	Mining and processing activities	Skills development of permanently employed workers		• In order to maximise the positive impact, it is suggested that the project company provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience.	Employment Equity Act (No. 55 of 1998) and

				• Facilitate the transfer of knowledge between experienced employees and the local staff. • Perform a skills audit to determine the potential skills that could be sourced in the area. • Where possible train and empower local communities for employment in the operations of the mine.	the Labour Relations Act (No. 66 of 1995), Skills Development Act (No. 97 of 1998), Skills Development Levies Act (No. 9 of 1999)
139	Mining and processing activities	Local economic development benefits derived through mine's social responsibility programme		No mitigation measures are required.	N/A
140	Mining and processing activities	Deterioration of quality of life due to noise, visual and other environmental impacts		Adhere to specialist's recommendations.	NEMA, NHRA, NEMA, National noise-control regulations (GNR154), SANS 10103:2008, SANS 10210:2004, SANS 10328:2008, SANS 10357:2004
Closure and Decommissioning Phase					

141	Decommissioning of mine	Temporary stimulation of economy and growth of the GDP	N/A	No mitigation measures are required.	N/A
142	Decommissioning of mine	Temporary employment		Develop a Social and Labour Plan that will establish mitigation measures.	Social and Labour Plan
143	Decommissioning of mine	Temporary increase in government earnings		No mitigation measures are required.	N/A
144	Decommissioning of mine	Deterioration of quality of life due to noise, visual and other environmental impacts		Adhere to specialist's recommendations.	NEMA, NHRA, NEMA, National noise-control regulations (GNR154), SANS 10103:2008, SANS 10210:2004, SANS 10328:2008, SANS 10357:2004
Traffic Impacts					
Construction Phase					
145	Vehicular operation and usage of roads	Increase in traffic	±7 ha	Intersection: R101 and Road D1213 • Left-turn slip lane on R101 southern approach • Protected right-turn lane on R101 northern approach • Left-turn slip lane on D1231 Intersection: R101 and Road D3519 • Left-turn slip lane on R101 southern approach • Protected right-turn lane on R101 northern approach	National Road Traffic Act No. 93 of 1996, South African National Roads Agency
146	Construction of access roads and road upgrades	Improved access points			
147	Construction of access roads and road upgrades	Impeded access			
148	Construction of access roads and road upgrades	Improved road quality			

149	Use of existing gravel roads	Deterioration of road quality		• Left-turn slip lane on D1231 Road D1603 and Access 1: • Left-turn slip lane on D1603, eastern approach • Protected right-turn lane onD1603, western approach Road D1231 and Access 2: • Left-turn slip lane on D1231 southern approach • Protected right-turn lanes on both approaches of D1231 • Left-turn slip lane on D1231 northern approach • Left-turn slip lane on Access 2 approaches on both sides of D1231 Road D3519 and Access 3: • Left-turn slip lane on D3519, southern approach • Protected right-turn lane on D3519, northern approach Road D3519 and Access 4: • Left-turn slip lane on D3519, southern approach Road D3519: The road to be upgraded from a gravel road to a surfaced road up to Access 4. This road turns through the planned tailings storage facility and the relocation of a section of this road may be required. Road D1605: The road to be upgraded from a gravel road to a surfaced road from Road D1231 up to Access 1. These upgraders could be extended to the existing N11 to serve as access road from the villages west of the mine. The above mitigation measures are based on available data and site inspections and need to be confirmed with a traffic impact assessment during the EIA Phase.	Limited and National Roads Act 07 of 1998
150	Traffic accidents	Traffic accidents		Develop and implement a Traffic Safety Policy and apply to contractor and subcontractors	National Road Safety Act 9 of 1972

Operational Phase					
151	Vehicular operation and usage of roads	Increase in traffic	±7 ha	See above mitigation measures during construction phase.	National Road Traffic Act No. 93 of 1996, South African National Roads Agency Limited and National Roads Act 07 of 1998
152	Use of existing gravel roads	Deterioration of road quality			
153	Traffic accidents	Traffic accidents		• Develop and implement a Traffic Safety Policy and apply to visitors also. • Compile a Traffic Management Plan.	National Road Safety Act 9 of 1972

19. THE OUTCOME OF THE SITE SELECTION MATRIX. FINAL SITE LAYOUT PLAN

In line with the DMRE requirements, the proposed DRAFT site layout plan is provided in Appendix 4: Draft Site Plan below. The Site Selection Matrix is provided as part of the Alternatives discussion earlier in the document (refer to Section 9.1 and Table 5).

20. MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED.

Refer to Section 9.2.1 for alternatives considered.

21. STATEMENT MOTIVATING THE PREFERRED SITE.

A site selection matrix summarising the specialist recommendations and other practical considerations of the different sites are indicated in Table 5 under Section 9.2. All the alternative sites that were assessed have positive and negative aspects associated with them.

1) Overburden Site Location Alternative 3

Overburden Alternative 3 is preferred from a soil, land capability and agricultural potential; ecological; heritage, air quality and noise perspective. From a hydrogeological viewpoint, the location is only partially underlain by dolomite and does not occur over any geological faults. Overburden Alternative 3 is also preferred due to practical engineering considerations (e.g. shorter hauling distance, lower operational and rehabilitation costs and carbon footprint) and as it is located outside the proposed SANRAL N11 Ring Road and reserve.

2) Tailings Storage Facility Site Location Alternative 4

Tailings Storage Facility Site Alternative Option 4 is preferred from a hydrogeological perspective as it only partially overlies dolomite and geological faults. The alternative site does not impact any drainages. The alternative is also not situated over the proposed SANRAL N11 Ring Road or the road reserve. From a visual impact perspective, the site avoids ‘greenfield’ areas and allows for a substantial visual buffer (i.e. 500 m) from sensitive viewing areas to the facilities. The current layout will be optimised in order to avoid the rocky ridge where possible.

Another alternative option is to have no TSF on site and to process the ore at a nearby processing plant on the Northern bushveld Limb, such as Anglo’s Mokopane Mine or Ivanplats’ Platinum Mine, and make use of the mine’s TSF. This option will be investigated further during the EIA Phase.

3) Mine Infrastructure Site Location Alternative 1 and 2

Infrastructure Site Location Alternative 1 is preferred as it falls outside the 1:100 year floodline of the Rooisloot River. This Alternative is preferred from a visual impact perspective as the site avoids ‘greenfield’ areas and allows for a substantial visual buffer (i.e. 500 m) from sensitive viewing areas to the facilities. No geological faults or geological conduits are intersected on the site alternative however the site is located on dolomite. The site is located closest to the preferred TSF option therefore requiring a shorter pumping distance for tailings and return water which will have a lower economic cost.

Both alternative options impact on land capability and fertile soils and are located in areas of medium to low ecological sensitivity, however Infrastructure Site Alternative 2 has a slightly lower ecological impact compared to the other alternatives. Both alternative 1 and 2 are not situated over the proposed SANRAL N11 Ring Road and only partially overlaps the road reserve. Alternative site 2 is preferred from an air quality and noise perspective due to the least number of surrounding receptors and distance (over 1000 m) from the town of Mokopane. The location closest to road D1231 (Percy Fyfe Road) will also enable a higher noise level rating. This site is situated closest to the open pit which will shorten the hauling distances, resulting in a lower operational cost and carbon footprint, and allowing for a more manageable noise solution. Both alternatives considered have the same impact on heritage resources.

Another alternative option is to have no processing plant and associated infrastructure on site and to process the ore at a nearby processing plant on the Northern Bushveld Limb, such as Anglo's Mokopane Mine or Ivanplats' Platinum Mine. This option will be investigated further during the EIA Phase.

The preferred site alternatives will be further assessed during the EIA phase.

22. PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

22.1. Description of alternatives to be considered including the option of not going ahead with the activity.

In the case of the proposed development, possible alternatives were identified through review of existing environmental data, specialist inputs/studies and inputs from the design team. Alternatives relevant to this development can be categorized into the following:

1. **Site Location alternatives**
   - Location of the Processing Plant
   - Location of the Tailings Storage Facility (TSF)
   - Location of the Overburden facility and topsoil stockpile
2. **Layout alternatives**
   - Layout of the Processing Plant
   - Layout of the TSF
   - Layout of the Overburden facility and topsoil stockpile
3. **Service alternatives**
   - Water Provision Alternatives
   - Site Access Alternatives
   - Energy Alternatives
   - Technology alternative
4. **The "no-go" alternative**
   - To be assessed per environmental aspect/area

Please refer to Section 99.2 for a description of the above alternatives.

22.2. Description of the aspects to be assessed as part of the environmental impact assessment process

Key aspects identified by the EAP (Exigo) and specialists to be assessed as part of the EIA include inter alia:

- Biodiversity aspects (flora and fauna)
- Surface water aspects
- Impact on soils, land use and land capability
- Heritage aspects
- Socio-economic aspects (job creation, social investment, health, safety and security, skills training, change of land use, etc.)
- Communication and interaction with local community
- Visual impacts
- Traffic related aspects
- Groundwater aspects including impacts on groundwater quality and quantity and potential mine dewatering
- Air quality aspects (dust and emissions)
- Noise pollution
- Blasting and vibration impacts
- Rehabilitation and associated Financial Provision
- Floodline delineation and stormwater management

22.3. Description of aspects to be assessed by specialists

The above identified aspects will be assessed in the following proposed specialist studies:

1. Ecological Impact Assessment
2. Wetland / Riparian Impact Assessment
3. Soils, Agricultural Potential and Land Capability Assessment
4. Archaeological & Palaeontological Impact Assessment
5. Socio-Economic Impact Assessment
6. Social and Labour Plan
7. Visual Impact Assessment
8. Hydrogeological Impact Assessment; including a Water Supply Options Analysis & Geochemical Assessment (waste classification)
9. Mine Water Balance
10. Traffic Impact Assessment
11. Air Quality Impact Assessment
12. Noise Impact Assessment

13. Blasting & Vibration Assessment
14. Financial Closure Provision and Rehabilitation Plan
15. Floodline Delineation & Stormwater Management Plan

22.4. Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives

Assessment of environmental aspects and alternatives will be based on the Department of Environmental Affairs Guideline Document: EIA Regulations 2014. The significance of the aspects/impacts of the proposed activities will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts. Refer to Section 16 above for more details.

Refer to Section 9.1 for the method used to assess alternatives.

22.5. The proposed method of assessing duration significance

Refer to Section 16 above for more details.

22.6. The stages at which the competent authority will be consulted

The Department will also be consulted with upon submission of the following reports:

- Draft Scoping Report (SR)
- Final SR
- Draft EIA&EMPR
- Final EIA&EMPR

22.7. Particulars of the public participation process with regard to the Impact Assessment process that will be conducted

22.7.1. Steps to be taken to notify interested and affected parties.

22.7.1.1. Stakeholder Engagement

Stakeholder engagement forms an integral part of the EIA process and will be conducted throughout all the EIA process stages of the project. The comments received and issues raised during the review of the Draft SR will be incorporated into the Final SR. The aim of public participation and consultation is to achieve the following:

- Provide for public input and facilitate negotiated outcomes;
- Create trust and partnerships;
- Minimize negative impacts and enhance positive impacts;
- Provide up-front indication of issues that may prevent project continuation or can cause costly delays at a later stage; and
- Enhanced and shared benefits.

22.7.1.2. Stakeholder Identification (EIA Phase)

The key stakeholders for this assessment were identified. These include:

- The owners and occupiers of the site where the activity is or is to be undertaken or to any alternative site;
- The owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site;
- Waterberg DM;
- Mogalakwena LM;
- Limpopo Department of Economic Development, Environment and Tourism (LEDET);
- Department of Water and Sanitation (DWS) Limpopo;
- Department of Agriculture, Forestry and Fisheries (DAFF) Limpopo;
- Department of Agriculture and Rural Development: Limpopo
- Department of Rural Development and Land Reform: Limpopo
- Limpopo Department of Roads and Transport;
- South African Heritage Resources Agency (SAHRA);
- Limpopo Heritage Resources Authority;
- SANRAL;
- Eskom;
- Transnet;
- Other mines and industries in the area, e.g. Ivanhoe Platreef Project, Anglo Mokopane Mine;
- And other stakeholders.

22.7.1.3. I&AP communication

Stakeholders will be encouraged to contact Exigo to register as I&APs, raise issues or concerns or ask questions. The stakeholder will be requested to provide the following:

- Information on how they consider that the proposed activities will impact on them or their socio-economic conditions;
- Written responses stating their suggestions to mitigate the anticipated impacts of each activity;
- Information on current land uses and their location within the area under consideration;
- Information on the location of environmental features on site to make proposals as to how and to what standard the impacts on site can be remedied. Requested to make written proposals;
- Proposals on how to mitigate the potential impacts on their socio-economic conditions, and to make proposals as to how the potential impacts on their infrastructure can be managed, avoided or remedied.

Each issue, concern, and question identified through communication with Exigo and the response to these will be included in Appendix 8.9 Comments and Response Register.

22.7.1.4. Comments and response reporting

A comments and response register will be created and kept. The register will include all comments, concerns, questions and statements received during the duration of the project.

The name(s) of the person(s) who raised the comment, as well as the date that the comment was raised will appear in the register. The register will also contain the EIA team's response and/or a reference to where more information can be obtained in the relevant reports. Please refer to the Appendix 8.9

22.7.1.5. Public Open Day

One public open day will be held during the review period of the DSR on 14 November 2019, to provide I&APs with the opportunity to raise issues and comments and ask specific questions in the presence of the relevant consultants on the project as well as explain the authorisation process and associated timelines. Please refer to Section 10.4

22.7.1.6. Public Review of the Draft SR

The Draft SR will be made available for public comment as agreed with the stakeholders. The review period of the Draft SR will be made known to the registered parties via written notification. Please refer to Section 10.6.

22.7.2. Details of the engagement process to be followed

Refer to Section 10.1 to Section 10.7.

22.7.2.1. Description of the information to be provided to Interested and Affected Parties.

- The site plan;
- List of activities to be authorised;
- Scale and extent of activities to be authorised;
- Typical impacts of activities to be authorised (e.g. surface disturbance, vegetation removal, dust, noise, water etc.);
- The duration of the activity;
- Sufficient detail of the intended operation to enable I&AP's to assess what impact the activities will have on them or on the use of their land/property.
- In addition, the following reports will be provided to I&APs:
    - Draft Scoping Report
    - Draft EIA&EMPR

22.7.2.2. Description of the tasks that will be undertaken during the environmental impact assessment process

- Completion of the Public Participation Process (PPP): The comments received from I&APs will be included and assessed in the EIA&EMPR.

- Appointment of Specialists: The identified specialists will be appointed to undertake the specialist studies as identified in this Scoping Report.
- Draft Environmental Impact Assessment Report and Environmental Management Programme Report (EIA&EMPR): The results of the specialist studies will be synthesized by the project team to provide a draft EIA&EMPR.
- Draft EIA&EMPR published: The draft EIA&EMPR will be circulated to registered I&APs for comment for a period of 30 days.
- Revise Draft EIA&EMPR: The draft report will be updated by addressing and responding to the issues raised by I&APs.
- Final EIA&EMPR. The updated final report with the various specialist reports appended will be submitted to the Department of Mineral Resources and Energy (DMRE).

23. MEASURES TO AVOID, REVERSE, MITIGATE, OR MANAGE IDENTIFIED IMPACTS AND TO DETERMINE THE EXTENT OF THE RESIDUAL RISKS THAT NEED TO BE MANAGED AND MONITORED.

Table 23: Mitigation Type Table

No	Activity	Impact/Risk	Nature (Negative or Positive Impact)	Mitigation Type	Potential for Residual Risk without mitigation [6]
Soils, Agricultural Potential and Land Capability Impacts					
Planning Phase					
1	Obtaining of IWUL for crossings and mining through water courses	Delay of mining onset	Negative	Compliance measure	High
2	Obtaining permits for the eradication of protected trees / flora	Delay of plant construction	Negative	Compliance measure	High
Construction Phase					
3	Clearing of vegetation for open pit, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	Habitat destruction / fragmentation of fauna habitats	Negative	Control/reduction measure	High
4	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation	Soil erosion and sedimentation	Negative	Control/reduction measure	High
5	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species	Negative	Control/reduction measure	High
6	Vegetation clearing / vehicle movement	Habitat degradation due to dust	Negative	Control/reduction measure	High
7	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Negative	Avoidance/Prevent ion measure	High

[6] The Potential for Residual Risk with mitigation will only be established during the EIA Phase

8	Clearing of vegetation for open pit through water courses as well as road crossings	Impediment of flow patterns	Negative	Avoidance/Prevention measure	High
9	Heavy machinery and vehicle movement on site; Construction of infrastructure, roads etc. on site	Road mortalities of fauna / impact of human activities on site	Negative	Avoidance/Prevention measure	High
Operational Phase					
10	Storage of tailings, laydown areas of overburden dumps and stockpiles	Habitat destruction / fragmentation of fauna habitats	Negative	Control/reduction measure	High
11	Increased hardened surfaces around infrastructure and exposed areas around open pits, laydown areas of overburden dumps and stockpiles as well as TSF	Soil erosion and sedimentation	Negative	Control/reduction measure	High
12	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species	Negative	Control/reduction measure	High
13	Heavy machinery and vehicle movement on site	Habitat degradation due to dust	Negative	Control/reduction measure	High
14	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Negative	Avoidance/Prevention measure	High
15	Heavy machinery and vehicle movement on site; poaching, wood collection, fires etc.	Road mortalities of fauna / impact of human activities on site	Negative	Avoidance/Prevention measure	High
Closure and Decommissioning Phase					
16	Rehabilitation of mining site	Improvement of habitat through revegetation / succession over time	Positive	Enhancement	High
17	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	Negative	Control/reduction measure	High
18	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Spreading and establishment of alien invasive species	Negative	Control/reduction measure	High

19	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site / vehicle movement on site	Habitat degradation due to dust	Negative	Control/reduction measure	High
20	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Negative	Avoidance/Prevention measure	High
21	Heavy machinery and vehicle movement on site	Road mortalities of fauna / impact of human activities on site	Negative	Avoidance/Prevention measure	High
Post-Closure & Rehabilitation Phase					
22	Natural Successional processes	Improvement of habitat through revegetation / succession over time	Positive	Enhancement	High
23	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	Negative	Control/reduction measure	High
24	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species	Negative	Control/reduction measure	High
Ecological Impacts					
Planning Phase					
25	Obtaining of IWUL for crossings (watercourses) and mining layout on sensitive soils	Delay of mining onset	Negative	Compliance measure	High
Construction Phase					
26	Topsoil & subsoil stripping	Soil destruction and sterilization	Negative	Avoidance/Prevention measure	High
27	Heavy machinery and vehicle movement on site	Soil compaction	Negative	Control/reduction measure	High
28	Topsoil & subsoil stripping, exposure of soils to wind and rain during construction causing erosion and sedimentation in watercourses	Soil erosion and sedimentation	Negative	Control/reduction measure	High
29	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Negative	Avoidance/Prevention measure	High

30	Topsoil & subsoil stripping	Loss of land capability	Negative	Avoidance/Prevention measure	High
Operational Phase					
31	Topsoil & subsoil stripping, opencast mining	Soil destruction and sterilization	Negative	Remediation/corrective measure	High
32	Heavy machinery and vehicle movement on site, laydown areas of TSF	Soil compaction	Negative	Control/reduction measure	High
33	Increased hardened surfaces around infrastructure, laydown areas of WRDs and stockpiles as well as TSF, pipeline crossings	Soil erosion and sedimentation of water courses	Negative	Control/reduction measure	High
34	Heavy machinery and vehicle movement on site	Spillages of harmful substances leading to water pollution in water courses	Negative	Avoidance/Prevention measure	High
35	Topsoil & subsoil stripping	Loss of land capability	Negative	Remediation/corrective measure	High
Closure and Decommissioning Phase					
36	Rehabilitation of mining site	Improvement of eroded soils and compaction	Positive	Enhancement	High
37	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	Negative	Control/reduction measure	High
38	Heavy machinery and vehicle movement on site	Soil compaction	Negative	Control/reduction measure	High
39	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Negative	Avoidance/Prevention measure	High
Post-Closure & Rehabilitation Phase					
40	Natural processes	Improvement of soil compaction and erosion	Positive	Enhancement	High
41	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	Negative	Remediation/corrective measure	High

Heritage Impacts					
Planning Phase					
42	Siting of Open Pit	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	Negative	N/A	High
43	Siting of Overburden Facility	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	Negative	N/A	High
44	Siting of Overburden Facility and Tailings Storage Facility	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	Negative	Avoidance/Prevention measure	Negligible
45	Siting of Overburden Facility and Tailings Storage Facility	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	Negative	N/A	Negligible
46	Siting of , Open Pit, Overburden Facility and TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	Negative	Avoidance/Prevention measure	Negligible
Construction Phase					
47	Stripping of Open Pit footprint	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	Negative	N/A	High
48	Stockpiling of overburden	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	Negative	N/A	Negligible
49	Stockpiling of overburden and construction of TSF	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	Negative	Avoidance/Prevention measure	Negligible
50	Stockpiling of overburden and construction of TSF	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	Negative	N/A	Negligible
51	Stripping of Open Pit footprint, stockpiling of overburden and construction of TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	Negative	Avoidance/Prevention measure	Negligible
Operational Phase					
52	Opencast mining activities	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	Negative	N/A	High
53	Stockpiling of overburden	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	Negative	N/A	Negligible

54	Stockpiling of overburden and deposition of tailings in TSF	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	Negative	Avoidance/Prevention measure	Negligible
55	Stockpiling of overburden and deposition of tailings in TSF	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	Negative	N/A	Negligible
56	Opencast mining activities, stockpiling of overburden and deposition of tailings in TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	Negative	Avoidance/Prevention measure	Negligible
Closure and Decommissioning Phase					
57	Backfilling of Open Pit	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	Negative	N/A	High
58	Backfilling of overburden into Open Pit	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	Negative	N/A	Negligible
59	Backfilling of overburden into Open Pit & decommissioning of TSF	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	Negative	N/A	Negligible
60	Backfilling of overburden into Open Pit & decommissioning of TSF	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2, 3	Negative	N/A	Negligible
61	Backfilling of overburden into Open Pit & decommissioning of TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	Negative	N/A	Negligible
Post-Closure & Rehabilitation Phase					
62	Rehabilitation of Open Pit footprint	Exigo-ZNM-SA01 (Stone Age) impacted by Open Pit	Negative	N/A	High
63	Rehabilitation of Overburden footprint	Exigo-ZNM-SA02 (Stone Age) impacted by Overburden Alt 3	Negative	N/A	Negligible
64	Rehabilitation of Overburden footprint & TSF	Exigo-ZNM-IA01 - Exigo-ZNM-IA04 Iron Age) impacted by Overburden Alt 1 and TSF Alt 1, 2, 4	Negative	N/A	Negligible
65	Rehabilitation of Overburden footprint & TSF	Exigo-ZNM-HP01 - Exigo-ZNM-HP05 (Historical Period) impacted by Overburden Alt 1, 2, 4 and TSF Alt 2,	Negative	N/A	Negligible

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66	Rehabilitation of Open Pit and Overburden footprint & TSF	Exigo-ZNM-BP01 - Exigo-ZNM-BP08 (Burials) impacted by Open Pit, Overburden Alt 1, 2, 4 and TSF Alt 1, 2, 3, 4	Negative	N/A	Negligible
Palaeontological Impacts					
Construction Phase					
67	Exploration for mining, construction of processing plant complex, pipelines and roads	Destruction of fossils.	Negative	Control measure	High
Hydrogeological Impacts					
Construction Phase					
68	Contamination to ground- and surface water systems from oil, grease and diesel spillages from construction vehicles	Contamination to ground- and surface water systems	Negative	Avoidance/Prevention measure	High
69	On-site sanitation	Contamination to ground- and surface water systems	Negative		High
70	Storage of chemicals and building materials during construction of mine residue facilities	Contamination to ground- and surface water systems	Negative		High
Operational Phase					
71	Mine dewatering	Increased abstraction/inflows from groundwater resource with possible impact on surrounding groundwater users	Negative	Control measure	High
72	Mass transport and seepage from new mine residue facilities at the proposed mine along surface drainages and groundwater pathways	Contamination to ground- and surface water systems	Negative	Control measure	High
Closure and Decommissioning Phase					
73	Re-watering and decanting of open pits	Oxidation of backfilled material & contamination to ground- and surface water systems	Negative	Control measure	High
74	Seepage and mass transport from mine residue facilities impacting on	Contamination to ground- and surface water systems	Negative	Control measure	High

	groundwater quality				
Post-closure and Rehabilitation Phase					
75	Re-watering and decanting of open pits	Oxidation of backfilled material & contamination to ground- and surface water systems	Negative	Remediation/corrective measure	High
76	Seepage and mass transport from mine residue facilities impacting on groundwater quality	Contamination to ground- and surface water systems	Negative	Control measure	High
Air Quality Impacts					
Planning Phase					
77	Detailed engineering taking existing ambient baseline into account	PM10 and PM2.5	Negative	N/A	High
Construction Phase					
78	Transport and general construction activities	Gaseous and particulate emissions; fugitive dust	Negative	Control/reduction measure	High
79	Clearing of groundcover and levelling of area	PM10 and PM2.5	Negative	Control/reduction measure	Negligible
80	Materials handling	PM10 and PM2.5	Negative	Control/reduction measure	Negligible
81	Wind erosion from open areas	PM10 and PM2.5	Negative	Control/reduction measure	Negligible
Operational Phase					
82	Vehicle activity on paved and unpaved roads	Gaseous and particulate emissions; fugitive dust	Negative	Control/reduction measure	High
83	Materials handling	PM10 and PM2.5	Negative	Control/reduction measure	Negligible
84	Wind erosion	PM10 and PM2.5	Negative	Control/reduction measure	Negligible
Closure and Decommissioning Phase					
85	Dust generated during rehabilitation activities	PM10 and PM2.5	Negative	Control/reduction measure	High
86	Demolition of infrastructure	PM10 and PM2.5	Negative	Control/reduction measure	Negligible
87	Tailpipe emissions from the vehicles used during the closure phase	Gaseous and particulate emissions; fugitive dust	Negative	Control/reduction measure	Negligible
Post-Closure & Rehabilitation Phase					
88	Wind erosion from open areas	PM10 and PM2.5	Negative	Remediation/corrective measure	High

Noise Impacts					
Construction Phase					
89	Construction of roads	Noise impact on surrounding landowners	Negative	Control/reduction measure	High
90	Construction of Tailings Storage Facility	Noise impact on surrounding landowners	Negative	Control/reduction measure	Negligible
91	Stripping of Open Pit footprint	Noise impact on surrounding landowners	Negative	Control/reduction measure	Negligible
92	Stockpiling of overburden and topsoil and establishment of berms around open cast	Noise impact on surrounding landowners	Negative	Control/reduction measure	Negligible
93	Construction of Processing Plant	Noise impact on surrounding landowners	Negative	Control/reduction measure	Negligible
Operational Phase					
94	Deposition of tailing to Tailings Storage Facility	Noise impact on surrounding landowners	Negative	Avoidance/Prevention measure	High
95	Vehicular movement on roads	Noise impact on surrounding landowners	Negative	Control/reduction measure	Negligible
96	Open Cast mining activities: blasting and drilling	Noise impact on surrounding landowners	Negative	Control/reduction measure	Negligible
97	Stockpiling of overburden and topsoil	Noise impact on surrounding landowners	Negative	Control/reduction measure	Negligible
98	Processing activities: crushing and screening	Noise impact on surrounding landowners	Negative	Control/reduction measure	Negligible
Closure and Decommissioning Phase					
99	Decommissioning of roads, vehicular movement on roads	Noise impact on surrounding landowners	Negative	Control/reduction measure	High
100	Backfilling of Open pit	Noise impact on surrounding landowners	Negative	Control/reduction measure	Negligible
101	Backfilling of overburden to Open Pit and spreading topsoil	Noise impact on surrounding landowners	Negative	Control/reduction measure	Negligible
102	Decommissioning of processing plant	Noise impact on surrounding landowners	Negative	Control/reduction measure	Negligible
Post-Closure & Rehabilitation Phase					

103	Rehabilitation of roads, vehicular movement on roads	Noise impact on surrounding landowners	Negative	N/A	High
104	Rehabilitation of Open pit footprint	Noise impact on surrounding landowners	Negative	N/A	Negligible
105	Rehabilitation of Overburden/Topsoil footprints	Noise impact on surrounding landowners	Negative	N/A	Negligible
106	Rehabilitation of processing plant footprint	Noise impact on surrounding landowners	Negative	N/A	Negligible
Blasting & Vibration Impacts					
Operational Phase					
107	Open cast mining activities: blasting	Ground vibration	Negative	Control/reduction measure	High
108	Open cast mining activities: blasting	Air blast	Negative	Control/reduction measure	Negligible
109	Open cast mining activities: blasting	Fly rock	Negative	Control/reduction measure	Negligible
110	Open cast mining activities: blasting	Fumes	Negative	Control/reduction measure	Negligible
Visual Impacts					
Construction Phase					
111	Preparation of earthworks for pit area and the construction of the offices, plant and infrastructure. Construction of earth berm around pit area	Build access roads to site, exposure of earth to create place for the construction activities - the building of the plant and offices. Pre-strip site to establish open pit area. The exposure of earth and rock (contrast with existing landscape character) results in the altering of the visual quality and sense of place of the study area. These activities which will also generate dust which be visible from nearby residential areas and farmstead/tourist accommodation (considered to be sensitive receptor areas) and public roads. Night lighting during this phase.	Negative	Control/reduction measure	High
Operational Phase					
112	Removal of vegetation, topsoil and overburden from mining areas.	Exposure of earth and rock (contrast with existing landscape character) resulting in the	Negative	Control/reduction measure	High

		altering of the visual quality and sense of place of the study area. These activities which will also generate dust will be visible from nearby residential areas (considered to be sensitive receptor areas) and public roads.			
113	Excavation of the mining areas using drill rigs, blasting, excavators and dozers	Exposure of rock through blasting that would contrast with the existing natural landscape in the immediate vicinity of the open pit as the mining operation advances along with the movement of trucks and excavators that would generate dust. The result is the altering of the visual quality and sense of place of the study area. These activities will be visible from nearby residential and tourist areas (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe).	Negative	Control/reduction measure	Negligible
114	Trucks moving overburden to the Overburden Facility, graders maintaining the haul roads and water tankers wetting the roads	Dust generated by moving trucks that is visible from surrounding residential areas and public roads will result in the altering of the visual quality and sense of place of the study area. These activities will be visible from nearby residential and tourist areas (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe).	Negative	Control/reduction measure	Negligible
115	Growth of the Overburden Facility as the mining progresses. Backfilling of overburden back into the pit	Physical presence of the Overburden Facility that alters the visual quality and sense of place of the study area. This activity will be visible from nearby residential and tourist areas (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe).	Negative	Control/reduction measure	Negligible

116	Growth of the Tailings Storage Facility (TSF) as the mining progresses	Physical presence of the TSF that alters the visual quality and sense of place of the study area. This activity will be visible from nearby residential areas (considered to be sensitive receptor areas) and public roads.	Negative	Control/reduction measure	Negligible
117	Lighting of the plant and office areas including security and any other lighting associated with the movement of vehicles at night	Light pollution resulting in the alteration of the baseline visual quality and sense of place of the study area. These activities will be visible from nearby residential and tourist areas (considered to be sensitive receptors areas) and public roads (N11 and Percy Fyfe).	Negative	Avoidance/Prevention measure	Negligible
Closure and Decommissioning Phase					
118	Rehabilitation of disturbed areas	Improvement of the visual quality and sense of place of the project area visible from nearby residences and tourist facilities (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe).	Positive	Enhancement	High
119	Backfilling and closure of open pit areas and final grading (shaping with graders) laying of topsoil in selected areas and hydroseeding. TSF remains as a residual effect of the mine	The final shaping (dust creation) and rehabilitation process that alters the visual quality and sense of place of the study area. These activities and the residual final excavation and TSF will be visible from nearby residential and tourist areas (considered to be sensitive receptor areas) and public roads (N11 and Percy Fyfe)	Negative	Remediation/corrective measure	Negligible
Post-Closure Phase					
120	Rehabilitation of exposed areas and growth of grasses and vegetation	Improvement of the visual quality and sense of place of the project area visible from nearby residences and tourist facilities as well as public roads (N11 and Percy Fyfe).	Positive	Enhancement	High
Socio-economic Impacts					

Construction Phase					
121	Construction activities	Temporary stimulation of economy and growth of the GDP	Positive	Enhancement	High
122	Construction activities	Temporary creation of jobs	Positive	Enhancement	High
123	Construction activities	Temporary increase in government earnings	Positive	N/A	High
124	Construction activities	Temporary increase in household income during construction	Positive	N/A	High
125	Construction activities	Loss of commercial activities - agriculture and tourism	Negative	Control/reduction measure	High
126	Construction activities	Change to the sense of place	Negative	N/A	High
127	Construction activities	Temporary increase in crime and social conflicts associated with influx of people	Negative	Control/reduction measure	High
128	Construction activities	Deterioration of quality of life due to noise, visual and other environmental impacts	Negative	Control/reduction measure	High
129	Construction activities	Impact on property values	Negative	Control/reduction measure	High
130	Construction activities	Physical displacement and potential loss of family ties	Negative	Avoidance/Prevention measure & Enhancement	High
131	Construction activities	Economic displacement of disadvantaged communities	Negative	Compliance measure	High
132	Construction activities	Increased pressure on local services and infrastructure	Negative	Avoidance/Prevention measure & Enhancement	High
Operational Phase					
133	Mining and processing activities	Stimulation of economy and growth of the GDP	Positive	Enhancement	High
134	Mining and processing activities	Creation of jobs	Positive	Enhancement	High
135	Mining and processing activities	Increase in government earnings	Positive	N/A	High
136	Mining and processing activities	Increase in household income during operation	Positive	Enhancement	High

137	Mining and processing activities	Improved living standards of positively affected households	Positive	Enhancement	High
138	Mining and processing activities	Skills development of permanently employed workers	Positive	Enhancement	High
139	Mining and processing activities	Local economic development benefits derived through mine's social responsibility programme	Positive	N/A	High
140	Mining and processing activities	Deterioration of quality of life due to noise, visual and other environmental impacts	Negative	Control/reduction measure	High
Closure and Decommissioning Phase					
141	Decommissioning of mine	Temporary stimulation of economy and growth of the GDP	Positive	N/A	High
142	Decommissioning of mine	Temporary employment	Positive	Compliance measure	High
143	Decommissioning of mine	Temporary increase in government earnings	Positive	N/A	High
144	Decommissioning of mine	Deterioration of quality of life due to noise, visual and other environmental impacts	Negative	Control/reduction measure	High
Traffic Impacts					
Construction Phase					
145	Vehicular operation and usage of roads	Increase in traffic	Negative		High
146	Construction of access roads and road upgrades	Improved access points	Positive		Negligible
147	Construction of access roads and road upgrades	Impeded access	Negative		Negligible
148	Construction of access roads and road upgrades	Improved road quality	Positive		Negligible
149	Use of existing gravel roads	Deterioration of road quality	Negative		Negligible
150	Traffic accidents	Traffic accidents	Negative	Avoidance/Prevention measure	High
Operational Phase					
151	Vehicular operation and usage of roads	Increase in traffic	Negative		High
152	Use of existing gravel roads	Deterioration of road quality	Negative	Avoidance/Prevention measure	Negligible

153	Traffic accidents	Traffic accidents	Negative		High

24. L) OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

24.1. 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:

24.1.1. Impact on the socio-economic conditions of any directly affected person[7]

The following potential socio-economic impacts were assessed and the results thereof are provided in the Socio-Economic Scoping Report (Appendix 6: Socio-economic Scoping Report):

- Temporary stimulation of economy and growth of the GDP
- Temporary creation of jobs
- Temporary increase in government earnings
- Temporary increase in household income during construction
- Loss of commercial activities - agriculture and tourism
- Change to the sense of place
- Temporary increase in crime and social conflicts associated with influx of people
- Deterioration of quality of life due to noise, visual and other environmental impacts
- Impact on property values
- Physical displacement and potential loss of family ties
- Economic displacement of disadvantaged communities
- Increased pressure on local services and infrastructure
- Improved living standards of positively affected households
- Skills development of permanently employed workers
- Local economic development benefits derived through mine's social responsibility programme

The relevant mitigation measures are provided in Table 22 of this report. The Socio-Economic Impact Assessment Report will be submitted along with the EIA&EMPR.

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

The following heritage impacts were assessed and the results thereof are provided in the Heritage Scoping Report (Appendix 7: Heritage Scoping Report). The impacts on heritage resources due to the proposed development can be divided into two main categories:

- Indirect or secondary effects: impact on heritage resources occurs later in time or at a different place from the causal activity, or as a result of a complex pathway, e.g. restriction of access to a heritage

[7] Provide the results of Investigation, assessment, and evaluation of the impact of the mining on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as Appendix 6 and confirm that the applicable mitigation is reflected in Table 22.herein.

resource resulting in the gradual erosion of its significance, which is dependent on ritual patterns of access.

- Direct or primary effects: impact on heritage resources occurs at the same time and in the same space as the activity, e.g. loss of historical fabric through demolition work.

The impacted heritage resources are as follows:

- Scatters of Stone Age artefacts in low densities of moderate to low archaeological significance. The Stone Age sites are located within the demarcated footprint for the mine development and impact on the sites can be anticipated.
- A number of small stone terraces, a metal smelting site and grain bin stands and stone cairns indicate Later Iron Age Farmer Period occupation / activity in the area and has moderate significance. These are located within the demarcated footprint for the mine development and impact on the site can be anticipated.
- Old agricultural landscapes were noted in various locations where piles of rock and stones were removed from fields and stacked on stone cairns. In addition, rough stone walls were constructed from these stones along agricultural fields, the remains of which are still evident in the landscape. Generally, these sites might be associated with the early phases of settlement of the respective farms, which was proclaimed during the first part of the 19th century. However, the sites are probably not of heritage significance as such historical agricultural landscapes occur frequently and throughout the landscape of the Limpopo Province and the Waterberg.
- Foundation remains of stone, brick and mud houses, ash middens and stone stock enclosures occur in association with Acacia and Euphorbia Trees and represent a settlement area dating to the mid-20th century of low significance. The dilapidated remains of a square stone dwelling also occurs and has a low significance.
- A large open-air calcrete quarry probably dating to the recent Historical Period of low heritage significance.
- A Historical Period farmhouse in the project area is older than 60 years and generally protected under the National Heritage Resource Act (NHRA 1999). The structure is well preserved is rated as of moderate significance.
- At least 9 graves or potential burial sites were identified across the project area. The burial places hold various numbers of graves, a number of which are older than 60 years or unmarked. In many instances, burial locations in this area follow a general (and fairly common) pattern where graves occur around the remains of historical house structures and homestead complexes. Some of these graves occur within the proposed open pit footprint and impact on these sites are therefore anticipated. All the burials are considered to be of high significance.
- A large number of irregular stone structures, rock heaps and stone cairns were documented in the project area. The function of these features is not known but some of the structures might indicate prehistoric or Historical Period burials. As such, the heritage significance of these features remains to

be established and are therefore unknown. In most instances, the sites are not located within the demarcated footprint for the mine development but in the larger project area apart from three sites on which impact can be anticipated.

The relevant mitigation measures are provided in Table 22 of this report. The Heritage Impact Assessment Report will be submitted along with the EIA&EMPR.

25. OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT.

Please refer to the Alternatives Assessment in Section 9.

26. UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I HERMAN GILDENHUYS **herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected parties have been correctly recorded in the report.**

Final version of Scoping Report to be signed before submission to the DMRE

_ ____________________

Signature of the EAP

DATE:

27. UNDERTAKING REGARDING LEVEL OF AGREEMENT

I HERMAN GILDENHUYS **herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with interested and Affected Parties and stakeholders has been correctly recorded and reported herein.**

Final version of Scoping Report to be signed before submission to the DMRE

_ _____________

Signature of the EAP

DATE:

-END-

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29. APPENDIX 1: EAP'S QUALIFICATIONS

30. APPENDIX 2: COMPANY PROFILE & EAP'S CURRICULUM VITAE

31. APPENDIX 3: LOCALITY MAP

32. APPENDIX 4: DRAFT SITE PLAN

The draft site plan is provided below.

Please note that the open pit and plant footprints are proposed to be 74 ha and 53 ha respectively with an overburden and topsoil footprint of 49 ha and 25 ha respectively, and a proposed TSF footprint of 144 ha. The exact layout of the TSF, plant and offices will be finalized during the EIA phase following the input from Interested & Affected Parties, the engineering design team and specialists.

33. APPENDIX 5: DMRE CORRESPONDENCE

34. APPENDIX 6: SOCIO-ECONOMIC SCOPING REPORT

35. APPENDIX 7: HERITAGE SCOPING REPORT

36. APPENDIX 8: PUBLIC PARTICIPATION DOCUMENTATION

36.1. Appendix 8.1: Advertisement

The proof of advertisement will be attached to Final Scoping Report

36.2. Appendix 8.2: Site Notice

The proof of site notices will be attached to Final Scoping Report

36.3. Appendix 8.3: Notification Letter

36.4. Appendix 8.4: Proof of Notification

36.5. Appendix 8.5: Background Information Document (BID)

36.6. Appendix 8.6: SANRAL Consultation Meeting Minutes and Attendance Register

36.7. Appendix 8.7: Consultation Meeting Results and Attendance Registers

36.8. Appendix 8.8 I&AP Correspondence

36.9. Appendix 8.9 Comments and Response Register

37. APPENDIX 9: POLICY AND LEGISLATIVE CONTEXT

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
Legislation	
The Constitution of the Republic of South Africa (Act No. 108 of 1996) Section 2 of the Constitution of the Republic of South Africa (108 of 1996) (Constitution) states that: "This Constitution is the supreme law of the Republic; law or conduct inconsistent with it is invalid, and the obligations imposed by it must be fulfilled." Section 24 of the Constitution, states that everyone has the right to an environment that is not harmful to their health or well-being and 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. Section 24 guarantees the protection of the environment through reasonable legislative (and other measures) and such legislation is continuously in the process of being promulgated. Section 32 provide for access to information, held by any person or organ of state, where such information is required to exercise or protect the rights of any other person. The Promotion of Access to Information Act, 2 of 2000 gives effect to the provisions of this right. Section 33(1) concerns administrative justice which includes the constitutional right to administrative action that is lawful, reasonable and procedurally fair. The Promotion of Administrative Justice Act, 3 of 2000, gives effect to the provisions of this right.	The Scoping Report was accordingly prepared, submitted and considered within the constitutional framework set by inter alia sections 24, 32 and 33 of the Constitution.
The National Environmental Management Act (Act No. 107 of 1998) read with the Environmental Impact Assessment Regulations, 2014 (as amended on 7 April 2017) and Environmental Impact Assessment Regulations, Listing Notices 1, 2 and 3	The Environmental Impact Assessment (EIA) process to be undertaken in respect of the authorisation process of the

The overarching principle of the National Environmental Management Act 1998 (Act 107 of 1998) (NEMA) is sustainable development. It defines sustainability as meaning the integration of social, economic and environmental factors into planning, implementation and decision making so as to ensure the development serves present and future generations. Section 2 of NEMA, provides for National Environmental Management Principles. These principles, that is endorsed by the MPRDA in section 37 thereof include: • Environmental management must place people and their needs at the forefront of its concern. • Development must be socially, environmentally and economically sustainable. • Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated. • Environmental justice must be pursued. • Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing must be pursued. • Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle. • The participation of all Interested and Affected Parties (I&APs) in environmental governance must be promoted. • Decisions must take into account the interests, needs and values of all I&APs. • The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment. • Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.	proposed mining operations is in compliance with the MPRDA, as well as the NEMA read with the Environmental Impact Assessment Regulations of 2014 (Government Notice No's R 982, 983, 984 and 985 of 2014, as amended). The proposed development involves 'listed activities', as identified in terms of the NEMA. In terms of section 24(1) of the NEMA, the potential consequences for or impacts on the environment of inter alia listed activities must be considered, investigated, assessed and reported on to the Minister responsible for mineral resources, except in respect of those activities that may commence without having to obtain an environmental authorisation in terms of the NEMA. An application for Environmental Authorisation in line with the provisions contained in GNR 982 (as amended) was submitted to the Department of Mineral Resources and Energy: Limpopo Region (DMRE), in terms of section 24 of the NEMA for consideration (Application submitted to DMRE on 8 August 2018). The activities specified above in Table 4 were identified as being

• The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.
• The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.
 	
Section 28 of the NEMA places a duty on every person who causes, has caused or may cause significant pollution or degradation of the environment to take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.
 	
Persons on whom sub-section 28(1) imposes an obligation to take reasonable measures, include:
• An owner of land or premises,
• A person in control of land or premises, or
• A person who has a right to use the land or premises on which or in which-
  o Any activity or process is or was performed or undertaken; or
  o Any other situation exists, which causes, has caused or is likely to cause significant pollution or degradation of the environment.
 	
The required measures may include:
• Investigation, assessment and evaluation of the impact on the environment;
• Informing and educating employees about the environmental risks of their work and the manner in which their tasks must be
	applicable to the proposed mining operations.
	
	The Draft Scoping Report will be distributed for public review on the 20th of August 2018 for a period of 30 days (20 August 2018 to 19 September 2018) as part of the environmental impact assessment process.

performed in order to avoid causing significant pollution or degradation of the environment; • Cessation, modification or control of any act, activity or process causing the pollution or degradation; • Containment or prevention of the movement of pollutants or the causant of degradation; • Elimination of any source of pollution or degradation; or • Remediation of the effects of the pollution or degradation. The NEMA gives effect to the precautionary principle in section 2 which requires that development be socially, environmentally and economically sustainable, and requires the consideration of all relevant factors including that: a risk-averse and cautious approach" is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions. Section 24N of the NEMA states, amongst others, that the Minister responsible for mineral resources may require the submission of an environmental management programme before considering an application for an environmental authorisation. The holder (defined in section 1 of the NEMA as the holder of right or permit granted in terms of the MPRDA) and any person issued with an environmental authorisation: • must at all times give effect to the general objectives of integrated environmental management laid down in section 23; • must consider, investigate, assess and communicate the impact of his or her prospecting or mining on the environment; • must manage all environmental impacts- • in accordance with his or her approved environmental management programme, where appropriate; and • as an integral part of the prospecting or mining, exploration or production operation, unless the Minister responsible for mineral resources directs otherwise; • must monitor and audit compliance with the requirements of the	

environmental management programme; • must, as far as is reasonably practicable, rehabilitate the environment affected by the prospecting or mining operations to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and • is responsible for any environmental damage, pollution, pumping and treatment of polluted or extraneous water or ecological degradation as a result of his or her operations to which such right, permit or environmental authorisation relates. Section 24S of the NEMA provides that residue stockpiles and residue deposits must be deposited and managed in accordance with the provisions of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), on any site demarcated for that purpose in the environmental management plan or environmental management programme in question.	
Limpopo Environmental Management Act No. 7 of 2003 (LEMA) The objectives of the LEMA include to manage and protect the environment in the Limpopo Province and to secure ecologically sustainable development and responsible use of the Province's natural resources. The LEMA must be interpreted and applied in accordance with the national management principles as set out in Section 2 of the NEMA (Act 107 of 1998). Environmental advisory bodies are outlined in the legislations, together with outlines pertaining to the different types of protected areas and how these should be managed. Chapters 4 – 8 of the legislation discuss the wild and exotic fauna species of the province, professional hunting, aquatic systems, invertebrates and indigenous plants as well as recommended management systems. The Act places a prohibition on the collection, movement and sale of certain such resources. The Act furthermore stipulates that no person shall import, export or convey endangered species of wild fauna and flora into, out of and between Provinces or National Boundaries. The legislation also deals with the preservation of caves and cave formations, limited development areas, mountain catchment areas and environmental pollution.	The provisions of this legislation will be heeded throughout the proposed mining operations and will be considered in the compilation of all reports.

DEA Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010 (GNR 891 of October 2014) The above documents is a series of guideline documents on environmental impact management legislation and regulations. The EIA Regulations make it clear that an Environmental Assessment Practitioner (EAP) appointed to manage an EIA process must, amongst other requirements, have knowledge of all guidelines that have relevance to the proposed activity and the EIA process, and must throughout the EIA process take into account all relevant guidelines. While guidelines may contain information that provide guidance in terms of best practice in terms of certain EIA aspects, the guidelines also address, often in laymen's terms, how to meet the peremptory requirements prescribed by the legislation. While the best practice guidance must to be taken into account, the peremptory requirements of the legislation must be adhered to. This guideline must be read together with the NEMA, the EIA Regulations, the relevant SEMA(s) and its Regulations, and is not intended to be a substitute for the provisions of the NEMA, the SEMAs or the Regulations, in any way.	The guidelines will be considered in the compilation of the Scoping Report.
National Environmental Management Act, 1988 (Act No. 107 of 1998) – Financial Provisioning Regulations, 2015 - GNR 1147/2015, as amended In accordance with the above regulation, the holder of a mining right must make the prescribed financial provision for the costs associated with the undertaking of the management, rehabilitation and remediation of the negative environmental impacts due to prospecting, exploration and mining activities and the latent or residual environmental impacts that may become known in future.	A Financial Closure and Rehabilitation Plan will be compiled for the proposed project as per the Regulations.
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) Previously South African mineral rights were owned either by the State or the private sector. This dual ownership system represented an entry barrier to potential new investors. The current Government's objective is for all mineral rights to be vested in the State, with due regard to constitutional	The Mining Right Application was prepared and submitted according to the provisions of this legislation. The legislation will be heeded throughout the proposed mining operations and

ownership rights and security of tenure. The MPRDA was passed in order to make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources, and to provide for matters connected therewith. The Preamble to the MPRDA inter alia affirms the State's obligation to: • protect the environment for the benefit of present and future generations; • ensure ecologically sustainable development of mineral and petroleum resources; and • promote economic and social development. The aforesaid preamble affirms the general right to an environment provided for in section 24 of the Constitution (as set out hereinabove). The objects of the MPRDA, as set out in section 2 thereof serve as a guide to the interpretation of the Act. The objects of the MPRDA are as follows: • recognise the internationally accepted right of the State to exercise sovereignty over all the mineral and petroleum resources within the Republic; • give effect to the principle of the State's custodianship of the nation's mineral and petroleum resources; • promote equitable access to the nation's mineral and petroleum resources to all the people of South Africa; • substantially and meaningfully expand opportunities for historically disadvantaged persons, including women, to enter the mineral and petroleum industries and to benefit from the exploitation of the nation's mineral and petroleum resources; • promote economic growth and mineral and petroleum resources development in the Republic; • promote employment and advance the social and economic welfare of all South Africans; • provide for security of tenure in respect of prospecting, exploration,	will be considered in the compilation of the EMPR.

mining and production operations; • give effect to section 24 of the Constitution by ensuring that the nation's mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development; and • ensure that holders of mining and production rights contribute towards the socio-economic development of the areas in which they are operating. The national environmental management principles provided for in section 2 of the NEMA apply to all prospecting and mining operations and any matter relating to such operation. These principles apply throughout the Republic to the actions of all organs of state including inter alia the Department of Mineral Resources and Energy that may significantly affect the environment. Any prospecting or mining operation must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of prospecting and mining projects to ensure that exploitation of mineral resources serves present and future generations. **Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002) - Minerals and Petroleum Resources Development Regulations, GNR 527/2004** The MPRDA Regulations, although various sections of the MPRDA itself have been repealed, still remain enforce. The Regulations make specific provision regarding matters such as: • Social and Labour Plans (Part II) • Pollution Control, including Noise, Waste, Soil Conservation, Blasting, Vibration and Shock Management (Part III). Accordingly, these Regulations must be read in conjunction with the NEMA and NEM:WA.	
National Water Act (Act No 36 of 1998) (NWA) In terms of the NWA, the national government, acting through the Minister	Insofar as the undertaking of section 21 water uses is

of Water and Sanitation (previously the Minister of Water Affairs), is the public trustee of South Africa's water resources, and must ensure that water is protected, used, development, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons (section 3(1)). Section 19 of the NWA places an obligation on land owners, persons in control of land, occupants of land and land users of land on which: • any activity or process is or was performed or undertaken; or • any other situation exists, which causes, has caused or is likely to cause pollution of a water resource, to take all reasonable measures to prevent any such pollution from occurring, continuing or recurring. The measures referred to in sub-section 19(1) may include measures to: • Cease, modify or control any act or process causing the pollution; • Comply with any prescribed waste standard or management practice; • Contain or prevent the movement of pollutants; • Eliminate any source of the pollution; • Remedy the effects of the pollution; and • Remedy the effects of any disturbance to the bed and banks of a watercourse. In terms of the NWA a person may only use water without a license under certain circumstances. All other use, provided that such use qualify as a use listed in section 21 of the Act, require a water use license. A person may only use water without a license if such water use is permissible under Schedule 1 (generally domestic type use) if that water use constitutes a continuation of an existing lawful water use (water uses being undertaken prior to the commencement of the NWA, generally in terms of the Water Act of 1956), or if that water use is permissible in terms of a general authorisation issued under section 39 (general authorisations allow for the use of certain section 21 uses provided that the criteria and thresholds	concerned, an application for a water use licence for the mining development will be submitted to the Department of Water and Sanitation (DWS) during the EIA Phase, as per GNR 267 of 2017. The requirements of regulation GN704 will be adhered to. All clean and dirty water management structures will be designed in accordance with section 6 of the GN704.

described in the general authorisation is met). Permissible water use furthermore includes water use authorised by a license issued in terms of the NWA. Section 21 of the NWA indicates that "water use" includes: • taking water from a water resource (section 21(a)); • storing water (section 21(b)); • impeding or diverting the flow of water in a watercourse (section 21(c)); • engaging in a stream flow reduction activity contemplated in section 36 (section 21(d)); • engaging in a controlled activity which has either been declared as such or is identified in section 37(1) (section 21(e)); • discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit (section 21(f)); • disposing of waste in a manner which may detrimentally impact on a water resource (section 21(g); • disposing in any manner of water which contains waste from, or which has heated in, any industrial or power generation process (section 21 (h)); • altering the bed, banks, course or characteristics of a watercourse (section 21(i)); • 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 (section 21(j)); and • using water for recreational purposes (section 21(k)). **Regulations regarding the procedural requirements for Water Use Licence Application and Appeals, GNR 267/2017** The Regulations serve to prescribe the procedure and requirements of	

water use licence applications as contemplated in Sections 41 of NWA, as well as appeals in terms of Section 41(6) of the NWA. In addition to the above and in terms of section 26 of the NWA, Regulations on the Use of Water for Mining and Related Activities Aimed at the Protection of Water Resources were published in GNR 704 of 4 June 1999 (GNR 704). The aforesaid GNR 704 provides for inter alia the capacity requirements of clean and dirty water systems (regulation 6), the protection of water resources by a person in control of a mine (regulation 7), security and additional measures (regulation 8) and temporary or permanent cessation of a mine or activity (regulation 9). According to GNR 704 "no person in charge of a mine may carry on any underground or opencast mining, prospecting or any other operation or activity under or within the 1:50 year flood-line or within a horizontal distance of 100 metres from any watercourse or estuary, whichever is the greatest".	
National Water Act, (Act No. 36 of 1998) Section 26(1)(h) & (l) read together with GNR 2834/1985 Regulations 2 promulgated under the Water Act, (Act No. 54 of 1956) This regulation governs the operation of a water care work/ sewage treatment plant. The owner of a water care work/ sewage treatment plant must register the class of works with the Director General in the appropriate format and include the following information: • in respect of the work concerned, the particulars referred to in Schedule I or II, as the case may be; and • in respect of each person (excluding an unskilled labourer) employed or to be employed for the operation of the said work, his full names, identity number or other proof of identity, date of birth and the qualifications and experience referred to in Schedule III. Regulation 5 requires that the registration certificate as issued by the Director-General must be displayed in a prominent place on that work and shall include the names and classification in terms of regulation 4(b) of all persons employed on such work. Moreover, the owner of any water care work shall in writing notify the Director-General during January of each year of the employment or	The proposed sewage treatment plant will be registered as required.

termination of employment on such work during the past year of any person referred to in Schedule III, stating, in the case of the employment of such person, the information referred to in regulation 2(c)(ii) in respect of such person. The number persons to be employed together with their qualification are specified in Regulation 7.	
National Water Act, (Act No. 36 of 1998) Section 123 read together with Regulations regarding the Safety of Dams GNR 139/2012 Every dam with a safety risk must be classified in accordance with the Annexure provided in the regulations on the basis of its size and hazard potential to determine the level of control over the safety of the structure that is applicable in terms of these Regulations. Regulation 2(7) states that when an owner intends to construct a new dam with a safety risk or to enlarge, alter or repair and existing dam with a safety risk, he or she much, after completion of the feasibility studies for the proposed project, furnish the Director General with information as set out in regulations 7(a) – (b) The remainder of the regulations sets out the requirements to be complied with relating to a dam with a safety risk in respect of design, construction, putting into operation, maintenance, monitoring, dam safety inspections, dam safety evaluations, and decommissioning of the dam must be determined in accordance with the category classification.	The proposed Tailings Storage Facility (TSF) shall be classified and designed as per the GNR 139 of 2012.
The Water Services Act (Act No. 108 of 1997) The main objects of this Water Services Act, 108 of 1997 (“WSA”) are to, inter alia, provide for the right of access to basic water supply and the right to basic sanitation necessary to secure sufficient water and an environment not harmful to human health or wellbeing. Section 6 of the WSA provides for access to water services through a nominated water services provider and section 6(1) states that subject to subsection (2), no person may use water services from a source other than a water services provider nominated by the water services authority having jurisdiction in the area in question, without the approval of that water services authority. Section 7 pertains to the industrial use of water and section 7(1) states that subject to subsection (3), no person may obtain water for industrial use	The legislation will be heeded throughout the proposed mining operations and will be considered in the EIA process.

from any source other than the distribution system of a water services provider nominated by the water services authority having jurisdiction in the area in question, without the approval of that water services authority. Subsection (2) states that subject to subsection (3), no person may dispose of industrial effluent in any manner other than that approved by the water services provider nominated by the water services authority having jurisdiction in the area in question. Subsection (4) states that no approval given by a water services authority under this section relieves anyone from complying with any other law relating to the use and conservation of water and water resources or the disposal of effluent.	
National Heritage Resources Act (Act No. 25 of 1999) (NHRA) The NHRA established the South African Heritage Resources Agency (SAHRA) as well as provincial heritage resources agencies. In terms of the NHRA, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. No person may damage, disfigure, alter, subdivide or in any other way develop any part of a protected area unless, at least 60 days prior to the initiation of such changes, he/she/it has consulted with the relevant heritage resources authority. Section 34 of the NHRA provides for the protection of immovable property by providing for a prohibition on altering or demolishing any structure or part of any structure, which is older than 60 years, without a permit issued by the relevant provincial heritage resources authority. Accordingly, should the proposed activities, prospecting or mining activities or the closure and rehabilitation of mined land involve the altering or demolishing of any structure or part of any structure, which is older than 60 years, a permit issued by the relevant provincial heritage resources authority is required. No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite; destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite; trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or	An Archaeological Impact Assessment and Palaeontological Desktop Study will be conducted for the project.

any meteorite; or bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. No person may, without a permit issued by SAHRA or a provincial heritage resources authority destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves; destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or bring onto or use at the burial ground or grave referred to above any excavation equipment or any equipment which assists in the detection or recovery of metals. Section 38 of the NHRA states that any person who intends to undertake developments categorised in section 38 of the NHRA must at the very earliest stages of initiating such development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development. By way of example, the developments referred to in section 38 of the NHRA include: • the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 metres in length; • the construction of a bridge or similar structure exceeding 50 metres in length; • any development or other activity which will change the character of a site – o exceeding 5000 m2 in extent; or o involving three or more existing erven of subdivisions thereof; or o involving three or more erven or divisions thereof which have been consolidated within the past five years; or o the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources	

authority; • the re-zoning of a site exceeding 10 000 m2 in extent; or • any other category of development provided for in regulations by SAHRA or the provincial heritage resources authority. However, the abovementioned provisions are subject to the exclusion that section 38 does not apply to a development as described in subsection (1) if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act 73 of 1989 (now the NEMA in view of the repeal of the listed activities under the ECA). Provided that the consenting authority must ensure that the evaluation fulfils the requirements of the relevant heritage resources authority in terms of subsection (3), and any comments and recommendations of the relevant heritage resources authority with regard to such development have been taken into account prior to the granting of the consent.	
National Forest Act (Act 84 of 1998) (NFA) The National Forest Act: • Promotes the sustainable management and development of forests for the benefit of all; • Creates the conditions necessary to restructure forestry in State Forests; • Provide special measures for the protection of certain forests and protected trees; • Promotes the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes; • Promotes community forestry.	The legislation will be heeded throughout the proposed mining operations and will be considered in the Ecological Impact Assessment.
National Environmental Management: Biodiversity Act (Act 10 of 2004) The National Environmental Management Biodiversity Act (Act No. 10 of 2004) (NEMBA) aims to provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; the protection of species and ecosystems that warrant national protection; the sustainable use of	The legislation will be heeded throughout the proposed mining operations and will be considered in the Ecological Impact Assessment.

indigenous biological resources; the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith. The NEMBA provides for the publishing of various lists of species and ecosystems by the Minister of Environmental Affairs and Tourism (now the Minister of Water and Environmental Affairs) as well as by a Member of the Executive Council responsible for the conservation of biodiversity of a province in relation to which certain activities may not be undertaken without a permit. In terms of section 57 of the NEMBA, no person may carry out any restricted activity involving any species which has been identified by the Minister as "critically endangered species", "endangered species", "vulnerable species" or "protected species" without a permit. The NEMBA defines "restricted activity" in relation to such identified species so as to include, but not limited to, "hunting, catching, capturing, killing, gathering, collecting, plucking, picking parts of, cutting, chopping off, uprooting, damaging, destroying, having in possession, exercising physical control over, moving or translocating". The Minister has made regulations in terms of section 97 of the NEMBA with regards to Threatened and Protected Species which came into effect on 1 June 2007. Furthermore, the Minister published lists of critically endangered, endangered, vulnerable and protected species in terms of section 56(1) of the NEMBA. Additional Notices published in terms of the NEMBA which may find application to the proposed mine and which will be considered include: **Alien and Invasive Species Lists, GNR 599/2014 read with Alien and Invasive Species Lists, 2016 – GNR 864/2016** Section 73 of the NEMBA states that a person who is the owner of land on which a listed invasive species occurs must notify any relevant competent authority (i.e. the Minister, MEC or organ of state in the national, provincial or local sphere delegated as a competent authority for the control of alien and listed invasive species), in writing, of the listed invasive species occurring on that land. Organisations have a duty of care relating to listed invasive species. In this regard organisations are expected to: • take steps to control and eradicate the listed invasive species and	

to prevent it from spreading; and • take all the required steps to prevent or minimise harm to biodiversity. A list of these category species can be found under the Alien and Invasive Species List, 2014 published under GNR 599/2014. In terms of the regulations any person in control of a Category 1a, Category 1b, Category 2 and Category 3 Listed Invasive Species must comply with the provisions under section 73 (a) - (c). Note where an Invasive Species Management Programme has been developed combatting must take place in accordance with the programme. **Threatened or Protected Species Regulations, 2007 – GNR 152/2007** The purpose of these regulations is to, inter alia, - • provide for the registration of captive breeding operations, commercial exhibition facilities, game farms, nurseries, scientific institutions, sanctuaries and rehabilitation facilities and wildlife traders; • provide for the prohibition of specific restricted activities involving specific listed threatened or protected species; • provide for the protection of wild populations of listed threatened species.	
Protected Areas Act (Act No. 57 of 2003) The Protected Areas Act provides for: The protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas.	The legislation will be heeded throughout the proposed mining operations and will be considered in the Ecological Impact Assessment.
National Veld and Forest Fire Act, (Act No. 101 of 1998) Every owner on whose land a veld fire may start or burn or from whose land it may spread must prepare and maintain a fire break on his side of the boundary with adjacent land. The break must be wide enough to have a reasonable chance to prevent a fire from spreading, it must not cause soil	The legislation will be heeded throughout the proposed mining operations and will be considered in the Ecological Impact Assessment.

erosion and it must be reasonable free of flammable material capable of carrying a veld fire across it. When constructing a fire break protected plants may be removed but must be replanted elsewhere if possible.	
Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA) The objectives of the CARA are to provide for the conservation of the natural agricultural resources of South Africa by: the maintenance of the production potential of land; the combating and prevention of erosion and weakening or destruction of the water sources; and the protection of the vegetation and the combating of weeds and invader plants.	The legislation will be heeded throughout the proposed mining operations and will be considered in the Ecological Impact Assessment.
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM:AQA) The object of the National Environmental Management Air Quality Act (Act 39 of 2004) (NEM:AQA) is to regulate air quality in South Africa in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation. Although the Act was assented to in February 2005, most of the enabling provisions of the NEM:AQA commenced on 1 April 2010. The List of Activities and associated Minimum Emission Standards identified in terms of section 21 of the NEM:AQA commenced on 22 November 2013 (GN 893 of 22 November 2013. The List provides a list of activities that may cause atmospheric emissions which have or may have a significant detrimental effect on the environment as well as the minimum emission standards (“MES”) for these activities as contemplated in section 21 of NEM:AQA. The effect of the commencement of the NEM:AQA and the listed activities, listed in GN 893, is that an atmospheric emission licence (AEL) is required for conducting the listed activities. The National Dust Control Regulations (GNR 827 of 1 November 2013) were published on 1 November 2013 and prescribes general measures for the control of dust in all areas and the standard for acceptable dustfall rate for residential and non-residential areas. In addition, the National Ambient Air Quality Standards were published in GNR 1210 of 24 December 2009. In accordance with section 9 of the NEM:AQA the National Ambient Air Quality Standards identifies substances or mixtures of substances in ambient air which present or may present a threat to health, well-being or the environment. In terms of Annexure I of the National Atmospheric Emission Reporting	The project area falls within the Waterberg Bojanala National Priority National Priority Area and therefore air quality management is of great importance and the relevant air quality legislation will be heeded throughout the proposed mining operations and will be considered in the Air Quality Impact Assessment.

Regulations (GNR 283 of 2 April 2015), any person, that holds a mining right or permit in terms of the MPRDA, must register and report on emissions in the format as required on the South African National Atmospheric Emissions Inventory System (NAEIS).	
National Greenhouse Gas Emission Reporting Regulations – GNR 336/2016 The Minister of Environmental Affairs gave notice in June 2016 of her intention to make regulations regarding greenhouse gas emission reporting. The purpose of the Regulations will be to establish a single national reporting system of GHG to be used for: • Information purposes, inform implementation strategies and legislation; • SA to meet its reporting obligations under the United Framework Convention on Climate Change • Establishing and maintaining a National GHG Inventory These Regulations apply to the categories of emission sources listed in Annexure 1 and a corresponding data provider as classified. Mining and Quarrying is recognised and falls under Code 1A2i. Accordingly, the mine will have to register its facility on NAEIS by providing the relevant information as listed in Annexure 2 of the Regulation. As of the 31st of March 2018, the organisation, by applying tier 1 or 2 methods must submit the greenhouse gas emissions and activity data for the relevant GHG for its facilities in accordance with the data and format specified in Annexure 3 of the Regulation. Records of all data, measuring reports, algorithms, procedures and technical references to estimate GHG must be kept for 5 years.	The legislation will be heeded throughout the proposed mining operations and will be considered in the Air Quality Impact Assessment.
National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA) The NEM:WA commenced on 1 July 2009 and as a result of its commencement the relevant provisions in the Environment Conservation Act 73 of 1989 (ECA) in respect of waste management, were repealed. The NEM:WA sets out to reform the law regulating waste management and deals with waste management and control more comprehensively than was dealt with in the ECA. It also introduces new and distinct concepts never	The waste management activities as listed in GNR 921 of 29 November 2013 (as amended) which may be applicable to the proposed mining operations and for which a waste management license is required are included in Table 4

before canvassed within the realm of waste management in South Africa, such as the concept of contaminated land and extended producer responsibility. It also provides for more elaborate definitions to assist in the interpretation of the Act. Section 19 of the NEM:WA provides for listed waste management activities and states in terms of section 19(1), the Minister may publish a list of waste management activities that have, or are likely to have a detrimental effect on the environment. Such a list was published in GNR 921 of 29 November 2013 (as amended). Section 20 of the NEM:WA pertains to the consequences of listing waste management activities and states that no person may commence, undertake or conduct a waste management activity, except in accordance with the requirements or standards for that activity as determined by the Minister or in accordance with a waste management licence issued in respect of that activity, if a licence is required. In accordance with section 19(3), the Schedule to GNR 921 provides that a waste management licence is required for those activities listed in Category A and B thereof and compliance with the Norms and Standards is required for those activities listed in Category C thereof prior to the commencement, undertaking or conducting of same. In addition, GNR 921 differentiates between Category A, B, and Category C waste management activities. Category A waste management activities are those which require the conducting of a basic assessment process as stipulated in the EIA Regulations 2014, as amended, (GNR 982) promulgated in terms of the NEMA as part of the waste management licence application and Category B waste management activities are those that require the conducting of a scoping and environmental impact assessment process stipulated in the GNR 982 as part of the waste management licence application. Category C waste management activities do not require a waste management licence, however a person who wishes to commence, undertake or conduct a waste management activity listed under this category, must comply with, amongst others, the relevant National Norms and Standards for the Storage of Waste (GNR 926 of 29 November 2013) published in terms of the NEM:WA. With effect from 2 June 2014 the definition of "waste" has been amended in terms of the National Environmental Management: Waste Amendment Act (Act 26 of 2014) (NEM:WAA). In addition, section 4(b) of the NEM:WA has been deleted in terms of the National Environmental Laws Amendment Act	above. A Geochemical Waste Analysis will also be conducted for all residue stockpiles.

(NEMLAA, Act 25 of 2014) with effect from 2 September 2014. As a result, the NEM:WA finds application to residue stockpiles and residue deposits generated at a mine. Government agreed that the aforesaid amendments and the One Environmental System will only be implemented as from 8 December 2014. Amendments to GNR 921 were promulgated in GNR 633 of 24 July 2015 to include the establishment and/or reclamation of residue stockpiles and residue deposits as Category A and B listed activities requiring a waste management licence. Together with the aforesaid amendments, Schedule 3: Defined Wastes to the NEM:WA commenced on 2 June 2014. In terms of the aforesaid Schedule 3, residue stockpiles and residue deposits, which include wastes resulting from exploration, mining, quarrying, and physical and chemical treatment of minerals are listed in Category A and accordingly defined as hazardous waste. On 23 August 2013 Regulations were published in terms of the NEM:WA which requires waste to be classified: Waste Classification and Management Regulations (GNR 634 of 23 August 2013), these Regulations must be read together with the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GNR 635 of 23 August 2013). In order to conduct the waste classification, leach tests and a total analysis needs to be conducted. The leach test entails the leaching of a solid sample of waste with reagent water and the subsequent analysis of the leachate for specific components. The total analysis entails the analysis of the solid material for the total concentration of specific components that are present in the waste sample. The results of these two tests are compared to regulatory criteria and a classification is done based on the results of this comparison. In addition, all generators of hazardous waste must ensure that a safety data sheet for the hazardous waste is prepared in accordance with SANS 10234. If the Minister reasonably believes that a waste has not been classified correctly, he or she may require that the classification get peer reviewed to confirm the classification. Once waste has been classified, disposal methods must be decided on in accordance with the National Norms and Standards for Disposal of Waste to Landfill (GNR 636 of 23 August 2013) Residue stockpiles and residue deposits must be managed in the prescribed manner on any site demarcated for that purpose in the environmental management programme for the mining operation (section	

43A of the NEM:WA). On 24 July 2015 the Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits, 2015 (GNR 632) were published in terms of the NEM:WA. The purpose of GNR 632 is to regulate the planning and management of residue stockpiles and residue deposits from, amongst others, a mining operation. GNR 632 further provides for the characterisation and classification of residue stockpiles, the investigation and site selection and the design of residue stockpiles, impact management and monitoring and reporting systems for residue stockpiles.	
Hazardous Substances Act (Act No. 15 of 1973) This Act provides for the control of substances which may cause injury or ill to, or death, of human beings by reason of their toxic, corrosive, irritant, s sensitising or flammable nature. To provide for the prohibition and control importation, manufacture, sale, use, operation, application, modification, disp dumping of such substances and products.	The legislation will be heeded throughout the proposed mining operations and will be considered in the EIA process.
Spatial Planning and Land Use Management Act (Act No. 16 of 2013) (SPLUMA) The SPLUMA makes provision for the following: • A uniform, effective and comprehensive system of spatial planning and land use management for the Republic; • A system of spatial planning and land use management that promotes social and economic inclusion; • Common development principles, norms and standards to inform land development; • Sustainable and efficient use of land to be key considerations when making decisions involving land development; • Cooperative government and intergovernmental relations across all the spheres of government; • Redressing the imbalances of the past and ensuring that there is equity in the application of spatial development planning and land use management systems.	The legislation will be applicable with regards to the land development application for the mining activities.
The Noise Control Regulations GN R154 The Regulations provides noise levels for industrial and controlled areas, residential or business areas. The National noise control legislation defines the following: Section 1: • Ambient sound level - means the reading on an integrating impulse sound level meter taken at a measuring point in the absence of any	

alleged disturbing noise at the end of a total period of at least 10 minutes, after such meter had been put into operation; • Disturbing noise - means a noise level which exceeds the zone sound level or, if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7-dBA or more; • Noise nuisance - means any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person. • Controlled area is as follows – c) industrial noise in the vicinity of an industry - i. the reading on an integrating impulse sound level meter, taken outdoors at the end of a period of 24 hours while such meter is in operation, exceeds 61 dBA; or ii. the calculated outdoor equivalent continuous W-weighted sound pressure level at a height of at least 1,2 metres, but not more than 1,4 metres, above the ground for a period of 24 hours, exceeds 61 dBA; Section 7 allows for the following exemptions: (1) The provisions of these Regulations shall not apply, if- (a) the emission of sound is for the purposes of warning people of a dangerous situation; or (b) the emission of sound takes place during an emergency." The definition of a disturbing noise (+7 dBA from Rating Level SANS 10103:2008) forms the basis upon which a non-compliance in terms of South African legislation is made.	
Spatial Development Framework	
Waterberg District Municipality Final Draft Spatial Development Framework (SDF) 2010 The fundamental role of the Spatial Development Framework is to ensure the development of a sustainable urban and rural environment while at the same time creating an enabling environment for the implementation of the developmental agenda of national government, in a municipal area. According to the SDF, the Mogalakwena LM contributes 9.4% to the gross value added (GVA) through mining and quarrying. This is the fifth highest contributor.	According to the SDF the proposed site falls outside the Waterberg Biosphere Reserve. The SDF will be taken into account in the EIA process as well as the Ecological Impact Assessment.
Environmental Management Framework	

Waterberg District Environmental Management Framework (EMF) The Environmental Management Framework (EMF) is an initiative of the national Department of Environmental Affairs (DEA) in partnership with the Limpopo Department of Economic Development, Environment and Tourism (LEDET), and the Waterberg District Municipality (WDM). The EMF will support decision-making in the Waterberg District Municipality area in order to facilitate appropriate and sustainable development. The EMF provides for the following Environmental Management Zones (EMZ's): • Zone 1:Protection of natural vegetation, scenic landscape and rock painting areas, with limited appropriate tourism; • Zone 2: Nature and cultural tourism focus areas within a high quality natural setting; • Zone 3: Game and cattle farming (including hunting) areas with commercial focus; • Zone 4: Mining focus areas; • Zone 5: Potential large industrial and related activities focus area; • Zone 6: Restricted mining focus areas in aesthetic and/or ecological resource areas; • Zone 7: Urbanisation focus areas and nodes; • Zone 8: Rural settlement areas; • Zone 9: Agriculture focus areas with a tourism component; • Zone 10: Agriculture areas with commercial focus; and • Zone 11: Major infrastructure corridors. The EMF provides a short description of each EMZ, a description of the desired state of each EMZ (taken from the Desired State Report) as well as an indication of preferred activities, compatible activities and undesired activities. The NEMA and the EIA Regulations is applicable in respect to Zones 1 and 2.	The project area falls within Zone 1, Zone 6 and Zone 10, The relevant listed activities as per Listing Notice 3 of the EIA Regulations have been applied for where the proposed mine infrastructure is located within sensitive areas.
Other	
Limpopo Development Plan (LDP), 2015 – 2019 The LDP is a reflection of the provinces' provisions towards socio-economic development through the elimination of poverty, reduction of inequality and the improvement of the citizens quality of life as required by the NDP (Limpopo Provincial Government, 2015). Employment is cited as a key means to ensuring development by improving the standard and quality of life, developing self-esteem and self-actualization thereby enabling citizens	The IDP will be taken into consideration in the EIA process as well as the Socio-economic study for the proposed mine.

to reach their full potential (Limpopo Provincial Government, 2015). Mining is the predominant sector in the provincial economy, contributing 29% to the value of total production (Limpopo Provincial Government, 2015). Further, with new platinum mining developments it is expected that the sector will become even more dominant in the province (Limpopo Provincial Government, 2015). However, although mining does present significant growth and development opportunities, a diversified economy is necessary for maximising the developmental potential and mitigating any potential risks associated with commodity price drops and mine closures (Limpopo Provincial Government, 2015).	
Mogalakwena Local Municipality Integrated Development Plan (IDP) 2019/20 During the review of the Mogalakwena Local Municipality (LM) IDP in 2017, the vision of the LM was revised to ensure that it is aligned to the NDP. The LM envisions "to be the leading, sustainable and diversified economic hub focused on community needs" (Mogalakwena Local Municipality, 2019). This vision is to be achieved through the provision of affordable and quality basic services, through creating a conducive and sustainable environment for social and economic development and, being consultative, responsive and accountable (Mogalakwena Local Municipality, 2019). Like many historically disadvantaged localities in South Africa, the Mogalakwena LM is plagued with socio-economic challenges including low education levels, poor access to piped water and high unemployment rates. The decline of mining activity has been cited as a possible cause of the high unemployment rate within the LM. Consequently, these challenges are among the priority issues that are to be addressed in the municipality (Mogalakwena Local Municipality, 2019). Mining in the Mogalakwena LM comprises a small proportion of the land use however, it is the major economy of the LM (Mogalakwena Local Municipality, 2019). The key mining commodities include platinum, clay, granite, limestone, fluorspar and coal; these are mined predominately in rural landscapes (Mogalakwena Local Municipality, 2019). The Mogalakwena LM IDP acknowledges that mining is a highly invasive activity which causes biodiversity losses and high pollution levels however, the LM has prioritised road and stormwater infrastructure development in recognition of the potential growth of the area due to the expected influx of	The IDP will be taken into consideration in the EIA process as well as the Socio-economic study and Social and Labour Plan (SLP) for the proposed mine.

mining companies and the associated activities (Mogalakwena Local Municipality, 2019). Further, the infrastructure is also expected to attract tourism, grow the economy and create business opportunities for local people (Mogalakwena Local Municipality, 2019). Finance, wholesale, tourism and agriculture are also among the industries which have been identified as key role players in the promotion of growth and development within the municipality (Mogalakwena Local Municipality, 2019). In essence, the development of infrastructure, i.e. road and stormwater and bulk water services, have been identified as the enabling economic infrastructure which will result in the reduction of the high unemployment rate and poverty within the municipality (Mogalakwena Local Municipality, 2019).	
SANS Guidelines SANS 10103:2008, the Measurement and Rating of Environmental Noise with Respect to Annoyance, and to Speech Communication. Besides measurement techniques etc, this document provides noise levels that are expected in various areas (Rating Level). These are used by the Noise Regulations as limits of noise in the various areas. SANS 10328:2008, Methods for environmental noise impact assessments. The document sets out the methodology to compile a comprehensive Environmental Nosie Impact Assessment. Stipulations include methodologies and minimum requirements, as well as various noise sources for investigations. SANS 10357: 2008, Methods for noise modelling. SANS10210:2004, Calculating and predicting road traffic noise. The document defines the prediction and measurement relating to road traffic noise.	

38. APPENDIX 10: VISUAL ASSESSMENT VIEWS, POTENTIAL RECEPTORS AND LANDSCAPE CHARACTER

The Landscape Character of the study area was described by Graham A Young Landscape Architect (GYLA) (see Section 12.10 above). Photographic panoramas are presented in the figures below to illustrate the nature and character of the study area's landscape. Figure 84 illustrates the location of these viewing points.

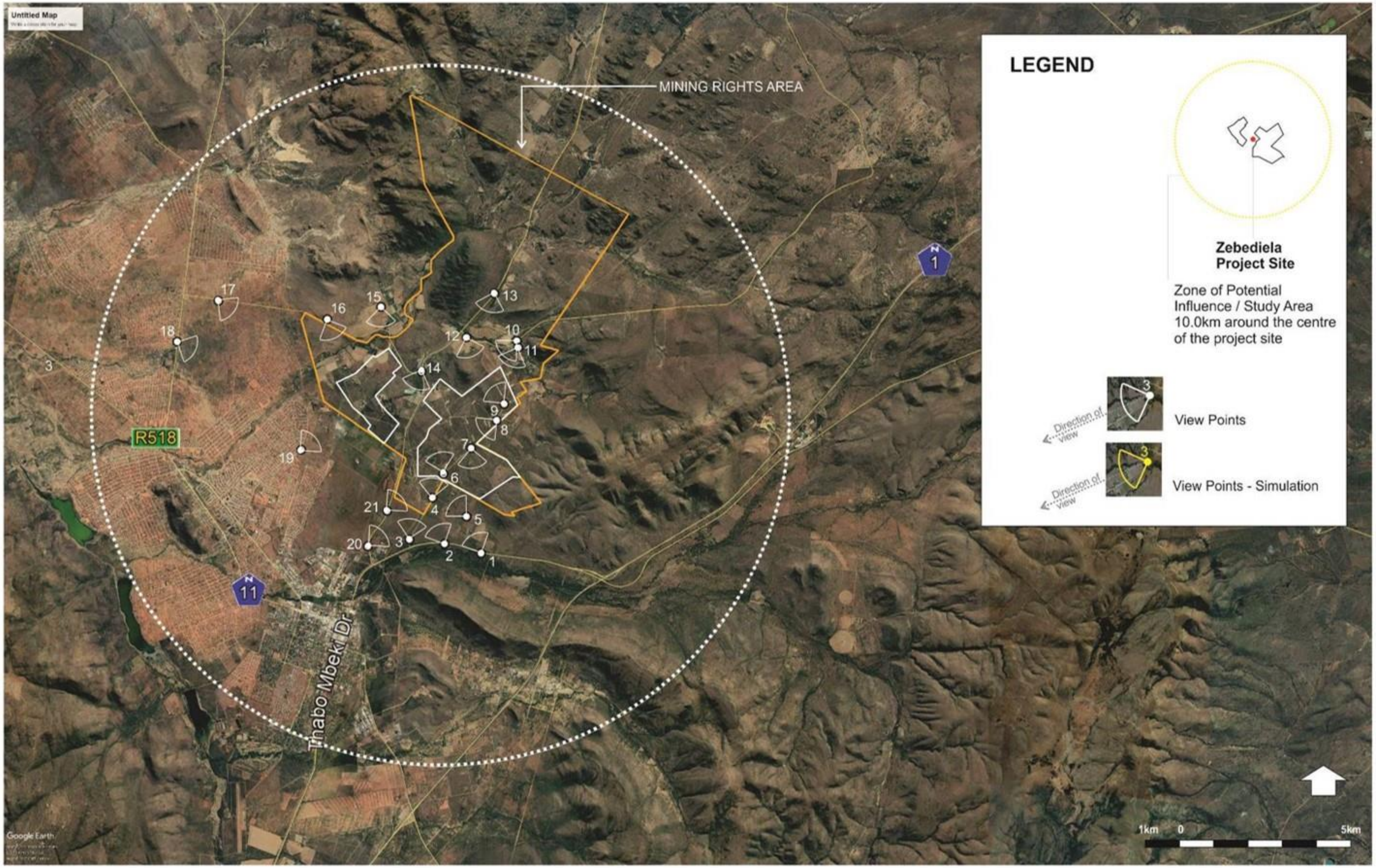

Figure 84: View points for photographic panoramas

Figure 85: Landscape character: Views 1, 2 and 3 as indicated on Figure 84 (GYLA, 2019)

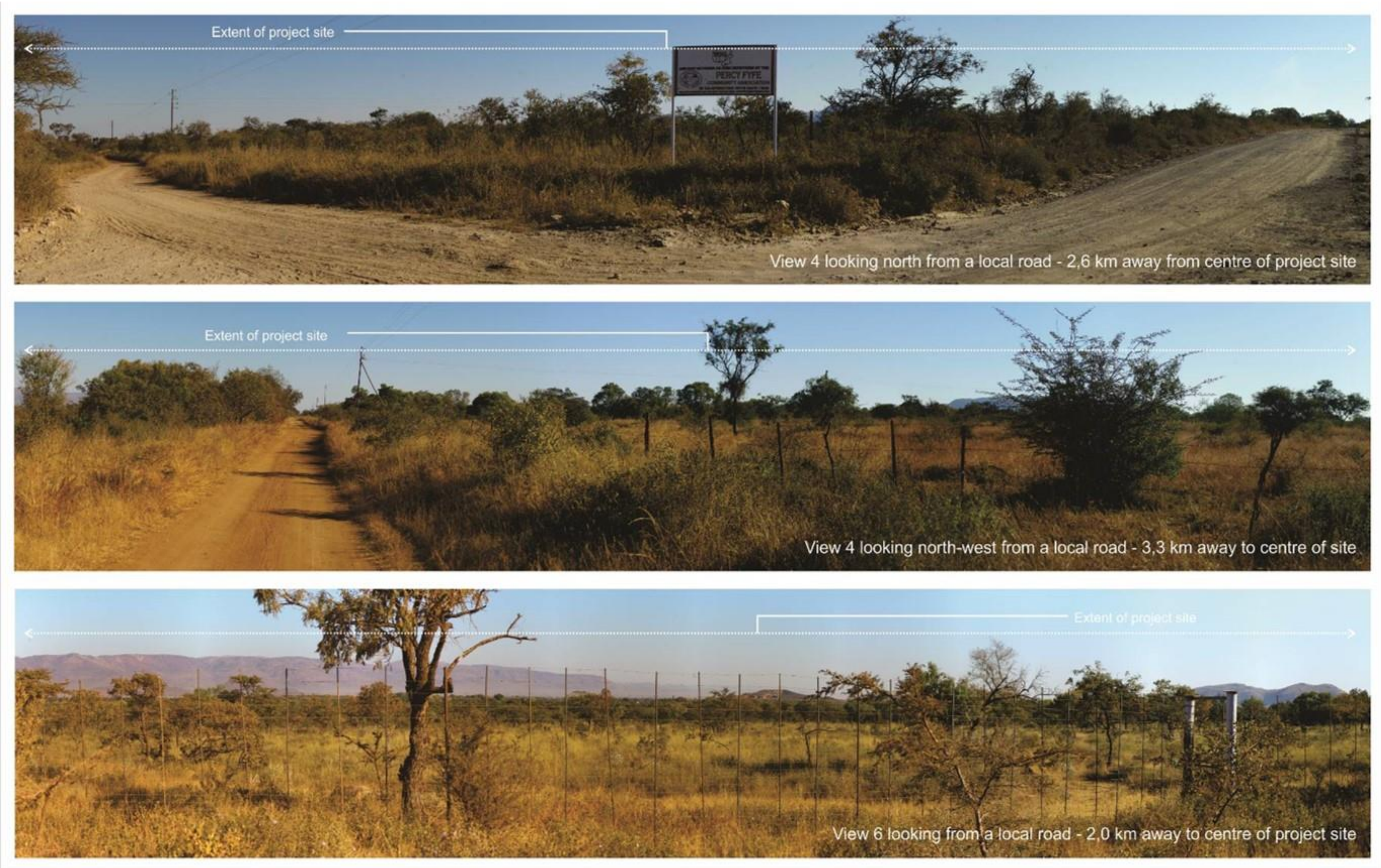

Figure 86: Landscape character: Views 4, 5 and 6 as indicated on Figure 84 (GYLA, 2019)

Figure 87: Landscape Character: Views 7, 8 and 9 as indicated on Figure 84 (GYLA, 2019)

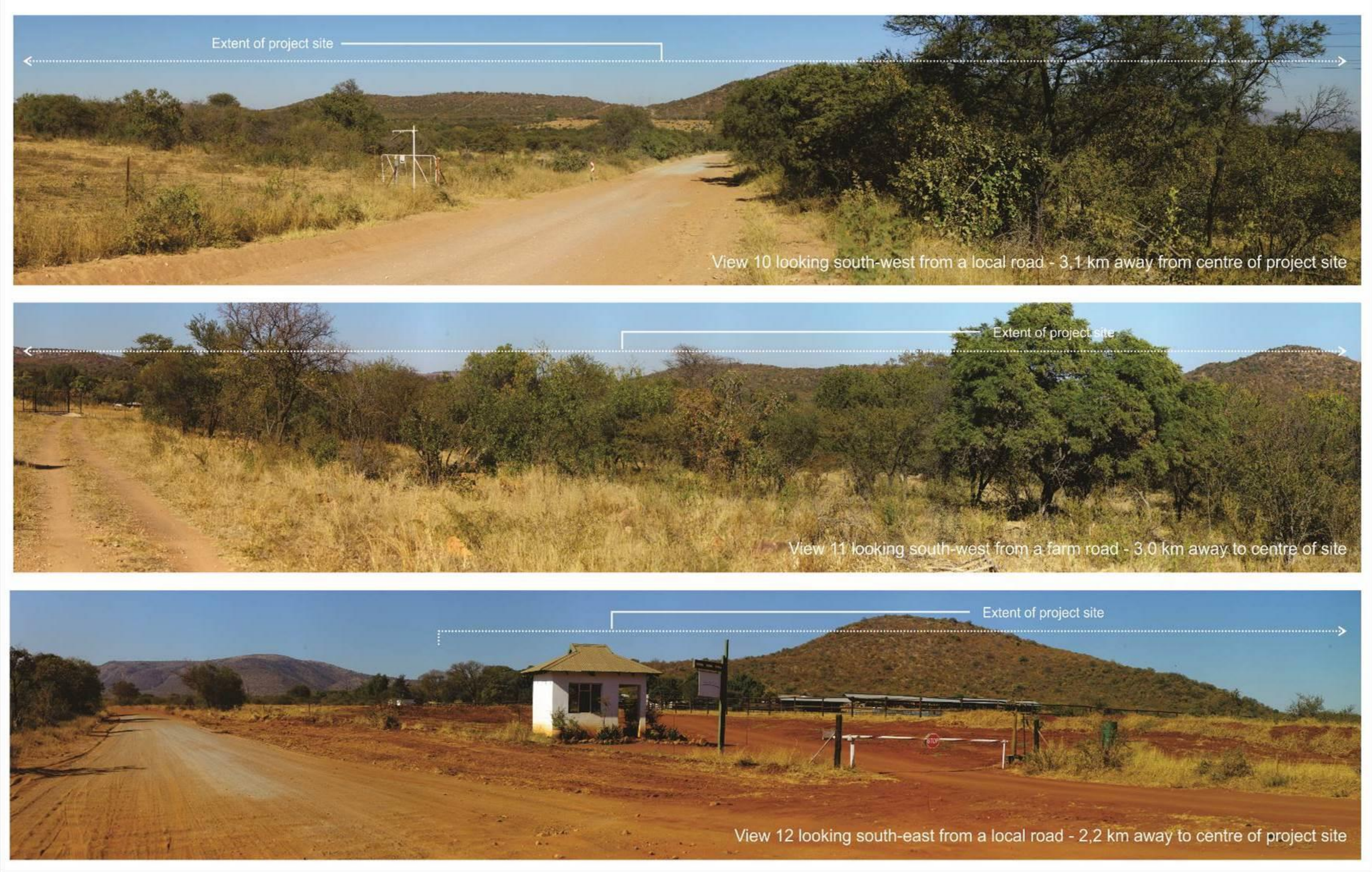

Figure 88: Landscape Character: Views 10, 11 and 12 as indicated on Figure 84 (GYLA, 2019)

Figure 89: Landscape Character: Views 13, 14 and 15 as indicated on Figure 84 (GYLA, 2019)

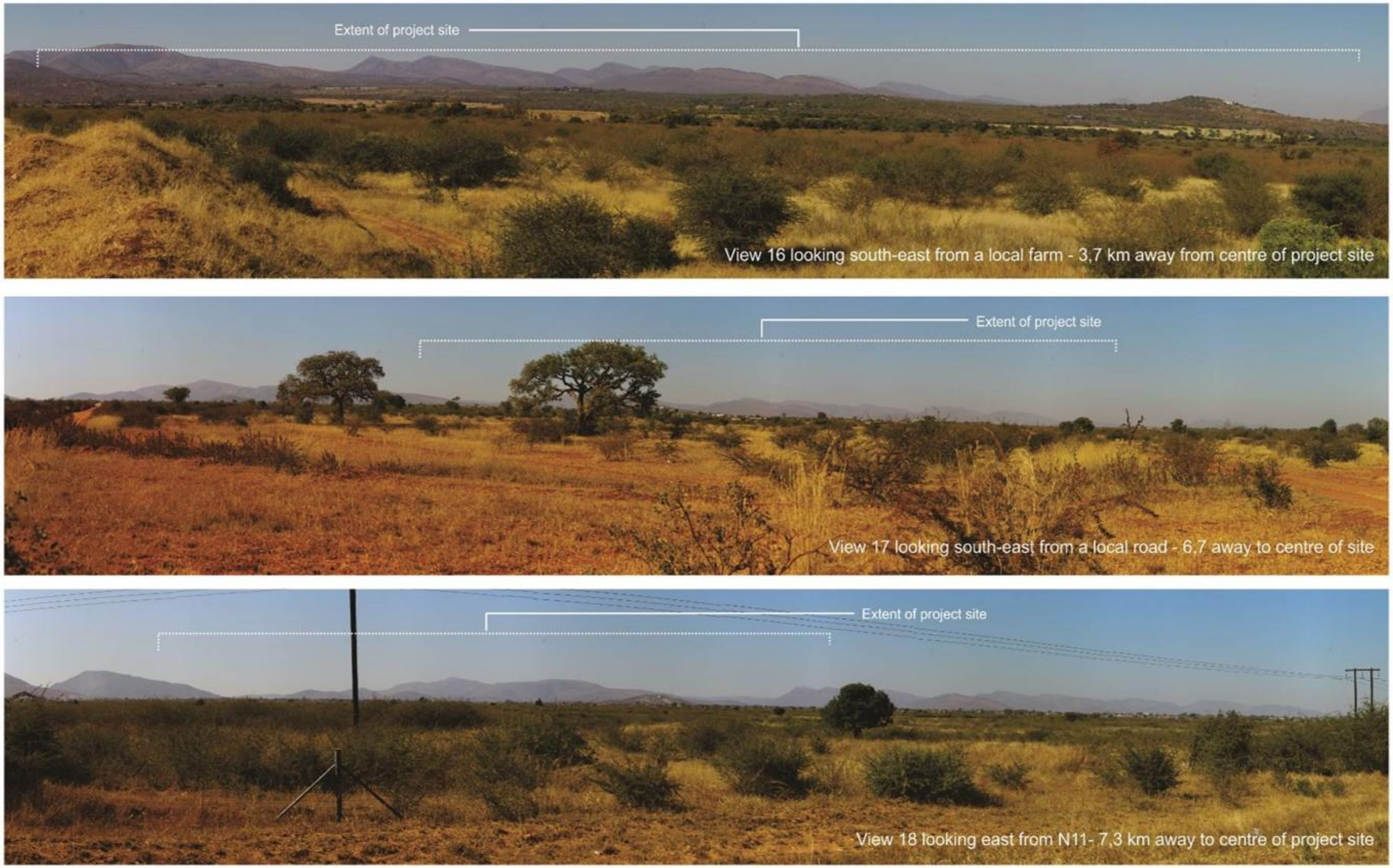

Figure 90: Landscape Character: Views 16, 17 and 18 as indicated on Figure 84 (GYLA, 2019)

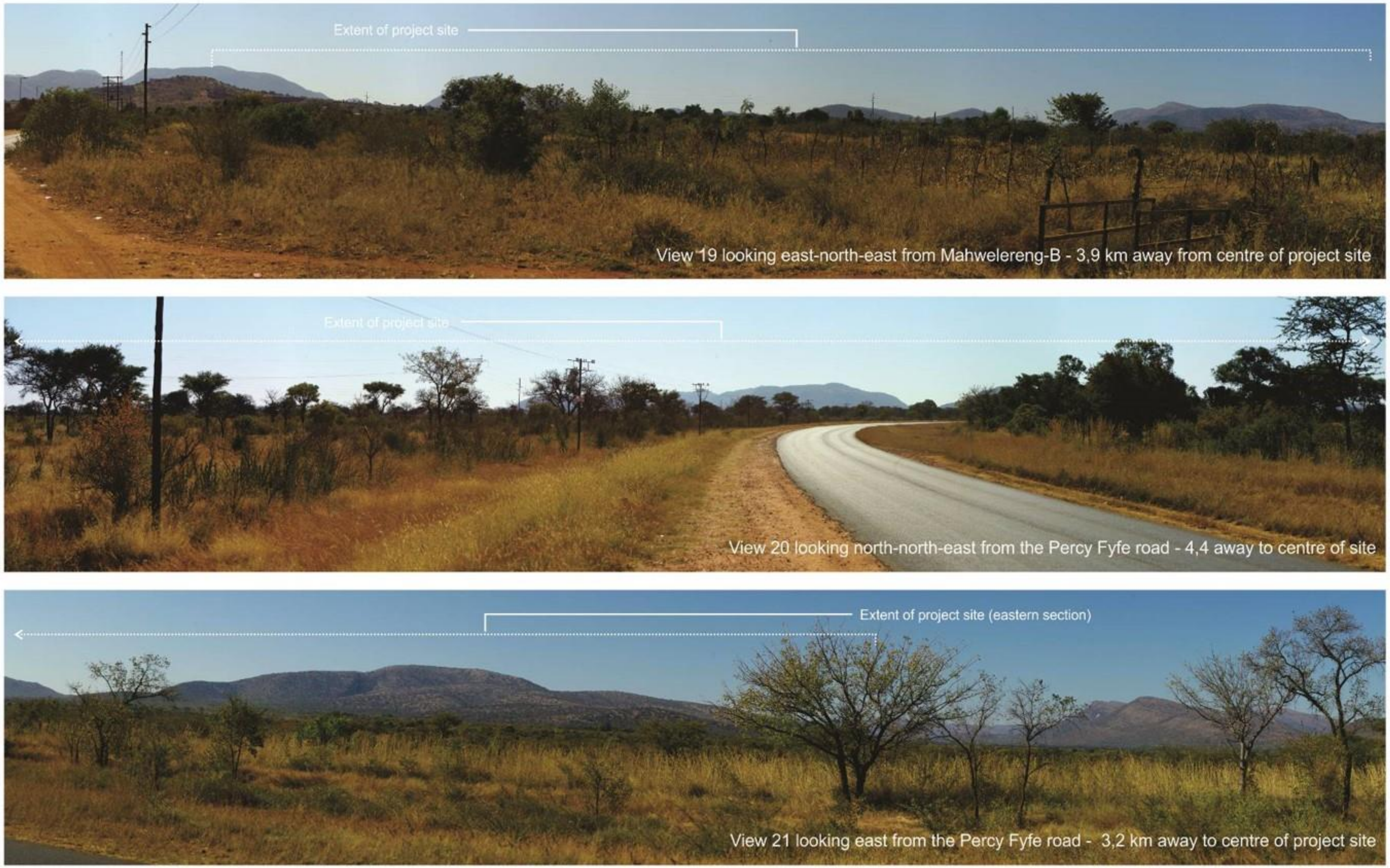

Figure 91: Landscape Character: Views 19, 20 and 21 as indicated on Figure 84 (GYLA, 2019)