mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT SCOPING REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH THE PROPOSED CONSTRUCTION AND OPERATION OF DOORNHOEK FLUORSPAR 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).

NAME OF APPLICANT: SA Fluorite (Pty) Limited & Southern Palace 398 (Pty) Limited

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DOORNHOEK FLUORSPAR MINE: DRAFT SCOPING REPORT

An EOH Company

Innovation in Sustainability

Technical Report: **SR-2016-07-14**

Prepared for: **Department of Mineral Resources**

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

DOORNHOEK FLUORSPAR MINE: DRAFT SCOPING REPORT

14 July 2016

Prepared for:

Department of Mineral Resources

Compiled by:

M Grobler (Pr.Sci.Nat; BSc Hons Conservation Ecology; M. Org Leadership)

C Uys (BHCS Hons Archaeology)

IMPORTANT NOTICE

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

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

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

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

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

OBJECTIVE OF THE SCOPING PROCESS

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

(a) identify the relevant policies and legislation relevant to the activity;

(b) motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

(c) identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;

(d) identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;

(e) identify the key issues to be addressed in the assessment phase;

(f) agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and

(g) identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

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Executive Summary

1. Introduction

SA Fluorite (Pty) Limited & Southern Palace 398 (Pty) Limited intends to develop a fluorspar operation at the Doornhoek Fluorspar Project in the Zeerust District of the North West Province. The project falls under the jurisdiction of the Ditsobotla and Ramotshere Moiloa Local Municipalities located within the Ngaka Modiri Molema District Municipality (Refer to Figure 2). The project area is located between Zeerust, Mahikeng and Lichtenburg and borders the eastern section of Mahikeng Local Municipality. The project site is located approximately 220 km west of Johannesburg and 18 km south of the town of Zeerust. The proposed site is adjacent to the Witkop open pit fluorspar mine. Figure 1 indicates the location of the project site. The following coordinates serve as the centre point of the site:

Latitude: 25°44'11.85"S; Longitude: 26°10'29.75"E

The Scoping and EIA Process is being undertaken in support of an environmental authorisation application submitted to the North West Department of Mineral Resources (DMR) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) read with the Environmental Impact Assessment Regulations, 2014 (GNR 982 of 2014) (EIA Regulations).

The proposed Doornhoek fluorspar mine will predominantly mine fluorspar along with the associated minerals. Lead, Zinc and copper are often associated with fluorspar deposits and vanadium is known to occur in the area. These minerals may be extracted simultaneously with the fluorspar or may be extracted later. Open pit mining would be carried out using a typical drill and blast operation, loading of ore and overburden by excavators and hauling by dump trucks. The stripping ratio for the 1.5 Million tons per annum (Mtpa) open pit scenario averages 3.8 waste to ore (w:o) ratio over the life of mine (LOM). Overburden would be hauled to a designated overburden dump during the early years of the LOM.

Due to the large area applied for and the extent of the orebody, it is estimated that the project will take at least five years of pre-development prior to any mining activities commencing. Therefore a five to 6 year pre-production period is anticipated, including the plant construction which will take 2-3 years.

Upon granting of the mining right (MR), the first year will involve negotiations with the landowners for access rights, lease or purchase agreements for road construction through their property in order to reach the orebody. Once this has been achieved construction will begin on the access roads. The main haul road construction will begin in the 3rd year after the MR has been approved in conjunction with the construction of the mine offices. Construction of the Tailings Storage Facility (TSF) and processing plant will commence in year 4 after the granting of a MR. This will be followed by pre-stripping and ramping up to reach full scale mining in the years following.

2. Project Description

Mine infrastructure will consist of the following:

- Ore Handling and Storage facilities
- Overburden and topsoil dumps
- General Buildings
- Potable and Service Water Dams, including a Storm Water Dam
- Processing Plant
- Emergency and Power facilities (substations)
- Fuel Storage
- Site Access Road and Haul Roads
- Tailings Storage Facility (TSF)
- Water and sewage reticulation
- Sewage Treatment Plant
- Water Treatment Plant

- **Construction of water management and distribution infrastructure**

Potable water reticulation will be via buried HDPE pipelines. Potable water at the mine will be gravitated from the potable water reservoir.

Various water supply options are being investigated. The following options have been identified:

- Municipal supply – Witkop Mine infrastructure (transfer of Witkop water allocation).
- Grey water discharge from Zeerust sewage treatment plant. Water transferred via Witkop infrastructure or via a new pipeline.
- Expansion and additional development of current groundwater supply for municipal use and utilization of Witkop infrastructure.
- Development of a standalone wellfield, targeting dolomitic formations south and southeast of the project area.
- Transfer of existing irrigation water allocations from the Zeerust dam, use of groundwater from existing boreholes no longer in use by landowners.

Should water be sourced from municipal supply (Witkop allocation, grey water from Zeerust STP or expansion of current municipal wellfield) a potable water pipeline of 15km from the Witkop Mine to the proposed Doornhoek Mine will need to be constructed. Potable water will be supplied to all surface infrastructure buildings where required. The potable water piping system will be buried 1 m below the terrace level.

A water treatment plant with a throughput capacity of 84m3 per day will be constructed on-site.

- **The construction of facilities for the storage of diesel, fuel and explosives**

A central fuel storage system with tanks contained within a bunded area will be installed adjacent to the processing plant and close to the mine service area. This fuel storage will mainly serve the refuelling requirements for the mine fleet and light vehicles. The combined fuel storage capacity will be $21m^3$.

- **Construction of haul and access roads**

Approximately 18km of on-site roads are required for the mining operation and to access site buildings and other infrastructure. The service roads have a planned width of 10m while the production roads from the pit to the ore storage pad, primary crusher, overburden/topsoil piles, and TSF, have a planned width of 18m.

- **Construction of a processing plant and associated infrastructure**

Provision has been made for a washing circuit to cater for potentially tenacious ultra-fine earthy zones of mineralization. A standard ball mill primary grinding circuit is likely to be adequate but provision has been made for a rod and ball mill primary circuit to prevent possible preferential grinding of the soft ore types, should future test work indicate the need. The presence of talc and micas demand a slime pre-float circuit to prevent depression difficulties in the fluorspar circuit. After thickening, fluorspar flotation begins with a standard rougher/scavenger circuit followed by a first cleaner. Six further cleaners follow with their tailings recycling to the head of the previous cleaner. The second cleaner tailings which will contain the majority of the middlings are pumped to a regrind circuit which is preceded by 3 stage dewatering cyclones. The regrind mill is on open circuit with the cyclones but closed circuit with the flotation ensuring soft ore is not over-ground. At the seventh cleaner, the concentrate grade should exceed 97%$CaF2$ as well as the impurities being below their specification limits. Dewatering of the concentrate will be undertaken by vacuum filtration, either drum or disc, though preference is for drum filtration, in a closed circuit with a concentrate thickener. The end result will be an acid grade filtercake with a moisture content in the range of 8% to 10% H20 which should be stored under cover either on site or at the rail siding. Storage should be 20,000 tons roughly equivalent to one month of production. Flotation tailings will be pumped to a tailings storage facility (TSF) where after settling the suspended solids, water will be recycled for maximised re-use throughout the plant.

The following reagents will possibly be used during the flotation process, potential impacts and risks associated with these chemicals in the process will be assessed as part of the EIA process:

- Soda ash to adjust pH to 9.5 during the rougher floatation stage- Supplier: Protea chemicals
- FS2 fatty acid collector- Supplier: To be determined
- R3-3F fatty acid collector –Supplier: Oleochemicals
- FA-2 and FA-1 fatty acid collectors - Supplier: Arizona chemicals
- PAX sulphide collector- Supplier: SENMIN International
- Dow Froth 200- frother , Supplier: Mimosa BS or Tan XS (Wattle Bark Extract) as a calcite depressants-Supplier: Bondtite Adhesives (Pty) Ltd
- Sodium silicate as a silicate depressant- Supplier: PQ Silicas South Africa (pty) Ltd
- Pionera F250 as a pyrite depressant- Supplier : Pionerra chemicals

- **Construction of mine offices and workshops**

Offices and workshops to support the mine and processing plant will be established on site. Part of the service building will provide office space to accommodate mine management, administration and engineering/geology staff. A first aid room, training and meetings rooms and a change room will also be provided.

- **Construction of a sewage treatment plant**

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 an estimated 40 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 is directly next to the water treatment plant and the storm water dam for easy local distribution of treated water.

Sewage reticulation should be handled with 150 ID PVC gravity piping installed subsurface with a minimum cover of 1 m, minimum slope of 1:100 and with 1050 diameter pre-cast manholes at spacing of no more than 90 m and at every change in direction or slope. Sewers should transport sewage to a common manhole at the lowest point from where it will be fed to the treatment facility.

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 should be disposed of at a registered hazardous waste disposal facility.

- **Construction of a water treatment plant**

The water treatment plant will be a turnkey package. 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 should be treated in two stages within the water treatment plant. Stage 1 of the treated water should be used for the plant requirements and Stage 2 should be used as make-up for potable water requirements. The water treatment plant will have a capacity of 84 m^3 per day.

- **Construction of perimeter and internal fencing**

The surface infrastructure and any terracing should be fenced with a 24 strand electric fence. The stores should be fenced independently with additional access control.

- **Establishment of overburden dump**

Overburden from mining activities will be stored in overburden dumps strategically placed in close proximity to the open pit areas. Overburden will be backfilled into the open pits proper once sufficient space is available.

  - Concurrent Rehab/Backfilling

Concurrent backfilling and rehabilitation is the preferred mining method for this project. It must be noted that concurrent backfilling is a standard mining rehabilitation method and is used on an international scale. It is important to quantify the environmental impacts of this management option. It also decreases the overall environmental footprint.

The approach to mining the deposits will be by open pit method with concurrent rehabilitation. The general sequence of conventional open pit mining will be as follows:-

Strip Overburden: The waste material overlying the ore will be removed by digging, pushing, scraping, drilling and blasting, followed by loading into the haul trucks for transportation to the overburden dump or as backfill for the portion being rehabilitated.

Ore Production: The ore will be drilled, blasted, loaded and hauled to the concentrator plant where the Run of Mine (ROM) will be directly tipped into the ROM bin for processing.

Rehabilitation: Mining and environmental legislation will require the disturbed ground to be rehabilitated to near its original form. The rehabilitation has been integrated into the mining sequence to ensure the total disturbed area is minimized.

Where the overburden or the ore cannot be excavated, it will require drill and blast to break up the rock.

- **Establishment of stockpiles**

A stockpile will be maintained outside the plant to facilitate mineralization blending and optimize the mining production schedule. The life of mine (LOM) calls for 75% of the run of mine (ROM) mineralization to be directly fed to the plant, with the remaining 25% going to a stockpile to assist with blending. The ore stockpile will be maintained at 30 000 tons with a volume of 10 345 m^3 and a footprint of 0.103 hectares. The filtercake concentrate stockpile will be stored under cover on site or at the rail siding with a volume of 20 000 tons.

- **Construction of a Storm Water Dam**

A Storm Water Dam with an estimated capacity of 90 000 m^3 should be constructed on site.

- **Construction of electricity distribution infrastructure**

Power is available at the existing Witkop substation approximately seven kilometres from the site. The power lines to the mine site will be approximately 10 km in length and will serve the process plant, pumping stations, mechanical shop, warehouse, service buildings and site lighting via an on-site substation near the plant and a local electric line network. The construction of the substation and the associated powerline entail the following:

- Construction of an approximately 10 km 132kV Kingbird line from the existing Witkop Substation to the proposed Doornhoek Fluorspar substation;
- Establishment of substations;
- Erection of a 36 meters Communication Tower inside the new substation;
- Obtainment of a servitude area for the power line route.

3. Alternatives

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

Various alternatives have been assessed for the project on scoping level and work shopped by means of specialist, client and engineering team interactions.

In the case of the proposed development, possible alternatives were identified through discussions with authorities, discussions with I&AP's (focus group meetings), reviewing of the existing baseline environmental data which was determined prior to initiating the EIA/MRA, specialist inputs/studies and the design team. Alternatives relevant to this development can be categorized into the following:

- **Site Location alternatives**
  - Location of processing plant and TSF
- **Layout alternatives**
  - Layout of processing plant and TSF
  - Layout of overburden dumps
- **Service alternatives**
  - Water provision;
  - Energy alternatives;
  - Access alternatives;
  - Waste disposal;
  - Technology alternatives; and
  - Mining Methodology alternatives.
- The "no-go" alternative
  - Assessed per environmental aspect/area

4. Public Participation

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 Table (refer to Table 4) which will be submitted along with this Scoping Report.

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

5. The Site

- The site falls within the summer rainfall region with very dry winters and frost that occurs fairly frequently during winter.
- The project area is located at an altitude of approximately 1 342 metres above mean sea level (mamsl). The topography is relatively flat, dipping at a low angle in a north-westerly direction. The project area is defined as hills and lowlands in the northern section, while the southern section is classified as escarpment (ENPAT, 2000). The topography of the area is a mixture of terrains, ranging from flat to moderately undulating plains, outcrops, bottomlands (drainage channels) and slightly undulating hills. Refer to Figure 16 and Figure 17 for elevation profiles of the study area and Figure 18 for a map of the terrain.

- The project site is located on Vaalian age Chunniespoort group sediments (Transvaal Super Group). The Chunniespoort group is largely represented by dolomite, dolomitic limestone, chert and shale and is intruded by numerous basic dykes and sills. The fluorspar deposits are large bedded replacement deposits of the classical Mississippi Valley type. Fluorspar mineralisation occurs mainly associated with stromalites in the Middle Frisco Zone and appears to have been introduced post deposition by hydrothermal brines. The fluorite occurs as a filling in permeable beds; within small gas cavities in the stromalites.
- The study area is situated within quaternary catchment A31D. The focus area is at an elevation of approximately 1450 mamsl. The topography of the catchment gently slopes in a northerly-westerly direction. The mean annual runoff (MAR) determined from quaternary catchment A31D is 9.04 Mm3/a (WR 2005). Quaternary catchment A31D falls within the Crocodile (West) and Marico water management area. The quaternary catchment is drained by the perennial Klein Marico River (which drains through the project area), a tributary of the Groot Marico River, which in turn is a tributary of the Marico which flows into the Limpopo River north of the project site.
- The project area is drained mainly by surface run-off (i.e. sheetwash) with surface water flowing into the rivers and streams that bisect the area. The storm water collects along roads and footpaths cutting through the area, to drain into the regionally channels indicated above. It must be noted that surface flow along these rivers generally only occurs in the period directly after precipitation events or a wet rainy season, and that these rivers may exhibit a large base-flow component with groundwater flow occurring within the sandy sediments lining its channel.
- Dolomitic eyes are water bodies fed by groundwater originating from fractures in the underlying dolomite. The fractures and intrusions of geological formations impenetrable to water in the dolomite form aquifers, dolomite compartments and dolomitic eyes. Aquifers are subterranean waterways/tunnels and reservoirs from which water is forced above ground through openings (fractures), which are called dolomitic eyes or springs. The dolomite area covers approximately 4022 km2 of the North West Province and forms the main watershed of the east-flowing Limpopo River system and the west-flowing Molopo River. The interdependence of ground and surface water is apparent in the ecology of the dolomitic eyes. These eyes are influenced by the water quality and quantity of both the surface water and the ground water. The sources of the Molopo, Molemane and Marico rivers are unique dolomitic eyes (springs) and associated wetland systems.
- An Aquatic Ecology Feasibility Study was undertaken by Scientific Aquatic Services in October 2014, where the Present Ecological State of the aquatic resources in the vicinity of the study area was assessed. A further study of the aquatic resources present was conducted in May 2016 as part of the baseline assessment for the proposed Doornhoek mining project. A literature review was undertaken and the aquatic Ecological Importance and Sensitivity (EIS) assessment performed is in agreement with literature cited. Based on the findings of the

assessment it is evident that aquatic features associated with the Klein Marico River have an EIS which can be considered moderate to high. The Klein Marico River system can therefore be defined as being unique on a local to national scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species), not usually very sensitive to flow modifications and often have substantial capacity for use.

- Sub-vertical dolerite and diabase dykes cross cut the sedimentary units of the region. These dykes are inferred to have low permeability relative to the country rock and thus act as barriers to groundwater flow and essentially compartmentalise the aquifer. This inference was based largely on the occurrence and location of a spring within the study area. Through evaluation of the data sources described above, the dykes structures in vicinity of the proposed mine were mapped. The identified dykes were then overlain across a simplified geological map and compartments were mapped according to the intersecting dyke structures. Twenty-three compartments were identified. The focus area of the proposed mine is situated over three compartments demarcated as compartments 1, 2 and 3. The identification of springs along the dyke separating compartments 1,2 and from 4 and 5 indicates that the dyke is likely semi-impermeable to impermeable. Therefore water table drawdown associated with a mining operation in compartments 1,2 and 3 are likely not to extend southerly into compartments 4 and 5.
- No springs are yet to be identified on the dyke separating compartment 1 and 19 thus this dyke is not necessarily impermeable and the drawdown associated with mine dewatering may possibly extend easterly into compartment 19. Similarly no springs have yet been identified on the dyke separating compartments 3 and 9 thus drawdown associated with mining operation may extend westerly into compartment 9.
- A hydrocensus as part of the pre-feasibility phase of the project was conducted between the 18th to the 21st of July 2013 and was reported on in Ages Report No. G 13/030 2013-07-29. An updated hydrocensus survey was also conducted during May 2016. As the hydrocensus forms the basis of the numerical modelling exercise detailed in ensuing sections.
- Hydrosensus 2016:
    - A total of 116 sites were visited over this period. This included 112 boreholes, 3 springs and 2 surface water site.
    - Of the sites visited 78% serve as water supply sources while the remaining 22% are not in use. The principle water uses are domestic consumption, livestock watering and irrigation. Of the 112 boreholes visited 83% were equipped with pumps. 75% were equipped with submersible pumps, 10% with mono pumps, 12% with wind pumps and 3% with wind pumps and submersible pumps.
    - The general condition of the boreholes, the number of sites in use and the equipment fitted to boreholes indicates a reliance on groundwater resources in the area.

- A total of 92 water levels were measured during the May 2016 hydrocensus. The average, maximum, minimum and standard deviation of the wells are indicated in Figure 28.
- Figure 29 and Figure 30 indicate the relative depth to groundwater as well as regional groundwater flow direction for the proposed project area and visited hydrocensus localities.

- Traces of more recent artisanal fluorspar mining (Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04) occurring within the proposed Doornhoek Fluorspar Mine Project areas is of low heritage significance. Two small Iron Age settlement and Iron Smelting sites (Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03) are of significance in terms of its regional representation in the Iron Age farmer period landscape of the Kaditswene Cultural Landscape. A large Iron Age occupation at Site EXIGO-DFM-IA01 is of high significance in terms of its regional representation in the Iron Age farmer period landscape of the area.
- The land use is dominated by game, livestock farming and chicken farming (Figure 59), and the Witkop Mine located to the west of the project area (no longer in operation). Mining activities have previously taken place on the site, with a number of abandoned mining activities and an abandoned shaft occurring on the site (Figure 60).The closest receptors are farm owners and workers in the area. These receptors, as well as receptors in neighbouring towns and settlements such as Zeerust and Groot Marico are accustomed to the quiet, rural setting.
- The project area lies partially within the Grassland and Savanna Biome and therefore forms an important ecotone between the two biomes.The broad classification identified seven vegetation units as indicated in Figure 21 as follows:

  1. *Stoebe vulgaris – Urelytrum agrypyroides* sour grassland on sandy soils;
  2. *Loudetia simplex* rocky grassland on sloping terrain (including outcrops);
  3. Grassland ecotone with pockets of bushclumps / very open woodland
  4. Mixed Woodland associated with sloping terrain;
     - Dense *Olea europaea – Searsia lancea* woodland on steep / moderately undulating slopes
     - *Protea caffra – Acacia caffra* woodland
     - Mixed *Olea – Searsia – Acacia caffra* undulating woodland
     - Mixed *Protea – Tarchonanthus - Olea* rugged woodland
  5. Mixed woodland habitat associated with plains / footslopes

- Mixed *Searsia lancea – Olea europaea* woodland
- Bushclumps / archaeological sites (stonewall terrains)

6. Drainage features
   - Mixed *Searsia lancea - Acacia karroo* riparian woodland & adjacent floodplains
   - Springs / eyes
7. Old cultivated fields / cultivated land

6. Impacts

A list of the potential impacts identified for the activities described in Section 5 together with the significance, probability and duration of the impacts is included in Table 15.

7. Mitigation

Possible mitigation measures that could be applied and the level of risk is indicated in Table 17 and Table 19.

8. 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 key 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 in by I&APs.
- Final EIA&EMPR. The revised final report will be published with the various specialist reports appended. This will be submitted to the Department of Mineral Resources (DMR).

SCOPING REPORT

1. CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.1. Details of Exigo Sustainability (Pty) Ltd

1.1.1. Details and Expertise of the EAP

Name of The Practitioner: Michael Grobler

Tel No.: 012 751 2160

Fax No. : 086 607 2406

E-mail address: michael@exigo3.com

1.2. Expertise of the EAP

1.2.1. The qualifications of the EAP

(With evidence attached as **Appendix 1**).

Please refer to
Appendix 1: EAP's Qualifications.

Michael Grobler

B.Sc Honours

Masters in Organizational Leadership

Pr.Sci.Nat

Chantal Uys

BHCS Hons Archaeology

Summary of the EAP's past experience

(Attach the EAP's curriculum vitae as **Appendix 2**)

1.2.2. Please refer to Appendix 2: Company Profile & EAP's Curriculum Vitae.

Michael Grobler

11 years

Chantal Uys

BHCS Hons Archaeology

7 years

2. DESCRIPTION OF THE PROPERTY

Table 1 Property Details

Farm Name:	Doornhoek 305 JP (Portion 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24, 25, 26, 27, 28, 29, 30, 31,

	32, 33 Farm 306 306 JP (Remaining Extent, Portion 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31) Knoflookfontein 310 JP (Portion 1, 2, 3, 4, 5, 6, 7,) Rhenosterfontein 304 JP (Portion 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 17, 18, 19, 20, 21, 23, 24, 25, 26, 28) Strydfontein 326 JP (Portion 2, 3, 4, 6, 7, 8, 9, 13, 14, 15, 17, 18, 19, 20, 21, 22) Kwaggafontein 297 JP (Portion 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 15, 17) Paardeplaas 296 JP (Portion 1, 2, 24, 25, 26, 27, 28, 29, 31, 32, 33, 34, 40) Saamgevoeg 320 JP (RE) Witrand 325 JP (RE, Portion 1, 2, 3)
Application area (Ha)	Approximately 23 000 Ha
Magisterial district:	Ngaka Modiri Molema District Municipality
Distance and direction from nearest town	The project area is located between Zeerust and Mafikeng in the southern section of the Ramotshere Moiloa Local Municipality and the western section of the Ditsobotla Local Municipality
21 digit Surveyor General Code for each farm portion	Refer to Appendix 10

3. LOCALITY MAP

(show nearest town, scale not smaller than 1:250000 attached as **Appendix 3).**

Please refer to Appendix 3: Locality Map.

4. DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

4.1. Listed and specified activities

Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site and attach as **Appendix 4**

Please refer to Appendix 4: Site Plan.

Table 2 Listed activities to be authorised

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY (Mark with an	APPLICABLE LISTING NOTICE (*GNR 983*	WASTE MANAGEMENT AUTHORISATION (Indicate whether

(E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route **etc…etc…etc** **E.g. for mining**,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)		**X** where applicable or affected).	***GNR 984 or GNR 985)***	an authorisation is required in terms of the Waste Management Act). **(Mark with an X)**
Mining of ore from open cast pit/s	Three open pits totalling 175 Ha with the potential to extend the pit size in later mining years	x	GN 984 – NEMA Listing Notice 2 of 2014 Activity 15	
			GN 984 – NEMA Listing Notice 2 of 2014 Activity 17	
			GN 985 – NEMA Listing Notice 3 of 2014 Activity 12	
			GN 983 – NEMA Listing Notice 1 of 2014 Activity 19	
Construction of a processing plant and associated infrastructure including mine offices and workshops	7 Ha	X	GN 983 – NEMA Listing Notice 1 of 2014 Activity 27	
			GN 984 –	

			NEMA Listing Notice 2 of 2014 Activity 21	
			GN 985 – NEMA Listing Notice 3 of 2014 Activity 12	
			GN 984 – NEMA Listing Notice 2 of 2014 Activity 15	
Establishment of ore, overburden and topsoil stockpiles	2 overburden stockpiles with combined footprint of 27.58 Ha Ore stockpile: 0.103 Ha	X	GN 985 – NEMA Listing Notice 3 of 2014 Activity 12	X (GN 921 – NEMWA Category B, Activity 7, 8, 9, 10)
			GN 983 – NEMA Listing 1 of 2014 Activity 9	
Construction of water and sewage pipelines	Potable water pipeline of 15km in length	X	GN 983 – NEMA Listing 1 of 2014 Activity 10	
Construction of a sewage treatment plant and water treatment plant	WTP – with a footprint of 400m^2 and a daily throughput of 84 m^3 STP – with a footprint			

	of 1190 m^2 and a daily throughput of 40 m^3			
Construction of facilities for the storage of oil, diesel, fuel and explosives	30 m^3	X	GN 985 – NEMA Listing Notice 3 of 2014 Activity 10	
Construction of water service dams: - Storm Water Dam - Potable water Dam - Fire Water Dam - Spray water Dam - Raw Water Dam - Process Water Dam	 90 000 m3 106 m3 106 m3 181 m3 392 m3 1375 m3	X	GN 984 – NEMA Listing Notice 2 of 2014 Activity 6	X (GN 921 – NEMWA Category B, Activity 1, 10)
			GN 984 – NEMA Listing Notice 2 of 2014 Activity 16	
			GN 983 – NEMA Listing Notice 1 of 2014 Activity 13	
			GN 985 – NEMA Listing Notice 3 of 2014 Activity 2	
Construction of access roads and internal haul roads (including the relevant culverts and/or bridges and other stormwater infrastructure)	18km in length, service roads to be 10m wide while haul roads will be 18m wide	X	GN 983 – NEMA Listing Notice 1 of 2014 Activity 56	
			GN 983 – NEMA Listing Notice 1 of	

			2014 Activity 12	
			GN 985 – NEMA Listing Notice 3 of 2014 Activity 4	
			GN 985 – NEMA Listing Notice 3 of 2014 Activity 18	
			GN 985 – NEMA Listing Notice 3 of 2014 Activity 14	
Stream/drainage diversions and backfilling of open pits			GN 983 – NEMA Listing Notice 3 of 2014 Activity 19	
Construction of electricity distribution infrastructure	Electrical distribution line with a capacity of 132 kV	X	GN 983 – NEMA Listing Notice 1 of 2014 Activity 11	
36 m Telecommunications Tower			GN 985 – NEMA Listing Notice 3 of 2014 Activity 3	
Generation and storage of tailings	TSF: 150 Ha TSF volume is 30 000 000 m^3	X	GN 983 – NEMA Listing Notice 1 of 2014 Activity 13	X (GN 921 – NEMWA Category B, Activity 1, 10)
			GN 984 – NEMA Listing Notice 2 of 2014 Activity 16	

Decommissioning	400 Ha	X	GN 983 – NEMA Listing Notice 1 of 2014 Activity 22	

5. DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

(Describe Methodology or technology to be employed, and for a linear activity, a description of the route of the activity

SA Fluorite (Pty) Limited & Southern Palace 398 (Pty) Limited intends to develop a fluorspar operation at the Doornhoek Fluorspar Project in the Zeerust District of the North West Province. The project falls under the jurisdiction of the Ditsobotla and Ramotshere Moiloa Local Municipalities located within the Ngaka Modiri Molema District Municipality (Refer to Figure 2). The project area is located between Zeerust, Mahikeng and Lichtenburg and borders the eastern section of Mahikeng Local Municipality. The project site is located approximately 220 km west of Johannesburg and 18 km south of the town of Zeerust. The proposed site is adjacent to the Witkop open pit fluorspar mine. Figure 1 indicates the location of the project site. The following coordinates serve as the centre point of the site:

Latitude: 25°44'11.85"S; Longitude: 26°10'29.75"E

The proposed Doornhoek fluorspar mine will predominantly mine fluorspar along with the associated minerals. Lead, Zinc and copper are often associated with fluorspar deposits and vanadium is known to occur in the area. These minerals may be extracted simultaneously with the fluorspar or may be extracted later. Open pit mining would be carried out using a typical drill and blast operation, loading of ore and overburden by excavators and hauling by dump trucks. The stripping ratio for the 1.5 Million tons per annum (Mtpa) open pit scenario averages 3.8 waste to ore (w:o) ratio over the life of mine (LOM). Overburden would be hauled to a designated overburden dump during the early years of the LOM.

Due to the large area applied for and the extent of the orebody, it is estimated that the project will take at least five years of pre-development prior to any mining activities commencing. Therefore a five to 6 year pre-production period is anticipated, including the plant construction which will take 2-3 years.

Upon granting of the mining right (MR), the first year will involve negotiations with the landowners for access rights, lease or purchase agreements for road construction through their property in order to reach the orebody. Once this has been achieved construction will begin on the access roads. The main haul road construction will begin in the 3rd year after the MR has been approved in conjunction with the construction of the mine offices. Construction of the Tailings Storage Facility (TSF) and processing plant will commence in year 4 after the granting of a MR. This will be followed by pre-stripping and ramping up to reach full scale mining in the years following.

5.1. Construction of the mining complex and associated infrastructure

Mine infrastructure will consist of the following:

- Ore Handling and Storage facilities
- Overburden and topsoil dumps
- General Buildings
- Potable and Service Water Dams, including a Storm Water Dam
- Processing Plant
- Emergency and Power facilities (substations)
- Fuel Storage
- Site Access Road and Haul Roads
- Tailings Storage Facility (TSF)
- Water and sewage reticulation
- Sewage Treatment Plant
- Water Treatment Plant
-

5.2. Construction of water management and distribution infrastructure

Potable water reticulation will be via buried HDPE pipelines. Potable water at the mine will be gravitated from the potable water reservoir.

Various water supply options are being investigated. The following options have been identified:

- Municipal supply – Witkop Mine infrastructure (transfer of Witkop water allocation).
- Grey water discharge from Zeerust sewage treatment plant. Water transferred via Witkop infrastructure or via a new pipeline.
- Expansion and additional development of current groundwater supply for municipal use and utilization of Witkop infrastructure.
- Development of a standalone wellfield, targeting dolomitic formations south and southeast of the project area.
- Transfer of existing irrigation water allocations from the Zeerust dam, use of groundwater from existing boreholes no longer in use by landowners.

Should water be sourced from municipal supply (Witkop allocation, grey water from Zeerust STP or expansion of current municipal wellfield) a potable water pipeline of 15km from the Witkop Mine to the proposed Doornhoek Mine will need to be constructed. Potable water will be supplied to all surface infrastructure buildings where required. The potable water piping system will be buried 1 m below the terrace level.

A water treatment plant with a throughput capacity of 84m3 per day will be constructed on-site.

5.3. The construction of facilities for the storage of diesel, fuel and explosives

A central fuel storage system with tanks contained within a bunded area will be installed adjacent to the processing plant and close to the mine service area. This fuel storage will mainly serve the refuelling requirements for the mine fleet and light vehicles. The combined fuel storage capacity will be $21m^3$.

5.4. Construction of haul and access roads

Approximately 18km of on-site roads are required for the mining operation and to access site buildings and other infrastructure. The service roads have a planned width of 10m while the production roads from the pit to the ore storage pad, primary crusher, overburden/topsoil piles, and TSF, have a planned width of 18m.

5.5. Construction of a processing plant and associated infrastructure

Provision has been made for a washing circuit to cater for potentially tenacious ultra-fine earthy zones of mineralization. A standard ball mill primary grinding circuit is likely to be adequate but provision has been made for a rod and ball mill primary circuit to prevent possible preferential grinding of the soft ore types, should future test work indicate the need. The presence of talc and micas demand a slime pre-float circuit to prevent depression difficulties in the fluorspar circuit. After thickening, fluorspar flotation begins with a standard rougher/scavenger circuit followed by a first cleaner. Six further cleaners follow with their tailings recycling to the head of the previous cleaner. The second cleaner tailings which will contain the majority of the middlings are pumped to a regrind circuit which is preceded by 3 stage dewatering cyclones. The regrind mill is on open circuit with the cyclones but closed circuit with the flotation ensuring soft ore is not over-ground. At the seventh cleaner, the concentrate grade should exceed 97%CaF2 as well as the impurities being below their specification limits. Dewatering of the concentrate will be undertaken by vacuum filtration, either drum or disc, though preference is for drum filtration, in a closed circuit with a concentrate thickener. The end result will be an acid grade filtercake with a moisture content in the range of 8% to 10% H20 which should be stored under cover either on site or at the rail siding. Storage should be 20,000 tons roughly equivalent to one month of production. Flotation tailings will be pumped to a tailings storage facility (TSF) where after settling the suspended solids, water will be recycled for maximised re-use throughout the plant.

The following reagents will possibly be used during the flotation process, potential impacts and risks associated with these chemicals in the process will be assessed as part of the EIA process:

- Soda ash to adjust pH to 9.5 during the rougher floatation stage- Supplier: Protea chemicals
- FS2 fatty acid collector- Supplier: To be determined
- R3-3F fatty acid collector –Supplier: Oleochemicals
- FA-2 and FA-1 fatty acid collectors - Supplier: Arizona chemicals
- PAX sulphide collector- Supplier: SENMIN International

- Dow Froth 200- frother , Supplier: Mimosa BS or Tan XS (Wattle Bark Extract) as a calcite depressants-Supplier: Bondtite Adhesives (Pty) Ltd
- Sodium silicate as a silicate depressant- Supplier: PQ Silicas South Africa (pty) Ltd
- Pionera F250 as a pyrite depressant- Supplier : Pionerra chemicals

5.6. Construction of mine offices and workshops

Offices and workshops to support the mine and processing plant will be established on site. Part of the service building will provide office space to accommodate mine management, administration and engineering/geology staff. A first aid room, training and meetings rooms and a change room will also be provided.

5.7. Construction of a sewage treatment plant

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 an estimated 40 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 is directly next to the water treatment plant and the storm water dam for easy local distribution of treated water.

Sewage reticulation should be handled with 150 ID PVC gravity piping installed subsurface with a minimum cover of 1 m, minimum slope of 1:100 and with 1050 diameter pre-cast manholes at spacing of no more than 90 m and at every change in direction or slope. Sewers should transport sewage to a common manhole at the lowest point from where it will be fed to the treatment facility.

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 should be disposed of at a registered hazardous waste disposal facility.

5.8. Construction of a water treatment plant

The water treatment plant will be a turnkey package. 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 should be treated in two stages within the water treatment plant. Stage 1 of the treated water should be used for the plant requirements and Stage 2 should be used as make-up for potable water requirements. The water treatment plant will have a capacity of 84 m^3 per day.

5.9. Construction of perimeter and internal fencing

The surface infrastructure and any terracing should be fenced with a 24 strand electric fence. The stores should be fenced independently with additional access control.

5.10. Establishment of overburden dump

Overburden from mining activities will be stored in overburden dumps strategically placed in close proximity to the open pit areas. Overburden will be backfilled into the open pits proper once sufficient space is available.

- Concurrent Rehab/Backfilling

Concurrent backfilling and rehabilitation is the preferred mining method for this project. It must be noted that concurrent backfilling is a standard mining rehabilitation method and is used on an international scale. It is important to quantify the environmental impacts of this management option. It also decreases the overall environmental footprint.

The approach to mining the deposits will be by open pit method with concurrent rehabilitation. The general sequence of conventional open pit mining will be as follows:-

Strip Overburden: The waste material overlying the ore will be removed by digging, pushing, scraping, drilling and blasting, followed by loading into the haul trucks for transportation to the overburden dump or as backfill for the portion being rehabilitated.

Ore Production: The ore will be drilled, blasted, loaded and hauled to the concentrator plant where the Run of Mine (ROM) will be directly tipped into the ROM bin for processing.

Rehabilitation: Mining and environmental legislation will require the disturbed ground to be rehabilitated to near its original form. The rehabilitation has been integrated into the mining sequence to ensure the total disturbed area is minimized.

Where the overburden or the ore cannot be excavated, it will require drill and blast to break up the rock.

5.11. Establishment of stockpiles

A stockpile will be maintained outside the plant to facilitate mineralization blending and optimize the mining production schedule. The life of mine (LOM) calls for 75% of the run of mine (ROM) mineralization to be directly fed to the plant, with the remaining 25% going to a stockpile to assist with blending. The ore stockpile will be maintained at 30 000 tons with a volume of 10 345 m^3 and a footprint of 0.103 hectares. The filtercake concentrate stockpile will be stored under cover on site or at the rail siding with a volume of 20 000 tons.

5.12. Construction of a Storm Water Dam

A Storm Water Dam with an estimated capacity of 90 000 m^3 should be constructed on site.

5.13. Construction of electricity distribution infrastructure

Power is available at the existing Witkop substation approximately seven kilometres from the site. The power lines to the mine site will be approximately 10 km in length and will serve the process plant, pumping stations, mechanical shop, warehouse, service buildings and site lighting via an on-site substation near the plant and a local electric line network. The construction of the substation and the associated powerline entail the following:

- Construction of an approximately 10 km 132kV Kingbird line from the existing Witkop Substation to the proposed Doornhoek Fluorspar substation;
- Establishment of substations;
- Erection of a 36 meters Communication Tower inside the new substation;
- Obtainment of a servitude area for the power line route.

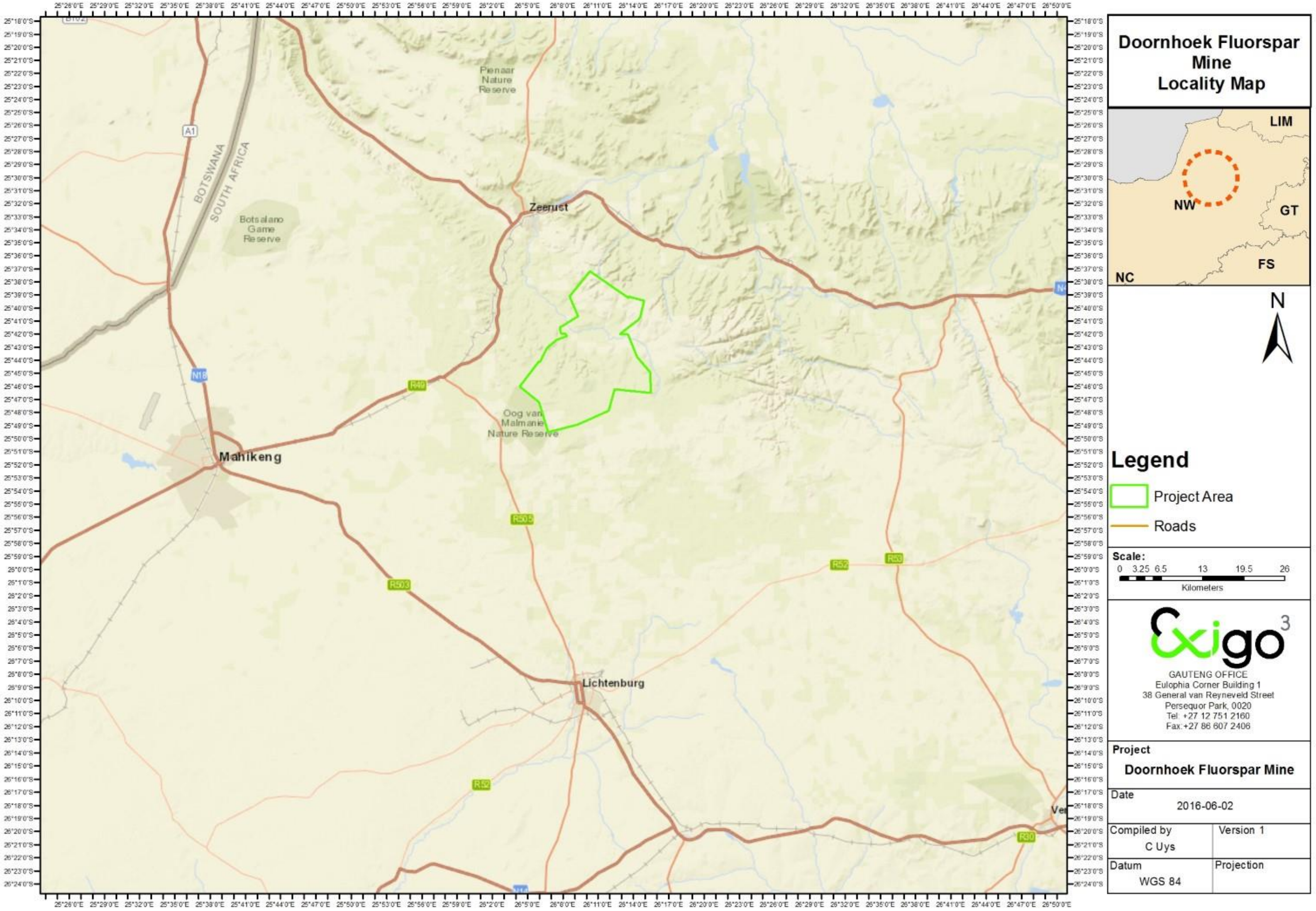

Figure 1: Regional Locality Map

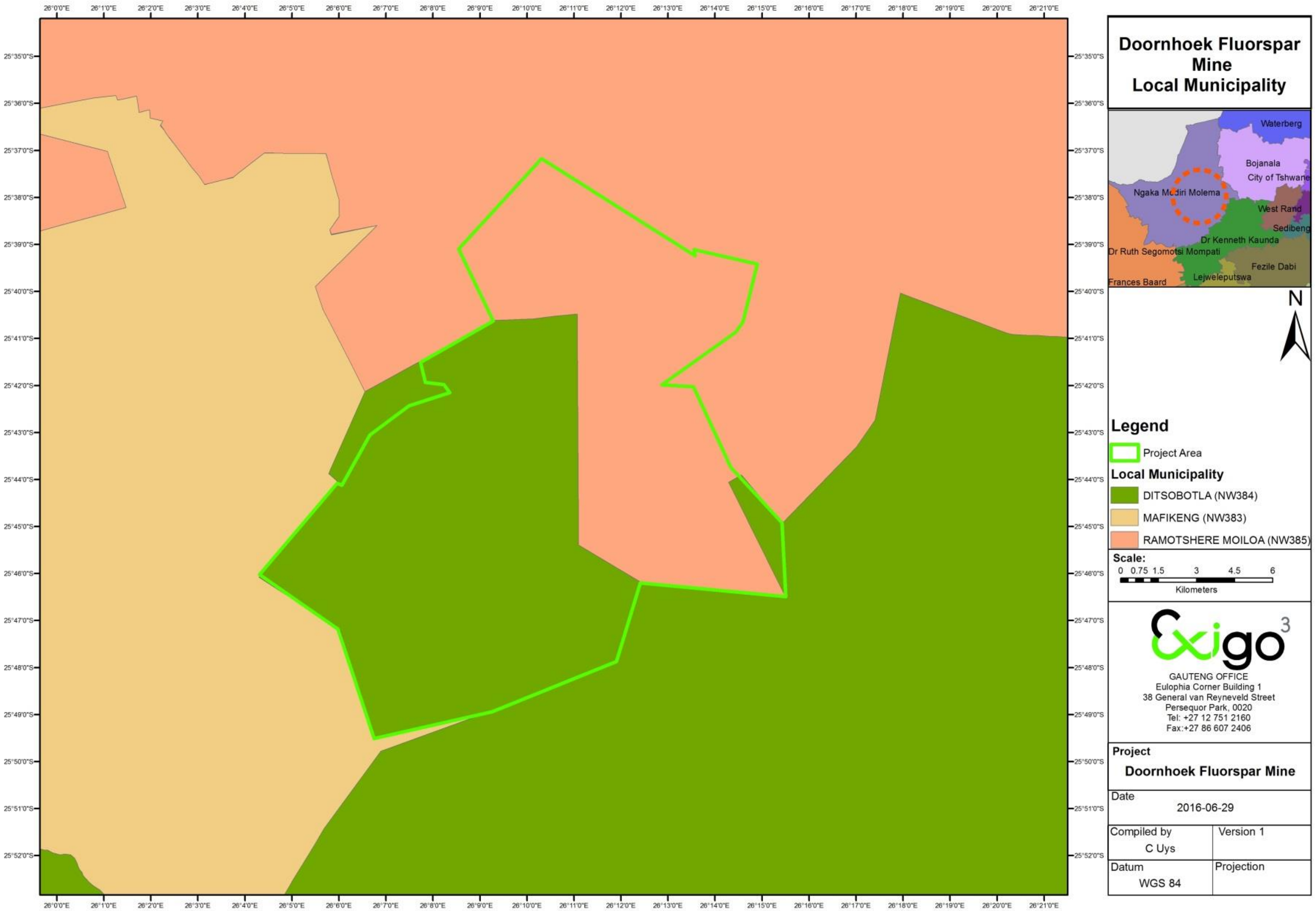

Figure 2: Municipality Map

6. POLICY AND LEGISLATIVE CONTEXT

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process);	**REFERENCE WHERE APPLIED**
Legislation	
The Constitution of the Republic of South Africa (Act 108 of 1996) Section 2 of the Constitution of the Republic of South Africa (Act 108 of 1996) (CA) 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 CA, 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 33(1) concerns administrative justice which includes the constitutional right to administrative action that is lawful, reasonable and procedurally fair.	The Scoping Report was accordingly prepared, submitted and considered within the constitutional framework set by inter alia section 24 and 33 of the Constitution.
The National Environmental Management Act (107 of 1998) and the Environmental Impact Assessment Regulations, 2014 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 (Act no 107 of 1989) provides for National	An application for Environmental Authorisation in line with the provisions contained in GNR 982 (EIA Regulations 2014) was submitted to the Department of Mineral Resources: North West Region (DMR), in terms of section 24 of the NEMA for consideration (Application submitted to DMR on 11 July 2016). The activities specified above in Table 2 were identified as being applicable to the proposed mining

Environmental Management Principles. These principles 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. • 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. The Environmental Impact Assessment (EIA) process to be undertaken in respect of the authorization process of the 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 R982, 983, 984 and 985 of 2014). The proposed development involves 'listed activities',	operations. The Draft Scoping Report will be distributed for public review on the 14th of July 2016 for a period of 30 days (14 July 2016 to 15 August 2016) as part of the environmental impact assessment process.

as identified in terms of the NEMA and in terms of section 24(1), the potential consequences for or impacts on the environment of inter alia listed activities must be considered, investigated, assessed and reported on to the Minster of Mineral Resources or to the relevant office of the Department 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.	
Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002) 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 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	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 will be considered in the compilation of the EMPr.

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, 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 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 in order to ensure that exploitation of mineral resources serves present and future generations. Section 38 of the MPRDA states that the holder of inter alia, a prospecting right, mining right or mining permit: • Must at all times give effect to the general objectives of integrated environmental management laid down in Chapter 5 of NEMA; • Must consider, investigate, assess and communicate the impact of his or her prospecting or mining on the environment as contemplated in section 24(7) of NEMA; • Must manage all environmental impacts – - In accordance with an environmental management plan or approved environmental management programme, where appropriate, and	

- As an integral part of the prospecting or mining operations, unless the Minister directs otherwise. • Must as far as 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 or ecological degradation as a result of prospecting or mining operations and which may occur inside and outside the boundaries of the area to which such right, permit or permission relates.	
2.7 National Water Act (Act No 36 of 1998) [NWA] In terms of the NWA, the national government, acting through the Minister of Water and Environmental Affairs (previously the Minister of Water Affairs and Forestry), 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)). 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 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 water course (section 21(c)); • engaging in a stream flow reduction activity contemplated in section 36 (section 21(d));	An IWULA for the mining development will be submitted to the Department of Water and Sanitation (DWS) during the EIA Phase. Please refer to the meeting minutes of the pre-application meeting held with the DWS on the 22 February 2016 in Appendix 6: DWS Pre-application Meeting Minutes& Attendance Register. A pre-application site visit was previously conducted with Ms Lethabo Ramashala and Mr Clement Makwela on the 25th of November 2014. 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.

• 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 water course (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)). 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 GN R. 704 of 4 June 1999 (GN R. 704). The aforesaid GN R. 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 addition measures (regulation 8) and temporary or permanent cessation of a mine or activity (regulation 9). According to GN R. 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”. Insofar as the undertaking of section 21 water uses is concerned, it is anticipated that application for registration and water use licensing will be undertaken. Of particular relevance within the context of waste disposal and water use and management the applicable water uses will be identified and included in the EIA&EMPR.	
National Heritage Resources Act (Act 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	Based on the archaeological findings on site the NHRA and the associated permitting process may be applicable to this project. An Archaeological Impact Assessment will be conducted for the project.

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 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, power-line, 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 as specified in the regulations; • 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 presumably 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.	
2.9 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 indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting 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	The legislation will be heeded throughout the proposed mining operations and will be considered in the Ecological Impact Assessment.

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.	
National Forests Act (Act 84 of 1998) The project may involve the cutting, disturbing, damaging or destroying of any protected trees declared in terms of section 12 of the National Forest Act (NFA) (Act 84 of 1998). Should the presence of these trees on site be confirmed after receipt of the Record of Decision (ROD), a licence in terms of section 15 of the NFA will be required.	It is expected that the project will involve the cutting, disturbing, damaging or destroying of protected trees declared in terms of section 12 of the NFA, therefore a licence in terms of section 15 of the NFA might be required. However the presence of these trees must be verified in order to confirm their presence.
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEMAQA) The National Environmental Management Air Quality Act (Act 39 of 2004) (NEMAQA) came into power on the 24th of February 2005. Additionally the amendment to the Minimum Emission Standards (GN R 893) also came into effect on the 12 June 2015. This Notice 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 NEMAQA. The effect of the commencement of the NEMAQA and the listed activities, listed in GN 964 is that an atmospheric emission licence (AEL) is now required for conducting these listed activities.	Currently there are no listed activities that require registration/permitting according to National Environmental Management: Air Quality Act, 2003 (Act No. 39 of 2004) for the proposed mine.
National Environmental Management: Waste Act (Act 59 of 2008)	The waste management activities as listed

("NEMWA") The NEMWA 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 NEMWA 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 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 NEMWA 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. In accordance with section 19(3), the Schedule to GNR 921 provides that a waste management licence is required for those activities listed therein prior to the commencement, undertaking or conducting of same. In addition, GNR921 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 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 EIA Regulations, 2014 as part of the waste management licence application. Category C waste management activities do not require a waste management licence, however a person who wished to commence, undertake or conduct a waste management activity listed under this category, must comply with the relevant requirements and standards, Section 20 of the NEMWA pertains to the consequences of listing waste management activities and states that no person my 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 terms of the current statutory framework with regards to waste	in GNR 921 of 29 November 2013 which may be applicable to the proposed mining operations and for which a waste management license is required are included in Table 2 above.

management, a waste management licence is required for those waste management activities identified in the Schedule to GNR 921. Certain of the waste management activities listed in the Schedule are governed by specific thresholds. Where any process or activity falls below or outside the thresholds stipulated, a waste management licence is not required.	
National Environmental Management Waste Amendment Act (Act 26 of 2014) (NEMWAA) On the 3rd of September 2014 the National Environmental Laws Amendment Act (NEMLAA, Act 25 of 2014) and the NEMWAA, published on 2 June 2014 came into effect. These laws are an attempt by the Department of Environmental Affairs (DEA) in cooperation with other government departments, mainly the Departments of Mineral Resources (DMR) and the Department of Water and Sanitation (DWS), to legislate the waste from mining and industrial activities under one legislative system, termed the One Environmental System. This system is subject to certain sections under other acts, such as the Mineral and Petroleum Resources Development Act (MPRDA) and the National Water Act (NWA). NEMLAA calls for a waste classification to be conducted according to Regulation 635 of NEMWAA, which forms part of the NEMLAA legislation. 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.	A waste classification is currently underway to classify the tailings and overburden material for the proposed mine.
Mine Health and Safety Act, 1996 (Act No 29 of 1996) Chapter 4 of the Regulations of the Mine Health and Safety Act, 1996 will be applicable if explosives are stored on site. The regulations include: • Security in respect of explosives • Receipt, storage, issuing, transportation and destruction of explosives • General precautionary measures when blasting	The legislation will be applicable to the storage of explosives on the mine site.
Spatial Planning and Land Use Management Act (Act No 16 of 2013) (SPLUMA)	A land development application will be submitted to the relevant municipality by

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 consideration 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 applicant along with the Environmental Authorisation and Mining Right (please refer to the relevant meeting minutes in Appendix 9.4: Focus Group Meeting Minutes and Attendance Registers).
Integrated Development Plans	
North West Provincial Development Plan (PDP) 2030 (2013) The National Development Plan (NDP) 2030 is informed by the New Growth Path and states that 11 million new employment opportunities must be created to improve the livelihoods of South Africans and grow the economy. It further states the key means for achieving the desired growth, including stimulation of private investment, involvement of labour intensive industries, and adequate beneficiation of the country's mineral resources.	The PDP identifies mining as one of its two priority economic sectors with a comparative advantage, together with agriculture. It is envisaged that mining will contribute an additional 55 000 jobs by 2030, representing about 14% of the Province's job creation. For that to happen, the sector must maintain an annual growth rate of 2.5% until 2030. The PDP acknowledges that downstream production (beneficiation) should be promoted, but more economic potential exists in backward linkages (e.g. equipment and chemicals manufacturing). The sector should be sensibly supported by the Province through investment retention and promotion. However, the Plan also stresses the necessity to use water efficiently in a province that experiences water scarcity, as well as to protect the environment and water resources for future use once mining activities have ceased. Furthermore, it

	aims to ensure that mining companies deliver more effectively on their socio-economic development obligations, with a particular focus on local enterprise development and local procurement of goods and services. The PDP will be heeded throughout the proposed EIA process and compilation of the SLP.
Ramotshere Moiloa Local Municipality (RMLM) Reviewed Integrated Development Plan IDP 2015/2016 From a local policy perspective, the proposed project does not appear to contravene any strategy or plan developed by the RMLM. The proposed project is in line with the Fourth Key Performance Area outlined in the IDP. KPA 4 pertains to local economic development and states the importance of transforming the local economy to create decent work and sustainable livelihoods for all that live in the local municipality (Ramotshere Moiloa Local Municipality IDP, 2015/2016).	The IDP will be heeded throughout the proposed EIA process and compilation of any future SLP's.
The Revised Ditsobotla Local Municipality (DLM) Integrated Development Plan (IDP) 2015/16 - 2017/18 (2013) From a local policy perspective, the proposed project does not appear to contravene any strategy or plan developed by the DLM. On the contrary, it seems to be in line with Key Performance Area (KPA) 3 "Local economic Development and Spatial Rationale", which is one of the five KPAs set out in the Revised DLM IDP. The main objectives under this KPA include: • Developing "a vibrant, growing economic environment conducive for investment attraction and retention", and • Creating "an enabling environment for job creation and businesses to thrive" (DLM IDP, 2015/16/2017/18).	The IDP will be heeded throughout the proposed EIA process and compilation of any future SLP's.

7. NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES.

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location).

7.1. Need

South Africa's fluorspar reserves (natural calcium fluoride) exceed 30 million tons. It has the third largest reserves in the world and accounts for around 30 % of the western world's reserves and about 10 per cent of all known reserves. Fluorspar is used mainly in the aluminium, steel and chemicals industries (Chamber of Mines, 2009).

There are currently two principal commercial grades of fluorspar:

- metallurgical grade (metspar), containing less than 97% CaF_2, typically 85% or more CaF_2; and
- acid grade (or acidspar), containing greater than 97% CaF_2.

Fluorspar, along with graphite and other minerals, is listed as a critical material (Byron, 2012). There are a number of areas identified for fluorspar demand that are gross domestic product (GDP) driven, including catalysts (expected to grow at 4% per year), water fluoridation (expected to grow at about 3% per year), direct use in glass and ceramics (approximately 4% per year growth), and fluorine gas (estimated to grow at about the level of GDP).

From 2009 to 2012, the world market acid grade fluorspar prices have varied from US$300/US400 to US$400/US$500 for markets including China, Mexico, and South Africa. The variance in fluorspar pricing over the 2009-2012 period is illustrated in Figure 3. It should be noted that the 2011 total world production was approximately 6.3 million tonnes and estimated a production of 6 million tonnes for 2012, of which approximately 60% is acid grade.

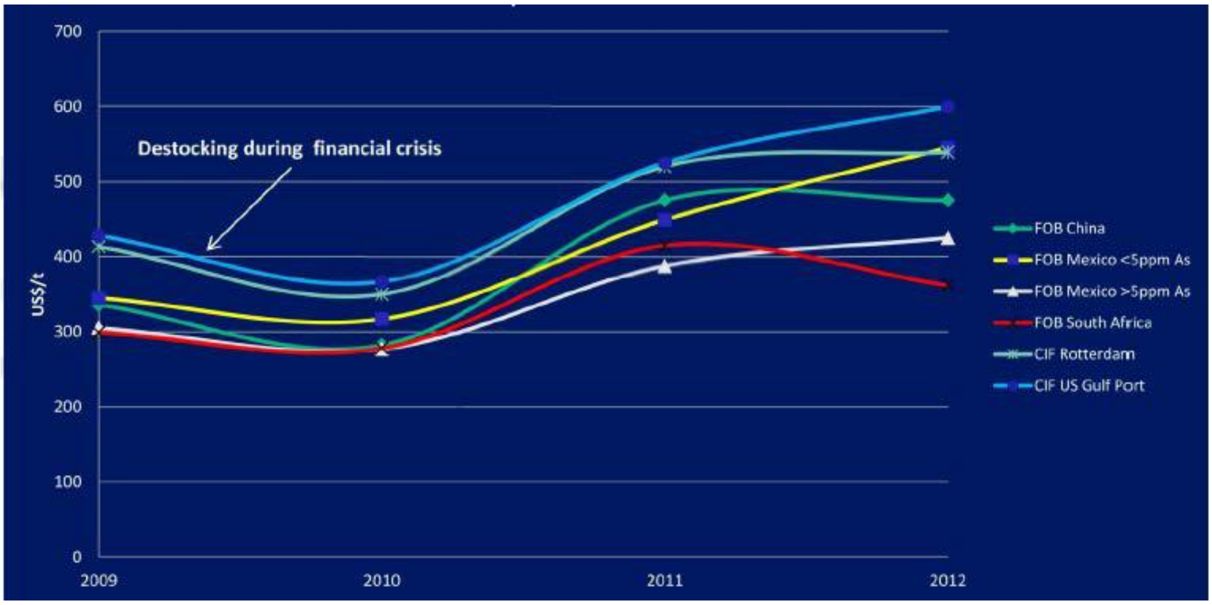

Figure 3: Acid grade fluorspar prices 2009 to June 2012 (Byron, 2012)

The outlook, with projections to 2017, indicates a significant growth in both metallurgical and chemical applications. The analysis indicates that:

- Metallurgical grade fluorspar demand will grow by approximately 4.6% per year, at the pace of basic metal use and global GDP.
- Direct use fluorspar (glasses and ceramics) demand is expected to rise at similar levels to metallurgical grade fluorspar demand.

- Use of acid grade fluorspar is expected to grow even faster, which will demand new deposits be brought to market, since some uses are price sensitive and demand will falter with rocketing prices.
- Demand for acid grade fluorspar may rise as much as 46% from 2010 levels by 2017.
- Between the Chinese domination of the industry and rising demand, there is a strong window opening for Western fluorspar. Thus providing an additional motivation in developing a South African mine in this limited international market (RPA, 2013).

In addition to the global socio-economic benefits, the Doornhoek Fluorspar Project will also provide the local communities with various benefits relating mainly to job creation and skills development. Unemployment in the project area is high and mining is seen to hold major possibilities for the area.

Without the implementation of this project, the mentioned benefits would not be realised. The realization of the outcome the Mining Charter (September 2010), within the context of the MPRDA (2002), would therefore also not be reached and this has potentially significant negative impacts on national economic growth and social well-being. The Mining Charters main objectives, which the Doornhoek Fluorspar Project will assist to reach, are:

- to promote equitable access to South Africa's Mineral Resources to all the people of South Africa;
- to substantially and meaningfully expand opportunities for Historically Disadvantaged South Africans (HDSAs) to enter the mining and minerals industry and to benefit from the exploitation of South Africa's mineral resources;
- to utilize and expand the existing skills base for the empowerment of HDSAs (Refer to SLP as part of the Mining Right);
- to promote employment and advance the social and economic welfare of mine communities and major labour sending areas; (Refer to the SLP as part of the Mining Right); and
- to promote beneficiation of South Africa's mineral commodities; and
- promote sustainable development and growth of the mining industry (Amended Mining Charter, 2010).

7.2. Desirability

The project area covers an area of 22,254 ha. The area within and surrounding the project area has seen sporadic exploration since the 1870s and intermittent extraction of fluorspar since 1917. Notable extraction occurred in the area between the 1910s and 1940s. Following exploration by the Geological Survey (now Council for Geoscience) in the early 1960s, renewed interest in the area led a number of companies to conduct exploration and mining activities in the area during the 1970s and 1980s.

Disinvestment following a market downturn led to the mineral rights being sold or returned to the surface owners, resulting in a complex unconsolidated holding of mineral rights. Following the change in the Mineral Law in South Africa in 2002, lapsed mineral titles were picked up by SA Fluorite (Pty) Ltd and Southern Palace 398 (Pty) Ltd.

The Witkop Fluorspar Mine (Witkop Mine) occurs to the north-east of the proposed project site. Market circumstances in 2008 and 2009 led to Witkop Mine being placed on care and maintenance, but it was re-commissioned in March 2011. The project was again placed on care and maintenance in 2012, citing weakness in the international fluorspar market, and is currently re-mining its old tailings dumps.

The North West Provincial Development Plan (PDP) 2030 identifies mining as one of its two priority economic sectors with a comparative advantage, together with agriculture. It is envisaged that mining will contribute an additional 55 000 jobs by 2030, representing about 14% of the Province's job creation. For that to happen, the sector must maintain an annual growth rate of 2.5% until 2030.

The PDP acknowledges that downstream production (beneficiation) should be promoted, but more economic potential exists in backward linkages (e.g. equipment and chemicals manufacturing). The proposed project appears to be in line with the policies and strategies formulated at the national, provincial and local levels. The development of mining activities, while protecting the environment and water resources, is seen as an opportunity for the further development of the North West Province and the Ramotshere Moiloa Local Municipality (RMLM) and Ditsobotla Local Municipality (DLM). However, agriculture and tourism are two other important activities for economic growth in the study area. Therefore, care should be taken when developing the project to ensure that it is not established to the detriment of the other key economic sectors in the area.

The proposed Doornhoek Fluorspar Mine will create job opportunities in the region and provide the local workforce with skills development training. The mine is dedicated to employing people from the local communities and has developed a Social and Labour Plan (SLP) to this effect. The SLP focuses largely on human resource development activities, which will focus on equipping people from the local communities with skills that will make them desired employees during both the construction and operational phases of the project.

The proposed Doornhoek Fluorspar Mine will have a significant positive effect on the national economy in terms of stimulation of domestic production, job creation, government revenue, and export earnings. The proposed project is also expected to bring a much needed rejuvenation to the local economies that face high unemployment and poor economic growth rates. Furthermore, the project falls within the developmental priorities of the local municipality that have identified the expansion of the mining sector as a sector for growth to develop the local economies and uplift its communities (RMLM IDP, 2014-2015).

The need and desirability of the project will be further assessed and evaluated in the EIA Report and relevant specialist studies (specifically the Socio-Economic Assessment.

8. PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The life of mine (LoM) for which is applied for will be 30 years and it is therefore requested that the authorization be issued for the same period. However the resource is large enough to mine in excess of 100 years.

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

NB!! – This section is not about the impact assessment itself; It is about the determination of the specific site layout having taken into consideration (1) the comparison of the originally proposed site plan, the comparison of that plan with the plan of environmental features and current land uses, the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout as a result.

9.1. Process to assess alternatives

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

Various alternatives have been assessed for the project on scoping level and work shopped by means of specialist, client and engineering team interactions.

In the case of the proposed development, possible alternatives were identified through discussions with authorities, discussions with I&AP's (focus group meetings), reviewing of the existing baseline environmental data which was determined prior to initiating the EIA/MRA, specialist inputs/studies and the design team. Alternatives relevant to this development can be categorized into the following:

- **Site Location alternatives**
  - Location of processing plant and TSF
- **Layout alternatives**
  - Layout of processing plant and TSF
  - Layout of overburden dumps
- **Service alternatives**
  - Water provision;
  - Energy alternatives;
  - Access alternatives;
  - Waste disposal;
  - Technology alternatives; and
  - Mining Methodology alternatives.
- The "no-go" alternative
  - Assessed per environmental aspect/area

9.2. Details of all alternatives considered.

With reference to the site plan provided as Appendix 4 and the location of the individual activities on site, provide details of the alternatives considered with respect to:

(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

1. Location and Layout Alternatives

All the location and layout alternatives have been assessed against the following:

- Distance to resource areas and cost implications (economic impact))
- Ecological sensitivity (including soils and land use potential)
- Heritage sensitivity
- Topography
- Proximity to surface water features
- Ownership of surface rights and subsequent social impact
- Nuisance factors (including noise and visual impacts) and subsequent social impacts

9.2.1. Site location alternatives

Five location alternatives were investigated for the proposed processing plant and TSF.

a) Alternative/option 1 for the proposed processing plant and TSF is situated north of the resource areas.

The advantages of location alternative/option 1 are:

- The proposed location alternative is not situated within any high ecological or archaeological sensitive areas,
- The proposed location alternative is situated on property owned by the applicant,
- The proposed location alternative is located on flat to slightly undulating terrain.

The disadvantages of proposed location alternative 1 are:

- The proposed location alternative is situated within close proximity to surface water features and within the floodline of the Klein-Marico River,
- Even though the initial ecological sensitivity does not show the site alternative to be located within a high ecological area, it is foreseen that riverine vegetation associated with the Klein-Marico River will be of high sensitivity,
- The proposed location alternative is located furthest away from the all the resource areas and thus has a higher economic impact in terms of costs,

- Various receptors are present in this area and a higher visual and noise impact is therefore expected.

b) Alternative/option 2 for the proposed processing plant and TSF is situated north of the resource areas south of alternative 1.

The advantages of location alternative/option 2 are:

- The proposed location alternative is not situated in close proximity to any surface water features,
- The proposed location alternative is situated on property owned by the applicant,
- The proposed location alternative is situated closer to resource areas C and D thereby minimizing costs associated with the transport of ore.

The disadvantages of proposed location alternative 2 are:

- The proposed location alternative is situated close to a high ecological sensitive area and within a high archaeological sensitive area,
- The terrain of the proposed location alternative is associated with ridges and outcrops.
- The proposed location alternative is further away from resource area A and thus has a higher economic impact in terms of costs associated with the transport of ore from resource area A,
- Various receptors are present in this area and a higher visual and noise impact is therefore expected.

c) Alternative/option 3 for the proposed processing plant and TSF is situated directly north of resource areas C and D and east of resource area A.

The advantages of location alternative/option 3 are:

- The proposed location alternative is situated in part on property owned by the applicant,
- The proposed location alternative is situated the closest to resource areas C and D but partly over resource area C resulting in partial sterilization.

The disadvantages of proposed location alternative 3 are:

- The proposed location alternative is situated in close proximity to surface water features,
- The proposed location alternative is situated within a high ecological sensitive area and in close proximity to a high archaeological sensitive area,
- The terrain of the proposed location alternative is associated with ridges and outcrops.
- The proposed location alternative is furthest away from resource area A and thus has a higher economic impact in terms of costs associated with the transport of ore from resource area A.

- The proposed location alternative is situated the closest to resource areas C and D but partly over resource area C resulting in partial sterilization,
- Various receptors are present in this area and a higher visual and noise impact is therefore expected.

d) Alternative/option 4 for the proposed processing plant and TSF is situated in the centre between resource area A and resource area C and D.

The advantages of location alternative/option 4 are:

- The proposed location alternative is located on flat to slightly undulating terrain,
- The proposed location alternative is not situated in close proximity to high archaeological sensitive areas.

The disadvantages of proposed location alternative 4 are:

- The proposed location alternative is not situated on property owned by the applicant,
- The proposed location alternative is situated in close proximity to surface water features,
- The proposed location alternative is situated close to a high ecological sensitive area,
- The proposed location alternative is in the centre between resource area A and resource areas C and D and thus has a higher economic impact in terms of costs associated with the transport of ore.

e) Alternative/option 5 for the proposed processing plant and TSF is situated directly south of resource areas C and D and east of resource area A.

The advantages of location alternative/option 5 are:

- The proposed location alternative is situated in part on property owned by the applicant,
- The proposed location alternative is situated the closest to resource areas C and D without impacting on the resource areas and thereby minimizes costs associated with the transport of ore.
- The proposed location alternative represents the largest available open area of all the options.
- The proposed location alternative is not situated in in close proximity to high archaeological sensitive areas,
- Most of the terrain associated with the proposed location alternative is flat to slightly undulating,
- The least amount of receptors are present in this area, the lowest visual and noise impacts are therefore expected.

The disadvantages of proposed location alternative 5 are:

- The proposed location alternative is situated in close proximity to surface water features however due to the size of the area these features can mostly be avoided,
- The proposed location alternative is situated close to some high ecological sensitive areas.
- A few ridges and outcrops occur within the area.
- The proposed location alternative is furthest away from resource area A and thus has a higher economic impact in terms of costs associated with the transport of ore from resource area A.

The preferred location alternative for the proposed processing plant and TSF is Alternative 5.

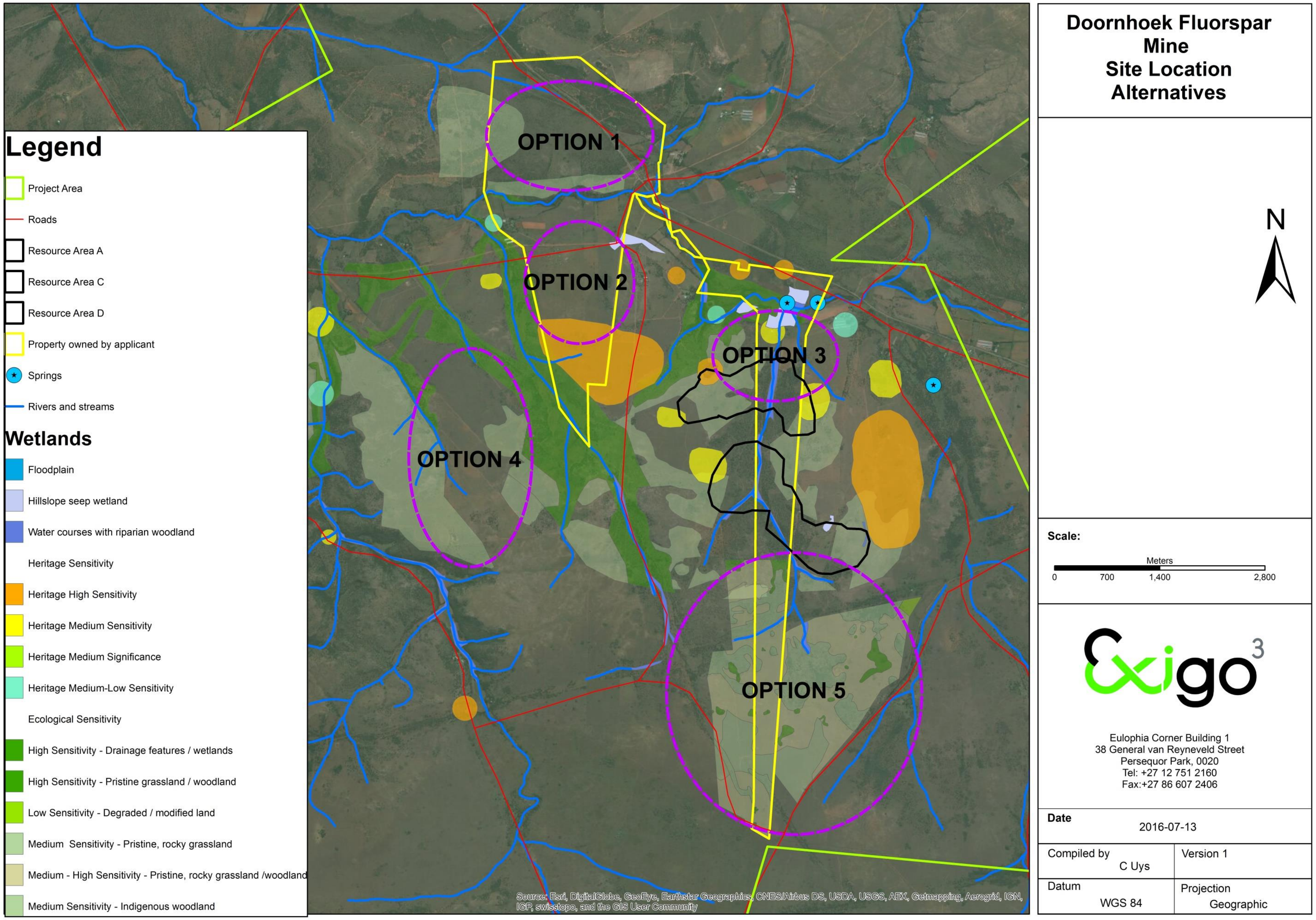

Figure 4 **Location Alternatives/Options Map**

9.2.2.Layout alternatives

Four layout alternatives were investigated for the proposed processing plant and TSF.

a) Layout 1 associated with the proposed processing plant and TSF is situated west of the location option area.

The advantages of proposed layout alternative 1 are:

- The processing plant is not situated within any surface water features,
- The proposed location alternative is situated in part on property owned by the applicant,
- The TSF footprint is not situated over any drainage features,
- The proposed location alternative is not situated in close proximity to high archaeological sensitive areas.

The disadvantages of layout alternative 1 are:

- Some high ecological sensitive areas occur within the TSF footprint and north-east of the processing plant,
- The plant is located in close proximity to the TSF and has subsequent safety concerns,
- Some ridges and outcrops occur within the area,
- The processing plant is located furthest away from resource area C and D which have significant financial implications due to hauling distances..

b) Layout 2 associated with the proposed processing plant and TSF is situated more to the east than layout option 1 with an elongated TSF.

The advantages of proposed layout alternative 2 are:

- The processing plant is not situated within any surface water features,
- The proposed location alternative is situated in part on property owned by the applicant,
- The proposed location alternative is not situated in close proximity to high archaeological sensitive areas,
- The processing plant is located closest to resource areas C and D with subsequent positive financial implications.

The disadvantages of layout alternative 2 are:

- The plant is located in close proximity to the TSF and has subsequent safety concerns,
- Some high ecological sensitive areas occur within the TSF footprint and north of the processing plant,
- The TSF footprint overlays a dyke/valley crossing the area,

- The TSF footprint is situated over a watercourse,
- Some ridges and outcrops occur within the area.

c) Layout 3 associated with the proposed processing plant and TSF is in more or less the centre of the location option.

The advantages of proposed layout alternative 3 are:

- The proposed location alternative is not situated in close proximity to any high archaeological sensitive areas,
- The processing plant is not situated in close proximity to any high ecological sensitive areas.

The disadvantages of layout alternative 3 are:

- The TSF is situated in close proximity to surface water features,
- The processing plant is located furthest from resource areas C and D,
- Some high ecological sensitive areas occur within the TSF footprint,
- The TSF and plant footprint are located mostly on property not owned by the applicant.
- Some ridges and outcrops occur within the area.

d) Layout 4 associated with the proposed processing plant and TSF is located in more or less the same location as that of option 1.

The advantages of proposed layout alternative 4 are:

- The proposed location alternative is not situated in close proximity to any high archaeological sensitive areas,
- The plant is not situated in close proximity to any surface water features,
- The processing plant is located closer to resource areas C and D but further away from the TSF and is therefore represents less of a safety concern,
- The processing plant is not situated in close proximity to any high ecological sensitive areas,
- The TSF footprint is not situated over any drainage features,
- The TSF and plant footprint are located in part on property owned by the applicant.

The disadvantages of layout alternative 4 are:

- Some high ecological sensitive areas occur within the TSF footprint,
- Some ridges and outcrops occur within the area.

Due to the larger ecological impact and topographic concerns associated with Alternative 2, the preferred layout alternative for the processing plant and TSF is Alternative 4 (at present).

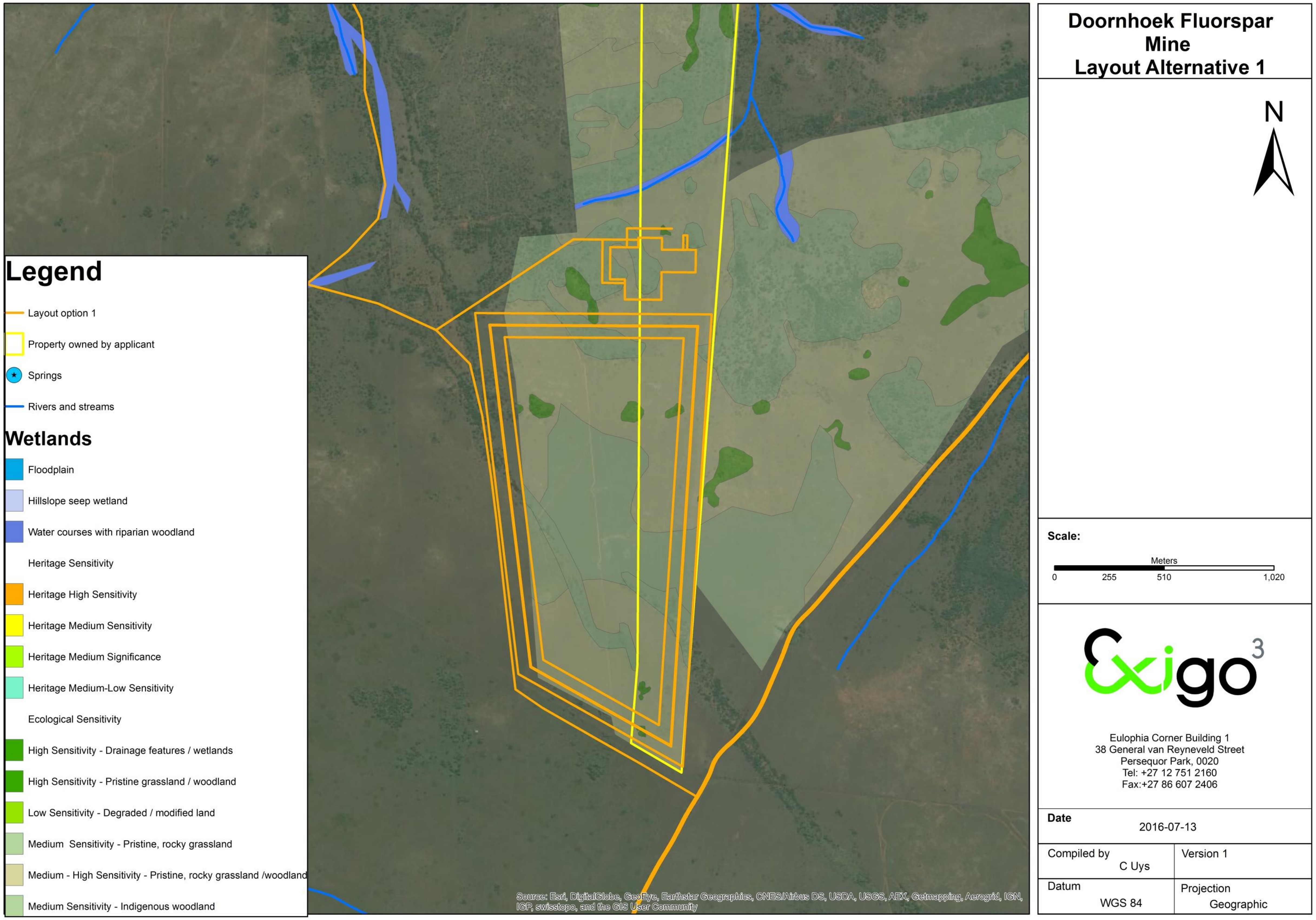

Figure 5 **Layout Alternative/Option 1**

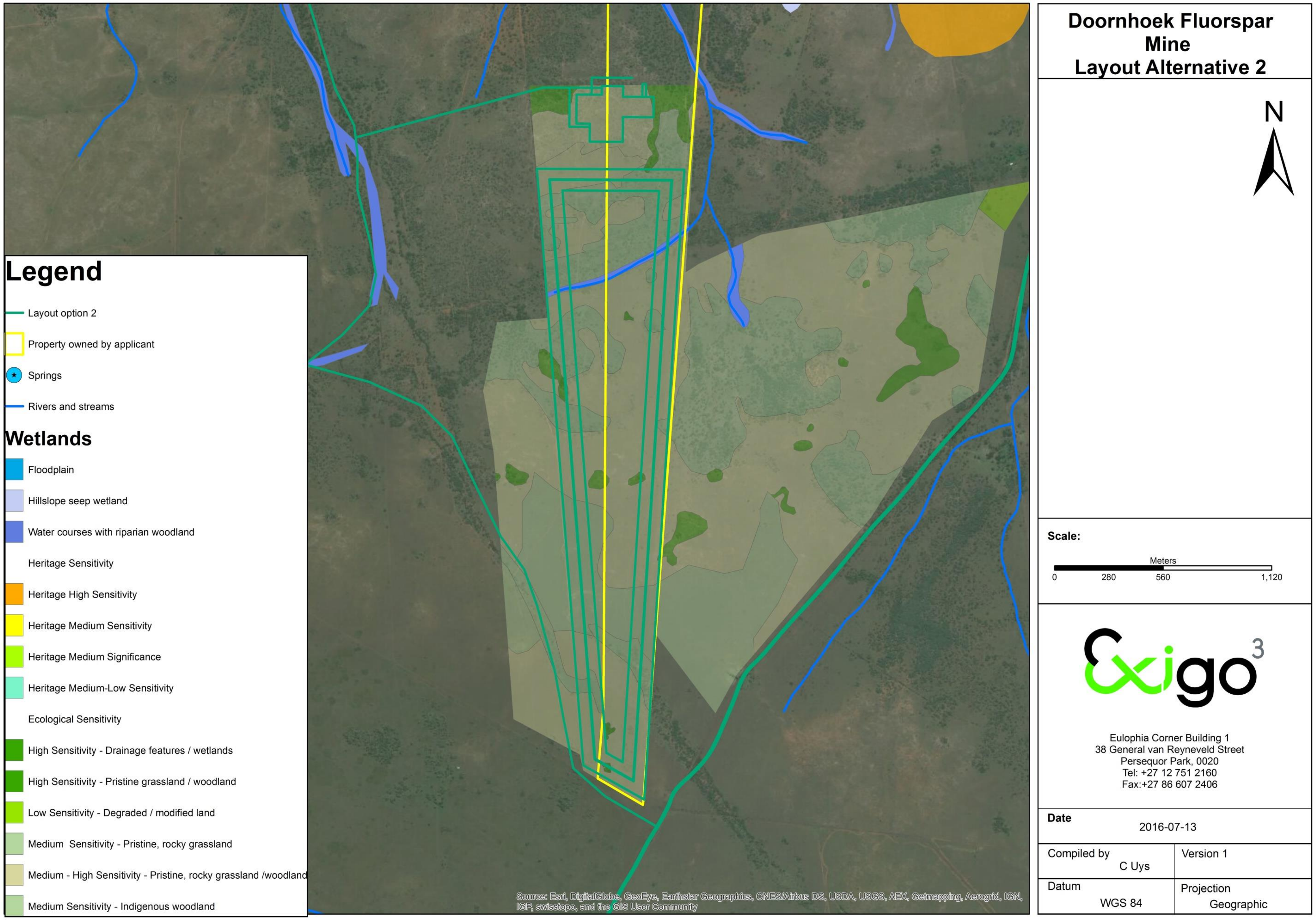

Figure 6 Layout Alternative/Option 2

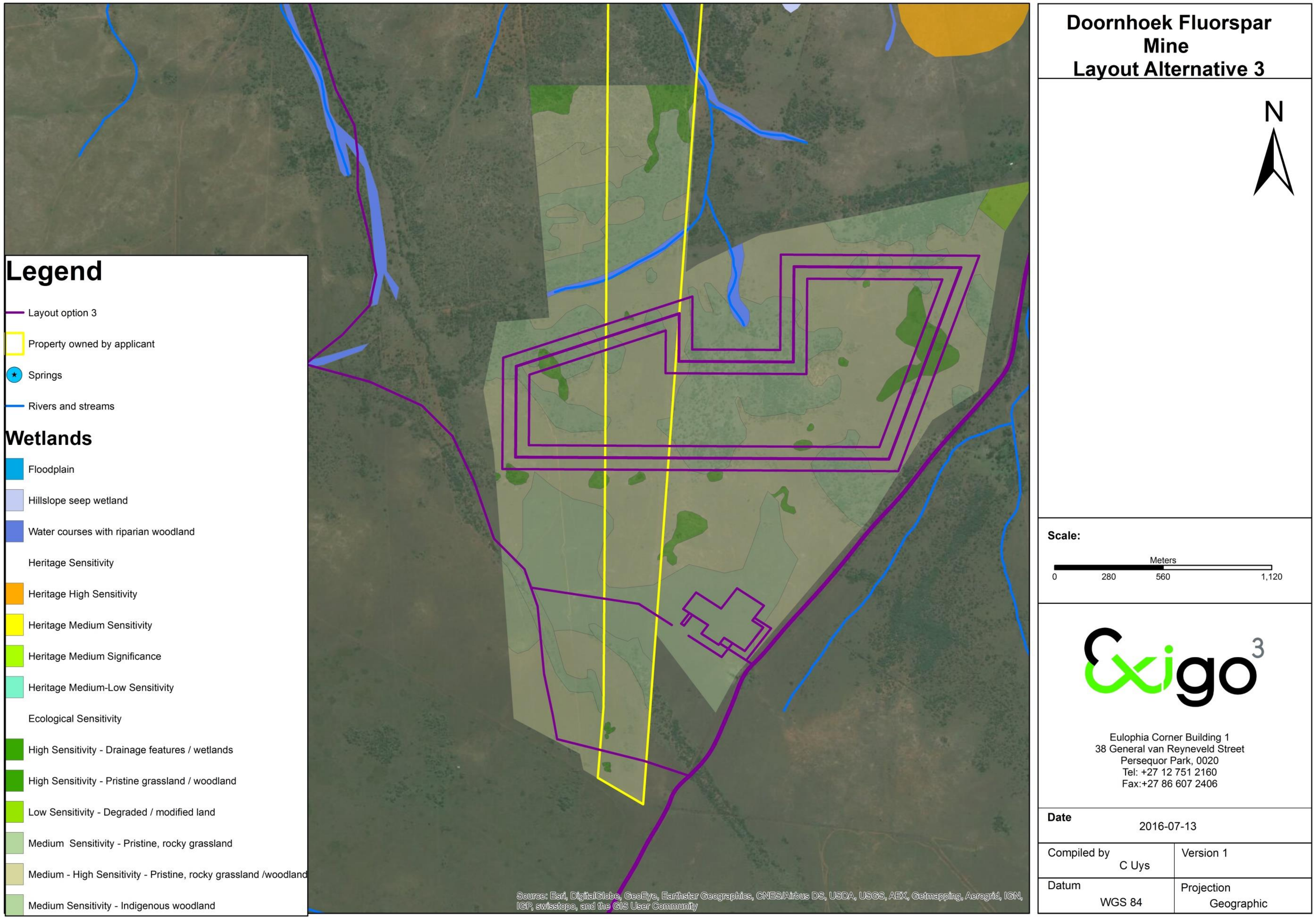

Figure 7 **Layout Alternative/Option 3**

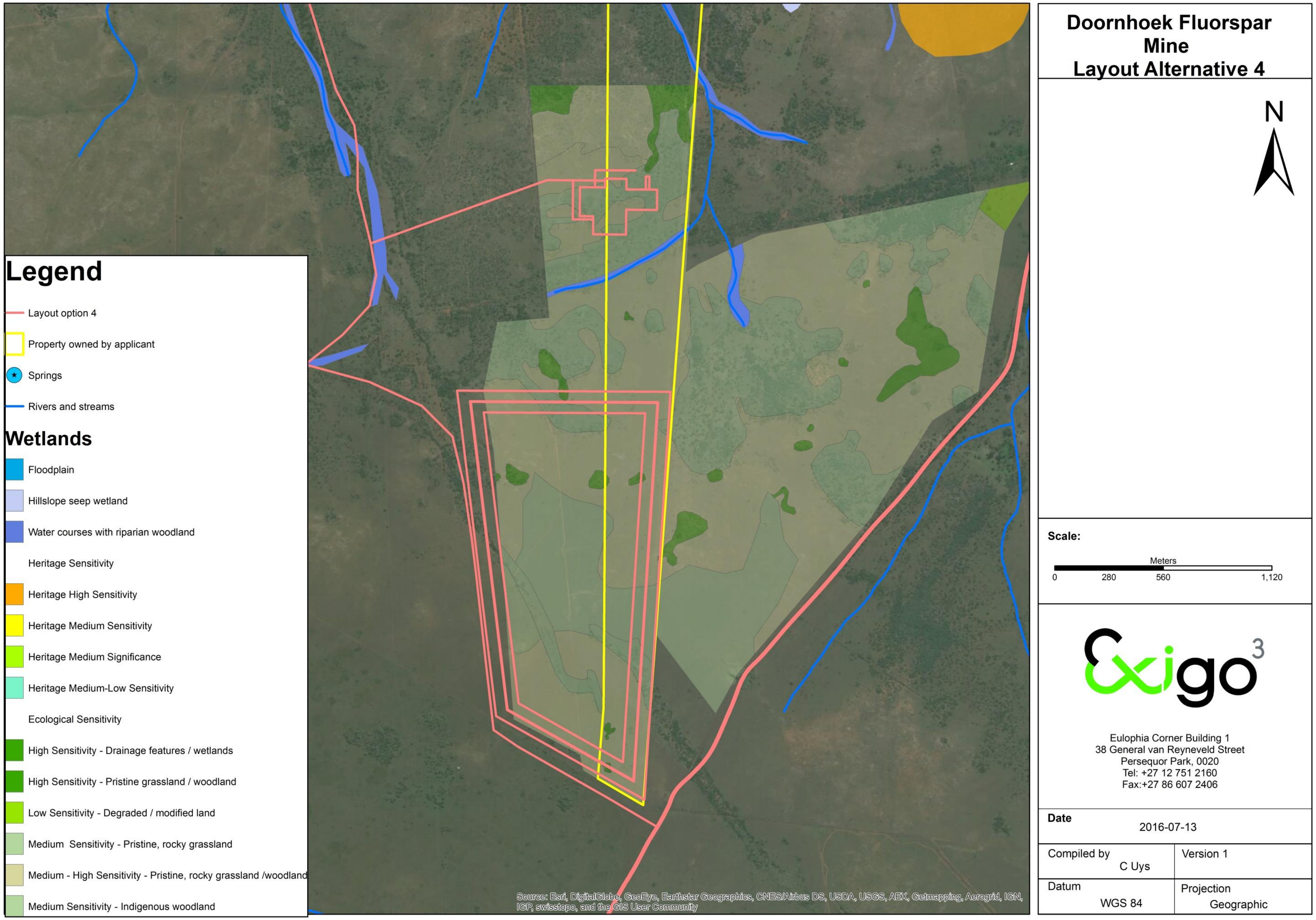

Figure 8 Layout Alternative/Option 4

9.2.3.Overburden Dump layout alternatives

Two location alternatives were investigated for the proposed overburden dump located at resource area A.

a) Alternative 1 is situated north of resource area A within an old open pit footprint.

The advantages of the proposed layout alternative are:

- The dump is not situated within any drainage lines at this location,
- The dump is not situated within any high ecological or archaeological sensitive areas, but is located on a low ecological sensitive area within an existing disturbed area from past mining activities.
- The dump can be positioned to act as a noise barrier and visual screen between the open pit and sensitive receptors (refer to Section 5.10 on rehabilitation and concurrent backfilling).

b) Alternative 2 is situated north-west of resource area A:

The advantages of layout alternative 2 are:

- The dump is not situated within any high ecological or archaeological sensitive areas, but is located on a medium ecological sensitive area within an existing disturbed area from past mining activities.
- The dump can be positioned to act as a noise barrier and visual screen between the open pit and sensitive receptors (refer to Section 5.10 on rehabilitation and concurrent backfilling).

The disadvantages of layout alternative 2 are:

- The dump footprint is located on a wetland area.

Alternative 1 is the preferred alternative for Resource A. The indicated overburden dump for resource area C & D is currently the preferred option. An alternative assessment will however be included in the EIA&EMPR (Refer to Figure 11).

Two alternatives for the deposition of overburden exist.

The first involves the deposition of overburden in layers, where the outer wall will be rehabilitated as the dump becomes higher. However, an alternative overburden construction method was identified. An “outer shell method” can be employed for the construction of the overburden dump, which would involve the construction of an outer berm for the dump during daytime hours with an 5 meter high noise reduction starter berm. The outer shell construction method thereby act as a noise barrier, and the construction of a berm would be very effective in screening off noise generated by trucks and earth-moving equipment operating behind the screen (as viewed from the closest receptors). The height of the berm must approximately 5 m above the highest point on the screened work area. Refer to Figure 9 below:

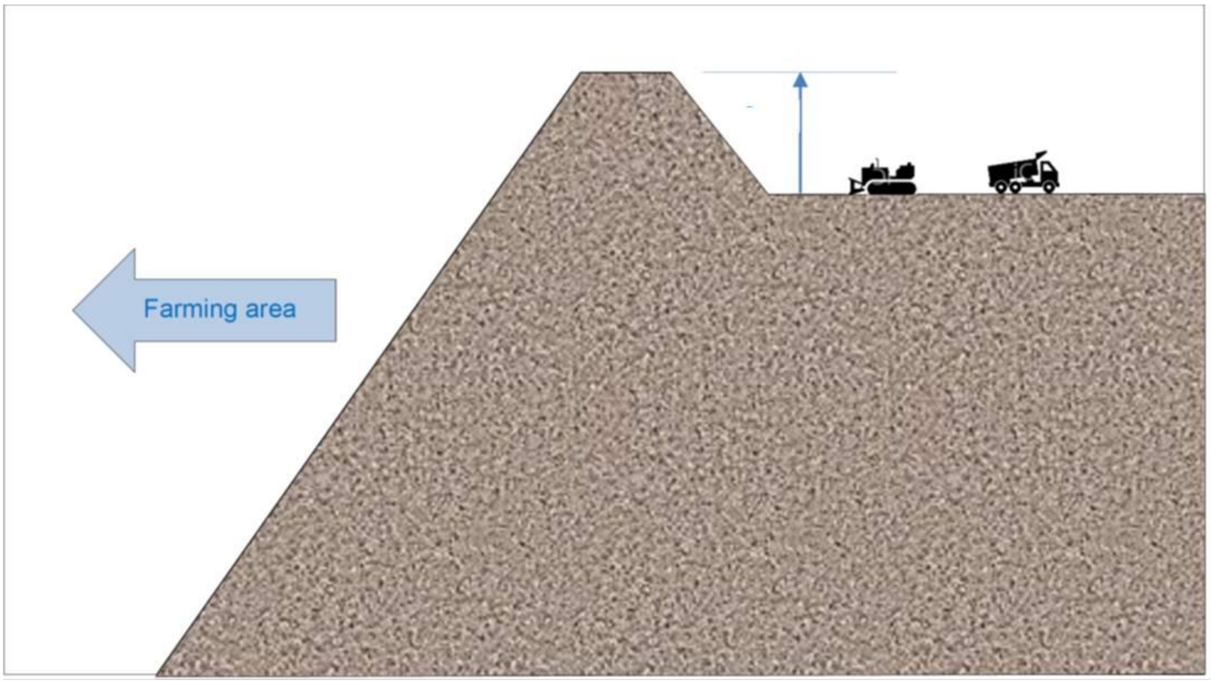

Figure 9: Outer Shell Method of Construction

The proposed outer shell dumping methodology as opposed to the conventional dumping method will result in the reduction of a number of environmental impacts such as the following:

- Air Quality – impacts will be lower due to the concurrent rehabilitation which will take place with the outer shell dumping methodology.
- Visual – impacts will be lower due to the concurrent rehabilitation undertaken during the outer shell dumping methodology.
- Noise –impacts will be far lower as the outer shell dumping methodology results in the screening of noise from the nearby receptors.
- Social – Social impacts will be lower due to the lower impacts on noise, air quality and visual.

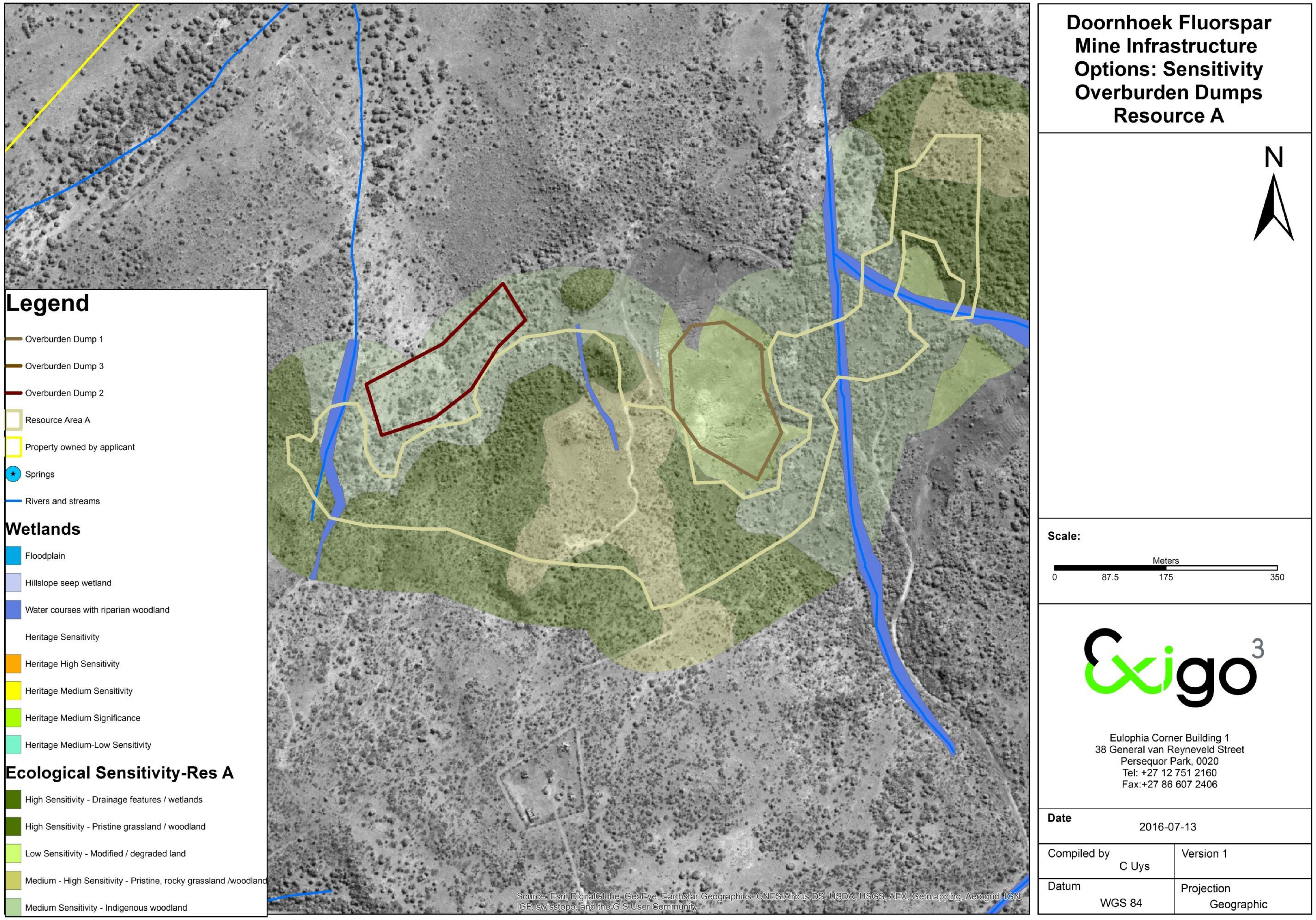

Figure 10 **Overburden Dump Alternatives for Resource Area A**

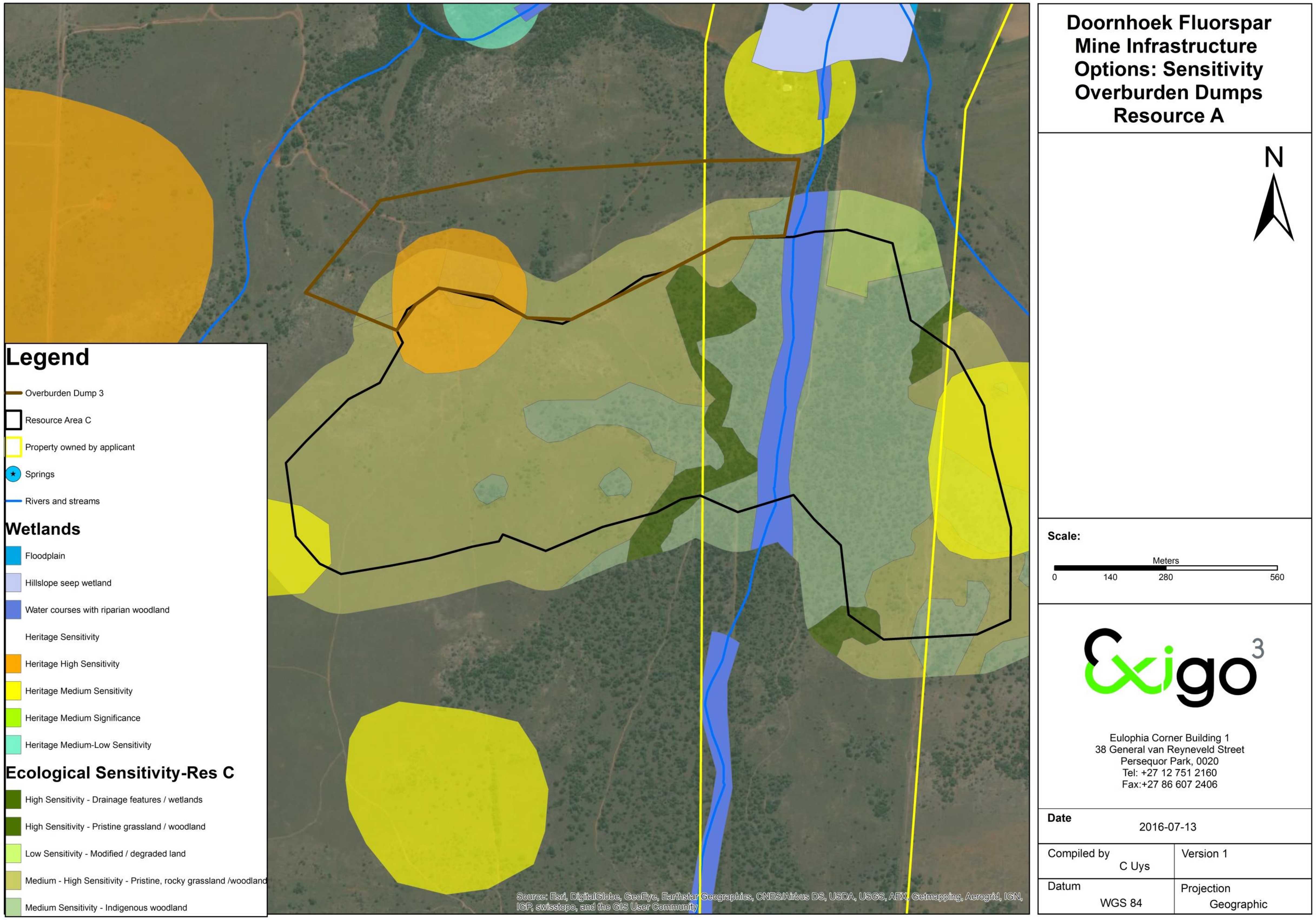

Figure 11 **Overburden Dump for Resource Area C & D**

9.2.4. Infrastructure Alternatives Summary

The following table summarises the various alternatives assessed according to the specific environmental aspects, and serves as a summary of the risks identified for the 5 location alternatives, the four plant and TSF layout alternatives as well as the two overburden dump layouts for Resource Area A.

Table 3 Comparative summary of the impacts associated with the proposed infrastructure location and layout alternatives

Environmental Aspect	Site Location Alternative 1	Site Location Alternative 2	Site Location Alternative 3	Site Location Alternative 3	Site Location Alternative 3	Plant & TSF layout Alt 1	Plant & TSF layout Alt 2	Plant & TSF layout Alt 3	Plant & TSF layout Alt 4	Overburden dump Alt 1	Overburden dump Alt 2
Surface Water Features	√		√	√	√		√	√			√
Ecological impacts	√	√	√	√	√	√	√	√	√		
Heritage impacts		√									
Topography		√	√		√	√	√	√	√		
Distance from resource areas and subsequent cost implication	√		√	√		√		√			
Property ownership and social impacts				√				√			
Distance between	N/A	N/A	N/A	N/A	N/A	√	√			N/A	N/A

plant and TSF and safety concern											

9.2.5. Service Alternatives

9.2.5.1. Water Provision

The following water supply options were identified:

- Municipal supply – Witkop Mine infrastructure (transfer of Witkop water allocation).
- Grey water discharge from Zeerust sewage treatment plant. Water transferred via Witkop infrastructure or via a new pipeline.
- Expansion and additional development of current groundwater supply for municipal use and utilization of Witkop infrastructure.
- Development of a standalone wellfield, targeting dolomitic formations south and southeast of the project area.
- Transfer of existing irrigation water allocations from the Zeerust dam, use of groundwater from existing boreholes no longer in use by landowners.

A water supply options analysis is currently underway and the above water supply alternatives will be assessed during the EIA Phase.

9.2.5.2. 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 and the fact that power constitutes a large part of the mine's operational expense mean that the high capital and operational cost associated with renewable energy make it prohibitively expensive.

9.2.5.3. Access alternatives

Three access alternatives were identified (refer to **Error! Reference source not found.**). The three alternatives access routes are as follows:

a) Alternative access route 1 follows an existing unpaved road south-east from resource area A to the processing plant.
b) Alternative access route 2 traverses northwards until it intersects a secondary gravel road to the east and accesses the site from the north.
c) Alternative access route 3 follows the same route as access route 2 but accesses the site from an existing unpaved road to the southeast of the processing plant and TSF.

The above access route alternatives will be assessed during the EIA Phase.

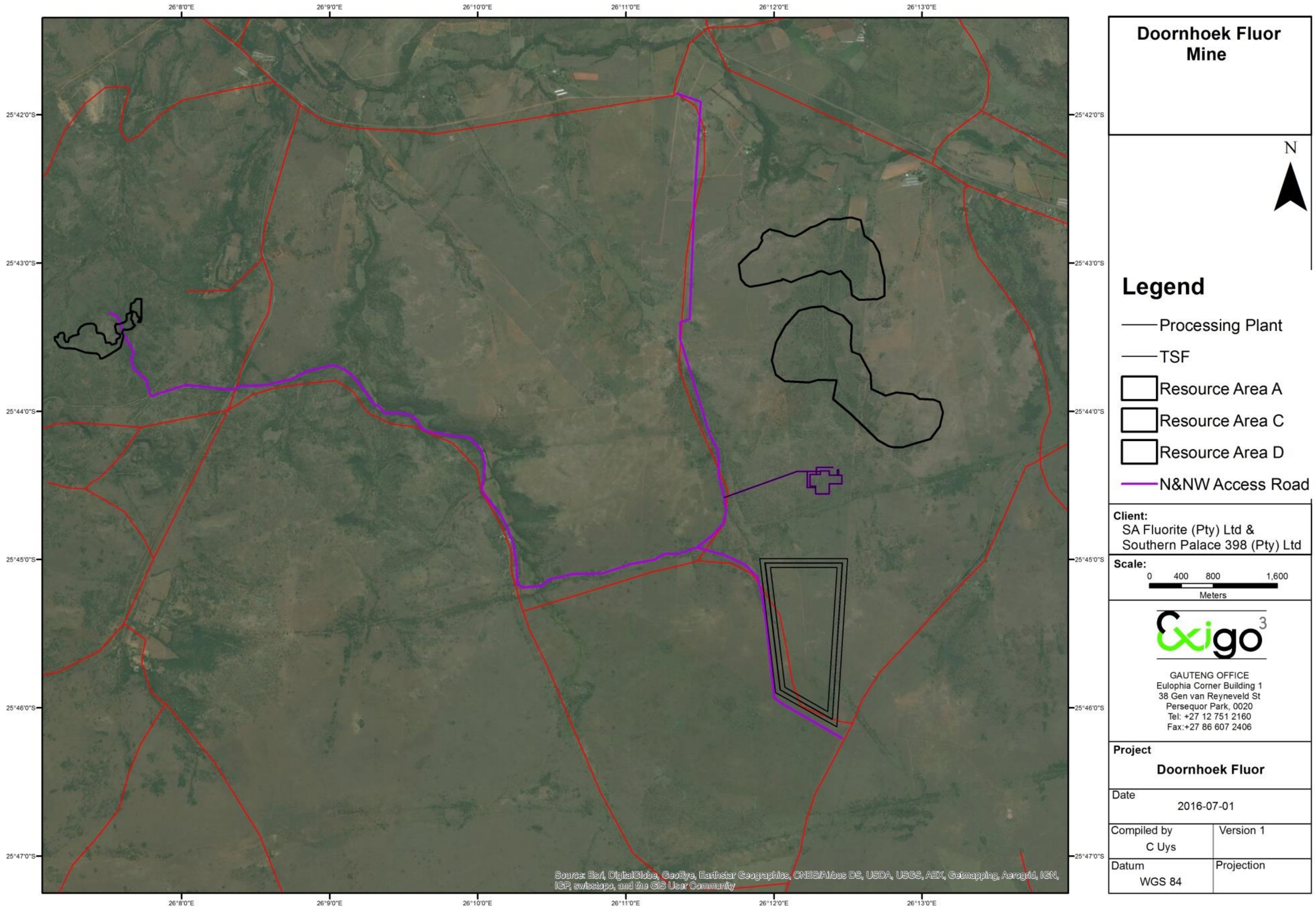

Figure 12: Access Route Alternatives 1 & 2 (Route 1 is from the North-West and Route 2 from the North)

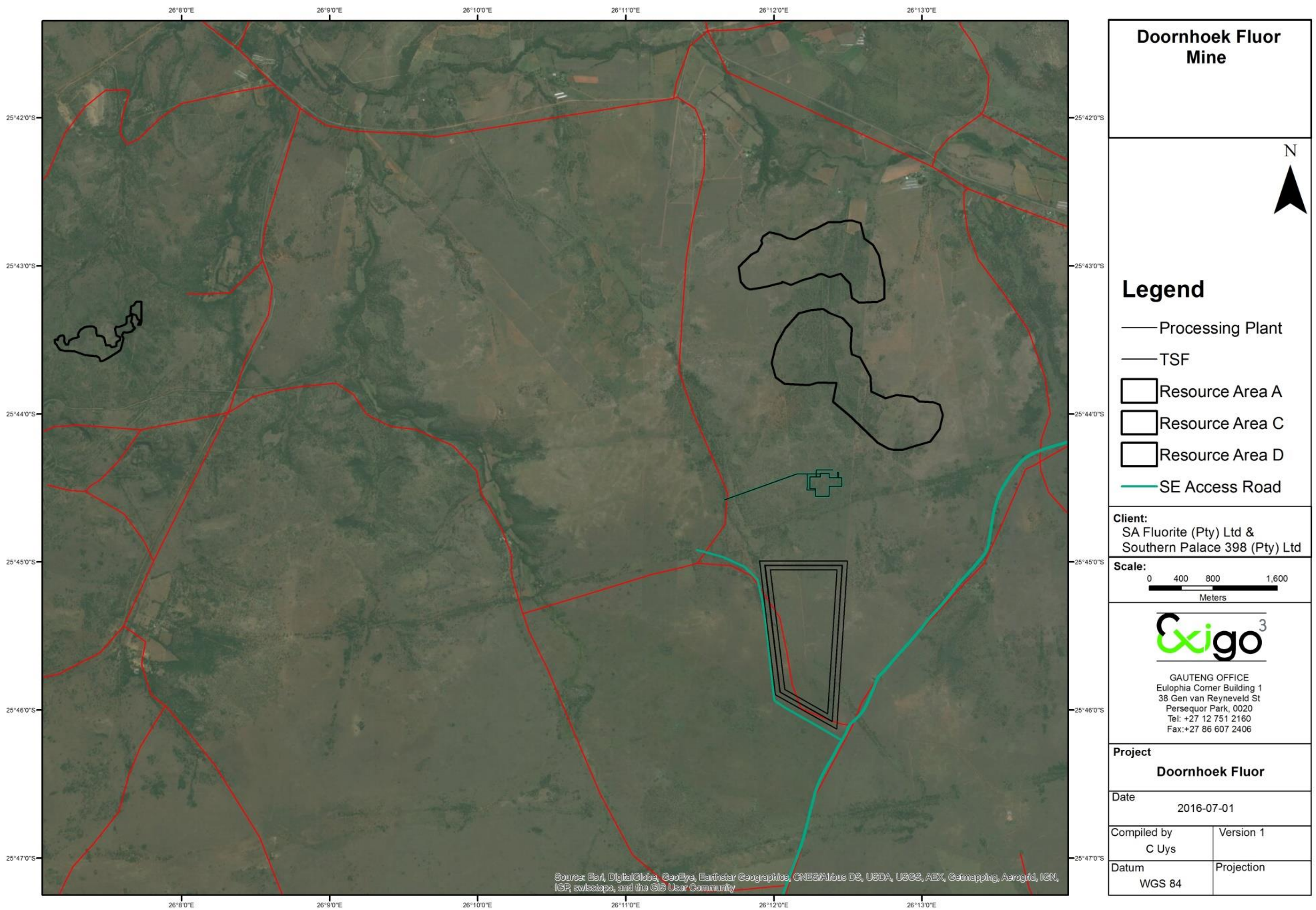

Figure 13: Access Route Alternative 3

9.2.5.4. Waste Disposal

Sewage reticulation should be handled with 150 ID PVC gravity piping installed subsurface with a minimum cover of 1 m, minimum slope of 1:100 and with 1050 diameter pre-cast manholes at spacing of no more than 90 m and at every change in direction or slope. Sewers will transport sewage to a common manhole at the lowest point from where it will be fed to a treatment facility.

An onsite activated sludge treatment facility should be constructed to treat sewage generated during the operational phase. The sludge treatment plant should be designed to process 40 m³ per day. This would cater for both mining and plant personnel. All sewage drainage, feeding the sludge plant should be gravity fed. The position of the sewage plant is directly next to the water treatment plant and the storm water dam 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 should be disposed of at a registered hazardous waste disposal facility.

9.2.6.Technology Alternatives (with regards to transport of ore and product)

It is foreseen that the proposed mine operation will contract trucks to transport ore from resource area A to the processing plant via the proposed access road alternatives. Ore from resource areas C and D will be transported via conveyers to the processing plant. Trucks will also be used to transport concentrate to the closest rail siding to be transported to the port of Durban via the existing railway infrastructure or alternatively via road (N4 and other national routes). The railway option is however preferred due to the lesser environmental and economic impacts associated therewith.

The alternatives assessment and traffic impact assessment was based on the current industry best practice transportation method of transporting ore and product by means of trucks or rail. However there are innovative transportation developments taking place that will bring about numerous benefits to a project such as Doornhoek including inter alia cost savings, lower carbon footprint, lower ecological footprint, and safety benefits. One such system that will be reconsidered closer to implementation is the Futran System. The Futran system is a revolutionary new transportation system that holds the promise of transforming the way people and goods are moved around (Milotek, 2015). As a Fractional Rapid Transit (FRT) system, the Futran system is designed to transport a range of pod types to take loads as light as a few hundred kilograms and as heavy as 20 tons using the same track type and the same motorised units (Milotek).

The Futran system consists of (Milotek, 2015): an elevated track network with switches that have no moving parts, from which moving stock is suspended, automated, motorised bogies, non-motorised slave bogies, skips, containers or pods, loading and offloading systems, on-site maintenance facilities, a traffic management system.

By using a light weight, strong, elevated track network, the system can be deployed on road and railway reserves, over obstacles and sensitive areas such as wetlands and rivers, high enough to enable animal and people migrations, and small enough not to be visually disturbing.

In the mining industry, the Futran system can be deployed to haul ore between shafts and plant, open pits, washing plants, overburden dumps, stockpiles, etc. The system can run from horizontal to vertical and everything in-between, so in the case of underground mining, the system has the potential of transforming the industry. Ore can be picked up at the face and taken straight to the surface without re-handling it, while cement, tools, materials, people, explosives and machinery can he taken into and out of the mine using the same system.

This system or of a similar nature will be reassessed for commercial utilization closer to implementation as the benefits are potentially significantly positive, but at present this application is for the current industry best practice, namely hauling via trucks.

9.2.7.Mining method alternatives

Two alternative mining methods could be implemented at the proposed operation namely, a standard opencast mining method of stripping with LOM placement of the overburden OR concurrent backfilling.

Concurrent Backfilling:

Concurrent backfilling and rehabilitation is the preferred mining for this project. It must be noted that concurrent backfilling is a standard mining rehabilitation method and is used on an international scale. It is important to quantify the environmental impacts of this management option. It also decreases the overall environmental footprint.

The approach to mining the deposits will be by open pit method with concurrent rehabilitation. The general sequence of conventional open pit mining will be as follows:-

Strip Overburden: The waste material overlying the ore will be removed by digging, pushing, scraping, drilling and blasting, followed by loading into the haul trucks for transportation to the overburden dump or as backfill for the portion being rehabilitated.

Ore Production: The ore will be drilled, blasted, loaded and hauled to the concentrator plant where the Run of Mine (ROM) will be directly tipped into the ROM bin for processing.

Rehabilitation: Mining and environmental legislation will require the disturbed ground to be rehabilitated to near its original form. The rehabilitation has been integrated into the mining sequence to ensure the total disturbed area is minimized. Concurrent backfilling makes rehabilitation possible as soon as mining has been completed in one area.

Concurrent backfilling has the following benefits (amongst other):

- Less Environmental impacts through the utilization of existing footprints are possible,
- A lower visual impact is realized as the overburden is placed in the open voids as opposed to being placed on surface.
- Reduced logistics and transportation costs and resultant reduced carbon footprints.
- Improved rehabilitation due to rehabilitation being possible as soon as an area is backfilled with all the associated biophysical benefits.
- Improved Time efficiency, improved mining safety.

9.2.8. Conclusion

Table 3 serves as a summary of the risks identified for the five site location alternatives, the four layout alternatives proposed for the processing plant and the TSF as well as the two layout alternatives for the overburden dump associated with resource area A. The preferred location alternative for the site is Alternative 5, while the preferred layout alternative for the plant and TSF is Alternative 4 due to the larger ecological impact and topographic concerns associated with Alternative 2. The preferred alternative for the overburden dump is Alternative 1.

The preferred water supply option and access road alternative will be assessed and decided upon during the EIA Phase. With regards to technology alternatives, transport of the ore and product was considered by road via truck or via existing railway infrastructure to the port of Durban. The railway option is however preferred due to the lesser environmental and economic impacts associated therewith.

Based on the assessment of these alternatives it is proposed that the EMPr will focus on assessing and presenting mitigation measures associated with the preferred site location, layout and technology alternatives stated above.

9.2.9. "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.

It is the opinion of the majority of specialists that in the event that the Doornhoek Fluorspar Mine is not constructed that the status quo will be maintained. The no-go alternative will imply that virtually none of the identified impacts of proceeding with the project will be incurred. The studies to be undertaken during the impact assessment phase will provide reference to the no-go alternative.

In addition to the global socio-economic benefits associated with the mine, the Doornhoek Fluorspar Mine will also provide the local communities with various benefits relating mainly to job creation and skills development. Unemployment in the area is high and mining is seen to hold major possibilities for the area.

Without the implementation of this project, the mentioned benefits would not be realised. The realization of the outcome of the Mining Charter (2004), within the context of the MPRDA (2002), would therefore also not be reached and this has potentially significant negative impacts on national economic growth and social well-being. The Mining Charters main objectives, which the Doornhoek Fluorspar Mine will assist to reach, are:

- to promote equitable access to South Africa's Mineral Resources for all South Africans;
- to substantially and meaningfully expand opportunities for historically disadvantaged South Africans (HDSAs);
- to utilize the existing skills base for the empowerment of HDSAs (Refer to the Social and Labour Plan (SLP) as part of the Mining Right);
- to expand the skills base of HDSAs to serve the community; (Refer to the SLP conducted

according to the MPRDA);

- to promote employment and advance the social and economic welfare of mining communities and areas supplying mining labour; (Refer to the SLP as part of the Mining Right); and
- to promote beneficiation of South Africa's mineral commodities beyond mining and processing, including the production of consumer products.

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

- Groundwater Impacts
- Surface water Impacts
- Fauna and Flora Impacts
- Heritage Impacts
- Visual Impacts
- Air Quality Impacts
- Noise Impacts
- Traffic Impacts
- Socio Economic Impacts

10. DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land.

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 Environmental Authorisation Application and the Mining Right Application (MRA) as well as the process to be followed; and requesting I&AP's to register their comments with Exigo, was placed in both English and Afrikaans in a local newspaper (the Mafeking Mail Newspaper was used due to the Zeerust News only being published monthly by the 29th which would not have allowed sufficient time for the 30 day commenting period on the Draft SR prior to the legally required submission of the Final SR) on the 14th of July 2016 in accordance with regulation 41(2)(c) and (d) of the EIA Regulations of 2014.

In addition the availability of the Draft Scoping Report (DSR) for public review as well as the Public Meeting to be held during the review period of the DSR was also advertised in the above advert.

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) will be erected at key locations surrounding the project site and within the project area on the 15th of July 2016.

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 8th of June 2016:

- 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;
- Municipal Manager of the Ngaka Modiri Molema District Municipality (NMMDM);
- Municipal Manager of the Ramotshere Moiloa Local Municipality (RMLM);
- Municipal Manager of the Ditsobotla Local Municipality (DLM);
- Department of Rural, Environment and Agricultural Development, North West Province;
- Department of Water and Sanitation (DWS) Limpopo - North West Proto CMA;
- Department of Public Works and Roads North West;
- Department of Community Safety & Transport Management North West;
- Department of Finance, Economic & Enterprise Development North West;
- Department of Agriculture – North-West;
- Department of Rural Development and Land Reform (DRDLR);
- SANRAL (Northern region);
- South African Heritage Resources Agency (SAHRA) (North West);
- Regional Manager of Land Development and Environmental Management for ESKOM;
- AGRI North West;
- Afriforum;
- North West Farmers Union;
- Molemane Eye Nature Reserve;
- Other mines in the area;
- And other stakeholders.

10.4. Public Meetings

Public meetings will be during the review period of the DSR during the end of July/early August; 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 meetings will be advertised in a local newspaper on the 14th of July 2016. All issues raised by the I&APs during the public meetings will be included in the Final Scoping Report (FSR) to be submitted to the DMR.

10.5. Focus Group Meetings

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, as follows:

- Landowners who are directly affected by the activity (refer to Table 4);
- Landowners directly adjacent to activity (refer to Table 4);
- Ngaka Modiri Molema District Municipality (NMMDM);
- Ramotshere Moiloa Local Municipality (RMLM);
- Department of Mineral Resources (DMR);
- Department of Water and Sanitation (DWS).

Please refer to the draft meeting minutes of the above focus group meetings as well as Table 4 for more details of the key issues discussed (refer to Appendix 9.4: Focus Group Meeting Minutes and Attendance Registers). Please note that these meeting minutes are currently out for public review and the final meeting minutes will be appended to the FSR and/or submitted earlier as may be required by the Department.

10.6. Draft Scoping Report

The EIA Regulations 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 (15 July till 15 August 2016) will be made available for public comment on the DSR as part of the environmental impact assessment process. The availability of the DSR will be announced via advert, site notices and notification letters as specified above to all the identified potential I&AP's.

In addition, the DSR will be distributed for comment as follows:

- Electronic copies will be made available on dropbox; and
- Hard copies will be made available at key locations such as the relevant local municipalities.

10.7. Final Scoping Report

The Draft Scoping Report (DSR) will be updated after the draft review to incorporate the comments received and issues raised by I&APs. The Final Scoping Report (FSR) will be submitted to the DMR by the 23rd of August 2016.

11. SUMMARY OF ISSUES RAISED BY I&APS

(Complete the table summarising comments and issues raised, and reaction to those responses)

Table 4: Comments and Response Table

Interested and Affected Parties	Contact Person	Contact Details	Consulted	Notification/Consultation	Issues Raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, ongoing, etc.)
Government Departments							
Department of Mineral Resources (DMR)	Mr Phumudzo Nethwadzi (Head of Environment) Mr Percy Makamu (Environmental Department) Ms Ellen Kwele (Social and Labour Plan Department)	phumudzo.nethwadzi@dmr.gov.za desmond.makamu@dmr.gov.za lontshang.kwele@dmr.gov.za	Y	Meeting: On 17 May 2016 a pre-application meeting was held with the Department. Please refer to the agenda, attendance register, presentation and meeting minutes in Appendix 5: DMR Pre-application Meeting Minutes & Correspondence. Via email: On 26 May 2016 the minutes for the pre-application meeting held on the 17th of May 2016 with the Department was sent to the meeting attendees for review.	Refer to Appendix 5: DMR Pre-application Meeting Minutes & Correspondence		Ongoing
				Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the Department.	No comment received to date.		
Department of Water &	Lethabo Ramashala	Tel: 082 908 3177	Y	Meeting:	Refer to Appendix 6: DWS Pre-		Ongoing

Sanitation Limpopo - North West Proto CMA (Harties-Kurperoord Office)		ramashalal@dws.gov.za		A pre-application meeting was held on the 22nd of February 2016 with the Department. Please refer to the agenda, attendance register, presentation and meeting minutes in Appendix 6: DWS Pre-application Meeting Minutes& Attendance Register. Via email: On 1 March 2016 the minutes for the pre-application meeting held on the 22nd of February 2016 with the Department was sent to the meeting attendees for review.	application Meeting Minutes& Attendance Register..		
	Rachel Mpe Gladness Masindi Clement Makwela Amanda Ramotshe	Tel: 012 207 9911 mper@dws.gov.za Tel: 012 207 9911 Mobile: 083 488 1385 masindig@dws.gov.za Tel: 083 407 0879 makwelac@dws.gov.za Tel: 012 207 9199 Mobile: 079 367 8681 ramotshoa@dws.gov.za		Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the Department.	No comment received to date.		
Department of Rural, Environment and Agricultural Development, North West Province	Head Of Department	Private Bag X2039 Mmabatho 2735 North West Province South Africa		Via fax: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the Department.	No comment received to date.		Ongoing

		Tel: (018) 389 5146/5104 Fax: (018) 392 4377					
	Ngaka Modiri Molema District	Tel: (018) 389 5943 / 5936 Fax: 086 646 0984		Via fax: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the Department.	No comment received to date.		
	Environmental Services Chief Directorate	Tel: 018 389 5666 bsebogodi@nwpg.gov.za		Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the Department.	No comment received to date.		
Department of Public Works and Roads North West		Private Bag X2080 Mmabatho 2735 Tel: 018 388 1435/1377/1250 Fax: 018 388 4021		Via fax: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the Department.	No comment received to date.		Ongoing
Department of Community Safety & Transport Management North West	Mr Oageng Mosiane (HOD)	Tel: 0182008006 omosiane@nwpg.gov.za		Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the Department.	No comment received to date.		Ongoing
Department of Finance, Economic & Enterprise Development North West		Private Bag X12 Mmabatho 2735 Tel: 018 387 7700 Fax: 018 384 9440		Via fax: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the Department.	No comment received to date.		Ongoing
Department of Agriculture – North-West	Head of Communications: Agriculture Ms Bonolo Mohlakoana	Private Bag X2039 Mmabatho 2735 Tel: (018) 389 5719 Fax: (018) 384 4571 Cell: 082 901 2435 bmohlakoana@nwpg.gov.za		Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the Department.	No comment received to date.		Ongoing

Department of Rural Development and Land Reform (DRDLR)	Deputy Director: Ngaka Modiri Molema District (Land Reform) Ms Yolanda Folotsi	Tel: 0183919600 Mobile: 0828270649 yolanda.folotsi@drdlr.gov.za		Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the Department.	No comment received to date.		Ongoing
Local Authorities							
Ngaka Modiri Molema District Municipality (NMMDM)	Michelle van Rooyen (PA to Acting Municipal Manager)	vanrooyenm@nmmdm.gov.za	Y	Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the NMMDM.	No comment received to date.		Ongoing
	Tebogo Mpa IDP Collen Mbengo Townplanning Gift Ditsele Thabang Ramorei Morena Mofokeng	mpat@nmmdm.gov.za czmbengo@gmail.com ditseleg@nmmdm.gov.za tthramorei@gmail.com mofokengm@nmmdm.gov.za		Meeting: On 9 June 2016 a focus group meeting was held with the municipality. Please refer to the agenda, attendance register, presentation and meeting minutes in Appendix 9.4: Focus Group Meeting Minutes and Attendance Registers. Via email: On 27 June 2016 the minutes for the focus group meeting held on the 19tth of June 2016 with the NMMDM were sent to the meeting attendees for review.	Refer to Appendix 9.4: Focus Group Meeting Minutes and Attendance Registers..		
Ditsobotla Local Municipality (DLM)	Municipal Manager	monjuta79@gmail.com	Y	Via email & sms: On 8 June 2016 a notification	No comment received to date.		Ongoing

	Mavis Matladi (PA to MM) Mr Israel Motlhabane (LED Director)	mavismmatladi@gmail.com Tel: 072 497 7017		inviting I&AP's to register on the project was sent to the DLM. Please note that various attempts were made to arrange a focus group meeting with the municipality albeit unsuccessfully. (a register hereof is available)			
Ramotshere Moiloa Local Municipality (RMLM)	Suping Selau	Tel: 063 554 8468 Suping.selau@ramotshere.gov.za	Y	Meeting: On 11 April 2016 a focus group meeting was held with the municipality. Please refer to the agenda, attendance register, presentation and meeting minutes in Appendix 9.4: Focus Group Meeting Minutes and Attendance Registers. Via email: On 15 April 2016 the minutes for the focus group meeting held on the 11th of April 2016 with the RMLM were sent to the meeting attendees for review.	Refer to Appendix 9.4: Focus Group Meeting Minutes and Attendance Registers.		Ongoing
	Cedric Mtileni (MM's Offoce)	Tel: 078 509 6666 cedric.mtileni@gmail.com		Meeting: On 8 June 2016 a follow-up focus group meeting was held with the municipality. Please refer to the agenda, attendance register, presentation and meeting	**No further comment received to date.**		

	Berlinda Seabi Difference Mokgalagadi Julie Amods (LED) Donald Modibersone Graham Johnson	Tel: 078 714 1881 berlinda.seabi@gmail.com Tel: 079 869 7667 mokgalagadid@gmail.com Tel: 072 860 6898 amodsj@gmail.com Tel: 073 651 4231 modibetsonedg@gmail.com Tel: 072 863 8375		minutes in Appendix 9.4: Focus Group Meeting Minutes and Attendance Registers. Via email & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the RMLM.			
Ward Councillor – RMLM Ward 19	Councillor PM Motang	P.O.BOX 2200 Supingstad 2886 Tel: 0183530002 Fax: 0183530002 Cell: 0839764663		Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the councillor.	No comment received to date.		Ongoing
Ward Councillor – DLM Ward 14	Councillor Moheta Buti	PO Box 7 Lichtenburg 2740 Tel: 018 632 6955 Fax: 018 632 5247		Via fax: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the councillor.	No comment received to date.		Ongoing
South African Heritage Resources Agency: North West	Submission on SAHRA website	Colette Scheermeyer cscheermeyer@sahra.org.za info@sahra.org.za		Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the SAHRA.	No comment received to date.		Ongoing
SANRAL	Northern Region	Michael Yorke-Hart Regional Manager		Via email: On 8 June 2016 a notification	No comment received to date.		Ongoing

		Private Bag X17 Lynnwood Ridge 0040 38 Ida Street Menlo Park Tel: (012) 426 6200 Fax: (012) 348 1512 YorkeHM@nra.co.za		inviting I&AP's to register on the project was sent to the SANRAL.			
Eskom		Mr Xander Neethling Distribution Division (The Land Development & Environmental Management) PO Box 3499 Polokwane 0700 Tel: 015 299 0527 neethx@eskom.co.za		Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to Eskom.	No comment received to date.		Ongoing
Other NGO's, Conservancies, Resident's Associations etc.							
Molemane Eye Nature Reserve	Reserve Manager: Mr. MA Dinale (Dionne)	adinale@nwptb.co.za		Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
	Park Administration	Tel/Fax: +27(0)18 643 9904/5 Fax to email: +27(0)86 643 9905 Email: molemane@mweb.co.za Email: molemanenr@nwptb.co.za		Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Molopo Eye Private Game Reserve	Park Manager: Dionne Dinale	Manager Cell: + 27 (0)76 429 3978 and 083 770 6127 Office: +27(0)53 989 0200 Fax/email: +27(0)53 989 0201 molopo@nwptb.co.za		Via email: On 7 July 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		

AfriForum	Chairperson: Marcus Pawson Admin officer: Angie du Preez	Tel: 086 10 200 30 marcus@afriforum.co.za Tel: 012 644 3949 angie@afriforum.co.za evalna@afriforum.co.za		Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the AfriForum. Via email: On 9 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
North West Farmers Union		PO BOX 2923, MAFIKENG, 2745 Tel: (018) 381-0017 Fax: (018) 381-0018		Via fax: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
AGRI North West		Dave Harman Mobile: 083 989 0248 davehharman@gmail.com	Y	Via telephone: On 8 June 2016 Ms Uys contacted Mr Harman to introduce herself and to obtain his email address. Via email: On 8, and 10 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Directly Affected Land Owners (Surface Right Owners)							
Kafferskraal 306 JP Ptn 1,5,10,29	Mondialeshelf Holdings (Pty) Ltd Mr Sandow Rossouw	PO Box 75360 Lynnwood Ridge 0040 Tel: 012 808 0011 Mobile: 082 822 2475 Fax: 086 635 5311	Y	On 23 February a consultation meeting was held with between the applicant and Mr Sandow.	Mr Sandow raised the following concerns during the consultation meeting: 1. Possibility for the purchase of Portion 6 and 7 of the farm Knoflookfontein 2. Preferably access to mine should take	1. Noted 2. Noted.	Ongoing

	Shaun (Foreman)	sandow@iafrica.com Mobile: +27825617766			place via Portion 6 and 7 of Knoflookfontein. 3. Source of water supply.	3. A water supply options analysis study is currently underway and water supply options to be investigated will be included in the Draft Scoping Report which will be made available to I&AP's for comment.	
				Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No further comments received to date.		
Kafferskraal 306 JP Ptn 26, 27	Blue Anvil Holding (Pty) Ltd Mr Sandow Rossouw Shaun (Foreman)	PO Box 75360 Lynnwood Ridge 0040 Tel: 012 808 0011 Mobile: 082 822 2475 Fax: 086 635 5311 sandow@iafrica.com Mobile: +27825617766	Y	On 23 February a consultation meeting was held with between the applicant and Mr Sandow.	Mr Sandow registered as an I&AP on the project and raised the following concerns during the consultation meeting: 1. Possibility for the purchase of Portion 6 and 7 of the farm Knoflookfontein 2. Preferably access to mine should take place via Portion 6 and 7 of Knoflookfontein. 3. Source of water supply.	1. Noted 2. Noted. 3. A water supply options analysis study is currently underway and water supply options to be investigated will be included in the Draft Scoping Report which will be made available to I&AP's for comment.	Ongoing
				Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.			
Kafferskraal 306 JP Ptn 24,25,30	ENRC/SOUTHERN PALACE (PTY) LTD (applicant)	N/A This property belongs to the applicant.					
Knoflookfontein 310 JP Ptn 1	Fatima Green	PO Box 866 Zeerust 2865 Mobile: 0716922591	Y	On 2 March 2016 a consultation meeting was held between Ms Green and the applicant.	During the consultation meeting Ms Green raised the following concerns: 1. Waste water 2. Water resource impacts 3. Explosion/blasting concerns 4. Safety concerns with people working	1. Impact relating to waste water will be assessed in the Hydrogeological Impact Assessment study currently underway for the project.	Ongoing

					5. Impact on animal 6. Safety/Security 7. Dust from blasting 8. Labour issues 9. Will farms be bought/leased at a fair price 10. Graves 11. Usage of roads 12. Traffic 13. Does not want a mine on her doorstep, would prefer to be bought out.	2. See above comment. 3. Impacts relating to blasting will be assessed in the Blasting and Vibration study being undertaken for the project. 4. Socio-economic impacts will be assessed in Socio-Economic Impact Assessment study currently underway for the project. 5. Impact will be assessed in Ecological Impact Assessment study currently underway for the project. 6. See comment on socio-economic impacts. 7. Impact will be assessed in Air Quality Impact Assessment study currently underway for the project. 8. See comment on socio-economic impacts. 9. To be negotiated with applicant after granting of authorisations. 10. Impact will be assessed in Archaeological Impact Assessment study currently underway for the project. 11. Existing roads will be used as far as possible. Roads will be upgraded accordingly. 12. Impact will be assessed in Traffic Impact Assessment study currently underway for the project. 13. Noted.	
				Via registered post: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	**No further comment received to date.**		
Knoflookfontein 310 JP Ptn 3	Hannes Mouton	PO Box 982 Zeerust 2865 Mobile: 084 5932091	Y	On 2 March 2016 a consultation meeting was held between Ms Elize Booysen and Ms Ester Mouton and the	Ms Booysen and Ms Mouton raised the following concerns during the consultation meeting:	1.Water use and pollution impact will be	Ongoing

	Elize Booysen Ester Mouton	Mobile: 084 688 7154 booysenelize@gmail.com Mobile: 079 206 7496		applicant.	1. Water use and pollution 2. It was stated that there were no other issues at this stage but that they would inform if anything arises and issues will be raised at the public meeting.	assessed in the Hydrogeological Impact Assessment study and Water Supply Options Analysis study which are currently underway as part of the EIA process. 2. Noted.	
				Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	**No further comment received to date.**		
Knoflookfontein 310 JP Ptn 6, 7	Mahne & Mahne CC Petrus Boshoff	P O Box 222 Lichtenburg 2740 Mobile: 0832365804 pcondernemings@gmail.com	Y	A consultation meeting was arranged with Mr Boshoff on the 11th of May 2016. However Mr Boshoff was not present for the meeting when the applicant arrived and a consultation letter was subsequently left with the farm manager Joe. A follow-up telephone call was placed by the applicant on the 25th of May 2016 to which there was no answer.			Ongoing
				Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.			
				Via telephone and email: On 10 June 2016 Ms Uys contacted Mr Boshoff to discuss the project and obtain his email address in order to send him the notification. She sent him the notification via			

				email and also informed him that they wished to arrange a telephonic consultation with him. She asked that he provide her with a suitable date and time for such a consultation.			
				Via email: On 28 June 2016 Ms Uys emailed Mr Boshoff to confirm if he had received She stated that they wished to arrange a telephonic consultation with him and asked if he could provide a suitable date and time for such a consultation. She asked that Mr Boshoff contact her should he have any questions and/or require further information.	Via email: On 28 June 2016 Mr Boshoff confirmed receipt of the notification. **No further comment received to date.**		
Rhenosterfontein 304 JP Ptn 9,10	Hendrik Andreas Jacobus Grobler Tannie Marthie v/d Heever	P O Box 141 Zeerust 2865 Tel: 018 642 3319 Mobile: 0791506470 Mobile: 0829676917	Y	Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	**Refer to previous consultation noted above.**		Ongoing
Directly Adjacent Land Owners (Surface Right Owners)							
Kafferskraal 306 JP Ptn 8,9	ENRCENRC/SOUTHERN PALACE (PTY) LTD (applicant) Occupier: Loek van den Heever	P O Box 52505 Dorandia Pretoria Mobile: 082 644 6512 loekvdheever@sepfluor.co.za	Y	On 23 February a consultation meeting was held between Mr van den Heever and the applicant.	The following concerns were made by Mr van den Heever during the consultation meeting: 1. All environmental issues were discussed and agreed upon.	1. Noted. 2. Noted.	Ongoing

					2. All projections were explained and understood. 3. The company committed to address all issues as and when they arise.	3. Noted.	
				Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Via email: On 23 June 2016 Mr van den Heever contacted Ms Uys and stated that he had discussed the proposed mining right application with Mr Koos Vivier from Exigo. He requested to meet with the consultants prior to the 1st of July and asked to be registered as an I&AP.	Via email: On 27 June 2016 Ms Uys informed Mr van den Heever that a meeting was proposed for the 1st of July at 14:00 pm and asked whether he was available on this date and time. She also sent a calendar invite for the meeting.	
					On 27 June 2016 Mr van den Heever confirmed his availability for the meeting.	On 28 June 2016 Ms Uys asked Mr van den Heever to please inform het as the items which he would like to place on the agenda for discussion in order for them to prepare accordingly.	
				A focus group meeting was held with Mr van den Heever on the 1st of July 2016.	During the focus group meeting the following matters were discussed between Mr van den Heever and the consultants: 1. Mr van den Heever confirmed that he represents both his own interests as a landowner as well as those of Sepfluor (Pty) Ltd. 2. Use will be made of his gmail account for emails and comments in his personal capacity. 3. Mr van den Heever farms with game and some exotic game. 4. Mr van den Heever is of the opinion that the project area had abundant groundwater resources with low water levels. Linked aquifers occurred in the dolomite. 5. He stated that there was no dewatering	1. Noted. 2. Noted. 3. Noted. 4. Noted. 5. Noted. 6. Noted. 7. This information will be made provided in the Draft Scoping Report which will be made available to the public for comment. A water supply options analysis is currently underway.	

					at Witkop as the open pits were only approximately 15m deep. 6. He informed the consultants of the presence of existing reservoirs on old mine site (Marico Fluorspar). 7. He requested mining schedule, planned mining per year as well as ROM per annum, water supply options.		
Kafferskraal 306 JP Ptn RE	Paul Stephanus Snyman & E Scheepers	PO Box 207 Zeerust 2865 Tel: 0186423270 Mobile: 082 948 2824 (Elsie Snyman – wife)	Y	On 12 April 2016 a consultation meeting was held between Mr Snyman and the applicant.	During the consultation meeting Mr Snyman raised the following concerns: 1. Labour should not be housed on farms. 2. No informal settlements. 3. No impact on groundwater resources. 4. Safety. 5. Livestock Theft. 6. Labour should not be sources from existing labour on farms. 7. Impact on salaries for farm workers. 8. Family cemetery is located on the farm.	1. It is planned for labour to the mine to be housed in established area in the town of Zeerust. 2. Socio-economic impacts relating to influx of people will be assessed in the Socio-economic study currently being conducted for the project. 3. Impacts relating to groundwater will be assessed in the Hydrogeological Impact Assessment study. 4. Socio-economic impacts will be assessed in the Socio-economic study. 5. Noted. Socio-economic impacts will be assessed in the Socio-economic study. 6. Socio-economic impacts will be assessed in the Socio-economic study. 7. Socio-economic impacts will be assessed in the Socio-economic study. 8. Noted. A heritage impact assessment study is currently underway for the project as part of the EIA process.	Ongoing
				Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the			

				stakeholder.			
Kafferskraal 306 JP Ptn 4,6	Mondialeshelf Holdings (Pty) Ltd Mr Sandow Rossouw Shaun (Foreman)	PO Box 75360 Lynnwood Ridge 0040 Tel: 012 808 0011 Mobile: 082 822 2475 Fax: 086 635 5311 sandow@iafrica.com Mobile: +27825617766	Y	Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	**Refer to previous consultation noted above.**		Ongoing
Kafferskraal 306 JP Ptn 14	Hendrina Johanna Steyn	Landowner deceased					Ongoing as soon as new owners contact details have been obtained
Kafferskraal 306 JP Ptn 12,28	Blue Anvil Holding (Pty) Ltd Mr Sandow Rossouw Shaun (Foreman)	PO Box 75360 Lynnwood Ridge 0040 Tel: 012 808 0011 Mobile: 082 822 2475 Fax: 086 635 5311 sandow@iafrica.com Mobile: +27825617766	Y	Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing
Paardeplaats 296 JP Ptn 31 Saamgevoeg 320 JP RE	FSM Trust Frans & Wim Mouton	PO Box 997 Zeerust 2865 Mobile: 082 576 5809 fsmtrust@vodamail.co.za	Y	On 24 May 2016 a consultation meeting was held between Mr's Mouton and the applicant	The following concerns were raised by Mr's Mouton during the consultation meeting: 1. The project area is a water restricted area and this is a serious problem. Should water be abstracted in the area and it affects farming activities, then the farm will need to be purchased by the mine at a fair market value. 2. Dust could pose a problem for current chicken farming activities taking place on the farm. Should dust be an issue and affect the chicken farming, the mine will need to purchase the farm.	1. Water related impacts will be determined by the relevant specialist studies. 2. Air Quality related impacts will be determined by the relevant specialist studies. 3. Socio-economic impacts relating to the sourcing of labour for the mine will be assessed in the socio-economic study which is currently being conducted as part of the EIA process.	Ongoing

					3. Labour.		
				Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	**No further comment received to date.**		
Knoflookfontein 310 JP Ptn RE	Martha Margaretha van der Walt **Recently sold to Petrus Boshoff**	Mobile: 0832365804		Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing
Knoflookfontein 310 JP Ptn 2	Elize Booysen Ester Mouton	PO Box 982 Zeerust 2865 Mobile: 084 688 7154 booysenelize@gmail.com Mobile: 079 206 7496	Y	Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing
Knoflookfontein 310 JP Ptn 4	Hannes Mouton Elize Booysen Ester Mouton	PO Box 982 Zeerust 2865 Mobile: 084 5932091 Mobile: 084 688 7154 booysenelize@gmail.com Mobile: 079 206 7496	Y	Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing
Knoflookfontein 310 JP Ptn 5	Ramapitsi Family Trust Aaron Machewane	Mobile: 0630290692 Mobile: 072 918 5587 AaronM@mapcw.co.za	Y	Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Via email: On 8 June 2016 Mr Machewane requested details as per the sms sent to him. He stated that he was one of the farm owners for the Ramapitsi farm.	Via email: On 9 June 2016 Ms Uys thanked Mr Machewane for his email and provided him with a copy of the notification as requested.	Ongoing
Rhenosterfontein 304 JP Ptn 2,5,17,25	Mr Hendrik Andreas Jacobus Grobler Tannie Marthie v/d Heever	P O Box 141 Zeerust 2865 Tel: 018 642 3319 Mobile: 0791506470 Mobile: 0829676917	Y	Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing

Rhenosterfontein 304 JP Ptn 6	Witkop Fluorspar Mine (Pty) Ltd Hendrik Hanekom	Mobile: 0795174083 hendrik.hanekom@sallies.co.za	Y	Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Via telephone: On 21 June 2016 Mr Hanekom contacted Ms Uys and asked to receive the notification as mentioned in the sms. He asked whether she had informed anyone from the Witkop Fluorspar Mine of the project.	Via telephone and email: On 21 June 2016 Ms Uys provided Mr Hanekom with a copy of the notification. She also informed him that she had been contacted by Mr Jaco Erasmus from Witkop Fluorspar Mine and had provided him with a notification as well.	Ongoing
Rhenosterfontein 304 JP Ptn 15	Hendrina Carolina Barnard	Contact details unknown					
Witrand 325 JP Ptn 2	Klipveld Minerale (Pty) Ltd Jacobus Philipus De Ridder Anna Catherina Jacoba de Ridder	Private Bag X12038 Lichtenburg 2740		Via registered post: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Strydfontein 326 JP Ptn 2	Christel Boerdery (Pty) Ltd Harry Du Preez	Private Bag X12038 Lichtenburg 2740 Tel: 0186730256 Mobile: 0833061128		Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Other Land Owners within Mining Right Area (Surface Right Owners)							
Doornhoek 305 JP Ptn 3,7	Wanda Arabella Hamburg Monica Lombard	Contact details unknown					
Doornhoek 305 JP Ptn 10,28	Hendrik Josifus Enslin Hennie Enslin Danette	P O Box 94 Zeerust 2865 Tel: (018) 6422815 Mobile: 0823232093 Mobile: 082 823 0980 enslinhennie@gmail.com	Y	Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Via email: On 9 June 2016 Ms Danette Enslin requested that a copy of the notification be sent to her.	Via email: On 10 June 2016 Ms Uys thanked Ms Enslin for het email and provided her with a copy of the notification as requested. She also stated that she was free to contact her should she require any further information.	Ongoing
Doornhoek 305 JP Ptn 4	Johannes Hendrik & Catharina Susanna Snyman Gerhard Snyman	P O Box 203 Zeerust 2865 Tel: 018-6423325 Mobile: 082 717 4875 Mobile: 0823253166	Y	On 2 March 2016 a consultation meeting was held between Mr Snyman and the applicant.	Mr Snyman raised the following concerns during the consultation meeting: 1. He strongly wanted to bring to the attention of the applicant that the old mine dump on the property has been	1. Noted. 2. Noted.	Ongoing

					given away. 2. He was not likely to sell his farm as it has been in the family for more than 100 years. 3. Old graves on property.	3. Noted. A Heritage Impact Assessment study is currently underway as part of the EIA process for the proposed mine.	
				Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	**No further comment received to date.**		
Doornhoek 305 JP Ptn 5,6,13,14,24,27	Gert Johannes Grobler Johan Grobler Jnr	P O Box 765 Zeerust 2865 Tel: (018) 6421994 Mobile: 0823219598 Mobile: 0823266258		Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Doornhoek 305 JP Ptn 8,32,29 Kwaggafontein 297 JP Ptn 7	Frans Markram & Juliana Elizabeth Markram	P O Box 1571 Zeerust 2865 Tel: (018) 6422254 Mobile: 0829082758	Y	On 11 April 2016 a consultation meeting was held between Mr Markram and the applicant.	Mr Markram had no objections to the proposed mine at the time of the consultation meeting but wished to discuss the matter with his sons prior to completing the registration form. The applicant arranged to collect the form from him the next day. However the form was not completed the next day and Mr Markram committed to deliver the form to the applicant the day thereafter. The registration form has not been received to date. During the consultation meeting Mr Markram indicated that he wished to sell the farm portion(s).	Noted.	Ongoing
				Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	**No further comment received to date.**		
Doornhoek 305 JP Ptn 9	Emily Jacoba Swart	P O Box 490		Via registered post:	No comment received to date.		Ongoing

		Zeerust 2865 Tel: (018) 6423766 (Son)		On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.			
Doornhoek 305 JP Ptn 18	Gertruida Petronella Enslin & Hendrik Josifus Enslin	P O Box 94 Zeerust 2865 Tel: (018) 6422815 Mobile: 0823232093 enslinhennie@gmail.com	Y	Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing
Doornhoek 305 JP Ptn 11	Ester Smit Trust	Mobile: 0785681923 Mobile: 0838625357		Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Doornhoek 305 JP Ptn 12,16,33	Hendrik Andreas Jacobus Grobler Tannie Marthie v/d Heever	P O Box 141 Zeerust 2865 Tel: 018 642 3319 Mobile: 0791506470 Mobile: 0829676917	Y	Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing
Doornhoek 305 JP Ptn 15,17	Frans Jurie Nicolas Badenhorst & Martina Anna Catharina Badenhorst	Mobile: 0835810331	Y	A consultation meeting was held between Mr & Mrs Badenhorst and the applicant.	During the consultation meeting the following concerns were raised by Mr and Mrs Badenhorst: 1. No real problem or issues with the proposed mine. 2. Level of the current water table in the area.	1. Noted. 2. Water table levels will be assessed and indicated in the Hydrogeological Impact Assessment Report currently underway for the project.	Ongoing
				Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	**No further comment received to date.**		

Doornhoek 305 JP Ptn 19	George Richard Swart & Martha Susanna Johanna Swart	P O Box 1096 Zeerust 2865 Tel: (018) 642 2891 Mobile: 0826868461		Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Doornhoek 305 JP Ptn 20	National Government of the RSA	Refer to DRDLR details above.		Notifications were sent as presented above.			
Doornhoek 305 JP Ptn 23	Theo Ernst Rabe Magda Rabe	Mobile: 0823359885 Mobile: 0829257756		Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Doornhoek 305 JP Ptn 25,26	Catharina Magdalena Grobler	P O Box 301 Zeerust 2865 Tel: (018) 6421994		Via registered post: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Doornhoek 305 JP Ptn 30,31 Kafferskraal 306 JP Ptn 8,9	ENRC/SOUTHERN PALACE (PTY) LTD (applicant) Occupier: Loek van den Heever	loekvdheever@sepfluor.co.za	Y	Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to above correspondence.		Ongoing
Kafferskraal 306 JP Ptn 15,16,18,19,20,23 Strydfontein 326 JP Ptn 22	ENRC/SOUTHERN PALACE (PTY) LTD (applicant)	N/A					
Rhenosterfontein 304 JP Ptn 21	AstraDeals Eighteen cc Mnr Cloete	Mobile: 0827401707		Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Strydfontein 326 JP Ptn 21	Varkfontein Inv CC	Contact details unknown					
Kafferskraal 306 JP Ptn 2, 22	Namaria Prop (Pty) Ltd Mr Sandow Rossouw	PO Box 75360 Lynnwood Ridge 0040 Tel: 012 808 0011 Mobile: 082 822 2475	Y	Via registered post, email & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the	Refer to previous consultation noted above.		Ongoing

	Shaun (Foreman)	Fax: 086 635 5311 sandow@iafrica.com Mobile: +27825617766		stakeholder.			
Kafferskraal 306 JP Ptn 4,6	Mondialeshelf Holdings (Pty) Ltd Mr Sandow Rossouw Shaun (Foreman)	PO Box 75360 Lynnwood Ridge 0040 Tel: 012 808 0011 Mobile: 082 822 2475 Fax: 086 635 5311 sandow@iafrica.com Mobile: +27825617766	Y	Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing
Kafferskraal 306 JP Ptn 7	Republic of South Africa	Refer to DRDLR details above.		Notifications were sent as presented above.			
Kafferskraal 306 JP Ptn 14	Hendrina Johanna Steyn Landowner deceased	P O Box 225 Zeerust 2865					Ongoing as soon as new landowner contact details are obtained.
Kafferskraal 306 JP Ptn 3	Willem Jacobus du Plessis	Tel: (018) 6434911 Mobile: 0844619413		Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Kafferskraal 306 JP Ptn 21	Vincent George Du Plessis	Mobile: 072 145 6860/6864		Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Kafferskraal 306 JP Ptn 17	Elsie Aletta Cecilia Evler	Contact information not available					Ongoing as soon as owners contact details have been obtained
Kafferskraal 306 JP Ptn 12, 13, 28	Blue Anvil Holding (Pty) Ltd Mr Sandow Rossouw	PO Box 75360 Lynnwood Ridge 0040	Y	Via email: On 8 June 2016 a notification inviting I&AP's to register on	Refer to previous consultation noted above.		Ongoing

	Shaun (Foreman)	Tel: 012 808 0011 Mobile: 082 822 2475 Fax: 086 635 5311 sandow@iafrica.com Mobile: +27825617766		the project was sent to the stakeholder.			
Kafferskraal 306 JP Ptn 11 Rhenosterfontein 304 JP Ptn 13	ENRC/SOUTHERN PALACE (PTY) LTD owned	N/A					
Kafferskraal 306 JP Ptn 31 Paardeplaats 296 JP Ptn 1	Thort Group Trading cc Frans Thiart 0289589454	Tel: 0289589454 / 0189589454					
Paardeplaats 296 JP Ptn 25	Elsie Hendrika Jacoba Palmer Snyman	Posbus 207 Zeerust 2865 Tel: 018 642 3270 Mobile: 0829482824		On 13 April 2016 a consultation meeting was held between Mrs Snyman and the applicant.	Mrs Snyman raised the following concerns during the consultation meeting: 1. Housing of labour in area 2. Informal settlements 3. Impact of mining of groundwater resources 4. Safety 5. Livestock theft 6. Use of farm labour 7. Wages paid by mine versus farm labour wages	1. It is planned for labour to the mine to be housed in established area in the town of Zeerust. 2. Socio-economic impacts relating to influx of people will be assessed in the Socio-economic study currently being conducted for the project. 3. Impacts relating to groundwater will be assessed in the Hydrogeological Impact Assessment study. 4. Socio-economic impacts will be assessed in the Socio-economic study. 5. Socio-economic impacts will be assessed in the Socio-economic study. 6. Socio-economic impacts will be assessed in the Socio-economic study. 7. Socio-economic impacts will be assessed in the Socio-economic study.	Ongoing
				Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the	**No further comment received to date.**		

				stakeholder.			
Paardeplaats 296 JP Ptn 26	Jacobus Johannes Smit	P O Box 233, Zeerust 2865 P O Box 32 Groot Marico 2850 Tel: (018) 642 1630 / (014) 282 1630 Mobile: 0835925147		Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Paardeplaats 296 JP Ptn 27, 28	Magrietha Wilhelmina Aletta van Niekerk & Johannes Hendrik Philippus (Hannes) van Niekerk	Posbus 229 Zeerust 2865 Tel: (018) 642 2916 Mobile: 0823882202		Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Paardeplaats 296 JP Ptn 29	Petronella Katrina (Karien) Botha	Mobile: 0828773744		Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Paardeplaats 296 JP Ptn 2,24,32,33	Magdalena Jacoba (Martie) van den Heever	P O Box 287 ZEERUST 2865 Tel: (018) 642 1851 Mobile: 0829676917		Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Paardeplaats 296 JP Ptn 34	Robert Frank McComb Taylor	Contact information not available					Ongoing as soon as owners contact details have been obtained
Paardeplaats 296 JP Ptn 40	Klopper Langoed (Pty) Ltd	Privaatsak X12038 Lichtenburg		Via registered post: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Paardeplaats 296 JP Ptn 31	FSM Trust Mr Wim Mouton Mr Frans Mouton	P O Box 997 Zeerust 2865 Mobile: 082 576 5809 fsmtrust@vodamail.co.za	Y	Via registered post & email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing

Kwaggafontein 297 JP Ptn 2	Kobus Snyman (Kowie)	P O Box 192 Zeerust Tel: (018) 6422929 Mobile: 0725388813 ks.grootleeu@gmail.com	Y	Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Via telephone and email: On 9 June 2016 Mr Snyman contacted the consultant stating that he had received an sms relating to the matter and requested more information to determine his next steps.	Via email: On 9 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder. Ms Uys also contacted Ms Snyman telephonically to provide more detail and address his concerns. He confirmed in the telephonic conversation that he had received the notification and would be providing comment in due course.	Ongoing
Kwaggafontein 297 JP Ptn 4	Pieter Daniel (Piet) Boeyens	Posbus 209 Zeerust 2865 Tel: (018) 6422908 Mobile: 0828089408		Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Kwaggafontein 297 JP Ptn 3,13	Dietmar Carl Jurgen Rassow & Dalziel Josephine Rassow	P O Box 775 Zeerust 2865 Tel: 0186422047		Via registered post: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Kwaggafontein 297 JP Ptn 1,5,6,8,9,11,12,15,17	Paul Stefanus Snyman	PO Box 207 Zeerust 2865 Tel: 0186423270 Mobile: 082 948 2824 (Elsie Snyman – wife)	Y	Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing
Rhenosterfontein 304 JP Ptn 1,2, 5, 7,8, 9, 10, 17, 19, 23, 24, 25	Hendrik Andreas Jacobus Grobler Tannie Marthie v/d Heever	P O Box 141 Zeerust 2865 Tel: 018 642 3319 Mobile: 0791506470 Mobile: 0829676917	Y	On 10 March 2016 a consultation meeting was held between Mr Grobler and the applicant.	During the consultation meeting Mr Grobler raised the following concerns: 1. Water: the old pipeline leading from the municipality to the now derelict Marico Fluorspar mine has been lifted on his farm and not stops at Witkop as far as he is aware. He was of the opinion that underground water would not be an option for mining purposes, and that this would be the most important issue	1. Noted. All water related impacts will be assessed in the hydrogeological impact assessment study currently underway for the project. 2. Noted.	Ongoing

					to farmers. 2. He was of the opinion that the farmers would welcome a mining operation in the area.		
				Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	**No further comment received to date.**		
Rhenosterfontein 304 JP Ptn 3	Catharina Magdalena Grobler	Hennie Grobler's daughter Contact information not available					Ongoing as soon as owners contact details have been obtained
Rhenosterfontein 304 JP Ptn 4,18	Hendrik Andreas Jacobus (Hennie) Grobler & Catherina Magdalena Grobler	P O Box 141 Zeerust 2865 Tel: 018 642 3319 Tel: 018 642 1994 Mobile: 0791506470	Y	Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing
Rhenosterfontein 304 JP Ptn 27 Strydfontein 326 JP Ptn 18	Witkop Fluorspar Mine (Pty) Ltd Hendrik Hanekom	Mobile: 0795174083 hendrik.hanekom@sallies.co.za	Y	Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing
Rhenosterfontein 304 JP Ptn 28	Hanekom Boerdery en Konstruksies Hendrik Hanekom						
Rhenosterfontein 304 JP Ptn 20	Johannes Hendrik (Hansie) Snyman Gerhard Snyman (Son)	Mobile: 0827174875 Mobile: 0823253166	Y	Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing
Rhenosterfontein 304 JP Ptn 26	Gertruida Petronella Enslin & Hendrik Josifus (Hennie) Enslin	Posbus 94 Zeerust 2865	Y	Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on	Refer to previous consultation noted above.		Ongoing

		Tel: (018) 6422815 Mobile: 0823232093 enslinhennie@gmail.com		the project was sent to the stakeholder.			
Witrand 325 JP Ptn RE,2, 3	Klipveld Minerale (Pty) Ltd, Jacobus Philipus De Ridder Anna Catherina Jacoba de Ridder	Privaatsak X12038 Lichtenburg 2740		Via registered post: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Witrand 325 JP Ptn 1	Johannes Hendrik Snyman & Susanna Catharina Snyman	Posbus 203 Zeerust 2865 Mobile: 0827174875/0823253166 Tel: 018 6423325	Y	Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Refer to previous consultation noted above.		Ongoing
Strydfontein 326 JP Ptn 3,9,13	ASC Saayman Testementary Trust	Contact information not available					Ongoing as soon as owners contact details have been obtained
Strydfontein 326 JP Ptn 6,8	Thathana Farms cc Paul Moreng	Mobile: 0835875193		Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing
Strydfontein 326 JP Ptn 7	Dawid Johannes (Jan) Jacobs	Mobile: 0829567059		Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	No comment received to date.		Ongoing

Strydfontein 326 JP Ptn 15,17	Maria Aletta (Marika) du Toit	P O Box 1310 Lichtenburg 2740 Mobile: 0798817159 Mobile: 0731310803 hothyena@yahoo.com	Y	Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Via telephone & email: On 21 June 2016 Ms du Toit contacted Ms Uys and requested to be registered as an interested and affected party on the project. She also asked to be provided with the following information: 1. Name of applicant 2. Is it a prospecting or mining application? 3. If mining where is the proposed mine? 4. Which minerals? 5. The DMR reference number 6. Who is the EAP (Environmental Assessment Practitioner) or the Environmental Consulting firm handling the application? 7. When was the application lodged? 8. She asked to also be provided with all document relating to the project.	Via email: On 21 June 2016 Ms Uys thanked Ms du Toit for her email and informed her that they were currently busy with the initial notification/introduction registration period and therefore no formal public participation has been initiated. She informed her that she has been registered as an I&AP on the project and will be kept informed of any progress going forward. She provided her with the notification and the following response to her queries: 1. SA Fluorite (Pty) Limited and Southern Palace 398 (Pty) Limited, applicant contact person: Mr Allan Saad 2. Mining Right Application 3. Please refer to Figure 5 in the attached notification 4. Mainly fluorspar (detail in this regard will be made available in the draft Scoping Report) 5. An application will be lodged with the DMR in July 2016 and therefore a mining right reference number has not yet been issued for the project. The prospecting right reference numbers are as follows: NW 30/5/1/1/2/763, NW 30/5/1/1/2/1696 & NW 30/5/1/1/2/1728 6. Exigo Sustainability (Pty) Ltd 7. Please refer to point 5 above 8. Please find the notification attached. All other reports will be made available for comment as they become available and of which you will be notified of in advance.	Ongoing
Strydfontein 326 JP Ptn 19	National Government of the RSA	Refer to DRDLR details above.		Notifications were sent as presented above.			
Strydfontein 326 JP Ptn 20	Willrich Adventures cc	Contact information not available					Ongoing as soon

							as owners contact details have been obtained
Strydfontein 326 JP Ptn 21	Varkfontein Inv cc	Contact information not available					Ongoing as soon as owners contact details have been obtained
Strydfontein 326 JP Ptn 22	ENRC/SOUTHERN PALACE (PTY) LTD	N/A					
Other Interested and Affected Parties							
SA Lime and Gypsym	Jaco Erasmus	PO Box 413745 Craighall 2024 Fax: 0860103516 Email: jaco@sakg.co.za Email: jan@sakg.co.za	Y	Via sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.	Via email: On 8 June 2016 Mr Erasmus requested that Ms Uys email him the information as mentioned in the sms.	Via email: On 9 June 2016 Ms Uys provided Mr Erasmus with the notification as requested.	Ongoing
Mr Joffrey Joubert	Portion 1 of the farm Doornplaats 340 JP (farm is adjacent to MRA)	PO Box 714 Zeerust Mobile: 082 550 0150 Doornhoek@gds.co.za		On 26 May 2016 a consultation meeting was held with between the applicant and Mr Joubert.	Mr Joubert made raised the following concerns during the consultation meeting: 1. Visual Impact	1. A Visual Impact Assessment will be conducted as part of the EIA process for the project.	Ongoing
SepFluor	Loek van den Heever	Riverside Office Park, 1st Floor Hennops House, 1303 Heuwel Avenue, Centurion, Gauteng, 0157 PO Box 11351, Die Hoewes, 0163 T: +27 (12) 6229400 (Switchboard) T: +27 (12) 6229414 (Direct) F: +27 (11) 6229494/5 M:+27 (82) 6445412	Y	Meeting: A consultation meeting was held with Mr. Van den Heever on the 1st of July 2016 at the offices of Exigo.	During the consultation meeting Mr. Van den Heever disclosed that he will register and partake in the process both in his personal capacity and on behalf of SepFluor. It was agreed that he will consult via his gmail address for personal and work address for Sepluor matters respectively.		

12. THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES

PLEASE NOTE THAT THE BASELINE ENVIRONMENT AS DESCRIBED BELOW HAS BEEN PRESENTED TO THE COMMUNITIES AND THEIR INPUT REQUESTED IN THE NOTIFICATIONS LETTERS AND DURING THE FOCUS GROUP MEETINGS HELD TO DATE. THE DRAFT SCOPING REPORT WITH THE BELOW DESCRIPTION OF THE BASELINE ENVIRONMENT WILL ALSO BE MADE AVAILABLE TO I&APS FOR REVIEW AND COMMENT AS PER SECTION 10 OF THIS REPORT. IN ADDITION, THE SPECIALISTS WILL ALSO CONSULT WITH THE COMMUNITY TO CONFRIM CERTAIN ASPECTS OF THE ENVIRONMENT SUCH AS HERITAGE SITES, FEATURES, LAND USE, ETC.

12.1. Type of environment affected by the proposed activity.

(its current geographical, physical, biological, socio- economic, and cultural character).

12.1.1. Climate

The site falls within the summer rainfall region with very dry winters and frost that occurs fairly frequently during winter.

12.1.2. Rainfall & Temperature

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. The main climatic factors analysed for the site were long-term monthly average rainfall, temperature and relative humidity.

The area known as the Bankenveld, which occur in portions of Zeerust and Marico, can be separated from the Highveld region on the grounds of the differences shown in its climatic statistics. The project site has warm to hot summers and cool and dry to cold winters, with an average annual rainfall of 439mm. According to Groundwater Resource Directed Measures (GRDM) the Mean Annual Precipitation (MAP) is 566mm/a and the Mean Annual Runoff is 8mm/a for the entire catchment. The Mean Annual Evaporation (MAE) is 8mm/a.

The average maximum temperatures for the region have been recorded between November and January, with temperatures reaching a maximum of 31°C. The average minimum temperatures are reached during June and July with a minimum temperature of 1°C.

The rainfall pattern of Marico catchments is highly variable and unevenly distributed within the catchments. The intermittence of the rainfall results in frequent floods and local droughts.

As far as the temperatures are concerned it is noticeable that the daily average maximums are all more than 30.3ºC, while the minimum for Zeerust is below 0ºC. The absolute maximum temperature of Zeerust is in excess of 40.6ºC. The absolute minimums recorded varies between -3.3ºC and -7.8ºC.The days with temperatures below freezing is still in the order of 23 to 32, but days with temperatures of less than -2.5ºC are less than on the Highveld.

As far as precipitation is concerned it is noticeable that the averages are all in excess of 600mm. Zeerust receives on average 57.1 days with thunder and only 1.1 days with hail.

Figure 14 indicates the monthly climatic averages of the project area, while Table 5 indicate the temperature, precipitation and humidity levels for the Zeerust and Mafikeng weather stations:

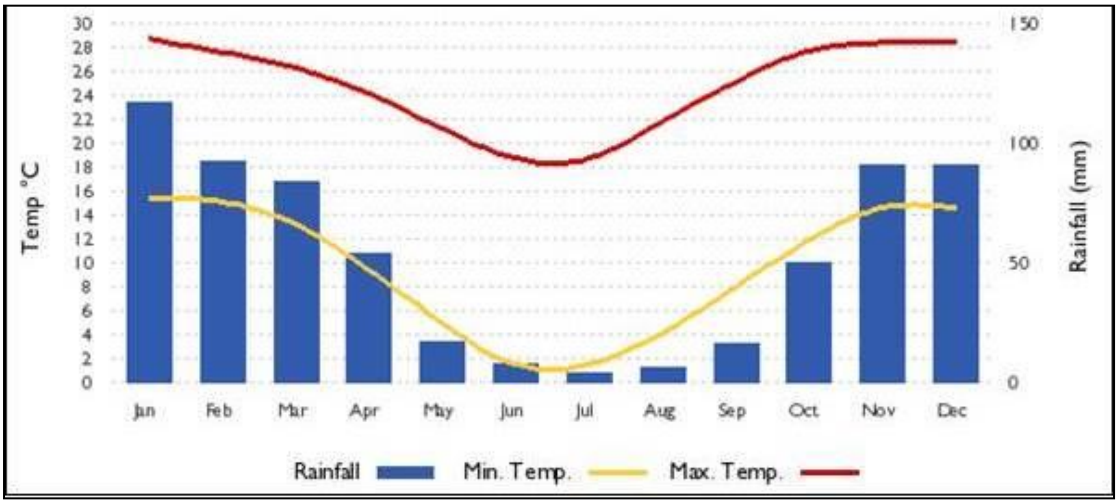

Figure 14: Monthly climatic averages for the project areas

Table 5: Temperature, precipitation and humidity levels for the weather stations of the project area (Source: South African Weather Bureau)

STATIONS:	MEAN TEMPERATURES (ºC)		PRECIPITATION (mm)			MEAN RELATIVE HUMIDITY (%)	
	JAN	JUL	MEAN	HIGH	LOW	JAN	JUNE
MAFIKENG	30,4	3,0	553	868	265	65	35
ZEERUST	30,8	-0,8	600	1002	390	69	36

12.1.3. Wind

The long-term weather record indicates that wind speed, experienced in the project area, ranges from 0 to more than 10.0 ms-1. The maximum wind speed rarely rises beyond 10 ms-1. Figure 15 indicates the seasonal variations of the wind direction and speed.

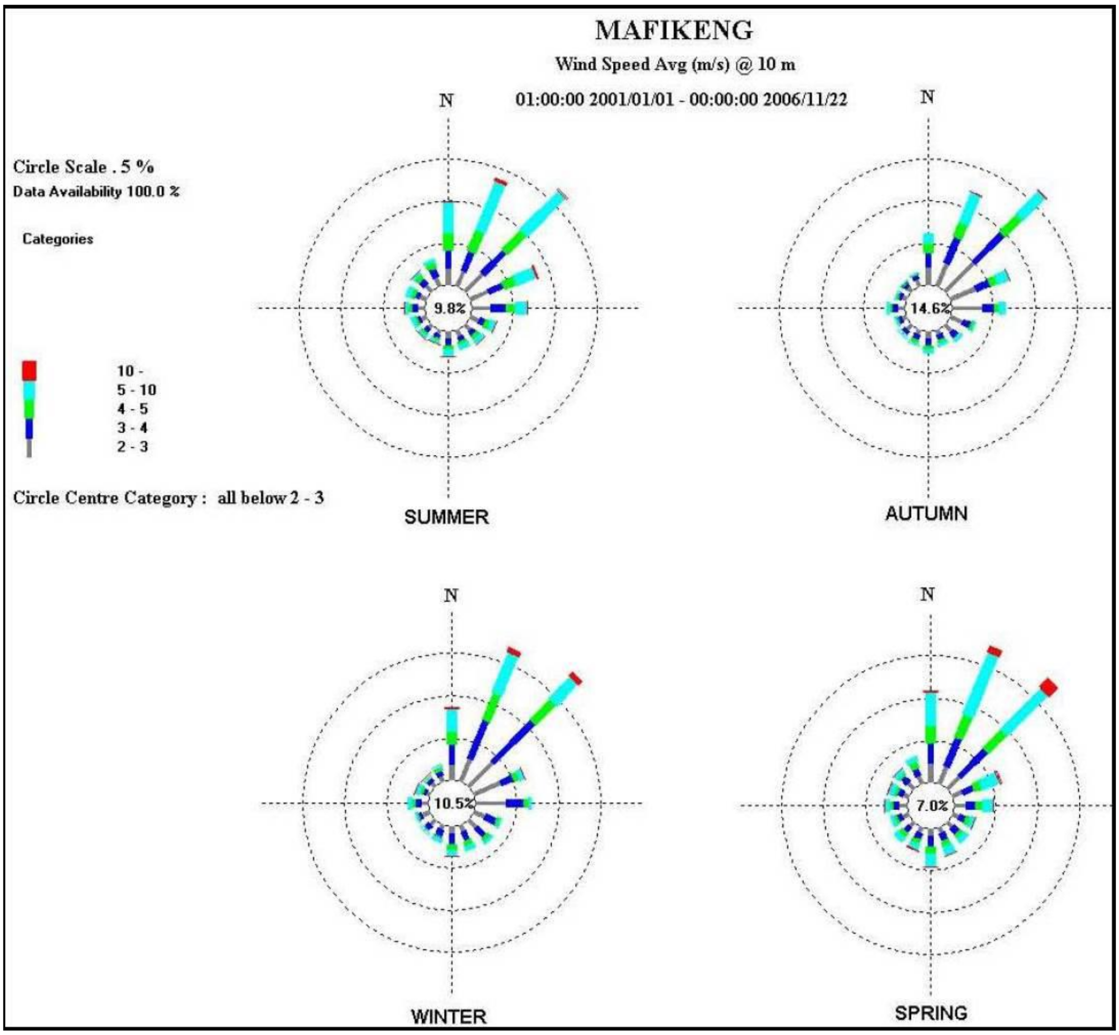

Figure 15: Wind roses for the different seasons of the project area as obtained from the Mafikeng weather station

12.2. Topography

The project area is located at an altitude of approximately 1 342 metres above mean sea level (mamsl). The topography is relatively flat, dipping at a low angle in a north-westerly direction. The project area is defined as hills and lowlands in the northern section, while the southern section is classified as escarpment (ENPAT, 2000). The topography of the area is a mixture of terrains, ranging from flat to moderately undulating plains, outcrops, bottomlands (drainage channels) and slightly undulating hills. Refer to Figure 16 and Figure 17 for elevation profiles of the study area and Figure 18 for a map of the terrain.

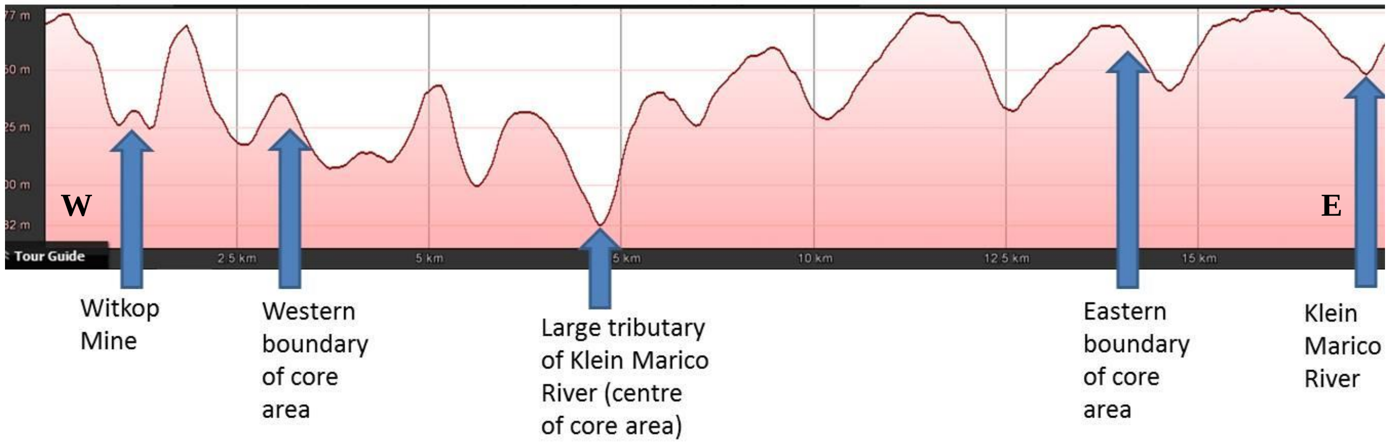

Figure 16: West-East Elevation Profile (exaggerated)

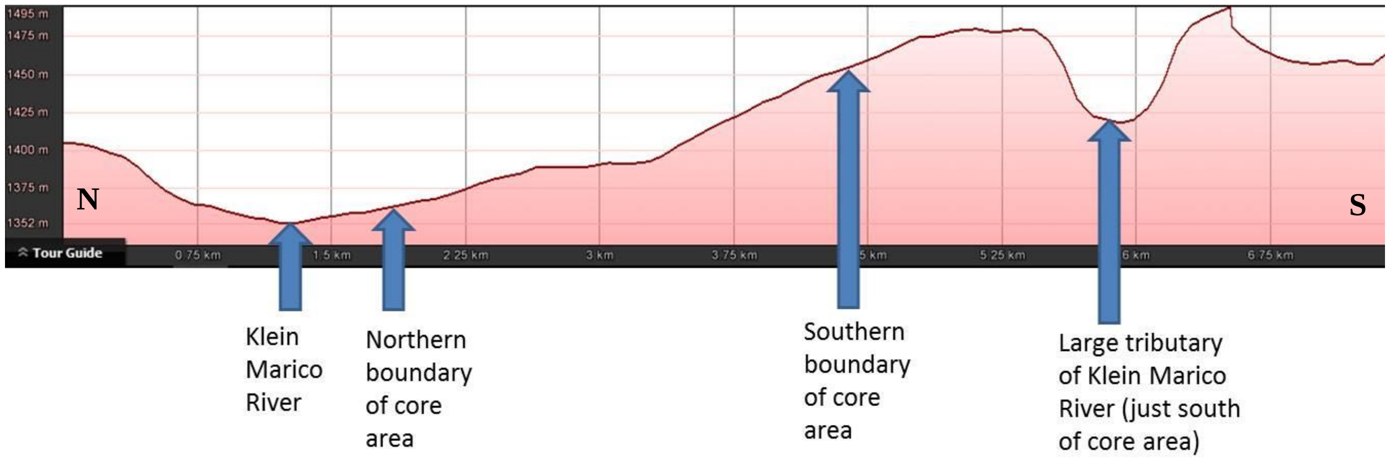

Figure 17: North-South Elevation Profile (exaggerated)

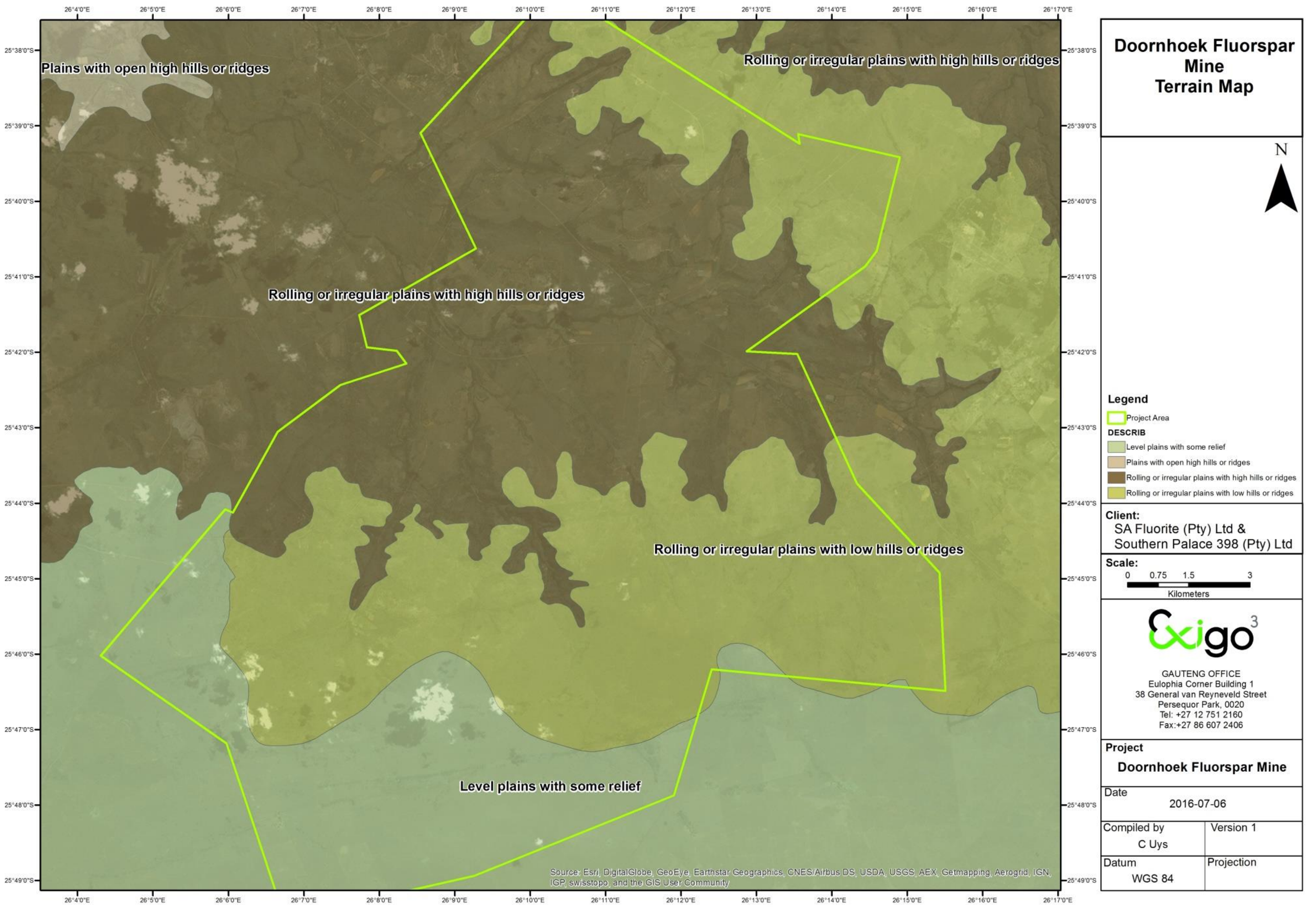

Figure 18: Terrain map

12.3. Geology

The following section describes the regional geology as depicted in the 1:250 000 geological maps sheets of Rustenburg (2526) and Mafikeng (2426). Thereafter the local geology pertinent to hydrogeology is described (refer to Figure 19).

The project site is located on Vaalian age Chunniespoort group sediments (Transvaal Super Group). The Chunniespoort group is largely represented by dolomite, dolomitic limestone, chert and shale and is intruded by numerous basic dykes and sills.

The fluorspar deposits are large bedded replacement deposits of the classical Mississippi Valley type. Fluorspar mineralisation occurs mainly associated with stromalites in the Middle Frisco Zone and appears to have been introduced post deposition by hydrothermal brines. The fluorite occurs as a filling in permeable beds; within small gas cavities in the stromalites.

The stratigraphic sequence of interest to this study thus consists of the upper formations of the Malmani sub-group and the overlying Pretoria group shales and clastics. The upper formations of the Malmani sub group include the Eccles and the Frisco formations.

The Eccles formation outcrops south of the project area and is characterised as a chert rich formation. The Frisco Formation overlies the Eccles formation. This unit hosts fluorite deposits and comprises stromalitic dolomites. The Frisco formation is overlain by the clastic and iron-rich sediments of the Penge Formation which in turn is unconformable overlain by Pretoria Group shales and clastic sediment of the Rooiberg formation. Shales, Bevets conglomerates and the Polo Ground Member of the Timeball Hill formation overlies the Rooiberg formation and is found outcropping in the northern portion of the study area. A diabase sill has intruded this formation and outcrops on the northern portion of the Doornhoek farm. Both east-west trending and north south trending dolerite dykes are abundant in the project area.

Extensive geological mapping has been conducted on the farms Strydfontein 326, Witrand 325, Rhenosterfontein 304, Doornhoek 305, Farm 306, Knoflookfontein 310 and is depicted in Figure 19. Much of the study area consists of the dolomite package overlain by cherts of the Penge formation. In the northern sections of the study area the Pretoria group shales, conglomerates and quartzites are extensive.

Based on the geological cores and cross sectional mapping (Sa Flourite (Pty) Ltd), the Frisco formation is subdivided into three units, the lower, middle and upper Frisco. The mineralisation zone is predominantly associated with the Middle Frisco unit and although of variable thickness the main mineralisation zone appears to be between 10-20 m thick

Cross sectional maps were available for the Rhenosterfontein 304, Doornhoek 305, Farm 306 and Knoflookfontein 310. The cross sections indicate that the sedimentary units dip gently. Numerous east-west trending and north-south trending normal faults transect the stratigraphic sequence (Figure 19).

These faults have resulted in places in the juxtaposition of dolomites against the Penge formation and Penge cherts against younger Pretoria group shales. In addition the Penge formation is in places substantially weathered thus resulting in a variable thickness of the package in the stratigraphic sequence. In general however, the Penge cherts appear to vary between ~10 m and ~30 m. The underlying laminar dolomites and stromalitic dolomites which make up the upper Frisco vary between ~10m to ~30 m. The chert horizon, which is consistently observed in the cross sections on all farms varies on average between ~10 m and 15 m. Below the chert horizon is the main mineralised zones. Much of the main mineralisation zone and the underlying layers consist of massive dolomites.

Cross-sectional maps were available for the Rhenosterfontein 304, Doornhoek 305, Farm 306 306 and Knoflookfontein 310. The cross-sections indicate that the sedimentary units dip gently towards the north. Numerous east-northeast to west-southwest trending and northwest to southeast trending dolerite dykes transect the stratigraphic sequence. These faults have resulted in places in the juxtaposition of dolomites against the Penge Formation and Penge Formation cherts against younger Pretoria Group shales. In addition the Penge Formation is in places substantially weathered thus resulting in a variable thickness of the package in the stratigraphic sequence. In general however, the Penge Formation cherts appear to vary between ~10 m and ~30 m. The underlying laminar dolomites and stromalitic dolomites which make up the upper Frisco vary between ~10m to ~30 m. The chert horizon, which is consistently observed in the cross-sections on all farms varies on average between ~10 m and 15 m. Below the chert horizon is the main mineralised zones. Much of the main mineralisation zone and the underlying layers consist of massive dolomites (Hill *et al*., 2015).

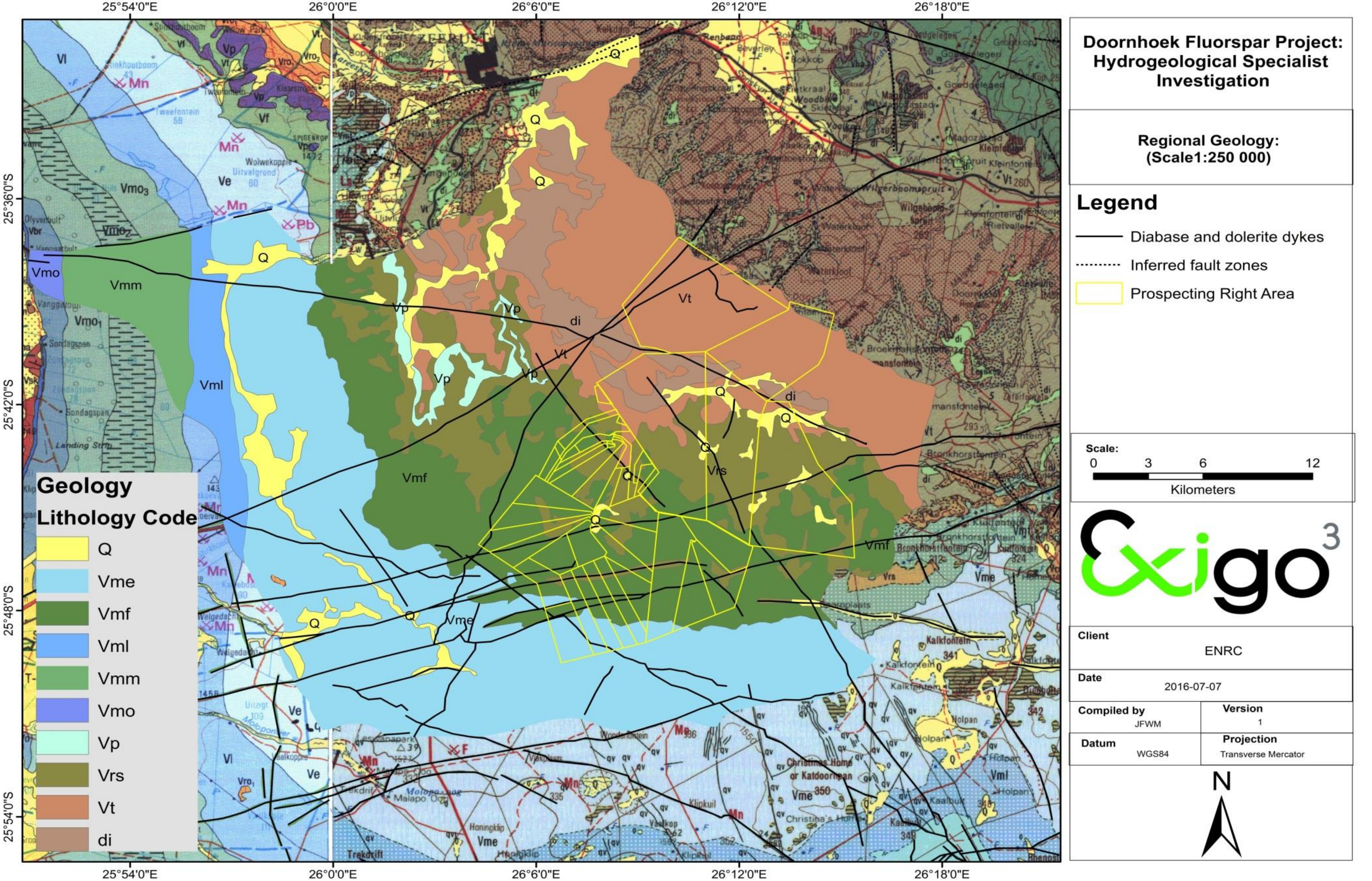

Figure 19: Regional geological map

12.4. Soil

The soils covering the project area can be grouped into different land types. A Landtype unit is a unique combination of soil pattern, terrain and macroclimate, the classification of which is used to determine the potential agricultural value of soils in an area. The landtypes, geology and associated soil types is presented in Table 6 below as classified by the Environmental Potential Atlas, South Africa (ENPAT, 2000). However, it must be noted that soil types are mostly determined by position on the landscape. A landtype map (Figure 20) indicates the location of the landtypes in the area.

Deeper sandy soils are associated with flat topography whilst shallow, rocky soils are associated with the undulating hills and rocky outcrops. Existing agricultural activities are limited to the flat areas of the project area. As a result of the irregular undulating rocky areas, fairly steep rocky slopes, shallow rocky nature of the soils and intensity of rainfall the project area is very susceptible to water erosion, especially on roads and areas denuded of vegetation with a poor herbaceous basal cover.

Table 6: Landtype, soils and geology of the project area

Landtype	Soil	Geology
Ae59	Red-yellow apedal, freely drained soils; red, high base status, > 300 mm deep (no dunes)	Shale, slate, siltstone and hornfels of the Strubenkop, Silverton and Timeball Hill Formations; quartzite of the Timeball Hill and Daspoort Formations; diabase sills present. Rocks possess regional dip of 7 degrees to the north and north-east.
Ac71	Red-yellow apedal, freely drained soils; red and yellow, dystrophic and/or mesotrophic	Shale, slate, siltstone and quartzite of the Rooihoogte and Timeball Hill Formations, with diabase sills in places. Dolomite and chert of the Chuniespoort Group in the south-west.

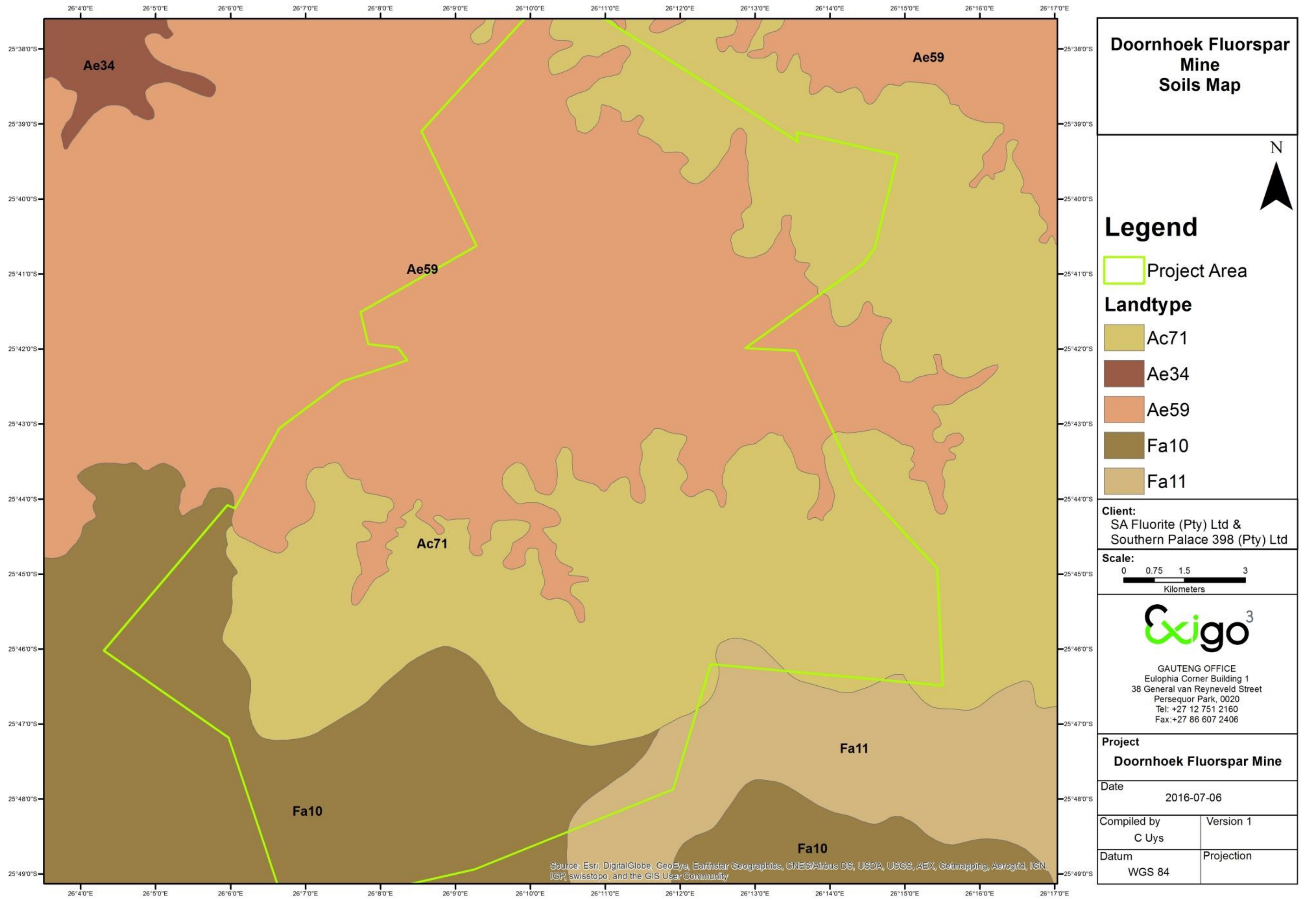

Figure 20: Soil types

12.5. Biodiversity

12.5.1. Vegetation at Doornhoek

The project area lies partially within the Grassland and Savanna Biome and therefore forms an important ecotone between the two biomes. Ecotones are transitional areas between adjacent but different habitats, ecosystems, landscapes, biomes, or ecoclimatic regions (Risser, 1993). Ecotones that are unique entities in the context of climate change are transition zones between ecoclimatic regions. Ecotones have narrow spatial extent, a steep ecological gradient and hence high species richness (Risser, 1993), a unique species combination, genetically unique populations (Lesica and Allendorf, 1994), and high intra-species genetic diversity (Safriel *et al.*, 1994).

Endemic plants

Mucina and Rutherford (2006) identified the following plant species as endemic to the main vegetation types (Carletonville dolomite Grassland and Moot Plains Bushveld) in the region:

- Succulent shrub: *Delosperma davyi*

Red data species

Habitat degradation is one of the main reasons for plant species becoming extinct in a particular area. Threatened species are also seen as indicators of the overall health of an ecosystem (Hilton-Taylor, 1996). Although no threatened species and Species of Conservation Concern were listed for the Grids 2526CC and 2526CA (SANBI, POSA website October 2011), the following red data species was found during the site surveys (Table 7):

Table 7: Red data species found during the vegetation survey

Plant species	Status (NCNCA)	Habitat on site
Boophane disticha	Declining	Rocky grassland, woodland on rocky slopes

Protected Trees

Two tree species listed as protected under the national list of declared protected tree species as promulgated by the National Forest Act (NFA), 1998 (No. 84 of 1998) were observed in the project area. The trees species listed in LEMA and the DAFF protected tree species list have a wide distribution in Southern Africa, although these trees have an importance in terms of medicinal, cultural and heritage value to local communities. The following protected tree species of concern occur in the area:

Table 8: Protected tree species of concern in the project area

Species	National Conservation status	Status in project area	Habitat of species
Acacia erioloba	Protected (NFA)	Isolated	Occur along old wagon-tracks as part of the historical areas of site
Securidaca longipedunculata	Protected (NFA)	Widespread	Shallow rocky soils with a sandy layer above on terraces and plateaus

Medicinal Plants

Medicinal plants are an important aspect of the daily lives of many people and an important part of the Southern African cultural heritage. The impact of the proposed development on populations of medicinal plants will be very little, although certain plants play an important role in the culture. The following medicinal plant species occur in the project area (Van Wyk & Gericke, 1997) as indicated in Table 9:

Table 9: Medicinal plant species and their habitats in the project area

Species	Indigenous / exotic	Status	Habitat of species
Acacia karroo	Indigenous	Widespread	Riparian woodland / floodplains / old fields on fertile soils
Acacia tortilis	Indigenous	Widespread	Woodlands on loamy to clayey soils including floodplains / old fields on fertile soils
Datura stramonium	Exotic	Widespread	Old fields / disturbed land
Dichrostachys cinerea	Indigenous	Widespread	Degraded woodland / natural woodland areas on sandy soils
Dombeya rotundifolia	Indigenous	Widespread	Riparian woodland / mountainous areas
Ehretia rigida	Indigenous	Localized	Termitaria / riparian woodland
Elephanthorhiza elephanthina	Indigenous	Widespread	Sandy plains
Euclea undulata	Indigenous	Widespread	Floodplains along rivers,

Species	Indigenous / exotic	Status	Habitat of species
			riparian woodland and on termitaria
Grewia bicolor	Indigenous	Widespread	All habitats of area
Gomphocarpus fruticosa	Indigenous	Localized	Along floodplains of rivers / in seasonal zones of rivers
Lippia javanica	Indigenous	Widespread	Old fields / disturbed land
Pavonia burchellii	Indigenous	Localized	Shady areas under trees / among rocks
Ricinus communis	Exotic	Widespread	Varied habitats / disturbed land along river courses
Terminalia sericea	Indigenous	Widespread	Deep sandy soils on plains
Typha capensis	Indigenous	Localized	In standing water of pans / rivers
Vernonia oligocephala	Indigenous	Widespread	Throughout many vegetation units of Savanna Biome
Ximenia caffra	Indigenous	Widespread	Bushveld / rocky terrain, termite mounds
Ziziphus mucronata	Indigenous	Widespread	Riparian woodland / floodplains / old fields on fertile soils

The present legislation under the Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983) (CARA), regulation 16, states that bush encroachers, which are indigenous plants, require sound management practices to prevent them from becoming problematic. Typical bush encroacher species that occur in the area listed under CARA (Act No 43 of 1983) is included in Table 10 below:

Table 10: Listed encroacher species for the Doornhoek project area

Species	Status	Habitat of species
Acacia karroo	Widespread	Riparian woodland / floodplains / old fields on fertile soils
Acacia tortilis	Widespread	Woodlands on loamy to clayey soils including floodplains / old fields on fertile soils
Dichrostachys cinerea	Widespread	Degraded woodland / natural woodland areas on sandy soils
Grewia bicolor	Widespread	All habitats of area

Species	Status	Habitat of species
Grewia flava	Localized	Bushveld on floodplains / sandy soils
Terminalia sericea	Widespread	Deep sandy soils on plains

Vegetation Units of the project area

The broad vegetation communities identified on the proposed development site during the desktop surveys are classified as physiographic physiognomic units, where physiognomic refers to the outer appearance of the vegetation, and physiographic refers to the position of the plant communities in the landscape. The physiographic-physiognomic units will be referred to as vegetation units in the following sections. These vegetation units are divided in terms of the land-use and soil differences that had the most definitive influence on the vegetation units.

The broad desktop analysis of the data resulted in the identification of 6 major vegetation / ecological units as indicated below and in the vegetation map. The location of these vegetation units is indicated in the vegetation map, while each of these vegetation units was further classified according to sensitivity into a sensitivity map. Land uses are mostly livestock and game farming. Mixed natural vegetation features as well as numerous drainage sections also occur within the project area.

The broad classification identified seven vegetation units as indicated in Figure 21 as follows:

8. *Stoebe vulgaris – Urelytrum agrypyroides* sour grassland on sandy soils;
9. *Loudetia simplex* rocky grassland on sloping terrain (including outcrops);
10. Grassland ecotone with pockets of bushclumps / very open woodland
11. Mixed Woodland associated with sloping terrain;
    - Dense *Olea europaea – Searsia lancea* woodland on steep / moderately undulating slopes
    - *Protea caffra – Acacia caffra* woodland
    - Mixed *Olea – Searsia – Acacia caffra* undulating woodland
    - Mixed *Protea – Tarchonanthus - Olea* rugged woodland
12. Mixed woodland habitat associated with plains / footslopes
    - Mixed *Searsia lancea – Olea europaea* woodland
    - Bushclumps / archaeological sites (stonewall terrains)
13. Drainage features
    - Mixed *Searsia lancea - Acacia karroo* riparian woodland & adjacent floodplains
    - Springs / eyes
14. Old cultivated fields / cultivated land

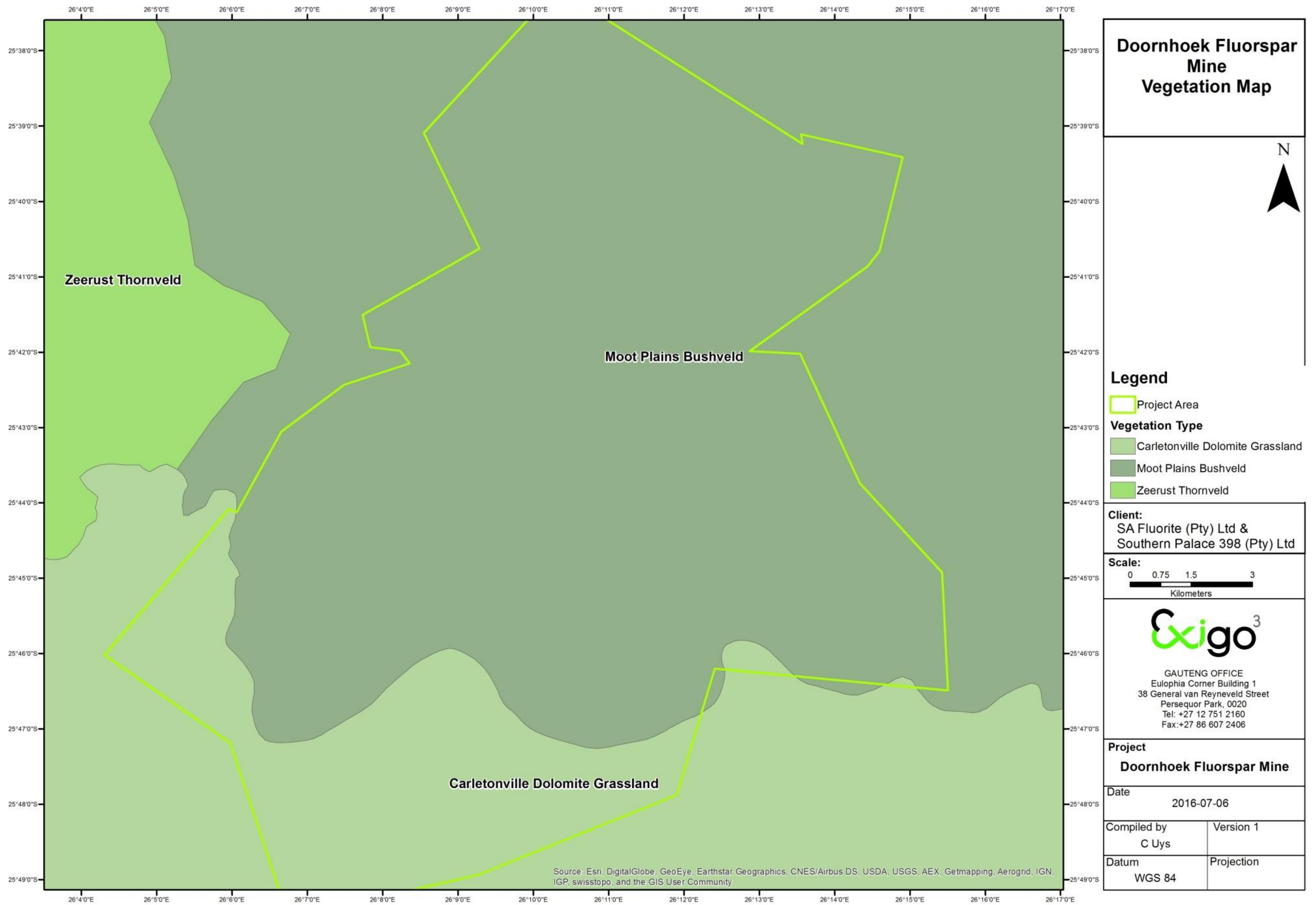

Figure 21: Vegetation Map of the project area

12.5.2. Fauna at Doornhoek

Five main fauna habitats potentially occur in the area namely:

1. Cliffs, rock-strewn hillsides and rocky hillslopes;
2. Riparian woodland and open water habitat;
3. Mixed broadleaf woodland habitat;
4. Grassland habitats
5. Old cultivated fields / degraded areas

Habitat A: Ridges / outcrops

The rocky habitat on site is an important habitat for various fauna species of conservation concern of which the most important would be reptiles (South African python), bats and smaller mammal species. The rocky ridges occupy isolated pockets of the project area. The ridges and outcrops create important microhabitats for fauna on site.

Although larger mammal species may not be as common in this habitat type, smaller species such as the dassie and Jameson's red rock rabbit are important prey species to predators in this habitat type. Dassies are the main prey of leopard in the rocky areas (Walker, 1986). The scavenger, the brown hyena, also seems to prefer these rocky areas to hide during the daytime. Other typical nocturnal animals which may occur in this habitat type include large spotted genet, small spotted genet, and species with a wide habitat tolerance such as, African wild cat, porcupine, pangolin, honey badger and striped polecat.

Habitat B: Open water habitat type and riparian woodland

The open water habitat type is associated with the perennial rivers and dams in the project area (Figure 22). These areas provide habitat and feeding grounds for various amphibians, fish species and avifauna. Mammal species that will specifically utilize this habitat are the Cape clawless otter. Otters are dependent on their food source such as crabs, frogs, fish or other aquatic life in the river ecosystems.

The shallow water habitat that occurs along the dam shores and rivers throughout the year is more suitable for waterbirds that forage along its banks. Threatened birds prefer these dense habitat types associated with riparian woodland in the area.

The riparian woodland along the banks of the riverine systems is important habitat for various birds, mammals and Herpetofauna (reptiles and amphibians).

The unique biota identified on a regional level (not necessarily within the mine focus area) includes:

- **Fish:** The cichlid fish (*Tilapia sparmanii*) is genetically distinct from other known conspecific populations;
- **Insecta:**
  - Four new mayfly (*Ephemeroptera*) species;

- Eight new caddisfly (*Tricoptera*) species, most of these only occurring at the site;

- **Crustacea:** Four new seed shrimp (*Ostracods*) distribution records and one new species

Figure 22: Open water habitat of the Klein Marico River

Habitat C: Mixed woodland associated with plains and valleys

The woodland area of the lower-lying plains and open valleys play an important role as habitat for various generalized fauna species. Birds and arboreal reptiles would utilize the larger tree species for breeding, roosting and foraging.

Habitat D: Pristine grasslands

The grassland habitat occurs in the southern and eastern sections of the project area. It would appear as though the changes in climate and lack of fire have changed most of the grasslands that used to occur in the larger area into woodlands (Grobler, pers. Comm). Grasslands in all their variations are currently one of South Africa's most threatened biomes, with only 2.5% formally conserved and more than 60% already irreversibly transformed. The primary threats to grassland habitat for fauna include degradation and conversion mainly as a result of large scale agriculture development, urbanisation, prospecting and mining. Although the Giant Bullfrog and Oribi used to occur in the grasslands of the area, it would appear as though it disappeared although more studies are needed to show whether this is in fact the case. Species typical of the grasslands in the region include species such as Jameson's red rock rabbit, secretary bird, steenbok and redwing francolin.

Habitat E: Old fields and cultivated land

The region has a long history of agricultural and urban settlement and these areas support a relatively low faunal diversity, with few threatened or sensitive species. However, Savanna and grassland habitats are usually interconnected, allowing easy movement for fauna. The degraded habitat types associated with cultivation and urban areas still provide important feeding grounds to some fauna in the area. The abandoned croplands present in this landscape increase the connectivity by 25%.

12.5.3. Wetlands

Five major wetland types were identified on site namely:

1. Floodplain wetland;
2. Valley bottom wetlands associated with the low-lying valleys of the project area:
    - Channelled;
    - Unchannelled
3. Valleyhead seep wetlands associated with the origin of low-lying rivers and channelled valley bottom wetlands;
4. Hillslope seep wetlands;
5. Depressions:
    - Man-made dams.

The wetland areas are presented in Figure 23. For planning purposes wetland areas were also delineated for a larger area outside of the focus area indicated in Figure 23. A map showing the wetlands within the larger study area is provided below as Figure 23.

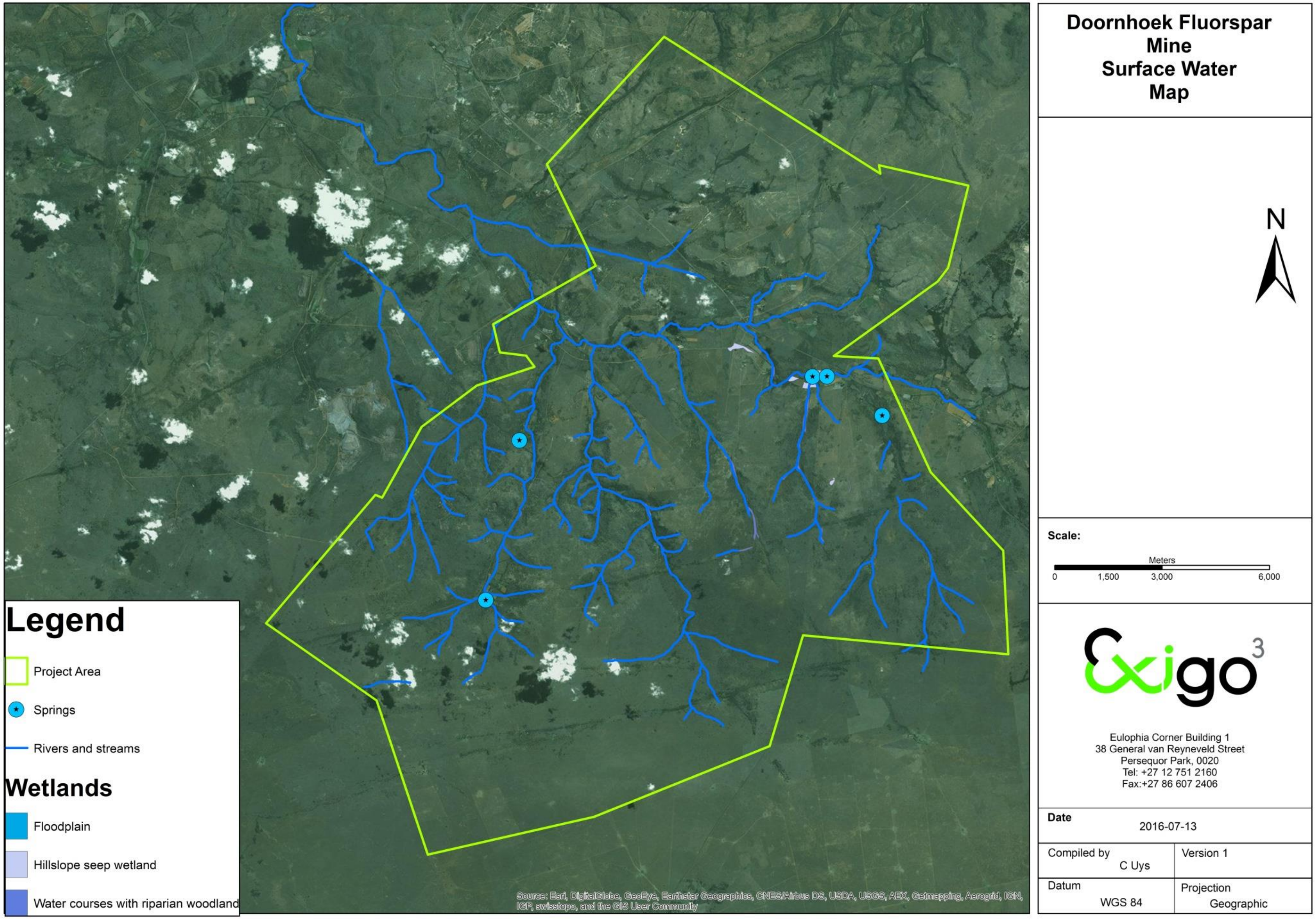

Figure 23 Wetland map for the proposed Doornhoek Fluorspar Mining Right Area

The impacts associated with the site are reflected in the results of the wetland integrity assessments. Evidence was observed on site of transformation of the floristic characteristics of the site. Impacting activities which may have altered the expected floristic composition include overgrazing, impoundments, road crossings, mining and agricultural activities.

All of the above impacts have resulted in the current condition of the wetlands on site departing significantly from the reference or unimpacted condition of the wetland. This is reflected in the results of the PES assessment which indicates that the Klein Marico River floodplains are in a moderately modified condition (PES C) mainly due to alien species invasion, erosion and sedimentation of the river ecosystem, while the tributaries of the Klein Marico is largely in a natural state. The springs and areas below the springs represent the most natural areas within the study area (PES score 4.0 – Class A: Largely Natural). The water quality in the springs is unchanged from reference conditions and the ecosystem largely intact, although canalisation and water abstraction have caused small changes to the ecosystem from reference conditions.

The EIS of the wetland indicated that the springs in the project area and areas below the springs in the valley bottom wetlands is highly sensitive from an ecological point of view considering that many red data fauna utilize this area as a source of water and habitat, while the floodplain wetland of the Klein Marico River have been altered by alien species invasion and impoundments and is an important corridor for the ecosystem at a local scale.

The Hydrological Functional and Importance (HFI) of all the wetland in the project area are considered to be Moderate and play a small role in moderating the quantity and quality of water of the Klein Marico River. The Klein Marico River floodplains and valley bottom wetlands with associated seeps do have a slightly better value in terms of the HFI.

Direct Human Benefits obtained from the wetlands on site were considered to be Moderate for the perennial water sources in the project area (Klein Marico River and springs), while the non-perennial wetlands have a Very Low value in terms of direct human benefit indicating that the locals therefore have a low dependency on the wetland and seldom benefit from it.

12.6. Surface Water

12.6.1. Surface Water at Doornhoek

The study area is situated within quaternary catchment A31D. The focus area is at an elevation of approximately 1450 mamsl. The topography of the catchment gently slopes in a northerly-westerly direction. The mean annual runoff (MAR) determined from quaternary catchment A31D is 9.04 Mm^3/a (WR 2005).

Quaternary catchment A31D falls within the Crocodile (West) and Marico water management area. The quaternary catchment is drained by the perennial Klein Marico River (which drains through the project area), a tributary of the Groot Marico River, which in turn is a tributary of the Marico which flows into the Limpopo River north of the project site.

A general orientation of the project area in relation to the WMA and sub-catchments is given by Figure 24.

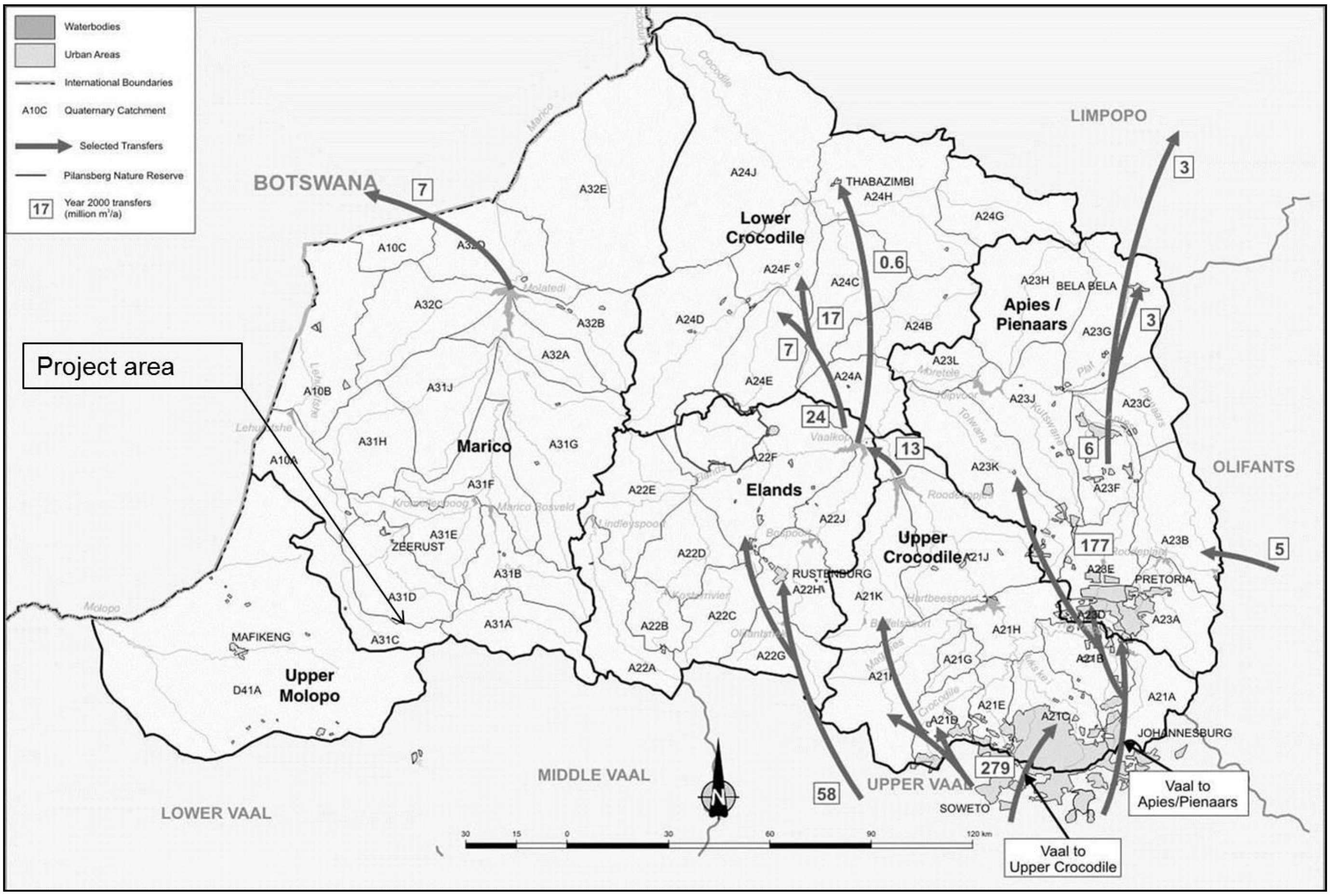

Figure 24 Project area in relation to the Crocodile (West) and Marico WMA

The Marico sub-management area corresponds to the catchment of the Marico River. Main tributaries of the Marico River include the Klein and Groot Marico rivers. This sub-area forms the western part of the WMA. The Groot Marico River is fed by a number of springs within the Groot Marico dolomitic aquifer compartment. These dolomitic eyes include the Molemane Eye and the Marico Eye.

The project area is drained mainly by surface run-off (i.e. sheetwash) with surface water flowing into the rivers and streams that bisect the area. The storm water collects along roads and footpaths cutting through the area, to drain into the regionally channels indicated above. It must be noted that surface flow along these rivers generally only occurs in the period directly after precipitation events or a wet rainy season, and that these rivers may exhibit a large base-flow component with groundwater flow occurring within the sandy sediments lining its channel.

Dolomitic eyes are water bodies fed by groundwater originating from fractures in the underlying dolomite. The fractures and intrusions of geological formations impenetrable to water in the dolomite form aquifers, dolomite compartments and dolomitic eyes. Aquifers are subterranean waterways/tunnels and reservoirs from which water is forced above ground through openings (fractures), which are called dolomitic eyes or springs. The dolomite area covers approximately 4022 km^2 of the North West Province and forms the main watershed of the east-flowing Limpopo River system and the west-flowing Molopo River. The interdependence of ground and surface water is apparent in the ecology of the dolomitic eyes. These eyes are influenced by the water quality and quantity of both the surface water and the ground water. The sources of the Molopo, Molemane and Marico rivers are unique dolomitic eyes (springs) and associated wetland systems.

An Aquatic Ecology Feasibility Study was undertaken by Scientific Aquatic Services in October 2014, where the Present Ecological State of the aquatic resources in the vicinity of the study area was assessed. A further study of the aquatic resources present was conducted in May 2016 as part of the baseline assessment for the proposed Doornhoek mining project. A literature review was undertaken and the aquatic Ecological Importance and Sensitivity (EIS) assessment performed is in agreement with literature cited. Based on the findings of the assessment it is evident that aquatic features associated with the Klein Marico River have an EIS which can be considered moderate to high. The Klein Marico River system can therefore be defined as being unique on a local to national scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species), not usually very sensitive to flow modifications and often have substantial capacity for use.

Figure 25 visually presents the locations of the various points along the various river systems, assessed, while Table 11 presents a description of the monitoring points.

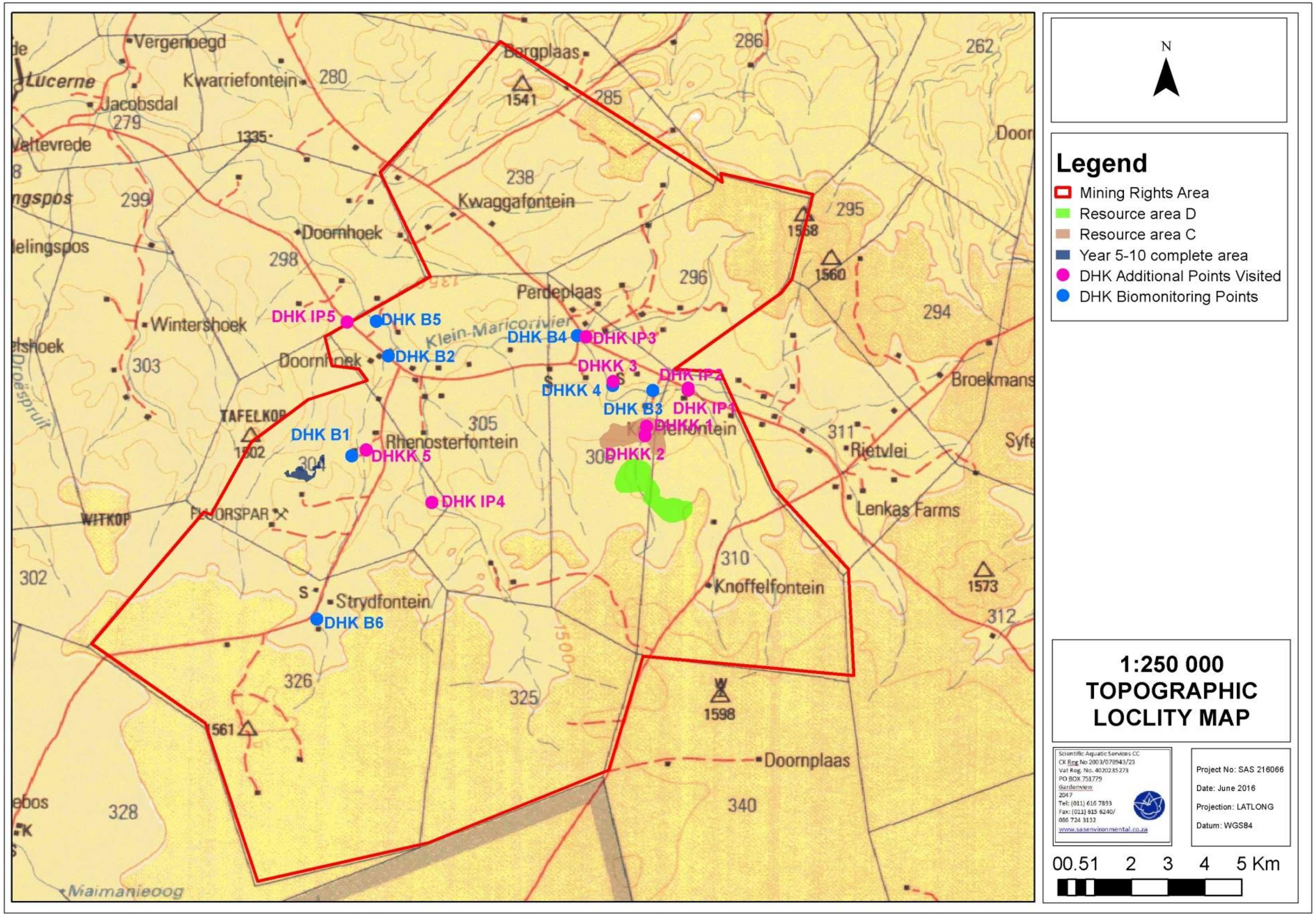

Figure 25 Riverine aquatic ecological assessment points presented on a 1:250 000 topographical map (Scientific Aquatic Services, 2016)

Table 11 Location of the biomonitoring points

Site	Detailed Site Description	GPS coordinates	
		South	East
DHK B1	A spring forming the source of a major unnamed tributary of the Klein Marico river	25°43'15.63"	26° 8'7.98"
DHK B2	A point further downstream on the unnamed tributary of the Klein Marico River and downstream of all possible mining activities	25°41'47.50"	26° 8'40.29"
DHK B3	The most upstream point on the Klein Marico river, a short distance downstream of one of the main springs feeding the system	25°42'18.05"	26°12'33.33"
DHK B4	A point located in the middle of the segment of interest of the Klein Marico River	25°41'29.66"	26°11'26.75"
DHK B5	A point located on the downstream edge of the segment of interest of the Klein Marico River and downstream of all potential mining activities	25°41'16.85"	26° 8'29.55"
DHK B6	A spring forming the source of an unnamed tributary of the Klein Marico River	25°45'39.40"	26° 7'37.38"
DHK IP1	The Spring on the Klein Marico River located to the east of the proposed mining area	25°42'17.71"	26°13'4.67"
DHK IP2	Upstream of the Spring on the Klein Marico River located to the east of the proposed mining area	25°42'15.87"	26°13'4.44"
DHK IP3	A small drainage line feeding into the Klein Marico river in the vicinity of point DHK B4	25°41'30.76"	26°11'34.39"
DHK IP4	A Major drainage feature feeding into the Klein Marico River and indicated as the Klein Marico river on some maps	25°43'56.65	26° 9'18.81"
DHK IP5	An unnamed tributary of the Klein Marico River on the western edge of the study area and located downstream of an existing mining operation	25°41'17.81"	26° 8'4.00"
DHKK 1	A small drainage line feeding into the Klein Marico river upstream of point DHK B3	25°42'82.5"	26° 12'4.63"
DHKK 2	A small drainage line feeding into the Klein Marico river upstream of point DHK B3 and DHKK 1.	25°42'96.4"	26° 12'4.44"
DHKK 3	A point located in the middle of the segment of interest on the Klein Marico River between sites DHK B3 and DHK B4.	25°42'16.6"	26° 11'9.71"
DHKK 4	A point located in the middle of the segment of interest on the Klein Marico River between sites DHK B3 and DHK B4 and upstream of site DHKK 3.	25°42'22.7"	26° 11'9.70"
DHKK 5	A small drainage line feeding into an unnamed tributary of the Klein Marico river in the vicinity of site DHK B1.	25°42'17.3"	26° 8'3.47"

Table 12 the next page summarizes the results obtained for the respective sites assessed. The following are key concepts in order to understand the table below:

- Intermediate Habitat Integrity Assessment (IHIA) - Method to rate habitat integrity of riverine taking habitat conditions and impacts into consideration.

- Invertebrate Habitat assessment System (IHAS) - Used to determine specific habitat suitability for aquatic macro-invertebrates, as well as to aid in the interpretation of the results of the South African Scoring System version 5 (SASS5) scores.
- Vegetation Response Assessment Index (VEGRAI) - Designed for qualitative assessment of the response of riparian vegetation to impacts in such a way that qualitative ratings translate into quantitative and defensible results.
- South African Scoring System 5 (SASS 5) Dickens & Graham (2001) – Assessment of Aquatic macro-invertebrate communities in order to assess river health.
- Macro-invertebrate Response Assessment Index (MIRAI) – Assessment of the four major components of a stream system that determine productivity, with particular reference to aquatic organisms, are flow regime, physical habitat structure, water quality and energy inputs.
- Fish Response Assessment Index (FRAI) - Index employs preferences and intolerances of the reference fish assemblage, as well as the response of the actual (present) fish assemblage to particular drivers to indicate a change from reference conditions

Table 12 Summary of aquatic assessment results

Index		Unnamed tributary of the Klein Marico River		Klein Marico River			
		DHK B1	DHK B2	DHK B3	DHK B4	DHK B5	DHKK 4
IHIA	October 2014	D	D	B	B	C	NA*
	May 2016	D	D	C	C	NA*	A
IHAS	October 2014	Inadequate	Inadequate	Borderline adequate	Inadequate	Inadequate	NA*
	May 2016	Adequate	Inadequate	Inadequate	Inadequate	NA*	Inadequate
VEGRAI	October 2014	B		E			
	May 2016	B		E			
SASS5 Dickens and Graham (2001)	October 2014	E	D	D	D	D	NA*
	May 2016	C	E	D	D	NA*	D
SASS5 Dallas (2007)	October 2014	D	A	D	C	D	NA*
	May 2016	D	E/F	D	D	NA*	D

MIRAI	October 2014	D	D	C	C	C	NA*
	May 2016	C	D	D	C	NA*	C
FRAI automated	October 2014	F		F			
	May 2016	E/F		E			
FRAI refined	October 2014	D/E		D/E			
	May 2016	D/E		D			
Integrated Ecological Category		C	C/D	D	C/D	C/D	C

Based on the findings of the aquatic study, both the unnamed tributary and Klein Marico River can be considered water stressed systems with moderate ecological importance and sensitivity.

Although not collected from the sites assessed, Marico barbs (*B. motobensis*) may potentially occur within the larger regional area based on known distribution. This species is a vulnerable red data list species and care should be taken to avoid larger scale impacts within the system.

The overall PES for the Klein Marico River, which occurs in the vicinity of the proposed Doornhoek mining project, appears to improve in a downstream direction and fall into largely to moderately modified conditions (Class D to Class C). The overall PES of the unnamed tributary of the Klein Marico Tributary decreases slightly in a downstream direction, but may also be classified as largely to moderately modified from natural conditions (Class D to Class C). The overall Integrated Ecological Category for these two systems thus fall within the Desired Ecological Management Class (according to the DWS RQS PES/EIS database) for a stream of this nature in the Klein Marico River Catchment. Prior to any potential impacts from mining, the systems present are already under considerable threat from the following:

- Reduced in-stream flow, stream connectivity and catchment yield;
- Impacts from cattle watering and agricultural return flows;
- Deteriorating water quality with specific reference to salinization and decreased oxygen levels resulting from the impacts mentioned above;
- Alien vegetation encroachment;
- Erosion; and
- Sedimentation.

It is deemed essential that all effort is made to ensure that impacts on the Klein Marico River and tributaries as a result of the proposed mining project are minimised. Specific mention is made of mining activities that will affect in-stream flow and stream connectivity, negative impacts on water quality, erosion and sedimentation. In addition, impacts from alien vegetation encroachment in the catchment may also occur.

12.7. Groundwater

12.7.1. Aquifer geometry and boundaries

The predominant geological units consist of dolomites, cherts and shales. Weathering of the Pretoria group shales and quartzites, the upper most lithological units in the study area, creates a good medium for groundwater storage and likely permit significant flow where bounded by a diabase sill which commonly intersects the strata. The underlying dolomitic package likely has variable permeability largely governed by the presence and absence of chert layers.

A band of chert underlies the laminar dolomites and overlies the main mineralisation zone. The cherts are likely to exhibit appreciable groundwater flow. Below the mineralisation zone the dolomites are characterised as massive and again secondary structures form preferential flow paths for groundwater flow.

Sub-vertical dolerite and diabase dykes cross cut the sedimentary units of the region. These dykes are inferred to have low permeability relative to the country rock and thus act as barriers to groundwater flow and essentially compartmentalise the aquifer. This inference was based largely on the occurrence and location of a spring within the study area.

In order to map the horizontal extent of the aquifer zones and the characteristics of the dolerite dykes compartmentalising the aquifer, the following data was obtained/evaluated:

- The airborne geophysical survey conducted by Xcallibur.
- 1:250 000 geological maps of the study area (Rustenburg 2526 and Mafikeng 2426).
- Known localities of springs were also plotted.
- Geophysical gravity survey on selected structures was conducted.

Error! Reference source not found. depicts the regional geology and hydrostratigraphic units within the project area.

12.7.2. Compartment mapping

Through evaluation of the data sources described above, the dykes structures in vicinity of the proposed mine were mapped. The identified dykes were then overlain across a simplified geological map and compartments were mapped according to the intersecting dyke structures.

Twenty-three compartments were identified. The focus area of the proposed mine is situated over three compartments demarcated as compartments 1, 2 and 3. The identification of springs along the dyke separating compartments 1,2 and from 4 and 5 indicates that the dyke is likely semi-impermeable to impermeable. Therefore water table drawdown associated with a mining operation in compartments 1,2 and 3 are likely not to extend southerly into compartments 4 and 5. This is evaluated further in ensuing sections.

No springs are yet to be identified on the dyke separating compartment 1 and 19 thus this dyke is not necessarily impermeable and the drawdown associated with mine dewatering may possibly extend easterly into compartment 19. Similarly no springs have yet been identified on the dyke separating compartments 3 and 9 thus drawdown associated with mining operation may extend westerly into compartment 9.

Springs have been identified on the dyke defining the northern boundary of compartment 19, this likely indicates that this dyke has low permeability and dewatering in the focus area is unlikely to impact on water users north of the focus area, i.e. in compartment 20.

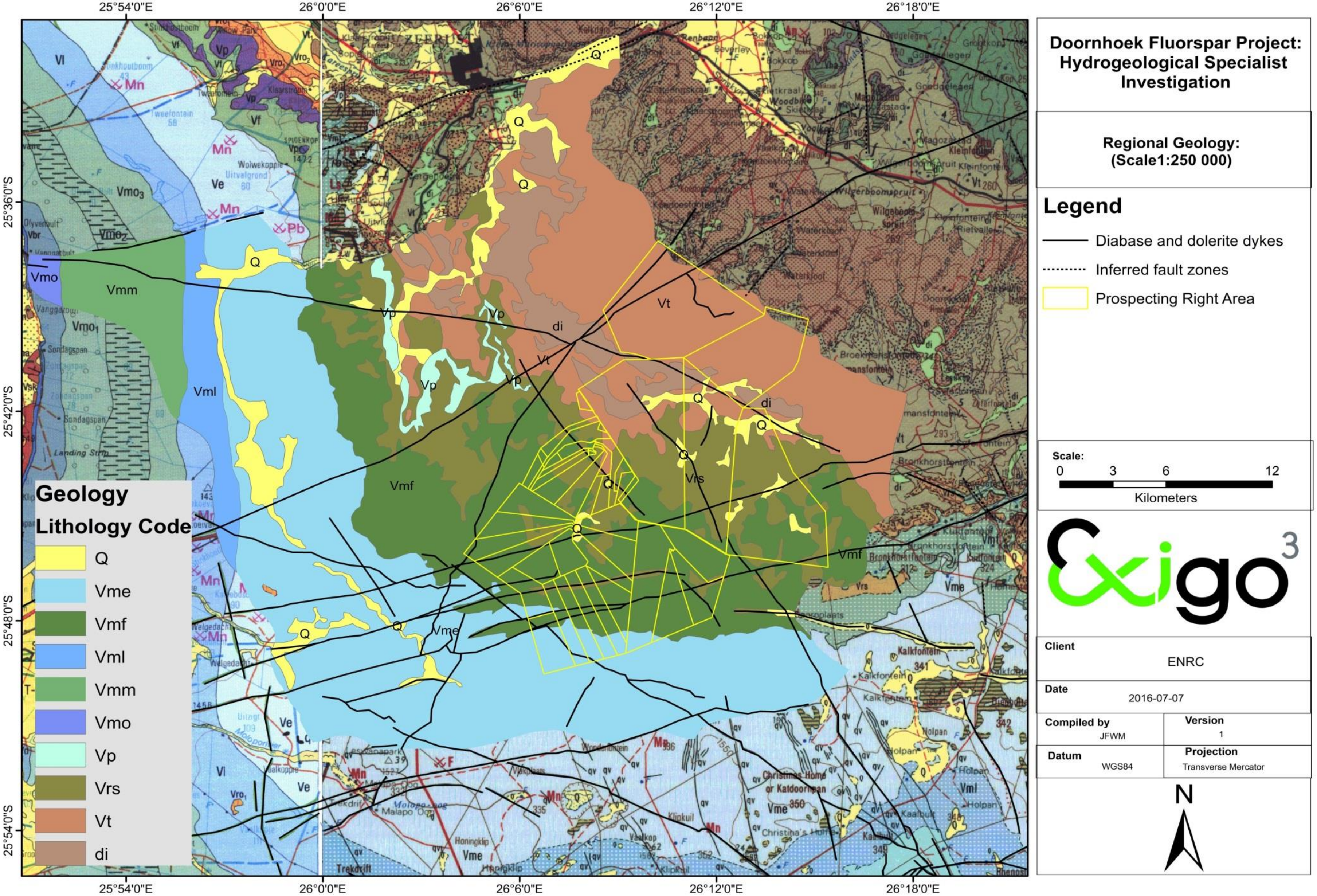

Figure 26 Regional geology and hydrostratigraphic units

12.7.3. Characteristics of the dolerite/diabase dykes

The nature of the dykes compartmentalising the aquifer zones is of significance when predicting the impact of the proposed mine. As such a geophysical gravity survey was conducted to enhance the understanding of these structures.

It was found that the dykes structures are typically 50 -90 m wide. The dyke separating compartments 1 and 19 was found to have a low density than the surrounding country rock. It was therefore inferred that the dyke is highly weathered and thus is unlikely to act as semi-impermeable barrier between compartments. This inference is supported by the lack of identified springs along the structure.

The dykes structure separating compartments 1,2 and 3 from compartments 4 and 5 (south of the resource) displayed a positive gravity anomaly compared with the dolomitic country rocks and was inferred to represent un-weathered diabase. Weathered margins adjacent to the dyke structure could not be identified. The dyke has a thickness of approximately 50 m.

The dyke structure separating compartment 3 and 9 did not show a significant anomaly compared with the other structures targeted. This finding was alike to the observation made based on the magnetic data. Due to a lack of springs observed on this structure is probable that this dyke is not impermeable and hence an interconnection between compartment 3 and 9 exists. This will be required to be validated through long duration pump tests.

The dykes cross cutting the resource are where found to have an impermeable centre zone and highly weathered margins. While hydraulic testing is required, it is likely that these structures provide preferential flow path for groundwater and as such may result in significant groundwater inflows to the proposed open pit.

12.7.4. Aquifer parameters (Hydraulic conductivity and Storativity)

As no boreholes were drilled and no pumping tests were conducted in this phase of work an estimation of the aquifer parameters was determined through conducting falling head tests. Typical of fractured aquifers it was found that the hydraulic conductivities are controlled by structures. The tests were conducted on the dolomites and cherts within the area. No tests were carried out on the quartzits and shales north of the focus area – a data gap which will be required to be closed in ensuing phases.

The dolomite and chert rock matrix is typically of low hydraulic conductivity. The median value obtained is 0.05 m/d. While boreholes located on the dyke margins show median hydraulic conductivity values in the order of 4.3 m^2/d.

As no pumping tests have been conducted, the storativity of the aquifer has not yet been determined and is only estimated based on literature.

12.7.5. Recharge

The water chemistry in the study area typically has a Ca-Mg-HCO3 signature which is indicative of freshly recharged groundwater. The low chloride concentrations observed in groundwater coupled with moderate rainfall conditions is further evidence of high recharge on the dolomite aquifers.

Due to the low chloride concentrations (harmonic mean <2 mg/l), the chloride mass balance method for determining recharge is not accurate. Methods such as the cumulative rainfall departure method (CRD) or Water table fluctuation (WTF) methods can cannot be utilised due to limited data.

- According to the Vegter recharge map recharge in the area is on the order of 65 mm/a in southern portion of the catchment, decreasing to approximately 45 mm/a in the northern portion of the catchment.
- According to the Harvest Potential Map, recharge within the catchment is in the order of 25 - 50 mm/a.
- Based on the Acru map, recharge to the vadose zone is in the order of 10 mm/a.

12.7.6. Water users and usages

The registered water users located in quaternary catchments A31D and A31C were sourced from the Department of water affairs (DWA) Water use authorisation and registration management system (WARMS). Water users that do not receive their water from a service provider, local authority, water board, irrigation board, government water scheme or other bulk supplier and who are using water for irrigation, mining purposes, industrial use, feedlots, or in terms of a General Authorisation must register on this database.

The registered water users per compartment are provided in Table 13. There are 50 registrations in the vicinity of the proposed mine. Eighteen of these registered users occur within compartments 1, 2 and 3 are thus likely to be effected by mine dewatering at the proposed operations. The largest number of registered users occurs in compartment 19 east of the focus area. As discussed in previous sections there is possibility for groundwater drawdown associated with the mining activities to impact this compartment, thus these users may potentially be affected by the proposed operation.

The compartment with the highest registered water use is compartment 9. These allocations are registered to the Witkop Mine operation. This operation is however no longer active and this allocation is unlikely being utilised annually.

Table 13 Registered Water Users- Warms database.

Compartment	No of registrations	Total of all registered volumes (m^3/a)
Compartment 1	12	194517
Compartment 19	20	234977
Compartment 2	4	59757
Compartment 20	6	257710

Compartment 3	2	96606
Compartment 4	2	86880
Compartment 5	2	116741
Compartment 9	2	2324000
Total	**50**	**3371188**

12.7.7. Hydrocensus User Survey

A hydrocensus as part of the pre-feasibility phase of the project was conducted between the 18th to the 21st of July 2013 and was reported on in Ages Report No. G 13/030 2013-07-29. An updated hydrocensus survey was also conducted during May 2016. As the hydrocensus forms the basis of the numerical modelling exercise detailed in ensuing sections, the work conducted and the major findings from the prefeasibility hydrocensus have been listed below.

Hydrosensus 2013:

- A total of 59 sites were visited over this period. This included 53 boreholes, 5 springs and 1 surface water site. Several surface water sites were included in the hydrocensus planning however upstream of the proposed mine area the stream beds were dry and therefore could not be sampled.
- Of the sites visited 68% serve as water supply sources while the remaining 32% are not in use. The principle water uses are domestic consumption, livestock watering and irrigation. Of the 53 boreholes visited 38 were equipped with pumps. 77% were equipped with submersible pumps, 10% with mono pumps, 8% with wind pumps and 3% with wind pumps and submersible pumps.
- The general condition of the boreholes, the number of sites in use and the equipment fitted to boreholes indicates a reliance on groundwater resources in the area.
- A total of 46 water levels were measured during the June 2013 hydrocensus. Three wells were artesian, 39 wells were static, 3 wells were recovering and 1 well was pumping. The average, maximum, minimum and standard deviation of the wells per compartment is given is indicated in Table 14. Also refer to Figure 27.

Table 14 A statistical analysis of water levels per compartment (hydrocensus2013).

Compartment no.	Average (mbgl)	Maximum (mbgl)	Minimum (mbgl)	Standard deviation	Number of wells
Compartment 1	15	77	0	20.6	13
Compartment 2	11.7	16	4.2	4.5	5

Compartment 3	16.8	44.1	6.2	26.8	2
Compartment 4	14.6	22.6	4	7.8	4
Compartment 5	20.2	37.4	0	18.9	3
Compartment 9	4.4	5.1	3.7	0.5	5
Compartment 19	13.2	17.6	4.6	5.3	5
Boreholes North of site	29.8	79.5	10.3	23.4	7

- The standard deviation calculated for compartments 1, 3, 5 and boreholes north of the project site is high. This indicates large variability between measured water levels in these compartments.
- The maximum water level of 77.00 mbgl in compartment 1 correspond to an abandoned mine shaft in this compartment. The water level in the shaft was in 2011 was approximately 23 mbgl, subsequently the shaft was dewatered resulting in the 2013 measured water level.
- Boreholes D132 and DH123 are used for water supply explaining the drawdown in these wells compared to others in the compartment. With the exception of these three boreholes there is similarity in observed water levels of compartment 1 and compartment 2.
- Only two water levels could be measured in compartment 3. The high standard deviation is a consequence of too few samples. Of interest however, Borehole DH 108 has a measured water level of 44.12 mbgl. This borehole is not equipped and therefor is not being pumped. This well is situated just north of the dyke separating compartment 3 and 5.
- SNF 01 is situated just south of this dyke and is artesian. The discrepancy in water level at the two sites situated approximately 600 m from one another confirms the interpretation that the dyke separating the mentioned compartment is impermeable.
- The variability of water levels measured north of the project site is attributed to over abstraction. This is particularly evident at borehole DHK 02 which has measured water level of 79.5 mbgl (the deepest in the study area).

Hydrosensus 2016:

- A total of 116 sites were visited over this period. This included 112 boreholes, 3 springs and 2 surface water site..
- Of the sites visited 78% serve as water supply sources while the remaining 22% are not in use. The principle water uses are domestic consumption, livestock watering

and irrigation. Of the 112 boreholes visited 83% were equipped with pumps. 75% were equipped with submersible pumps, 10% with mono pumps, 12% with wind pumps and 3% with wind pumps and submersible pumps.

- The general condition of the boreholes, the number of sites in use and the equipment fitted to boreholes indicates a reliance on groundwater resources in the area.
- A total of 92 water levels were measured during the May 2016 hydrocensus. The average, maximum, minimum and standard deviation of the wells are indicated in Figure 28.
- Figure 29 and Figure 30 indicate the relative depth to groundwater as well as regional groundwater flow direction for the proposed project area and visited hydrocensus localities.

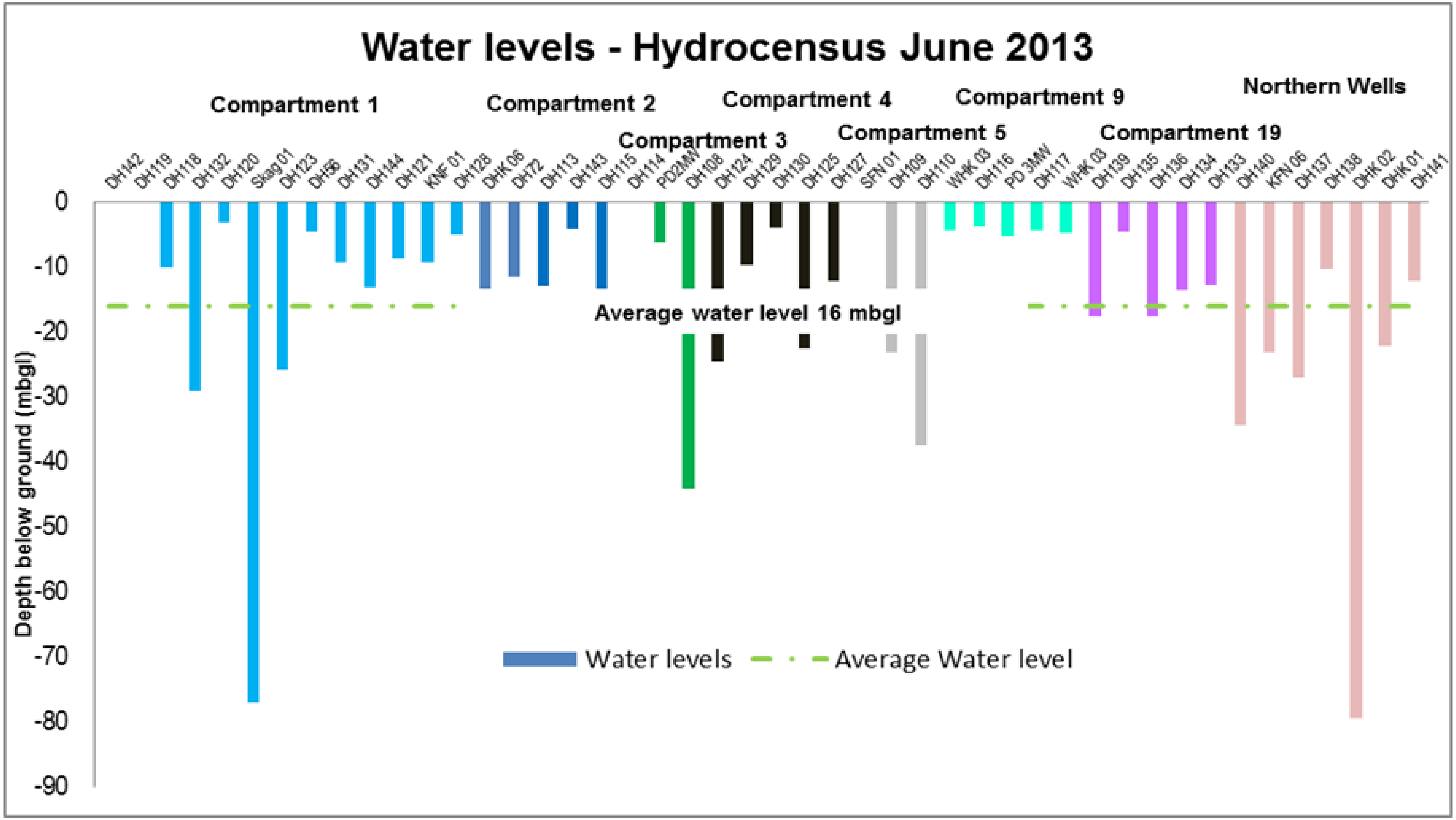

Figure 27 Measured water levels – hydrocensus 2013.

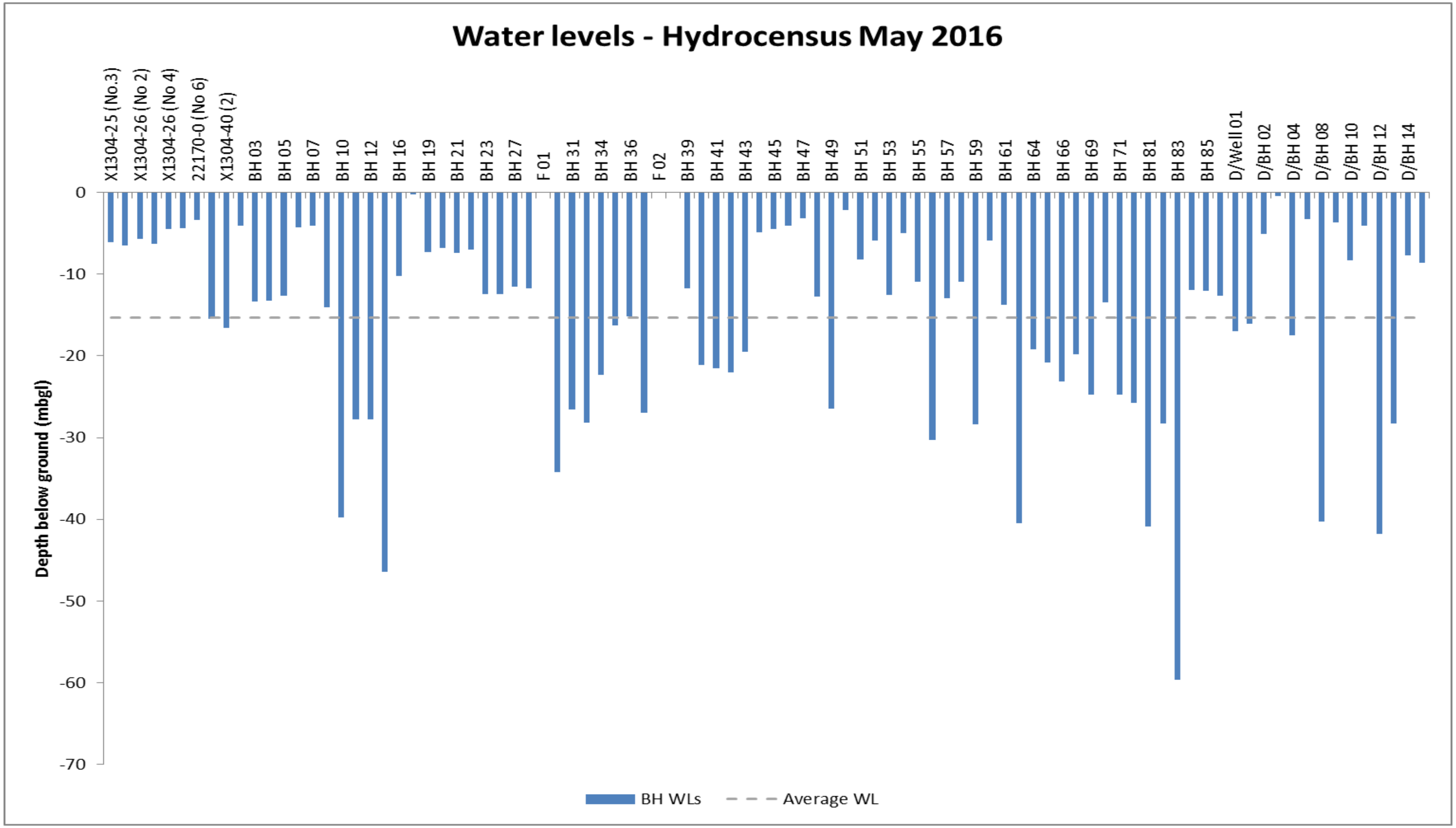

Figure 28 **Measured water levels – hydrocensus 2016.**

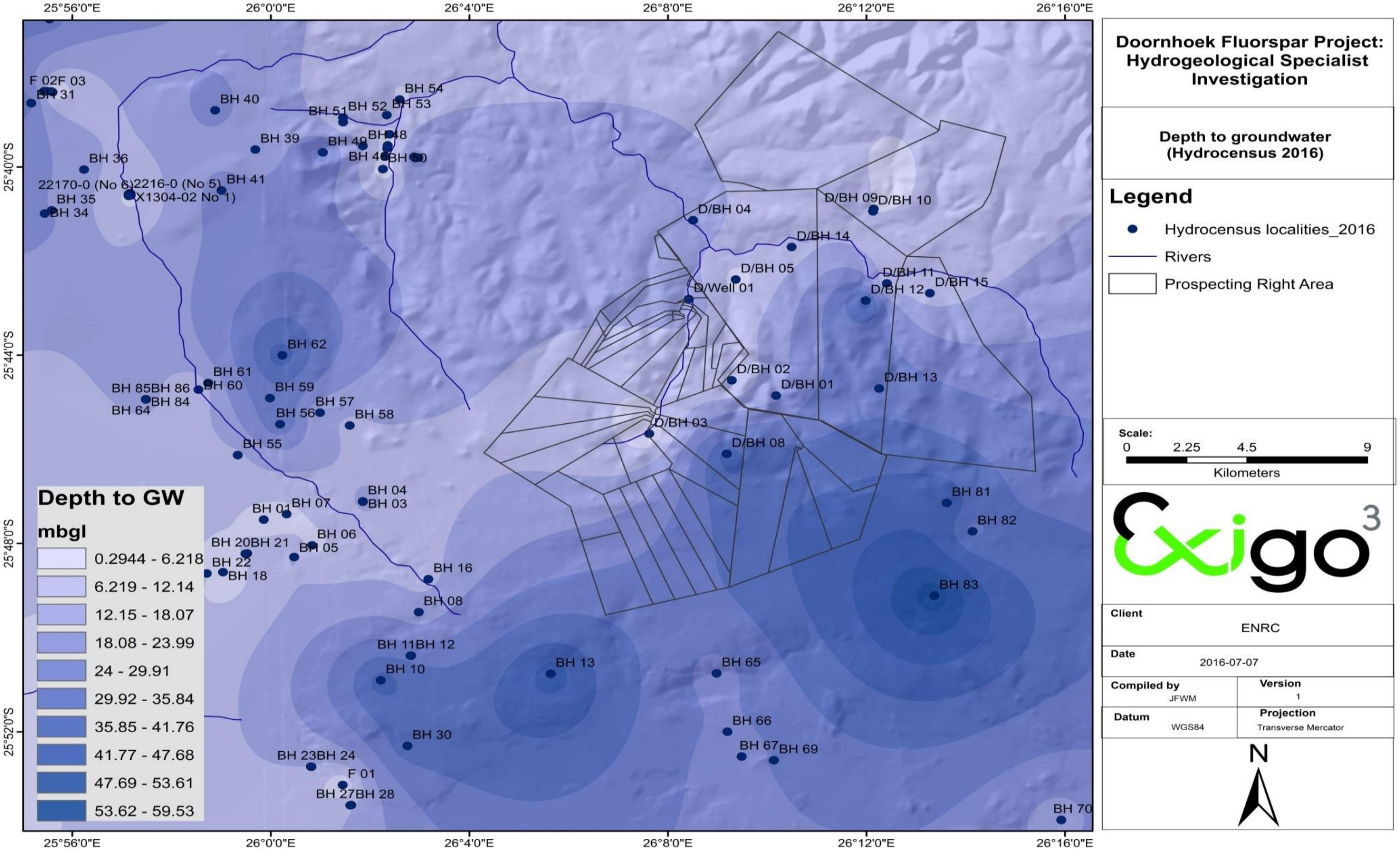

Figure 29 **Depth to groundwater.**

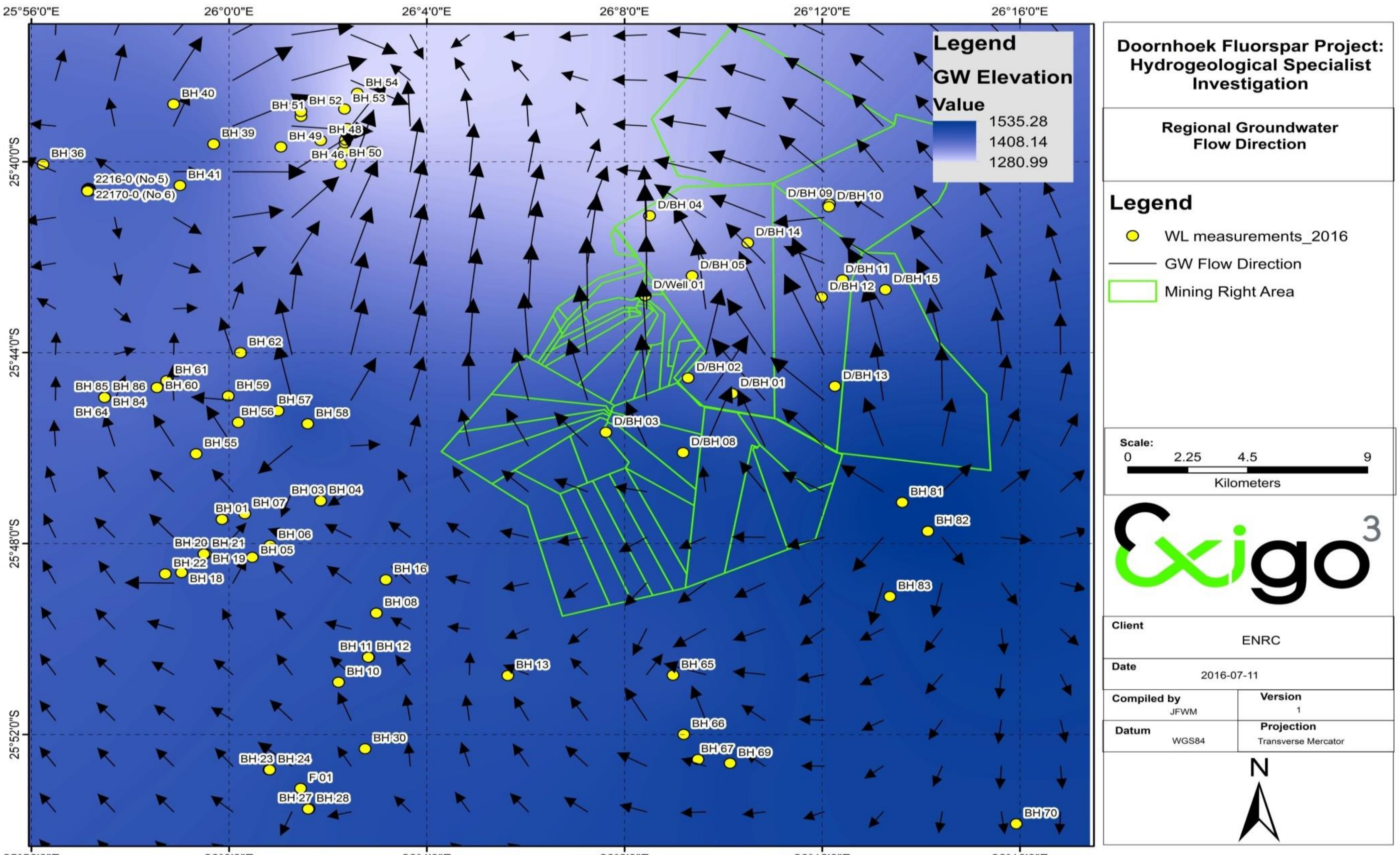

Figure 30 Groundwater elevation and flow directions.

12.7.8. Hydrochemistry

The major findings from the hydrochemistry study are listed as follows:

- Groundwater quality of the selected sampling sites is in accordance with most constituent concentration limits specified in SANS 241:2011. Exceptions include elevated fluoride which is a consequence of the fluorspar deposits in the study area, manganese which is commonly associated with dolomite aquifers and elevated selenium which was only observed in the May 2013 monitoring data, this trend should be evaluated in future monitoring (Figure 31 and Figure 32).
- The water quality of boreholes in compartment 9 is of inferior water quality likely owing to mining activities at the Witkop mine. With the exception of this compartment the water chemistry is typical of rock water interaction.
- The current land uses do not negatively impact on groundwater quality in the study area.
- The water chemistry in the study area typically has a Ca-Mg-HCO_3 signature which is indicative of freshly recharged groundwater. The low chloride concentrations observed in groundwater coupled with moderate rainfall conditions is further evidence of high recharge on the dolomite aquifers.
- Figure 33 depicts the spatial hydrochemistry distribution of sampling localities.

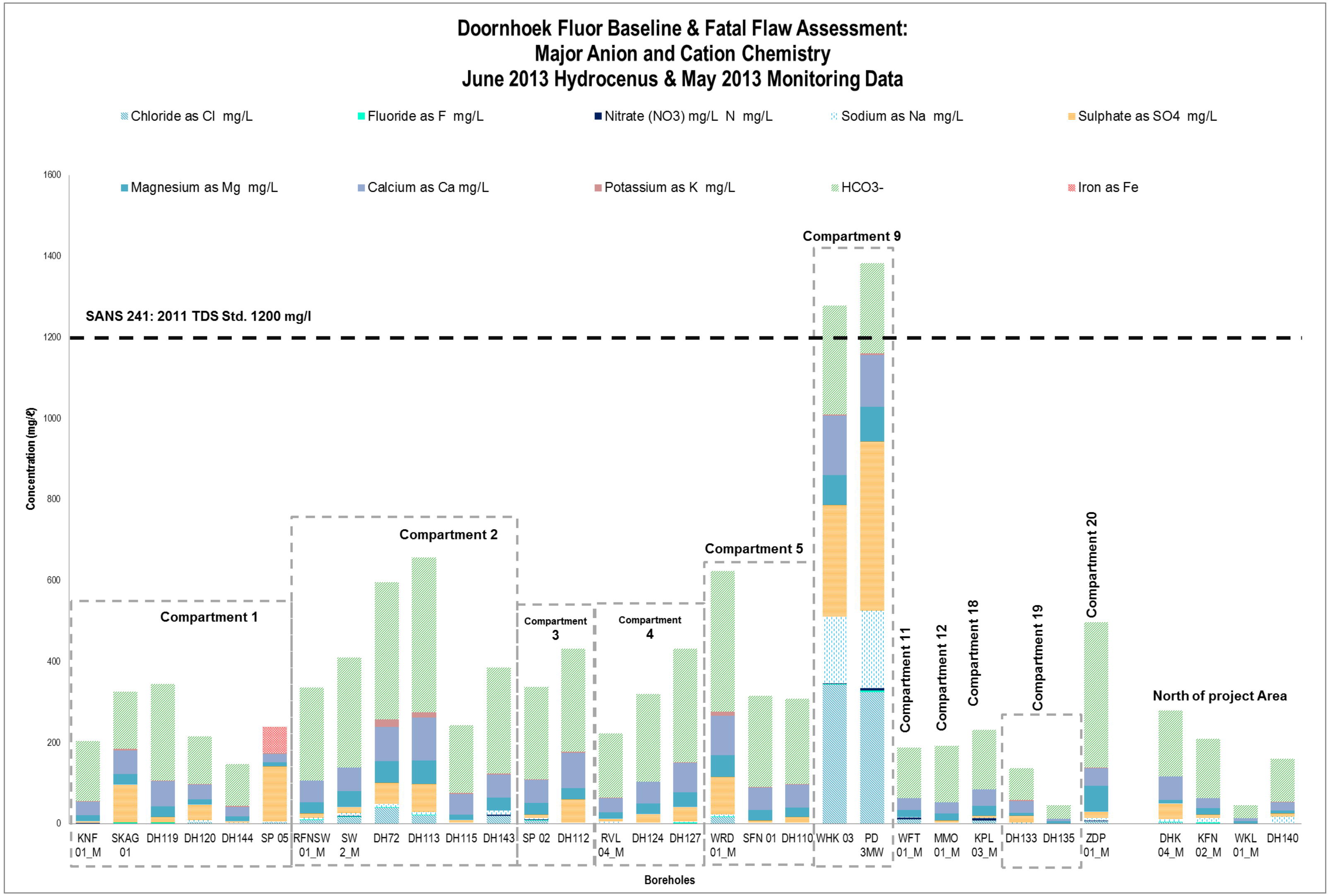

Figure 31 Hydrochemistry 2013

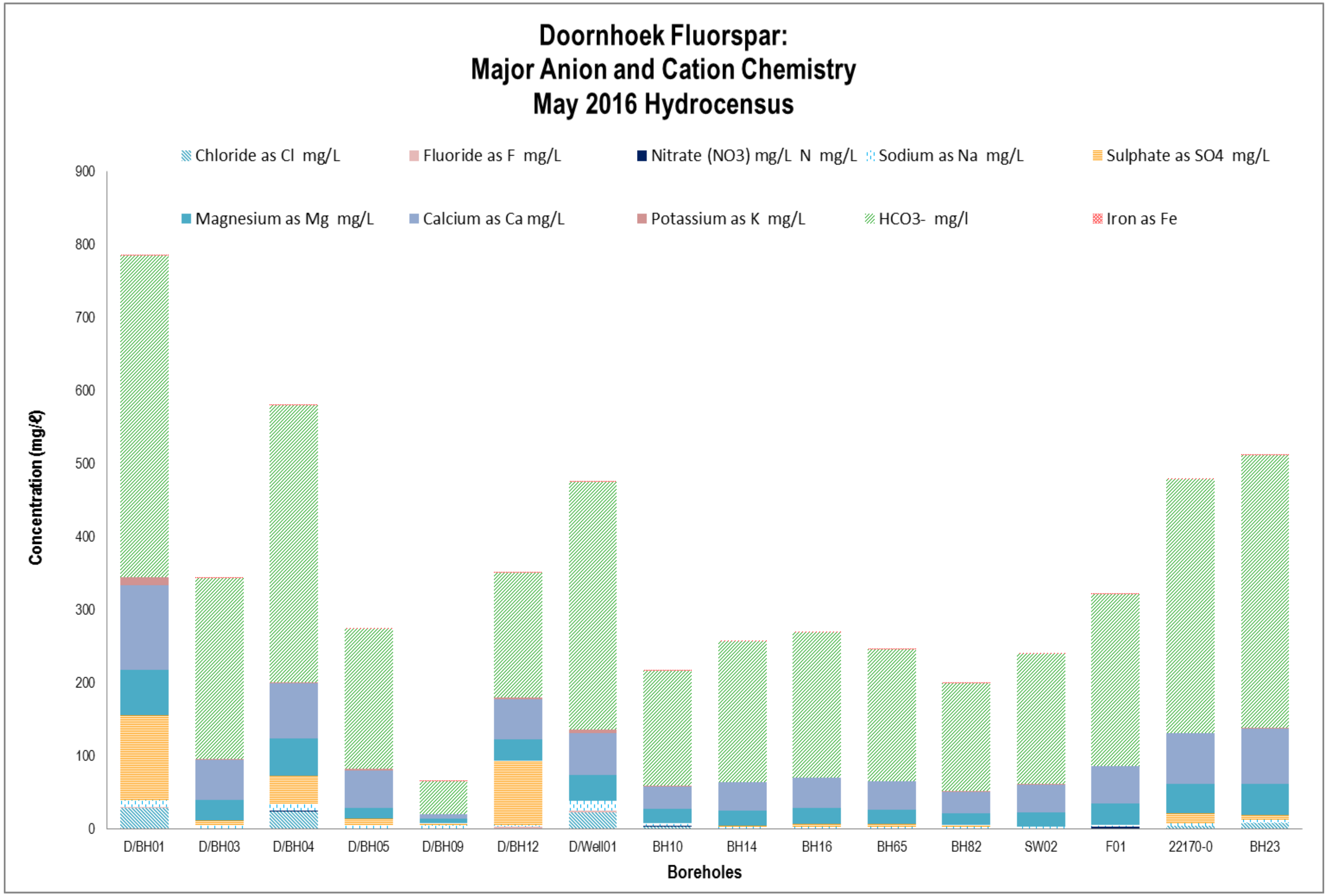

Figure 32 **Hydrochemistry 2016**

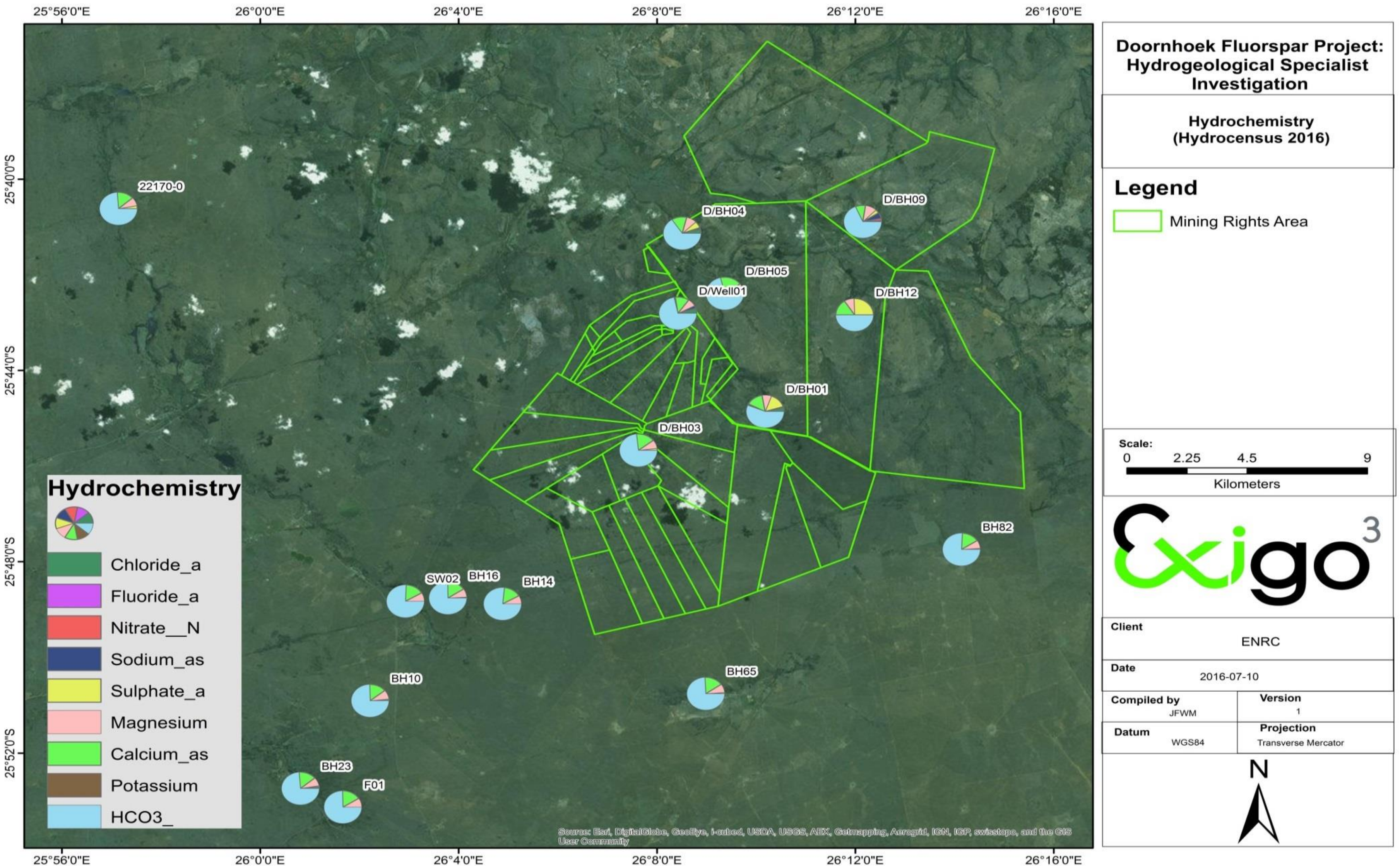

Figure 33 Spatial distribution hydrochemistry – hydrocensus 2016

12.7.9. Conceptual groundwater flow model.

A conceptual hydrogeological model was developed to represent site conditions. The conceptual model will form the basis for the development of the numerical groundwater flow model. Data gathered during site investigations was incorporated into the conceptual groundwater model. For a typical hydrogeological setting, groundwater flow is controlled by sub-surface structural geology as well as topography. Relevant hydrogeological parameters are also included, with potential environmental receptors. The numerical groundwater flow model will be used as management tool to simulate best practise scenarios. The components of the conceptual model are displayed schematically in Figure 34.

12.7.10. Geochemical Risk Assessment

A geochemical assessment of mine waste leachate potential, which is aimed at identifying potential geochemical risks associated with the tailings and overburden, was conducted for the Doornhoek Fluorite project by Exigo in 2014 as part of a baseline assessment. The study included an assessment of acid mine drainage (AMD) by using static acid base accounting (ABA) and net acid generation (NAG) tests.

The study also included an assessment of potential geochemical risks associated with the leaching of potential contaminants from effluent leaching from the waste material. A static distilled water leach test, which also forms part of the current NEMWAA regulations, was used and analysed. The results were compared to the SANS 241-1:2011 drinking water guideline values.

A mineralogical analysis was also conducted, which confirmed the abundance of carbonate minerals, especially dolomite [CaMg(CO3)2]. It also showed that the mineral fluorite [CaF2] is the most dominant fluoride containing mineral present in the ore and host rocks. The present study is being initiated for the following two purposes. The first is for legal compliance with the NEMWAA Regulations. The second is to evaluate the medium to long term behaviour of the mine waste, as the waste classification regulations assessment methodologies do not take dynamic geochemical processes into account. This model allows the quantification of risks taking time into account and allows the waste to be placed in the internationally accepted source pathway- receptor assessment methodology, which is also preferred by the Department of Environmental Affairs (Hansen, 2016).

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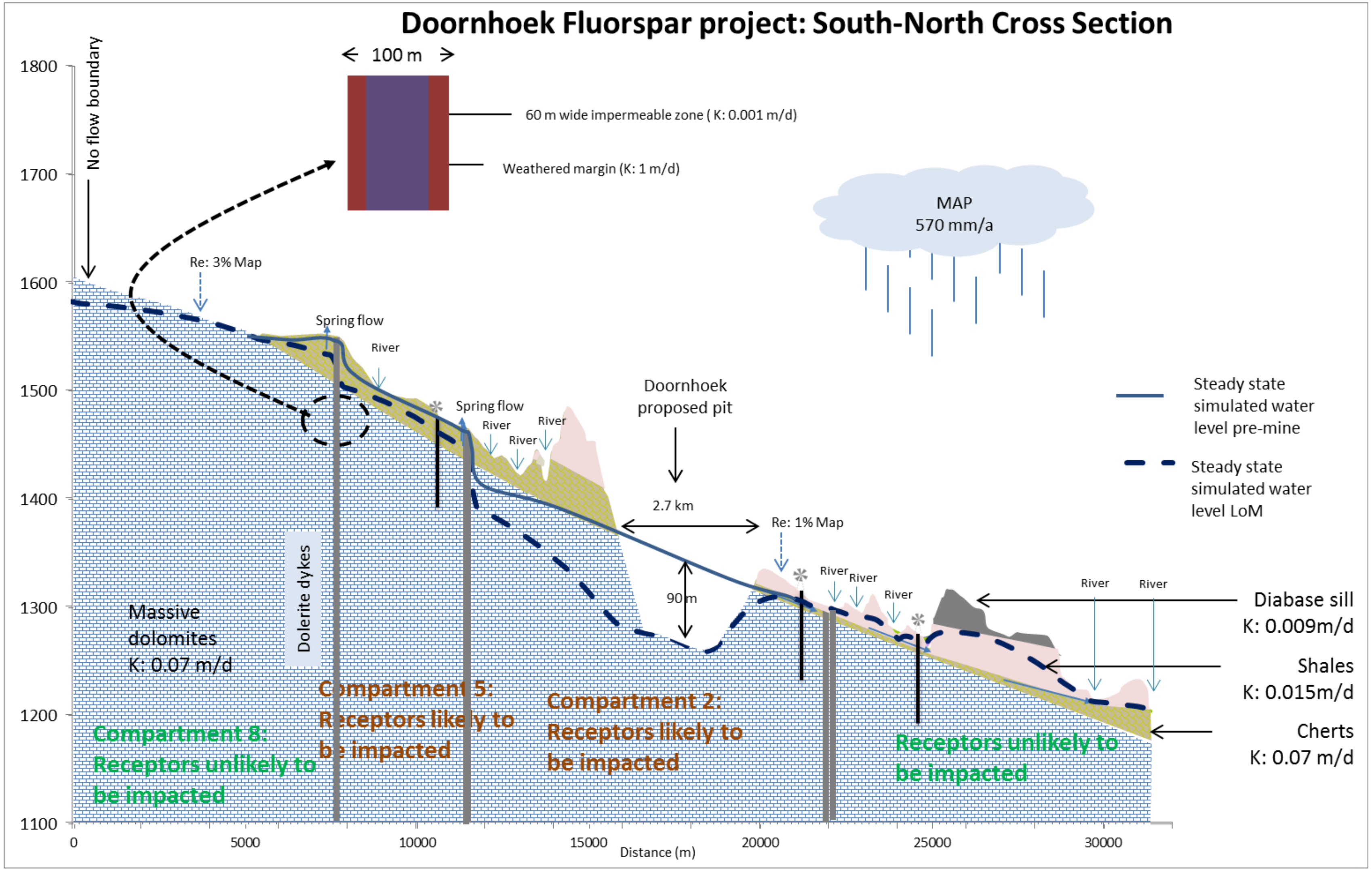

Figure 34 Conceptual hydrogeological model.

12.8. Heritage Resources

12.8.1. The Northwest Province Cultural Landscape

The landscape of the Marico has always played an important ecological and cultural role in the history of South Africa. The natural environment of the area has established itself as an ideal occupational terrain; large rivers in the area such as the Marico River have provided water, the fertile soil surrounding the rivers have provided food and the strategically situated hills and plains in the landscape sheltered many groups of people and many generations. Thus, the area presents the most important time periods in the history of South Africa, the signs of which are still visible today in the hundreds of archaeological sites scattered across the landscape. These signs range from 300 000 year old handaxes from the Earlier Stone Age, microlithic tools from the Later Stone Age, pot sherds, grinding stones and spectacular stone walling of previous Tswana inhabitants, to rock paintings and engravings.

Early history: The Stone Ages

Results from studies on the Earlier Stone Age show that sites dating back to 2.5 million years ago occur in areas around the Marico River and sites have been identified in riverbank deposits at many of other larger rivers and tributaries in the area. Formal stone tools such as specialized hand axes typical of the Acheulian industry of the early Stone Age were found. Similar to the distribution of ESA material, middle Stone Age sites occur widely near streams or other sources of water in the vicinity of source material used for the manufacture of stone tools.

Rock art and markings

Rock paintings are mainly known from the mountainous areas of Botswana, Namibia, Zimbabwe and South Africa, while rock engravings are mainly confined to the Kalahari-fringe areas of Namibia, Botswana, Zimbabwe and the central and northern interior of South Africa. Most engravings were made by pecking, a technique that made use of a hammer stone and stone punch, or by direct percussion. Three painting traditions have been identified in the Northwest and Limpopo Province areas; Hunter-Gatherer, Khoenkhoen and Bantu-speaker art.

The Iron Age Farmer Period

The landscape of the Northwest Province is dominated by massive Sotho-Tswana stone-walled mega sites and their ceramic tradition, known as Moloko. The Moloko ceramic tradition reflects the migration of the Sotho-Tswana to South Africa. The name Moloko is derived from the old Pedi (North Sotho) word for tribe and, according to Evers (1981:98), signifies the manner in which the Sotho-Tswana spread over the country through a process of lineage segmentation or splitting of tribes. The Moloko Tradition can be divided into two phases: an early phase in which sites were usually located at the foot of hills and contained little or no stone walling; and a later phase characterised by extensive stone wall complexes which were often erected on hills. The best-preserved Early Moloko site is Olifantspoort 29/72 near Rustenburg.

The second phase of the Moloko Tradition is associated with the large number of stone-walled complexes found in Gauteng, North West and Mpumalanga, as well as the Free State. The stone walls were erected to construct stock byres and to demarcate residential units; huts were pole-and-dagha structures except in some cases in the Free State, where corbelled stone huts were built.

During the second half of the 18th century, some of these stone-walled complexes, especially those occupied by Tswana communities in what is now known as the North West Province, expanded into enormously large settlements covering several kilometres. Good examples of these "megasites", as they have been described by Revil Mason, are Molokwane, the capital of the Bakwena-ba-Modimosana-ba-Mmatau near present-day Rustenburg, and Kaditshwene, the capital of the Hurutshe near the modern town of Zeerust.

The Anglo-Boer War

Possibly the most prominent colonial remnants in the Mafikeng and Zeerust landscape can be attributed to the South African War or the Anglo-Boer War (1899-1902), interestingly enough the first shots of both the 1st and 2nd Anglo-Boer Wars were fired in the Northwest Province. Thus, the various battles and skirmishes resulting from this influential conflict left a legacy of heritage sites scattered across the Transvaal where fortifications, war cemeteries and battlefields still remain.

12.8.2. Zeerust: Selected Archaeological Sites

The Kaditswene Cultural Landscape National Heritage Site

Kaditshwene / Gaditshwene (Tshwenyane Hills), approximately 20km north-east of Zeerust is the largest Iron Age stone-built city in South Africa. In 1820 this city was larger than Cape Town at that time. It was the manufacturing, trading and cultural capital of the Bahurutshe from before 1600 to 1823. Kaditshwene is historically considered a capital of the Bahurutshe nation and the largest Batswana settlement in Southern Africa with a population of 16,000 to 20,000, around the early 1800's. The large populations of the capital were grouped into three settlement zones, namely a central division, an upper or right-hand division, and a lower or left-hand division. The core of the central division, known as the kgosing (the chief or king's place), contained the chief or king's ward, which was located next to or around the main cattle enclosure and the central court (kgotla). Each ward contained a number of family units, whose members often shared a common line of descent and who were placed under the leadership of a headman or lesser chief. The stonewalled city of Kaditshwene was abandoned in the 1820’s when its peace-loving inhabitants proved no match for the aggression of the Sotho.

Anglo Boer War Burial Sites

A large number of war graves and cemeteries dating to the Anglo-Boer conflict occur in the landscape around Zeerust and Mafikeng. In most cases, these burials are randomly scattered in the veld and often occurring where soldiers fell during battle.

12.8.3. Heritage Resources at Doornhoek

Stone Age

Material from the earlier, middle and later Stone Age occur widely across the Northwest Province. At these locations, Stone Age material generally occurs along major drainage lines and at water sources as well as at rock shelters and outcrops. Following this pattern, sites of all periods of the Stone Age (earlier, middle, and later) are likely to occur along drainage lines and at sources of water on the project properties (see Figure 35-58).

Iron Age (Farmer Period)

Even though Early Iron Age sites occur in lower densities in this part of the Northwest Province, such sites generally occur along drainage lines and near water sources. A large number of later Iron Age (Farmer period) sites are scattered across the Marico landscape. These sites are typically characterised by elaborate and extensive stone walls covering large surface areas. Similarly, a large number of stone walled sites, grouped into two clusters, were identified in the project area.

<u>Stone Wall Cluster 1</u>

- Site DIA01 (S25.72821 E26.22280)
- Site DIA02 (S25.72415 E26.22277)
- Site DIA03 (S25.72039 E26.22087)

Circular sections of collapsed stone walling in three groups were located on the farm Knoflookfontein. The cluster of stone walls extends for about 1200m from north to south. The structures display irregular stone building with entrances which are demarcated by monoliths in places. No material culture was found in association with the walling and it is therefore not possible to ascertain an absolute temporality for the structures. However, considering similar sites in the surrounding landscape and the settlement history of Sotho-Tswana groups, the site probably dates to the late 18th early 19th century and might be regarded as part of the Kaditswene Cultural Landscape.

Figure 35: Aerial representation of stone wall settlements at Stone Wall Cluster 1

Figure 36: Rough stone walling at Site DIA01

Figure 37: Stone wall enclosure at site DIA02

<u>Stone Wall Cluster 2</u>

- Site DIA07 (S25.71337 E26.19040).
- Site DIA08 (S25.71494 E26.18801)
- Site DIA09 (S25.71434 E26.18637)
- Site DIA10 (S25.71266 E26.18569)

- Site DIA11 (S25.71205 E26.18640)
- Site DIA12 (S25.70935 E26.18295)
- Site DIA13 (S25.71075 E26.18577)
- Site DIA16 (S25.70921 E26.18843)

A large cluster of circular stone wall structures in at least 8 groups were identified on the Farm 306 JP. The cluster extends for about 800m from north to south and 700m from east to west. Similar to other stone walled sites in the area, the structures display irregular stone building with entrances which are demarcated by monoliths in places. At the site, no material culture was found in association with the walling and it is therefore not possible to ascertain an absolute temporality for the structures. However, considering similar sites in the surrounding landscape and the settlement history of Sotho-Tswana groups, the site probably dates to the late 18th early 19th century and might be regarded as part of the Kaditswene Cultural Landscape.

Figure 38: Aerial representation of stone wall settlements at Stone Wall Cluster 2

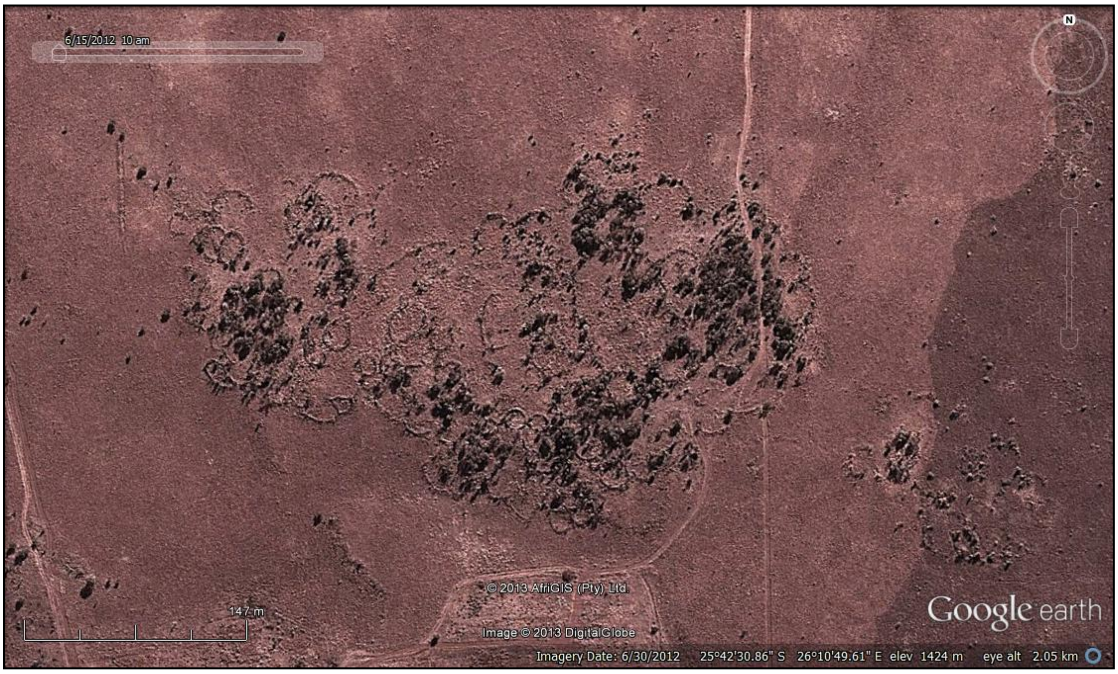

Figure 39: Detailed aerial representation of a large stone wall settlement (Site DIA12) at Stone Wall Cluster 2

Figure 40: Complex stone wall structures at Site DIA12

Figure 41: Collapsed stone walling at Site DIA12

Figure 42: Complex stone wall structures at Site DIA12

Satellite Clusters

- Site DIA04 (S25.71526 E26.21229)
- Site DIA05 (S25.71274 E26.20027)
- Site DIA06 (S25.71873 E26.19492)
- Site DIA14 (S25.72385 E26.19913)
- Site DIA15 (S25.70212 E26.17375)

- Site DIA17 (S25.71297 E26.22057)
- Site DIA18 (S25.74214 E26.13212)
- Site DIA19 (S25.74625 E26.13440)

A number of smaller satellite clusters of stone walled sites occur on Farm 306, Knoflookfontein, Doornhoek and Rhenosterfontein. The structures also display irregular stone building with entrances which are demarcated by monoliths in places. No material culture occurs in association with the walling and it is therefore not possible to ascertain an absolute temporality for the structures. However, considering similar sites in the surrounding landscape and the settlement history of Sotho-Tswana groups, the site probably dates to the late 18th early 19th century and might be regarded as part of the Kaditswene Cultural Landscape.

Figure 43: Detailed aerial representation of a large stone wall settlement Site DIA05

Historical / Colonial Period and recent

During the 18th and 19th centuries, the area around the towns of Mafikeng and Zeerust provided a passage for traders, explorers and adventurers moving across the Northwest Frontier into present-day Botswana. The town of Zeerust was established in 1867 and at the time, farms appeared around the town and related infrastructure emerged. Farmsteads and buildings were constructed on farms in the area, most of which were unfortunately destroyed during the terminal phases of the Anglo Boer War during the so-called “Scorched Earth” Campaign.

Still, most of the farms in the project area were proclaimed in the 19th century and beginning of the 20th century and farmsteads on these farms that might remain, probably date to the same period.

These remnants are consequently of historical significance and the occurrence of such structures of historical value (exceeding the 60year age delineation for heritage structures as set out by the NHRA No. 25 of 1999) and related graves / burial places should therefore be anticipated in the project area.

- Site DHP01 (S25.73768 E26.12901) & Site DHP09 (S25.73603 E26.12067)

The remains of a deserted Fluorspar Mine occur in the south-western portion of the study area on the farm Rhenosterfontein. Two large excavation pits, a mining plant and mining equipment remain at the site. The mine was in operation for much of the 20th century but closed in the 1970's.

Figure 44: Remains of diggings at a Fluorspar Mine on the farm Rhenosterfontein

- Site DHP02 (S25.72093 E26.13592)

On the farm Rhenosterfontein stands the remains of a White Stinkwood Tree of which it is said that the last White Rhino of the Marico was shot here. This is apparently also where the farm Rhenosterfontein derived its name from.

Figure 45: Significant White Stinkwood Tree on the farm Rhenosterfontein (in the background)

- Site DHP03 (S25.70059 E26.20345)

A historical three-room sandstone building occurs next to the Zeerust Road on Farm 306. The building was used as a school for much of the 20th century but currently is occupied and used as informal housing. The structure is of significance since it dates to the beginning of the 20th century but it is in a run-down state.

Figure 46: An historical school building on Farm 303

- Site DHP04 (S25.70835 E26.20745)

The dilapidated remains of the Farm 306 farmstead occur on the Farm 306 farm. At the site, a farmhouse, barn and other outbuildings remain. The house probably dates to the middle of the previous century.

Figure 47: Dilapidated farmstead on Farm 306

- Site DHP05 (S25.71870 E26.13553)

An old farmhouse occurs on the farm Rhenosterfontein, close to the adjacent family cemetery (Site DBP01). At the site, a farmhouse and other outbuildings remain. In addition, a large ash deposit is still visible at the farmstead and it is said that this is the remains of the original Rhenosterfontein farmhouse, demolished during the Anglo Boer War. The house probably dates to the middle of the previous century.

Figure 48: The old Rhenosterfontein farmhouse

- Site DHP06 (S25.70650 E26.15260)

This site demarcated the location of the original Doornhoek farmstead and, even thou the site could not be visited, it is possible that Historical Period structures might occur here.

- Site DHP07 (S25.72575 E26.13839) & Site DHP08 (S25.73296 E26.15430)

Two “ruins” or “murasies” are indicated on 1:50000 maps of the Doornhoek Fluorspar Study area. Unfortunately these sites could not be visited but aerial imagery of the features indicates little intact heritage remains. However it is possible that Historical Period structures, features and artefacts might occur at the sites.

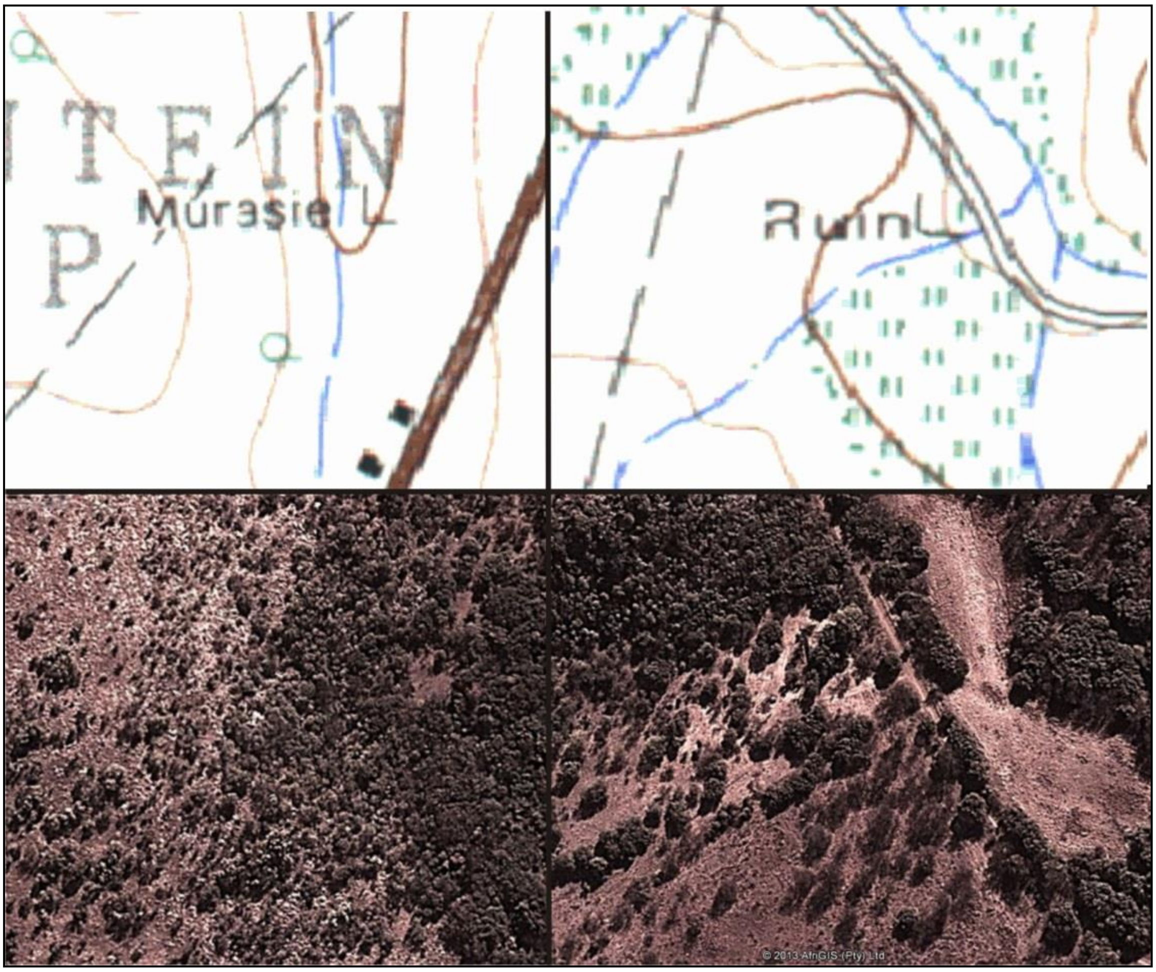

Figure 49: Ruins indicated on 1:50000 map sheets (top) and aerial imagery (bottom) on the farm Rhenosterfontein

Graves and Burials

- Site DBP01 (S25.71840 E26.13512)

A small family cemetery belonging to the Grobler family occurs high on a ridge above the original Rhenosterfontein farmstead, on the farm Rhenosterfontein. The cemetery holds in excess of 30 burials, all of which are dressed with marble, concrete and stone structures. Dates of internment range from 1890 – 2006 and the cemetery is not maintained.

Of interest is a fig tree next to the graveyard. It is said that the old family matriarch, Maria Basson often visited the spot to pray and read her Bible and later on in her will she requested to be buried at the spot. After her death in 1890 she was interred near the tree after which family members were buried in what became the Grobler family cemetery.

Figure 50: The Grobler family cemetery on the farm Rhenosterfontein

Figure 51: Historical fig tree (left) and the grave of the Grobler matriarch (right) on the farm Rhenosterfontein

- Site DBP02 (S25.71573 E26.14225)

A single grave dressed with stone occurs next to the Rhenosterfontein farmstead access road on the farm Rhenosterfontein. According to local folklore, the grave is that of a Scotsman who died of malaria towards the end of the 19th century. It is said that the Scot, who was romantically involved with one of the daughters of the then owner of the farm, was not allowed to be buried at the Rhenosterfonein family cemetery since he was a foreigner.

Figure 52: A single grave on the farm Rhenosterfontein

- Site DBP03 (S25.70166 E26.19592)

A large family cemetery occurs on Farm 306 next to a crop field. The cemetery holds in excess of 50 graves, most of which are dressed with stone, concrete and marble grave dressings. Many graves date to the last part of the 19th century and the first part of the 20th century and might be attributed to Anglo-Boer War related fatalities. The cemetery also holds a large number of infant burials.

Figure 53: Large historical family cemetery on Farm 306

- Site DBP04 (S25.70084 E26.20349)

A small informal cemetery with at least 3 graves dressed with stone occurs next to a farmhouse and south of the historical school building (Site DHP03) on Farm 306. According to a local the graves are those of dogs of the farm owner but this interpretation seem questionable in terms of the placement, appearance and size of the grave dressings.

In addition to these graves, the remains of historical marble tombstones and grave dressings, dating to the Anglo-Boer War period, are scattered across the farmstead. The features were obviously removed from war burials elsewhere and discarded at the farmhouse. Unfortunately, the context of the grave dressings, which carry historical significance, has been lost.

Figure 54: Graves in an informal cemetery on Farm 306

Figure 55: Marble tomb stone memorial remains at the Farm 306 farmstead

- Site DBP05 (S25.70096 E26.20879)

At least 4 fenced burials occur next to the Zeerust Road in dense undergrowth on Farm 306. The graves are demarcated with soil mounds and stones and one of the burials holds an unmarked wooden cross. It is possible that the graves might be attributed to relatives of local farm labourers.

Figure 56: Unmarked graves on Farm 306

- Site DBP06 (S25.75345 E26.17059)

A small family cemetery holding a large number of historical and more recent graves occur to the extreme south of the farm Doornhoek, outside of the project area. Some of the graves in the cemetery can be related to the Anglo-Boer War. The cemetery is not maintained and graves are dilapidated and densely overgrown.

Figure 57: Historical family cemetery on the farm Doornhoek

- Site DBP07 (S25.70640 E26.13783)

A grave is indicated on the 1:50000 map sheet of the project area on the farm Rhenosterfontein. The site could not be visited but it might be inferred that the burial is of significance and could probably be related to Anglo-Boer War graves in the area which are similarly indicated on map sheets for the area.

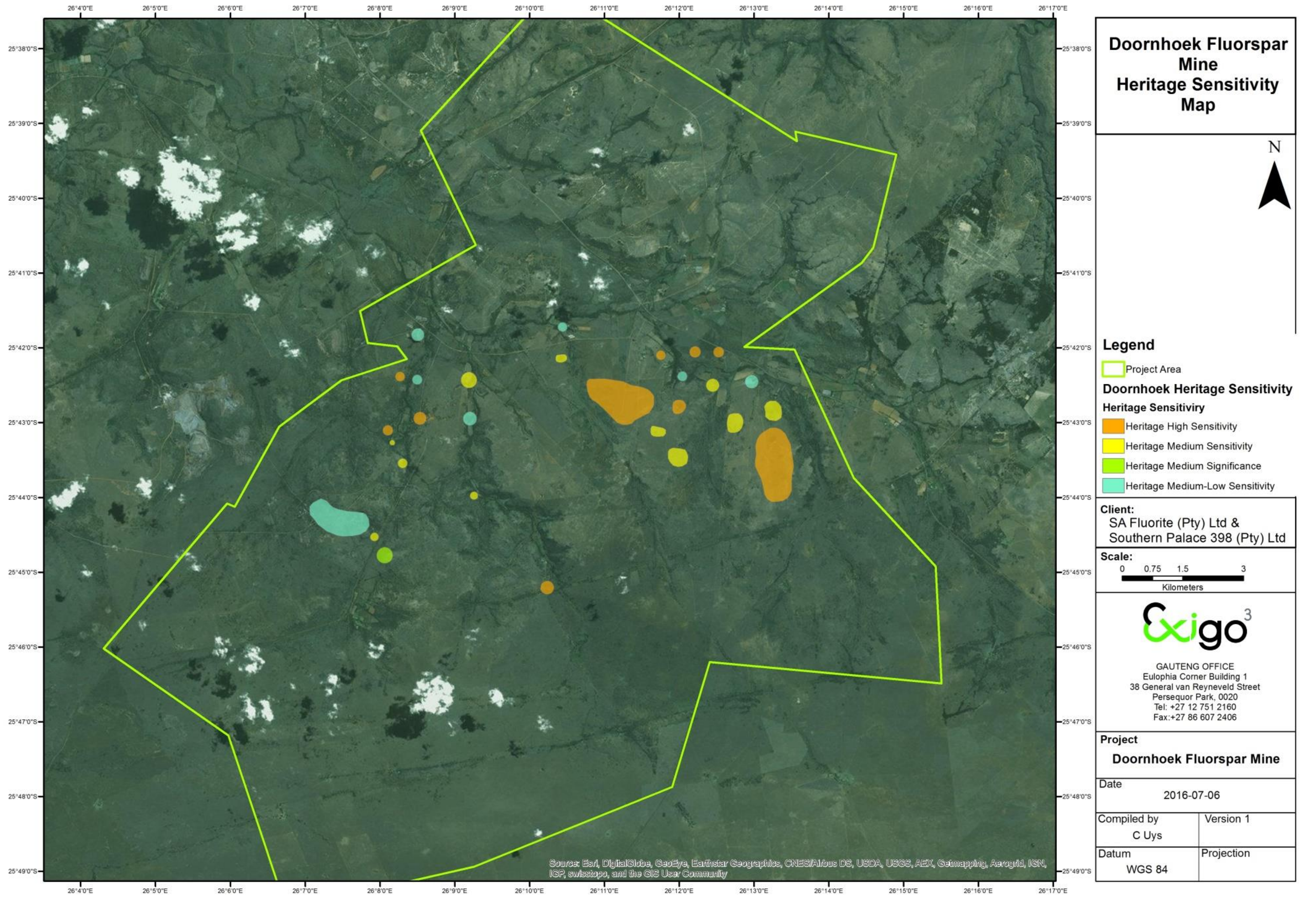

Figure 58: Map of heritage sites in the Doornhoek Fluorspar Project Area

12.9. Visual aspects and Sense of Place

The topography is relatively flat, dipping at a low angle in a north-westerly direction. The topography of the area is a mixture of terrains, ranging from flat to moderately undulating plains, outcrops, bottomlands (drainage channels) and slightly undulating hills (Figure 18). Some crop cultivation occurs in isolated areas of the area.

The land use is dominated by game, livestock farming and chicken farming (Figure 59), and the Witkop Mine located to the west of the project area (no longer in operation). Mining activities have previously taken place on the site, with a number of abandoned mining activities and an abandoned shaft occurring on the site (Figure 60).

The closest receptors are farm owners and workers in the area. These receptors, as well as receptors in neighbouring towns and settlements such as Zeerust and Groot Marico are accustomed to the quiet, rural setting.

The landscape is expected to be sensitive to visual intrusion, despite the fact that the number of visual receptors is low.

Figure 59: Farming activities located alongside the Klein Marico River

Figure 60: Abandoned mine

Figure 61: General surroundings in the Doornhoek Fluorspar Project area, with the stone-walled settlement in the foreground

12.10. Socio-Economic Environment

The site is situated in the North West Province of South Africa in the Ngaka Modiri Molema District Municipality (NMMDM) and in Ward 14 of the Ditsobotla Local Municipality. The site also borders the southern boundary of the Ramotshere Moiloa LM and the eastern section of the Mafikeng LM.

NMMDM is one of the four districts of North West province in South Africa. Its capital is Mahikeng, which is also the capital of the province. The municipal area covers approximately 28 206 km^2 and hosts a population of approximately 842 699 which amounts to a population density of 29.9/km^2. There are approximately 227 001 households in the district municipality.

NMMDM is mainly a rural and agricultural area with a dotting of a few secondary cities of Mahikeng-Mmabatho, Lichtenburg and Zeerust. Therefore it is rational to expect that the economic output depth will not be very extensive. Further, the type of industrial and economic activities prevailing in the district will be adding a very small portion to the overall provincial output as measured in GGVAs.

The figure below depicts the sector contribution to the gross and the employment figures.

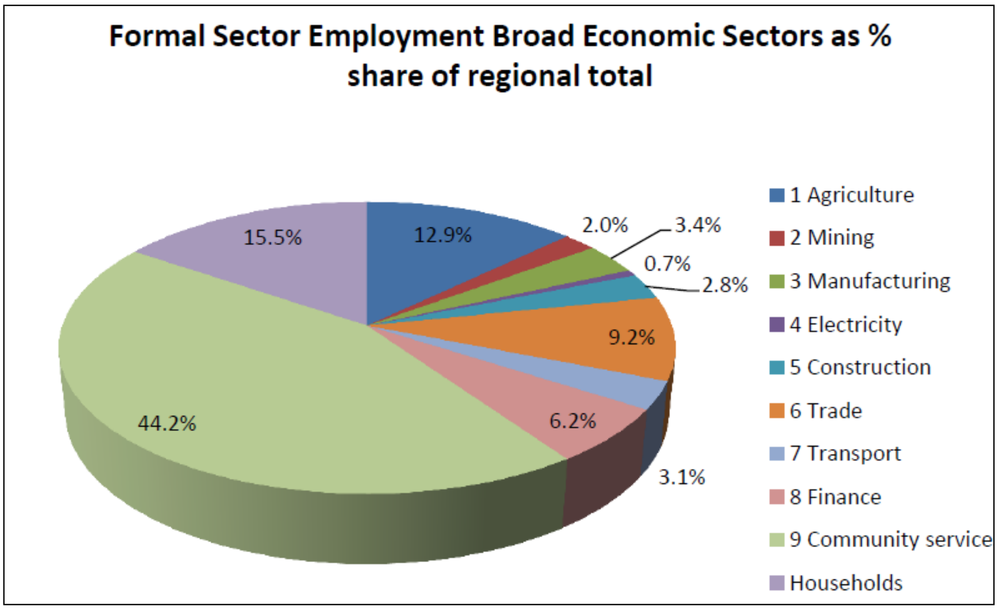

Figure 62: Formal Sector Employment (Draft NMMDM IDP 2012-2016)

As can be seen from Figure 62 above, the service industry is the main employer in the district with about 44% contribution to the economic sector. Key economic drivers such as manufacturing and agriculture contribute 3.4% and 12.9% respectively. The unemployment rate in the district is hovering above the national rate of 25%, to about 35%. According to the draft NMMDM IDP (2012-2016) there were about 80 000 unemployed people in the district municipality in 2010.

The following conclusions can be made with regard to development challenges in Ngaka Modiri Molema District Municipality:

- The area is generally highly underserviced in terms of both social and economic infrastructure;
- The area is very large in respect to the settlements across various municipalities;
- That such dispersed settlement patterns have a bearing on the costs (both of erecting the infrastructure, operating and maintain it);
- That the affordability levels given the poverty and human development challenges latent in the area makes viability of municipalities to establish, operate and maintain infrastructure o daunting prospect;
- That the most economically productive and skilled individuals are drawn away from the district;
- That the structure of the economy requires a serious overhaul through targeted and accelerated interventions, and
- That diversification while maintaining the triple bottom-line principle is critical (NMMDM IDP, 2012-2016).

The district municipality shares an international border with Botswana on the North and comprises the following five local municipalities:

Local municipality	Population	%	Dominant language
Mafikeng	259 478	34.01%	Tswana
Ditsobotla	147 596	19.34%	Tswana
Ramotshere Moiloa	137 439	18.01%	Tswana
Tswaing	114 150	14.96%	Tswana
Ratlou	104 322	13.67%	Tswana

Ditsobotla Municipality has a geographical area of 6 465 km^2 and is divided into 21 municipal wards. The population density is approximately 26.1/km^2 with a total population of 168 902 (www.wikipedia.org).

The gender distribution in the Ditsobotla Municipality is 50.5 % males and 49.5 % females.

Figure 63 indicates that about 60% of the population of Ditsobotla Municipality is made up of people aged from 15 to 64 years. This group represents the economically active section of the population. About 35% of the population is made up of children aged 14 and less, while 5% is made up of the older generation, who are 65 and above.

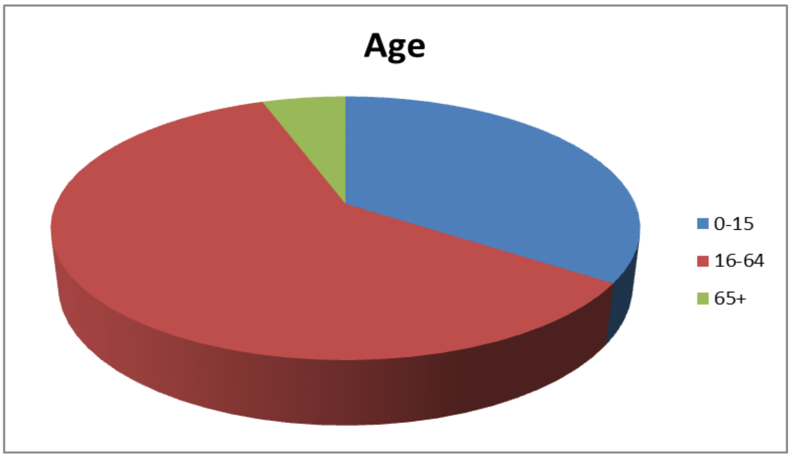

Figure 63: Age group (www.statssa.co.za)

The following figures were taken from the Census 2011 (www.statssa.co.za) data and provide detail on the socio-economic situation experienced in the area.

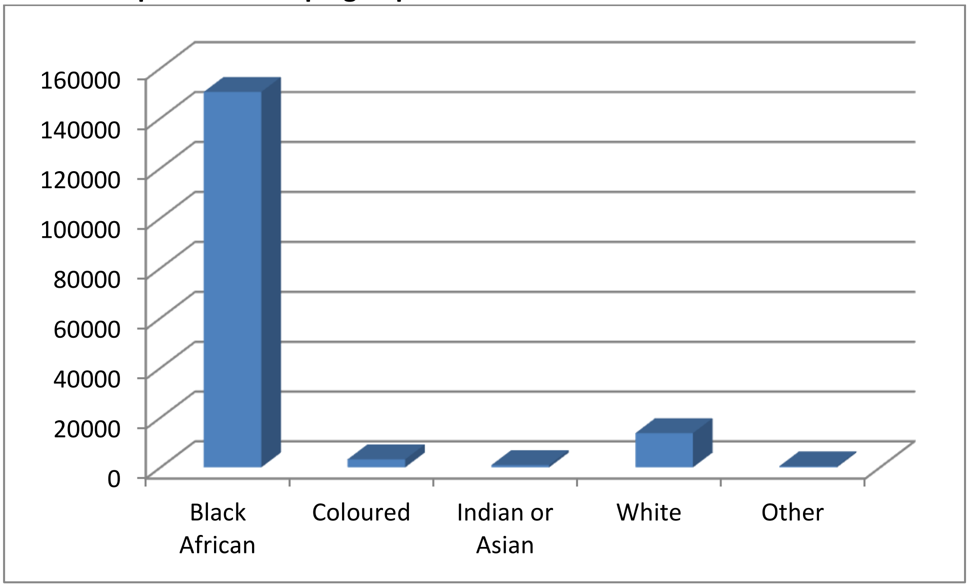

Figure 64: Population

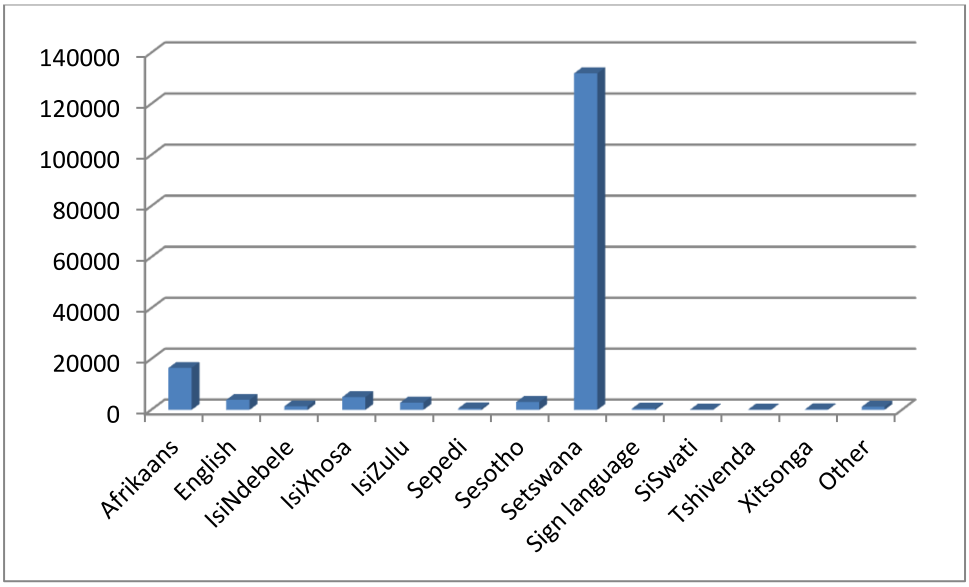

Figure 65: Language

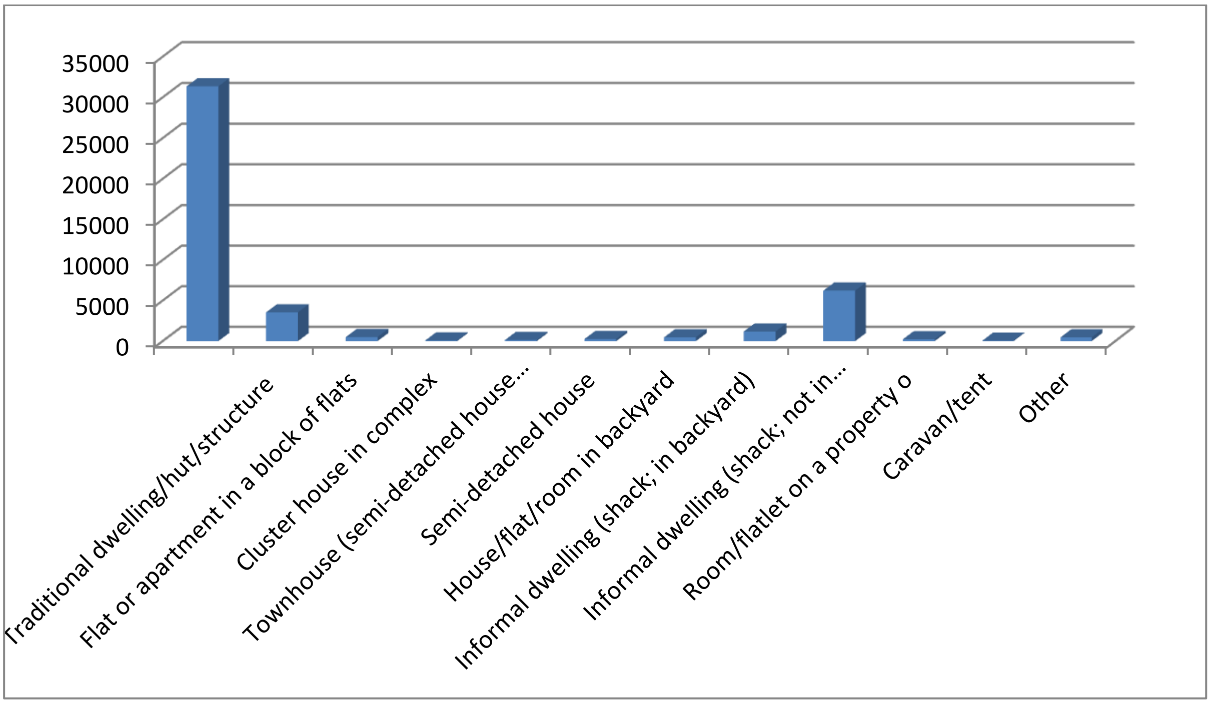

Figure 66: Type of main dwelling

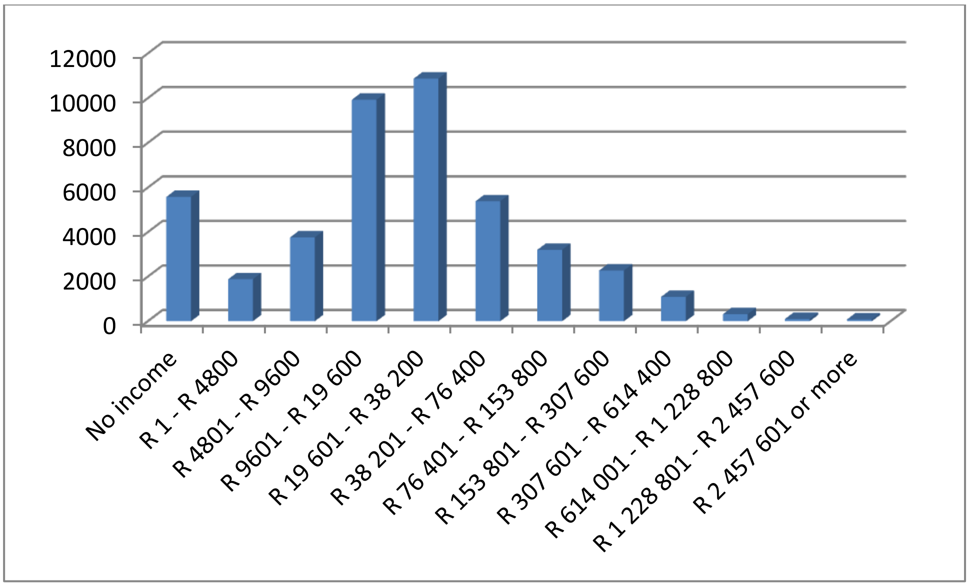

Figure 67: Annual Household Income

The municipality is situated in the semi-arid area of the central plateau in South Africa and as a result water scarcity is a common and pressing problem. The municipality has however been able to provide water to the community as depicted in Figure 68 below:

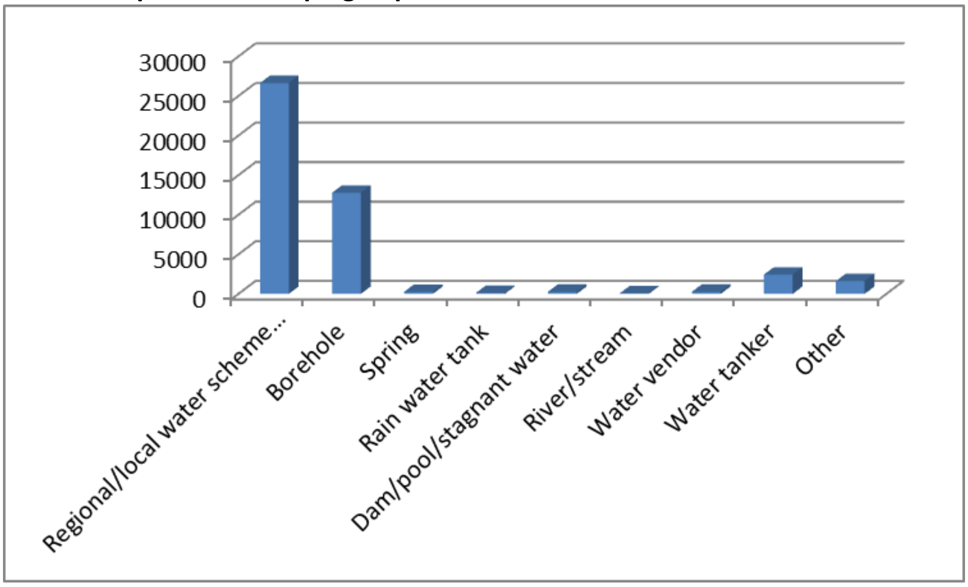

Figure 68: Source of water

13. DESCRIPTION OF THE CURRENT LAND USES.

The land use of the project area is mainly vacant or unspecified (ENPAT, 2002). Some patches of cultivated land and mining occur within the area. The Molemane Eye Nature Reserve borders the mining right area to the south east.

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

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 69 below and include:

- Heritage features,
- Ecological Sensitive areas; and
- Surface Water features.

14. ENVIRONMENTAL AND CURRENT LAND USE MAP.

(Show all environmental and current land use features)

See Figure 69 and Figure 70 below.

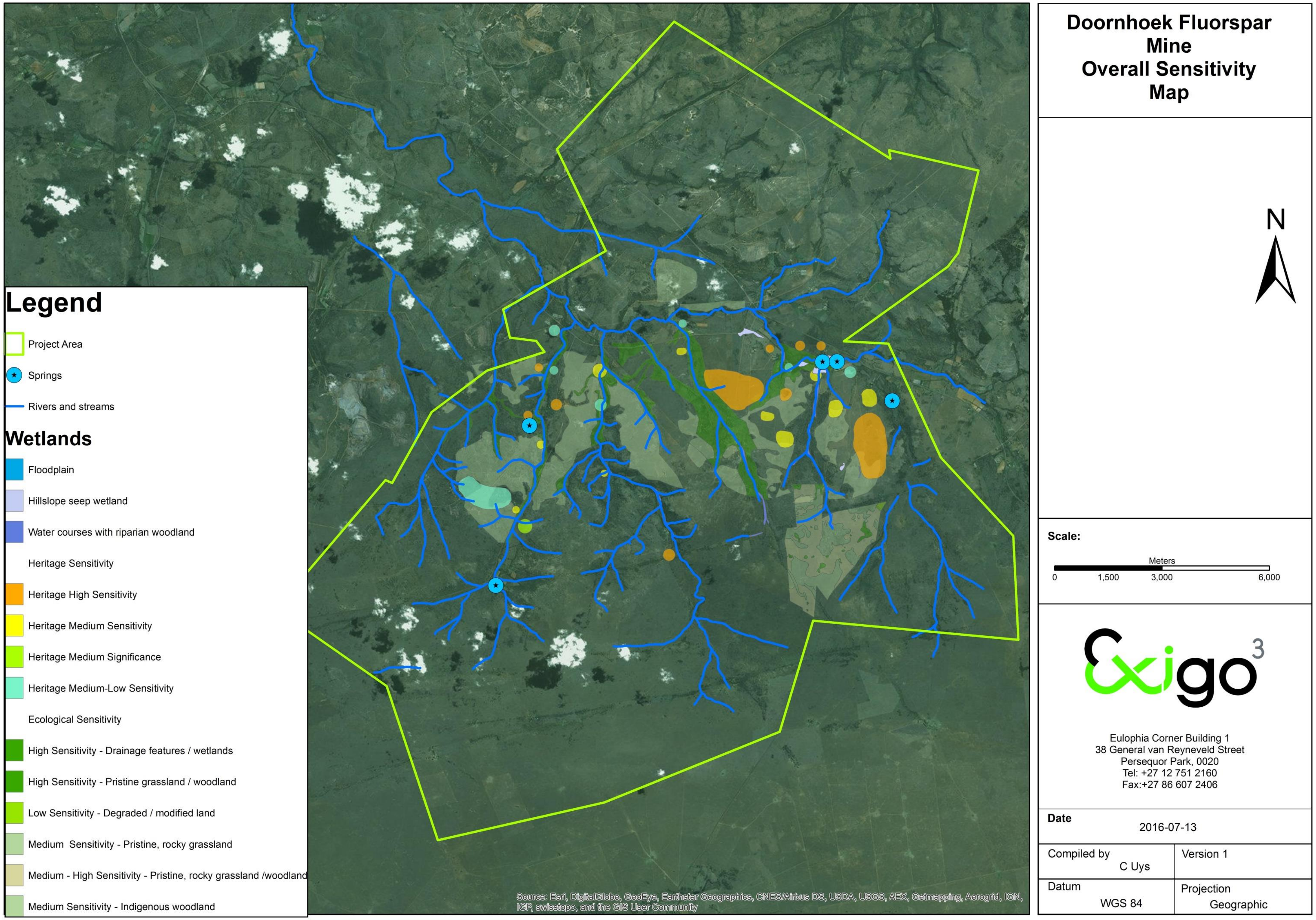

Figure 69 **Overall Sensitivity Map**

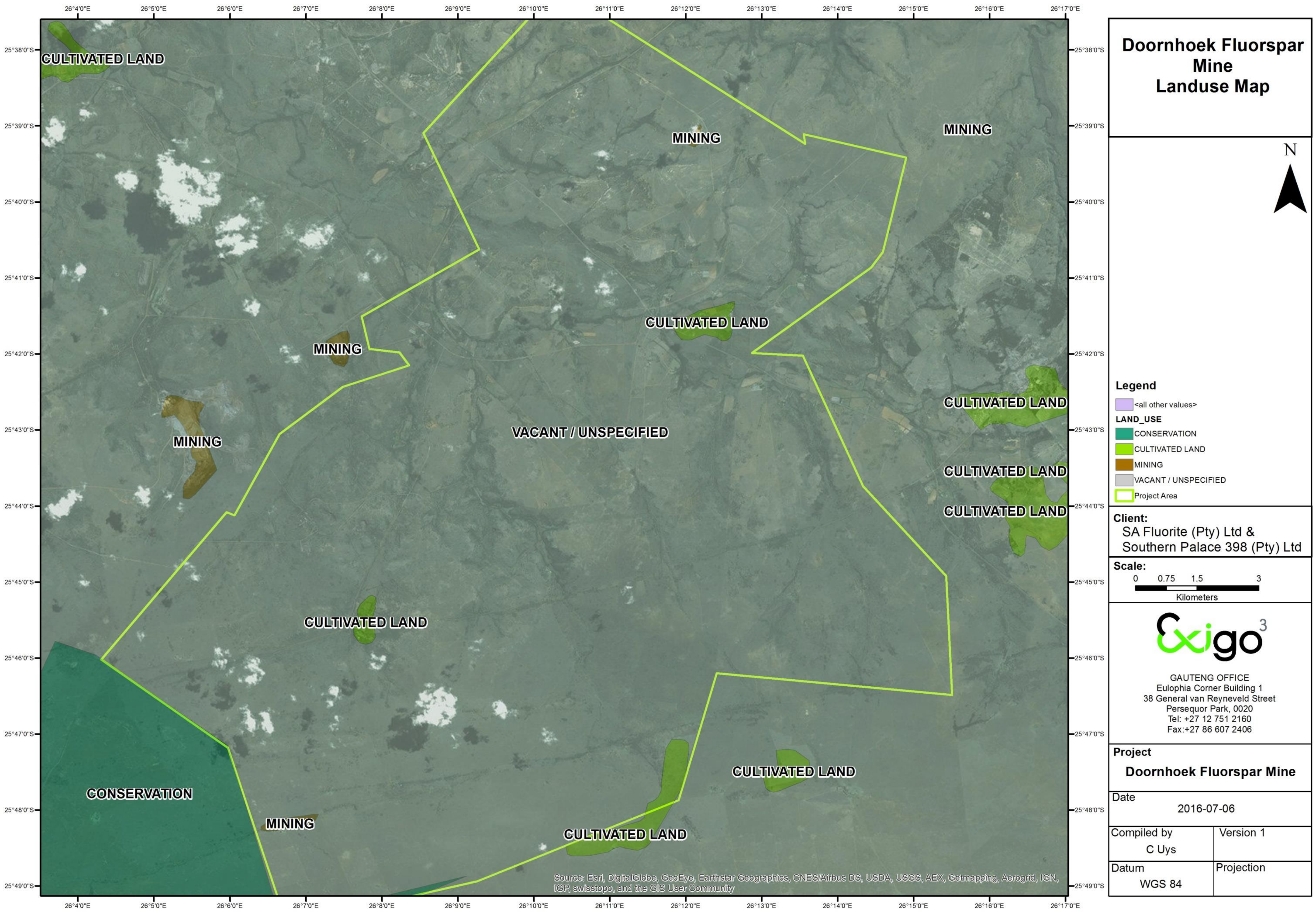

Figure 70: Land Use Map

15. IMPACTS IDENTIFIED

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability and duration of the impacts)

Table 15 Impact Assessment Table[1]

No	Activity	Impact	Without or With Mitigation	Nature (Negative or Positive Impact)	Probability		Duration		Scale		Magnitude/ Severity		Significance		Mitigation Effect
					Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Score	Magnitude	
	Ecology														
Planning Phase															
1	Eradication of protected trees / flora through permit application	Delay of mining onset	WOM	Negative	Definite	5	Short term	1	Local	1	Low	2	20	Negligible	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Short term	1	Local	1	Low	2	16	Negligible	Can be reversed
Construction Phase															

[1] Note that the impacts, mitigation measures and associated reporting 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).

2	Clearing of vegetation for open pits, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	Habitat destruction / fragmentation of fauna habitats	WOM	Negative	Definite	5	Permanent	5	Local	1	High	8	70	High	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Permanent	5	Local	1	Medium	6	60	Moderate	Can be avoided, managed or mitigated
3	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	Long term	4	Site	2	Medium	6	60	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low	Can be avoided, managed or mitigated
4	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	High	8	60	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Long term	4	Site	2	Low	2	32	Low	Can be reversed
5	Vegetation clearing / vehicle movement	Habitat degradation due to dust	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Long term	4	Site	2	Medium	6	60	Moderate	Can be reversed
6	Heavy machinery	Spillages of	WOM	Negative	Probable	2	Long term	4	Regional	3	Medium	6	26	Low	May cause

	and vehicle movement on site	harmful substances													irreplaceable loss of resources
			WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be reversed
7	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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
Operational Phase															
8	Storage of tailings, laydown areas of overburden dumps and stockpiles	Habitat destruction / fragmentation of fauna habitats	WOM	Negative	Definite	5	Permanent	5	Local	1	High	8	70	High	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Permanent	5	Local	1	Medium	6	60	Moderate	Can be avoided, managed or mitigated
9	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	Long term	4	Site	2	High	8	70	High	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate	Can be avoided, managed or mitigated

10	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	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Long term	4	Site	2	Low	2	32	Low	Can be reversed
11	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	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Medium term	3	Site	2	Medium	6	55	Moderate	Can be reversed
12	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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be reversed
13	Heavy machinery and vehicle movement on site; workers accommodated on site causing 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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
Closure and Decommissioning Phase															
14	Rehabilitation of mining site	Improvement of habitat through	WOM	Positive	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low	Can be avoided, managed or mitigated

		revegetation / succession over time	WM	Positive	Definite	5	Permanent	5	Local	1	Medium	6	60	Moderate	Can be reversed
15	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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Local	1	Low	2	12	Negligible	Can be avoided, managed or mitigated
16	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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be reversed
17	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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Site	2	Medium	6	22	Low	Can be reversed
18	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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Short term	1	Site	2	Low	2	10	Negligible	Can be avoided,

															managed or mitigated
19	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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
Post-Closure Phase															
20	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	Can be avoided, managed or mitigated
			WM	Positive	Definite	5	Permanent	5	Local	1	Medium	6	60	Moderate	Can be reversed
21	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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
22	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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
Wetlands															

Planning Phase															
1	Obtaining of IWUL for crossings and mining through water courses / wetlands	Delay of mining onset	WOM	Negative	Definite	5	Short term	1	Local	1	High	8	50	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	Can be reversed
Construction Phase															
2	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Wetland destruction / fragmentation of wetland habitats	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Long term	4	Local	1	High	8	65	High	Can be avoided, managed or mitigated
3	Clearing of vegetation for through wetlands and water courses for road crossings	Impediment of flow patterns	WOM	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Long term	4	Site	2	High	8	70	High	Can be avoided, managed or mitigated
4	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion	Soil erosion and sedimentation	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Long term	4	Local	1	Medium	6	44	Moderate	Can be avoided, managed or mitigated

	and sedimentation in wetlands														
5	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species in wetlands	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	High	8	60	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Long term	4	Site	2	Low	2	32	Low	Can be reversed
6	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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be reversed
Operational Phase															
7	Opencast mining	Dewatering of wetlands causing direct habitat loss / destruction	WOM	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Long term	4	Site	2	High	8	70	High	Can be avoided, managed or mitigated
8	Increased hardened surfaces around infrastructure and exposed areas around open pits, laydown areas of overburden dumps and stockpiles as	Soil erosion and sedimentation in wetland / water courses	WOM	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate	Can be avoided, managed or mitigated

	well as TSF, road crossings														
9	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species in wetlands	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Medium	6	52	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Long term	4	Site	2	Low	2	32	Low	Can be reversed
10	Heavy machinery and vehicle movement on site	Spillages of harmful substances leading to water pollution in wetlands	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be reversed
Closure and Decommissioning Phase															
11	Rehabilitation of mining site	Improvement of wetland habitat through revegetation / succession over time	WOM	Positive	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low	Can be avoided, managed or mitigated
			WM	Positive	Definite	5	Permanent	5	Local	1	Medium	6	60	Moderate	Can be reversed
12	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation in wetlands	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated

13	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Spreading and establishment of alien invasive species in wetlands	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be reversed
14	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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Short term	1	Site	2	Low	2	10	Negligible	Can be avoided, managed or mitigated
Post-Closure Phase															
15	Natural Successional processes	Improvement of wetland habitat at crossings through revegetation / succession over time	WOM	Positive	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low	Can be avoided, managed or mitigated
			WM	Positive	Definite	5	Permanent	5	Local	1	Medium	6	60	Moderate	Can be reversed
16	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	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
17	Exposed surfaces / poor monitoring of	Spreading and establishment of	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	Medium	6	44	Moderate	May cause irreplaceable loss of

	revegetation on site	alien invasive species													resources
			WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
	Soils														
Planning Phase															
	Delay of mining onset	Obtaining of IWUL for crossings (wetland soils) and mining layout on sensitive soils	WOM	Negative	Definite	5	Short term	1	Local	1	High	8	50	Moderate	Can be avoided, managed or mitigated
1			WM	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	Can be reversed
Construction Phase															
	Soil compaction	Heavy machinery and vehicle movement on site	WOM	Negative	Definite	5	Permanent	5	Local	1	High	8	70	High	May cause irreplaceable loss of resources
2			WM	Negative	Definite	5	Long term	4	Local	1	Low	2	35	Low	Can be reversed
	Soil erosion and sedimentation	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	May cause irreplaceable loss of resources
3			WM	Negative	Highly Probable	4	Long term	4	Local	1	Medium	6	44	Moderate	Can be avoided, managed or mitigated

		and sedimentation in wetlands													
4	Spillages of harmful substances	Heavy machinery and vehicle movement on site	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be reversed
5	Soil destruction and sterilization	Topsoil & subsoil stripping	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Long term	4	Local	1	High	8	65	High	Can be reversed
6	Loss of land capability	Topsoil & subsoil stripping, Clearing of vegetation through wetlands and water courses for road crossings	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Long term	4	Local	1	Medium	6	44	Moderate	Can be reversed
Operational Phase															
7	Soil compaction	Heavy machinery and vehicle movement on site, laydown areas of overburden dumps and stockpiles	WOM	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Long term	4	Site	2	High	8	70	High	Can be avoided, managed or mitigated
8	Soil erosion and sedimentation in wetland / water	Increased hardened surfaces around	WOM	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources

	courses	infrastructure and exposed areas around open pits, laydown areas of overburden dumps and stockpiles as well as TSF, road crossings	WM	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate	Can be avoided, managed or mitigated
9	Spillages of harmful substances leading to water pollution in wetlands	Heavy machinery and vehicle movement on site	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be reversed
10	Soil destruction and sterilization	Topsoil & subsoil stripping, opencast mining	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Long term	4	Local	1	Medium	6	55	Moderate	Can be reversed
11	Loss of land capability	Topsoil & subsoil stripping, Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Long term	4	Local	1	Medium	6	44	Moderate	Can be reversed
Closure and Decommissioning Phase															

12	Improvement of eroded soils and compaction / backfilling of pits	Rehabilitation of mining site	WOM	Positive	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low	Can be avoided, managed or mitigated
			WM	Positive	Definite	5	Permanent	5	Local	1	Medium	6	60	Moderate	Can be reversed
13	Soil erosion and sedimentation in wetlands	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
14	Soil compaction	Heavy machinery and vehicle movement on site	WOM	Negative	Definite	5	Permanent	5	Local	1	Medium	6	60	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Long term	4	Local	1	Low	2	35	Low	Can be reversed
15	Spillages of harmful substances	Heavy machinery and vehicle movement on site	WOM	Negative	Highly Probable	4	Medium term	3	Regional	3	Medium	6	48	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Short term	1	Site	2	Low	2	10	Negligible	Can be avoided, managed or mitigated
Post-Closure Phase															
16	Improvement of soil compaction and erosion	Natural processes	WOM	Positive	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low	Can be avoided, managed or mitigated
			WM	Positive	Definite	5	Permanent	5	Local	1	Medium	6	60	Moderate	Can be reversed
17	Soil erosion and sedimentation	Exposed surfaces / unrehabilitated	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	Medium	6	44	Moderate	May cause irreplaceable loss of

		areas on site post													resources
		closure / poor monitoring during LoM	WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
	Air Quality														
Planning Phase															
	Existing baseline ambient conditions	PM10 and PM2.5	WOM	Negative	Probable	2	Long term	4	Regional	3	High	8	30	Low	Can be avoided, managed or mitigated
1			WM	Negative	Probable	2	Long term	4	Regional	3	Medium	6	26	Low	Can be avoided, managed or mitigated
Construction Phase															
	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	Can be avoided, managed or mitigated
2			WM	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	Can be avoided, managed or mitigated
	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	Can be avoided, managed or mitigated
3			WM	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	Can be avoided, managed or mitigated
	Materials handling	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate	Can be avoided, managed or mitigated
4			WM	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	Can be avoided, managed or mitigated

5	Wind erosion from open areas	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	Can be avoided, managed or mitigated
Operational Phase															
6	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	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Long term	4	Local	1	Medium	6	44	Moderate	Can be avoided, managed or mitigated
7	Materials handling operations	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Long term	4	Local	1	Medium	6	44	Moderate	Can be avoided, managed or mitigated
8	Mining operations within open pit	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Long term	4	Local	1	Medium	6	44	Moderate	Can be avoided, managed or mitigated
9	Wind erosion	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low	Can be avoided, managed or mitigated
Closure and Decommissioning Phase															
10	Dust generated during rehabilitation activities	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	Can be avoided, managed or mitigated

11	Demolition of the structure	PM10 and PM2.5	WOM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	Can be avoided, managed or mitigated
12	Tailpipe emissions from vehicles utilised during the closure phase	Gaseous and particulate emissions; fugitive dust	WOM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	Can be avoided, managed or mitigated
Post-Closure Phase															
13	Wind erosion from open areas	PM10 and PM2.5	WOM	Negative	Probable	2	Medium term	3	Site	2	Medium	6	22	Low	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Medium term	3	Local	1	Low	2	12	Negligible	Can be avoided, managed or mitigated
	Geochemical / Waste Classification														
Operational Phase															
1	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by metals and metalloids	WOM	Negative	Improbable	1	Long term	4	Regional	3	High	8	15	Negligible	
			WM	Negative	Improbable	1	Long term	4	Site	2	High	8	14	Negligible	
2	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by sulphate	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Improbable	1	Long term	4	Site	2	Medium	6	12	Negligible	

		and fluoride													
3	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by nitrate	WOM	Negative	Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low	Can be avoided, managed or mitigated
			WM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	
4	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by metals and metalloids	WOM	Negative	Improbable	1	Long term	4	Regional	3	High	8	15	Negligible	
			WM	Negative	Improbable	1	Long term	4	Site	2	High	8	14	Negligible	
5	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	WOM	Negative	Improbable	1	Long term	4	Regional	3	High	8	15	Negligible	
			WM	Negative	Improbable	1	Long term	4	Site	2	High	8	14	Negligible	
6	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by nitrate	WOM	Negative	Highly Probable	4	Short term	1	Regional	3	Medium	6	40	Low	Can be avoided, managed or mitigated
			WM	Negative	Improbable	1	Short term	1	Site	2	Medium	6	9	Negligible	
Post-Closure Phase															
8	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by metals and metalloids	WOM	Negative	Improbable	1	Long term	4	Regional	3	High	8	15	Negligible	
			WM	Negative	Improbable	1	Long term	4	Site	2	High	8	14	Negligible	
9	Disposal of tailings	Contamination of	WOM	Negative	Highly	4	Long term	4	Regional	3	Medium	6	52	Moderate	Can be avoided,

	on tailings facility	groundwater, surface water and soil by sulphate and fluoride			Probable										managed or mitigated
			WM	Negative	Improbable	1	Long term	4	Site	2	Medium	6	12	Negligible	
10	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by nitrate	WOM	Negative	Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low	Can be avoided, managed or mitigated
			WM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	
11	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by metals and metalloids	WOM	Negative	Improbable	1	Long term	4	Regional	3	High	8	15	Negligible	
			WM	Negative	Improbable	1	Long term	4	Site	2	High	8	14	Negligible	
12	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	WOM	Negative	Improbable	1	Long term	4	Regional	3	High	8	15	Negligible	
			WM	Negative	Improbable	1	Long term	4	Site	2	High	8	14	Negligible	
13	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by nitrate	WOM	Negative	Highly Probable	4	Short term	1	Regional	3	Medium	6	40	Low	Can be avoided, managed or mitigated
			WM	Negative	Improbable	1	Short term	1	Site	2	Medium	6	9	Negligible	
Noise															
Planning Phase															

1	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
2	Open cast years 5 - 10 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
Construction Phase															
3	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
			WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
4	Open cast years 5 - 10 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
			WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
Operational Phase															
5	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	Can be reversed
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	Can be reversed
6	Open cast years 5 - 10 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	Can be reversed
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	Can be reversed

Closure and Decommissioning Phase															
7	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
			WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
8	Open cast years 5 - 10 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
			WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
Post-Closure Phase															
9	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
10	Open cast years 5 - 10 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
Planning Phase															
11	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
12	Open cast years 10 - 20 (receptor 8)	Potential increase/change of ambient/rating	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
			WM	Negative	Improbabl	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed

		levels.			e										
Construction Phase															
13	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
			WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
14	Open cast years 10 - 20 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Probable	2	Medium term	3	Site	2	Medium	6	22	Low	Can be avoided, managed or mitigated
			WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
Operational Phase															
15	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	Can be reversed
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	Can be reversed
16	Open cast years 10 - 20 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low	Can be avoided, managed or mitigated
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	Can be reversed
Closure and Decommissioning Phase															
17	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
			WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed

18	Open cast years 10 - 20 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Probable	2	Medium term	3	Site	2	Medium	6	22	Low	Can be avoided, managed or mitigated
			WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
Post-Closure Phase															
19	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
20	Open cast years 10 - 20 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
Planning Phase															
21	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
22	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
Construction Phase															
23	Open cast years 20-30 (receptor 1 to	Potential increase/change	WOM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed

	7 & 9 to 10)	of ambient/rating levels.	WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
24	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Probable	2	Medium term	3	Site	2	Medium	6	22	Low	Can be avoided, managed or mitigated
			WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
Operational Phase															
25	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	Can be reversed
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	Can be reversed
26	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low	Can be avoided, managed or mitigated
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	Can be reversed
Closure and Decommissioning Phase															
27	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
			WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
28	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating	WOM	Negative	Probable	2	Medium term	3	Site	2	Medium	6	22	Low	Can be avoided, managed or mitigated
			WM	Negative	Improbabl	1	Medium	3	Site	2	Low	2	7	Negligible	Can be reversed

		levels.			e		term								
Post-Closure Phase															
29	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
30	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
		Heritage													
Planning Phase															
1	Planning	Site EXIGO-DFM-IA01 (medium significance)	WOM	Negative	Improbable	4	Short term	4	Local	1	Low	2	28	Low	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be avoided, managed or mitigated
2	Planning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	WOM	Negative	Improbable	1	Short term	1	Local	1	Medium	6	8	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be avoided, managed or mitigated
3	Planning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Improbabl	1	Short term	1	Local	1	High	8	10	Negligible	Can be avoided,

		(low significance)			e										managed or mitigated
Construction Phase															
5	Construction / Clearing	Site EXIGO-DFM-IA01 (medium significance)	WOM	Negative	Definite	5	Permanent	4	Site	4	High	5	65	High	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	Can be avoided, managed or mitigated
6	Construction / Clearing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Medium	6	52	Moderate	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	Can be avoided, managed or mitigated
7	Construction / Clearing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	WOM	Negative	Definite	5	Short term	1	Local	1	Low	2	20	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be avoided, managed or mitigated
Operational Phase															
9	Mining / Processing	Site EXIGO-DFM-IA01 (medium significance)	WOM	Negative	Improbable	1	Medium term	3	Site	2	High	8	13	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be avoided, managed or mitigated
10	Mining / Processing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	WOM	Negative	Improbable	1	Medium term	3	Site	2	Medium	6	11	Negligible	Can be avoided, managed or mitigated

			WM	Positive	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be avoided, managed or mitigated
11	Mining / Processing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	WOM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be avoided, managed or mitigated
Closure and Decommissioning Phase															
13	Decomissioning	Site EXIGO-DFM-IA01 (medium significance)	WOM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	Can be avoided, managed or mitigated
14	Decomissioning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	WOM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	Can be avoided, managed or mitigated
15	Decomissioning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	WOM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	Can be avoided, managed or mitigated
Post-Closure Phase															
17	Post-Closure	Site EXIGO-DFM-IA01 (medium significance)	WOM	Negative	Improbable	1	Permanent	5	Site	2	Low	2	9	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Permanent	5	Site	2	Low	2	9	Negligible	Can be avoided, managed or mitigated

18	Post-Closure	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	WOM	Negative	Improbable	1	Permanent	5	Site	2	Low	2	9	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Permanent	5	Site	2	Low	2	9	Negligible	Can be avoided, managed or mitigated
19	Post-Closure	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	WOM	Negative	Improbable	1	Permanent	5	Site	2	Low	2	9	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Permanent	5	Site	2	Low	2	9	Negligible	Can be avoided, managed or mitigated
Paleontology															
Construction Phase															
1	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of stromatolites	WOM	Negative	Highly Probable	4	Permanent	5	Local	1	Low	2	32	Low	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Permanent	5	Local	1	Low	2	32	Low	Can be avoided, managed or mitigated
2	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of fossils.	WOM	Negative	Probable	2	Permanent	5	Local	1	Low	2	16	Negligible	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Permanent	5	Local	1	Low	2	16	Negligible	Can be avoided, managed or mitigated
3	Construction of buildings, dams, roads, pylons.	Preservation of fossils.	WOM	Positive	Improbable	1	Permanent	5	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Highly	4	Permanent	5	Local	1	Low	2	32	Low	Can be avoided,

	Exploration for mining				Probable										managed or mitigated
Operational Phase															
	Mining	Destruction of stromatolites	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low	Can be avoided, managed or mitigated
4			WM	Negative	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low	Can be avoided, managed or mitigated
	Mining	Destruction of fossils.	WOM	Negative	Probable	2	Permanent	5	Site	2	Low	2	18	Negligible	Can be avoided, managed or mitigated
5			WM	Negative	Probable	2	Permanent	5	Site	2	Low	2	18	Negligible	Can be avoided, managed or mitigated
	Mining	Preservation of fossils.	WOM	Positive	Improbable	1	Permanent	5	Site	2	Low	2	9	Negligible	Can be avoided, managed or mitigated
6			WM	Positive	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low	Can be avoided, managed or mitigated
Traffic															
Planning Phase															
	No additional traffic	No impact	WOM		Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be avoided, managed or mitigated
26			WM		Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be avoided, managed or mitigated
Construction Phase															
2	Additional	Increased traffic	WOM	Negative	Definite	5	Short term	1	Site	2	Low	2	25	Low	Can be avoided,

	construction traffic	volumes													managed or mitigated
			WM	Positive	Definite	5	Short term	1	Site	2	Low	2	25	Low	Can be avoided, managed or mitigated
Operational Phase															
	Additional operational traffic	Add tirps to the surrounding road network	WOM	Negative	Definite	5	Medium term	3	Regional	3	Low	2	40	Low	Can be avoided, managed or mitigated
3			WM	Positive	Definite	5	Long term	4	Regional	3	Low	2	45	Moderate	Can be avoided, managed or mitigated
	Visual														
Planning Phase															
	Implementation of Mitigation Measures such as visual berms / vegetation screens		WOM	Positive	Probable	2	Permanent	5	Regional	3	Low	2	20	Negligible	Can be reversed
1			WM	Positive	Probable	2	Permanent	5	Site	2	Low	2	18	Negligible	Can be avoided, managed or mitigated
Construction Phase															
	Site preparation: Clearance of vegetation and dust creation	Alteration of the visual quality and sense of place of the area	WOM	Negative	Definite	5	Medium term	3	Regional	3	Medium	6	60	Moderate	Can be reversed
2			WM	Negative	Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low	Can be avoided, managed or mitigated
	Construction of the Site Camp / Office	Alteration of the visual quality and sense of place of the area	WOM	Negative	Definite	5	Short term	1	Site	2	Low	2	25	Low	Can be reversed
3			WM	Negative	Highly Probable	4	Short term	1	Site	2	Low	2	20	Negligible	Can be avoided, managed or mitigated

4	Removal of topsoil and subsoil for open pit mining: overburden dumps, Soil dumps and Dust creation	Alteration of the visual quality and sense of place of the area	WOM	Negative	Definite	5	Medium term	3	Regional	3	Medium	6	60	Moderate	Can be reversed
			WM	Negative	Definite	5	Medium term	3	Site	2	Medium	6	55	Moderate	Can be avoided, managed or mitigated
5	Construction of the plant: physical structure will become more visible	Alteration of the visual quality and sense of place of the area	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	Can be reversed
			WM	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	May cause irreplaceable loss of resources
6	Lighting of the Area - Security lighting or any other lighting during the evening.	Light pollution, Alteration of the visual quality and sense of place of the area - specifically referring to night life such as star gazing	WOM	Negative	Definite	5	Short term	1	Regional	3	High	8	60	Moderate	Can be reversed
			WM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate	Can be avoided, managed or mitigated
Operational Phase															
7	Physical structure of the plant	Alteration of the visual quality and sense of place of the area	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	Can be reversed

8	Physical structure of the TSF	Alteration of the visual quality and sense of place of the area	WOM	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	
9	Operational activities of the open pit mine, including blasting, movement of trucks will create dust	Alteration of the visual quality and sense of place of the area	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	May cause irreplaceable loss of resources
10	Topsoil dumps, overburden dumps	Alteration of the visual quality and sense of place of the area	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	Can be reversed
			WM	Negative	Highly Probable	4	Medium term	3	Regional	3	High	8	56	Moderate	Can be avoided, managed or mitigated
11	Lighting of the Area - Security lighting or any other lighting during the evening.	Light pollution, Alteration of the visual quality and sense of place of the area - specifically referring to night life such as star gazing	WOM	Negative	Definite	5	Short term	1	Regional	3	High	8	60	Moderate	Can be reversed
			WM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate	Can be avoided, managed or mitigated
Closure and Decommissioning Phase															
12	Removal of the plant structures:	Alteration of the visual quality and	WOM	Negative	Definite	5	Short term	1	Regional	3	High	8	60	Moderate	Can be avoided, managed or mitigated

	Creation of dust	sense of place of the area	WM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate	
13	Removal of the plant structures: physical structures will be gone	Improvement of the visual quality and sense of place of the area	WOM	Positive	Highly Probable	4	Permanent	5	Regional	3	Low	2	40	Low	Can be avoided, managed or mitigated
			WM	Positive	Definite	5	Permanent	5	Regional	3	Low	2	50	Moderate	
14	Closure of the open pit mining areas: Creation of dust	Alteration of the visual quality and sense of place of the area	WOM	Negative	Definite	5	Short term	1	Regional	3	High	8	60	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate	
15	Removal of topsoil dumps and overburden dumps (note that some of the dumps might form part of the visual berms which will not be removed)	Improvement of the visual quality and sense of place of the area	WOM	Positive	Definite	5	Permanent	5	Site	2	Low	2	45	Moderate	Can be avoided, managed or mitigated
			WM	Positive	Definite	5	Permanent	5	Site	2	Low	2	45	Moderate	
16	Lighting of the Area - Security lighting or any other lighting during the evening.	Light pollution, Alteration of the visual quality and sense of place of the area - specifically referring to night	WOM	Negative	Definite	5	Short term	1	Regional	3	High	8	60	Moderate	Can be reversed
			WM	Negative	Highly Probable	4	Short term	1	Site	2	High	8	44	Moderate	Can be avoided, managed or mitigated

		life such as star gazing													
Post-Closure Phase															
17	Rehabilitation of cleared areas	Improvement of the visual quality and sense of place of the area	WOM	Positive	Definite	5	Long term	4	Regional	3	Low	2	45	Moderate	
			WM	Positive	Definite	5	Long term	4	Regional	3	Low	2	45	Moderate	
18	Physical structure of the TSF will remain on site	Alteration of the visual quality and sense of place of the area	WOM	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	Can be avoided, managed or mitigated
	Hydrogeology														
Construction Phase															
1	Establishment and operation of construction camp.	Groundwater and surface water contamination.	WOM	Negative	Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low	
			WM	Positive	Probable	2	Short term	1	Site	2	Low	2	10	Negligible	Can be avoided, managed or mitigated
2	Anthropogenic activities on site.	Contamination risk.	WOM	Negative	Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low	
			WM	Positive	Probable	2	Short term	1	Site	2	Low	2	10	Negligible	Can be avoided, managed or mitigated
3	Fuelling and movement of	Risk of hydrocarbon	WOM	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate	

	construction vehicles.	spillage and contamination.	WM	Positive	Probable	2	Medium term	3	Site	2	Medium	6	22	Low	Can be avoided, managed or mitigated
Operational Phase															
4	Mine dewatering zone of influence.	Lowering of regional groundwater levels.	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	
			WM	Positive	Probable	2	Long term	4	Regional	3	High	8	30	Low	Can be avoided, managed or mitigated
5	Possible groundwater abstraction from mine production boreholes.	Lowering of regional groundwater levels.	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	
			WM	Positive	Probable	2	Long term	4	Regional	3	High	8	30	Low	Can be avoided, managed or mitigated
6	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination.	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	
			WM	Positive	Probable	2	Medium term	3	Regional	3	Medium	6	24	Low	Can be avoided, managed or mitigated
7	Use of explosives for mine pit development.	Contribution to nitrate over-load in groundwater and surface water resources.	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	Medium	6	44	Moderate	
			WM	Positive	Highly Probable	4	Medium term	3	Site	2	Low	2	28	Low	Can be avoided, managed or mitigated
8	Hydrocarbon spillages from fuel storage facilities, fuelling and wash-bays.	Hydrocarbon contamination of groundwater and surface water resources.	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	
			WM	Positive	Probable	2	Long term	4	Site	2	Medium	6	24	Low	Can be avoided, managed or mitigated
9	Vegetation	Excessive runoff	WOM	Negative	Highly	4	Medium	3	Regional	3	High	8	56	Moderate	

	clearance.	causing silt generation and build-up in local surface water resources.			Probable		term								
			WM	Positive	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
Closure and Decommissioning Phase															
10	Increased groundwater ingress at disturbed/rehabilitated areas.	Recovering of regional groundwater levels.	WOM	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate	
			WM	Positive	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be avoided, managed or mitigated
11	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination.	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	
			WM	Positive	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be avoided, managed or mitigated
Post-Closure Phase															
12	Migration of contamination plume from mine waste sources.	Contamination of regional groundwater and surface water resources.	WOM	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	
			WM	Positive	Probable	2	Long term	4	Regional	3	Low	2	18	Negligible	Can be avoided, managed or mitigated
13	Post-closure pit flooding and groundwater quality.	Potential decanting of groundwater at low elevation areas.	WOM	Negative	Probable	2	Long term	4	Local	1	Medium	6	22	Low	
			WM	Positive	Probable	2	Long term	4	Local	1	Low	2	14	Negligible	Can be avoided, managed or mitigated

Aquatic															
Planning Phase															
1	Potentially poor planning leading to extensive and complex dirty water areas which need to be managed may impact on water quality.	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	May cause irreplaceable loss of resources
		WM	Negative	Probable	2	Permanent	5	Regional	3	Medium	6	28	Low	Can be avoided, managed or mitigated
2	Potentially poor planning leading to placement of polluting structures in non-perennial drainage lines which would increase mobility of pollutants and may impact on water quality.	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	Can be reversed
		WM	Negative	Improbable	1	Long term	4	Local	1	Low	2	7	Negligible	Can be avoided, managed or mitigated
3	Potentially inadequate separation of clean and dirty water areas leading to contaminated water leaving the defined dirty water area may impact in water quality.	**WOM**	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	May cause irreplaceable loss of resources
		WM	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low	Can be avoided, managed or mitigated
4	Clean and dirty water systems not being designed adequately to ensure protection of the water resources.	**WOM**	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	May cause irreplaceable loss of resources
		WM	Negative	Improbable	1	Long term	4	Local	1	Low	2	7	Negligible	Can be avoided, managed or mitigated
Construction Phase															
5	Clean and dirty water systems not being constructed to the required	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	May cause irreplaceable loss of

	specifications to prevent contamination of clean water areas may impact on water quality.													resources
		WM	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low	Can be avoided, managed or mitigated
6	Major earthworks and construction activities may lead to impacts on water quality as a result of erosion and sedimentation as well as resulting in the oxidation of pyrites. In addition, there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting.	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	May cause irreplaceable loss of resources
		WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
7	Poor housekeeping and management may lead to impacts on water quality.	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	Can be reversed
		WM	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low	Can be avoided, managed or mitigated
8	Spills and other unplanned events may impact on water quality.	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	Can be reversed
		WM	Negative	Probable	2	Medium term	3	Site	2	Medium	6	22	Low	Can be avoided, managed or mitigated
Operational Phase														
9	Mining activities and the establishment of mining waste may impact on water quality and thus needs to be managed	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources

	to prevent pollution.	**WM**	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be avoided, managed or mitigated
10	Clean and dirty water systems not being maintained and operated to the required specifications to prevent contamination of clean water areas may impact on water quality.	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
		WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be avoided, managed or mitigated
11	Poor housekeeping and management during operational phase may lead to impacts on water quality.	**WOM**	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	May cause irreplaceable loss of resources
		WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
12	Major earthworks and operational activities may lead to impacts on water quality as a result of erosion and sedimentation as well as resulting in the oxidation of pyrites. In addition, there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting.	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
		WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
13	Spills and other unplanned events during operational phase may impact on water quality.	**WOM**	Negative	Definite	5	Medium term	3	Regional	3	High	8	70	High	May cause irreplaceable loss of resources
		WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated

Closure and Decommissioning Phase														
14	Inadequate closure and rehabilitation leading to ongoing pollution from contaminating sources such as discard dumps and latent dirty water areas may impact on water quality.	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
		WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
15	Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality.	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	May cause irreplaceable loss of resources
		WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be avoided, managed or mitigated
16	Poor housekeeping and management during decommissioning phase may lead to impacts on water quality.	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	May cause irreplaceable loss of resources
		WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
17	Spills and other unplanned events during decommissioning phase may impact on water quality.	**WOM**	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate	Can be reversed
		WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
Post-Closure Phase														
18	Inadequate closure and rehabilitation leading to ongoing pollution from contaminating sources such as discard	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources

	dumps and latent dirty water areas may impact on water quality, with special mention of contaminated dirty water decent degenrated from in-filled opencast pits		**WM**	Negative	Probable	2	Medium term	3	Local	1	Low	2	12	Negligible	Can be avoided, managed or mitigated
19	Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality.		**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
20	Inadequate rehabilitation of mining areas leading to erosion and sedimentation of the aquatic resources present.		**WOM**	Negative	Definite	5	Permanent	5	Regional	3	Medium	6	70	High	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Medium term	3	Local	1	Low	2	12	Negligible	Can be avoided, managed or mitigated
	Socio-economic														
Construction Phase															
1	Capital investment into the establishment of the mine	Stimulation of production and GDP due to investment	**WOM**	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	
			WM	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	Can be reversed

2	Capital investment into the establishment of the mine	Stimulation of employment due to investment	**WOM**	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	Can be reversed
			WM	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	
3	**Creation of employment**	Improved standard of living due to creation of employment	**WOM**	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	Can be reversed
			WM	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	
4	**Creation of employment**	Skills development	**WOM**	Positive	Probable	2	Short term	1	Regional	3	Medium	6	20	Negligible	Can be reversed
			WM	Positive	Highly Probable	4	Short term	1	Regional	3	Medium	6	40	Low	
5	Capital investment into the establishment of the mine	Government revenue increase	**WOM**	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	
			WM	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	
6	Sterilisation of land due to construction and mine establishment activities	Loss of agricultural production due to land sterilisation	**WOM**	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	
7	Construction activities on site	Change in the sense of place among the directly and indirectly	**WOM**	Negative	Definite	5	Long term	4	Site	2	Medium	6	60	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Definite	5	Long term	4	Site	2	Low	2	40	Low	

		affected communities													
8	Capital investment into the establishment of the mine and recruitment of construction workers	Change in demographics of the area due to potential influx of workers and job seekers	**WOM**	Negative	Probable	2	Medium term	3	Regional	3	Medium	6	24	Low	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Medium term	3	Regional	3	Low	2	16	Negligible	
9	Construction activities that would increase traffic (light and heavy vehicles) on local roads	Deterioration of local infrastructure	**WOM**	Negative	Highly Probable	4	Short term	1	Regional	3	Medium	6	40	Low	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Short term	1	Regional	3	Medium	6	40	Low	
10	Influx of job seekers	Added pressure on basic service delivery and growth of informal settlements	**WOM**	Negative	Probable	2	Medium term	3	Regional	3	Medium	6	24	Low	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Medium term	3	Regional	3	Low	2	16	Negligible	
11	Capital investment into the establishment of the mine and recruitment of construction	Increase in social pathologies (Crime, xenophobia, prostitution, etc.) due to influx of	**WOM**	Negative	Probable	2	Medium term	3	Regional	3	Medium	6	24	Low	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Medium term	3	Regional	3	Low	2	16	Negligible	

	workers	people into the area													
12	Influx of job seekers	Pressure on local social facilities to provide quality services	**WOM**	Negative	Probable	2	Medium term	3	Regional	3	Medium	6	24	Low	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Medium term	3	Regional	3	Low	2	16	Negligible	
13	Construction activities that bring about the change in the sense of place	Impact on property values	**WOM**	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	
Operational Phase															
14	Mining operations	Stimulation of production and GDP due to operations	**WOM**	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	Can be reversed
			WM	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	
15	Mining operations	Stimulation of employment creation due to operations	**WOM**	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	Can be reversed
			WM	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	
16	Mining operations	Skills development	**WOM**	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	Can be reversed
			WM	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	
17	Creation of employment at the mine	Improved standard of living due to creation of employment	**WOM**	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	Can be reversed
			WM	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	
18	Mining operations	Increase in	**WOM**	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	Can be reversed

		government revenue and its ability to deliver services	**WM**	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	
19	Extraction and processing of minerals	Export earnings	**WOM**	Positive	Probable	2	Long term	4	Regional	3	Low	2	18	Negligible	Can be reversed
			WM	Positive	Probable	2	Long term	4	Regional	3	Low	2	18	Negligible	
20	Operation of the mine and employment from local community	Conflict between mine workers and farm workers about jobs and benefits	**WOM**	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Long term	4	Regional	3	Low	2	36	Low	
21	Increase in income	Increase in alcohol and drug abuse	**WOM**	Negative	Highly Probable	4	Long term	4	Regional	3	Low	2	36	Low	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Long term	4	Regional	3	Low	2	18	Negligible	
22	Operations of the mine requiring access to water, electricity, etc.	Pressure on local authorities to provide adequate basic services	**WOM**	Negative	Highly Probable	4	Long term	4	Regional	3	Low	2	36	Low	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Long term	4	Regional	3	Low	2	18	Negligible	
23	Investment into the local communities through SLP	Improved quality of life and service delivery	**WOM**	Positive	Highly Probable	4	Long term	4	Regional	3	Low	2	36	Low	Can be reversed
			WM	Positive	Definite	5	Long term	4	Regional	3	Low	2	45	Moderate	
Closure															
17	Expenditure on decommissioning and closure	Stimulation of production and GDP and	**WOM**	Positive	Definite	5	Short term	1	Regional	3	Low	2	30	Low	Can be reversed
			WM	Positive	Definite	5	Short term	1	Regional	3	Low	2	30	Low	

		employment												

16. METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision).

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 Guideline Document: EIA Regulations 2010. The significance of the aspects/impacts of the process 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.

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

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 fluorspar 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.

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

Kindly Refer to the Alternatives assessment discussion in Section 9.2. Below the Environmental Impact Statement highlighting the positive and negative impacts.

An assessment of potential impacts identified for the mining development was undertaken.

The positive and negative impacts with a high significance, without mitigation (WOM) are summarized in the table below. The impact rating with mitigation (WM) is indicated to the right. The complete impact rating is included in Table 15.

Table 16 High Significance Impacts

No	Activity	Impact	Without or With Mitigation	Significance
				Magnitude
	Ecology			
Construction Phase				
2	Clearing of vegetation for open pits, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	Habitat destruction / fragmentation of fauna habitats	WOM	High
			WM	Moderate
5	Vegetation clearing / vehicle movement	Habitat degradation due to dust	WOM	High
			WM	Moderate
Operational Phase				
8	Storage of tailings, laydown areas of overburden dumps and stockpiles	Habitat destruction / fragmentation of fauna habitats	WOM	High
			WM	Moderate
9	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	High
			WM	Moderate
11	Heavy machinery and vehicle movement on site	Habitat degradation due to dust	WOM	High
			WM	Moderate
	Wetlands			
Construction Phase				
2	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Wetland destruction / fragmentation of wetland habitats	WOM	High
			WM	High
3	Clearing of vegetation for through wetlands	Impediment of flow patterns	WOM	High

	and water courses for road crossings		WM	High
4	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation in wetlands	Soil erosion and sedimentation	WOM	High
			WM	Moderate
Operational Phase				
7	Opencast mining	Dewatering of wetlands causing direct habitat loss / destruction	WOM	High
			WM	High
8	Increased hardened surfaces around infrastructure and exposed areas around open pits, laydown areas of overburden dumps and stockpiles as well as TSF, road crossings	Soil erosion and sedimentation in wetland / water courses	WOM	High
			WM	Moderate
Soils				
Construction Phase				
2	Soil compaction	Heavy machinery and vehicle movement on site	WOM	High
			WM	Low
3	Soil erosion and sedimentation	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation in wetlands	WOM	High
			WM	Moderate
5	Soil destruction and sterilization	Topsoil & subsoil stripping	WOM	High
			WM	High
6	Loss of land capability	Topsoil & subsoil stripping, Clearing of vegetation through wetlands and water courses for road crossings	WOM	High
			WM	Moderate
Operational Phase				
7	Soil compaction	Heavy machinery and vehicle movement on site, laydown areas of overburden dumps and stockpiles	WOM	High
			WM	High
8	Soil erosion and sedimentation in wetland / water courses	Increased hardened surfaces around infrastructure and exposed areas around open pits, laydown areas of overburden dumps and	WOM	High
			WM	Moderate

		stockpiles as well as TSF, road crossings		
10	Soil destruction and sterilization	Topsoil & subsoil stripping, opencast mining	WOM	High
			WM	Moderate
11	Loss of land capability	Topsoil & subsoil stripping, Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	WOM	High
			WM	Moderate
Heritage				
Construction Phase				
5	Construction / Clearing	Site EXIGO-DFM-IA01 (medium significance)	WOM	High
			WM	Negligible
Visual				
Construction Phase				
5	Construction of the plant: physical structure will become more visible	Alteration of the visual quality and sense of place of the area	WOM	High
			WM	Moderate
Operational Phase				
7	Physical structure of the plant	Alteration of the visual quality and sense of place of the area	WOM	High
			WM	Moderate
8	Physical structure of the TSF	Alteration of the visual quality and sense of place of the area	WOM	High
			WM	High
9	Operational activities of the open pit mine, including blasting, movement of trucks will create dust	Alteration of the visual quality and sense of place of the area	WOM	High
			WM	Moderate
10	Topsoil dumps, overburden dumps	Alteration of the visual quality and sense of place of the area	WOM	High
			WM	Moderate
Post-Closure Phase				
18	Physical structure of the TSF will remain on site	Alteration of the visual quality and sense of place of the area	WOM	High
			WM	Moderate
Hydrogeology				

Operational Phase				
4	Mine dewatering zone of influence.	Lowering of regional groundwater levels.	WOM	High
			WM	Low
5	Possible groundwater abstraction from mine production boreholes.	Lowering of regional groundwater levels.	WOM	High
			WM	Low
6	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination.	WOM	High
			WM	Low
Closure and Decommissioning Phase				
11	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination.	WOM	High
			WM	Negligible
Post-Closure Phase				
12	Migration of contamination plume from mine waste sources.	Contamination of regional groundwater and surface water resources.	WOM	High
			WM	Negligible
Aquatic				
Planning Phase				
1	Potentially poor planning leading to extensive and complex dirty water areas which need to be managed may impact on water quality.		**WOM**	High
			WM	Low
2	Potentially poor planning leading to placement of polluting structures in non-perennial drainage lines which would increase mobility of pollutants and may impact on water quality.		**WOM**	High
			WM	Negligible
Construction Phase				
5	Clean and dirty water systems not being constructed to the required specifications to prevent contamination of clean water areas may impact on water quality.		**WOM**	High
			WM	Low
6	Major earthworks and construction activities may lead to impacts on water quality as a result of erosion and sedimentation as well as resulting in the oxidation of pyrites. In addition, there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting.		**WOM**	High
			WM	Negligible
7	Poor housekeeping and management may lead to impacts on water quality.		**WOM**	High
			WM	Low
8	Spills and other unplanned events may impact on water quality.		**WOM**	High
			WM	Low
Operational Phase				

9	Mining activities and the establishment of mining waste may impact on water quality and thus needs to be managed to prevent pollution.		WOM	High
			WM	Negligible
10	Clean and dirty water systems not being maintained and operated to the required specifications to prevent contamination of clean water areas may impact on water quality.		WOM	High
			WM	Negligible
12	Major earthworks and operational activities may lead to impacts on water quality as a result of erosion and sedimentation as well as resulting in the oxidation of pyrites. In addition, there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting.		WOM	High
			WM	Negligible
13	Spills and other unplanned events during operational phase may impact on water quality.		WOM	High
			WM	Negligible
Closure and Decommissioning Phase				
14	Inadequate closure and rehabilitation leading to ongoing pollution from contaminating sources such as discard dumps and latent dirty water areas may impact on water quality.		WOM	High
			WM	Negligible
15	Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality.		WOM	High
			WM	Negligible
16	Poor housekeeping and management during decommissioning phase may lead to impacts on water quality.		WOM	High
			WM	Negligible
Post-Closure Phase				
18	Inadequate closure and rehabilitation leading to ongoing pollution from contaminating sources such as discard dumps and latent dirty water areas may impact on water quality, with special mention of contaminated dirty water decent degenerated from in-filled opencast pits		WOM	High
			WM	Negligible
19	Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality.		WOM	High
			WM	Negligible
20	Inadequate rehabilitation of mining areas leading to erosion and sedimentation of the aquatic resources present.		WOM	High
			WM	Negligible
Socio-economic				
Operational Phase				
14	Mining operations	Stimulation of production and GDP due to operations	WOM	High
			WM	High
15	Mining operations	Stimulation of employment creation	WOM	High

		due to operations	**WM**	High
16	Mining operations	Skills development	**WOM**	High
			WM	High
17	Creation of employment at the mine	Improved standard of living due to creation of employment	**WOM**	High
			WM	High
18	Mining operations	Increase in government revenue and its ability to deliver services	**WOM**	High
			WM	High

Most of the impacts associated with the development can be mitigated to negligible, low or moderate levels of significance. The impacts of **high significance after mitigation** are as follows:

- Wetland impacts: Wetland destruction / fragmentation of wetland habitats from mining (open pits), impediment of flow patterns from road crossings through wetland or watercourses, and dewatering of wetlands causing direct habitat loss / destruction from mining (open pits)
- Soil impacts: Soil destruction and sterilization from topsoil & subsoil stripping, and soil compaction from heavy machinery and vehicle movement on site, laydown areas of overburden dumps and stockpiles
- Visual impacts: Alteration of the visual quality and sense of place of the area by the physical structure of the TSF
- Socio-economic impacts: Stimulation of production and GDP due to operations, stimulation of employment creation due to operations, skills development, improved standard of living due to creation of employment, and increase in government revenue and its ability to deliver services

The above impacts with a high significance following mitigation are negative apart from the socio-economic impacts which are positive impacts.

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).

Table 17 Mitigation Measures[2]

No	Activity	Impact	Size and Scale of Activity (not impact)	Typical Mitigation Measures	Compliance with Standards
Ecology					
Planning Phase					NEMBA, NEMA
1	Eradication of protected trees / flora through permit application	Delay of mining onset	400 Ha	Apply and obtain permits from DAFF after liaison with relevant officials and site visit to the area.	
Construction Phase					
2	Clearing of vegetation for open pits, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	Habitat destruction / fragmentation of fauna habitats	195 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.	

[2] 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.

				• Conduct flora species search and rescue efforts before ground clearing begins in order to reduce negative impacts on species of concern. • 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.	
3	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation	Soil erosion and sedimentation	195 Ha	• 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.	
4	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species	195 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 should even begin prior to the construction phase considering that small populations of the AIS occur around the sites.	
				• Institute strict control over materials brought onto site, which should be	

				inspected for seeds of noxious plants and steps 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.	
5	Vegetation clearing / vehicle movement	Habitat degradation due to dust	195 Ha	• Dampening of dusty areas or other dust suppression methods such as dust-aside or more environmentally friendly methods as required. • Re-vegetation of impacted areas is to be conducted on an on-going basis.	
6	Heavy machinery and vehicle movement on site	Spillages of harmful substances	36 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.	
7	Heavy machinery and vehicle movement on site; Construction of infrastructure, roads etc. on site	Road mortalities of fauna / impact of human activities on site	36Ha	• More fauna are normally killed the faster vehicles travel. A speed limit should be enforced (speed on site max 40-60 km/hour; Outside of the site 80 km/h. In Rain max 40 km/h). 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 site manager.	
Operational Phase					

8	Storage of tailings, laydown areas of overburden dumps and stockpiles	Habitat destruction / fragmentation of fauna habitats	180 Ha	• Final profile lines of rehabilitated areas must fit in with the character of the topography in the area. • Concurrent rehabilitation should occur during the operational phase on all exposed areas created by construction as well as roads, stockpiles and overburden dumps. Only indigenous species should be used for rehabilitation. The following programmes should be implemented as part of the operational phase of the mine: - Concurrent rehabilitation programme - Alien invasive programme - Fire management programme - Educational and training programme on the conservation and ecological systems • Refer to mitigation measures needed during the operational phase that are similar to the mitigation measures for impacts during the construction phase. Refer to mitigation measures for the fragmentation of fauna habitats that are similar to the mitigation measures for impacts during the construction phase.	
9	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	400 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).	

10	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species	36 Ha	• Daily dampening of dust areas. • 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 blow dust away from users. • 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 them by 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.	
11	Heavy machinery and vehicle	Habitat degradation due to dust	36 Ha	• Refer to mitigation measures that are similar for impacts during the	

	movement on site			construction phase.	
12	Heavy machinery and vehicle movement on site	Spillages of harmful substances	36 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 storm water 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.	
13	Heavy machinery and vehicle movement on site; workers accommodated on site causing poaching, wood collection, fires etc.	Road mortalities of fauna / impact of human activities on site	36 Ha	Refer to mitigation measures that are similar for impacts during the construction phase.	
Closure and Decommissioning Phase					
14	Rehabilitation of mining site	Improvement of habitat through revegetation / succession over time	400 Ha	Positive impact - no mitigation required.	

15	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	400 Ha	Refer to mitigation measures for the construction phase that are for similar impacts.	
16	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Spreading and establishment of alien invasive species	400 Ha	• To leave all affected areas in a safe condition. • Refer to mitigation measures for the construction phase that are for similar impacts.	
17	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site / vehicle movement on site	Habitat degradation due to dust	400 Ha	Refer to mitigation measures for the construction phase that are for similar impacts.	
18	Heavy machinery and vehicle movement on site	Spillages of harmful substances	36 Ha	Refer to mitigation measures for the construction phase that are for similar impacts	
19	Heavy machinery and vehicle movement on site	Road mortalities of fauna / impact of human activities on site	36 Ha	Refer to mitigation measures for the construction phase that are for similar impacts	
Post-Closure Phase					
20	Natural Successional processes	Improvement of habitat through revegetation / succession over time	400 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 storm water 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.	
21	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	400 Ha	Refer to mitigation measures for the construction phase that are for similar impacts	
22	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species	400 Ha	Monitor and manage invader species and alien species on the rehabilitated land until the natural vegetation can outperform the invaders or aliens.	
Wetlands					
Planning Phase					NEMA. NWA, NEMWA
1	Obtaining of IWUL for crossings and mining through water courses / wetlands	Delay of mining onset	205 Ha	Apply and obtain IWUL from DWS after liaison with relevant officials and site visit to the area	
Construction Phase					
2	Clearing of vegetation through wetlands and water courses for road crossings	Wetland destruction / fragmentation of wetland habitats	30 Ha	• No activity must take place within the 1:100 year flood line or the delineated riparian habitat, whichever is the greatest, or within 500 m radius from the boundary of any wetland unless authorised by the	

				necessary licenses. • Existing vegetation composition must be maintained or improved by maintaining the natural variability in flow fluctuations. • No activities that negatively affect catchment yield, hydrology and hydraulics must be practised unless authorised. • All construction and maintenance 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 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 wetland areas. • Remove and relocate any plants of botanical or ecological significance as indicated by the ecologist or Environmental Control Officer (ECO); • Vegetation to be removed as it becomes necessary; • Construction should preferably take place in winter to reduce disturbance to breeding fauna and flowering flora; • 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 wetlands of the area; • The ECO should advise the construction team in all relevant matters to ensure minimum destruction and damage to the wetland environment. The 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; • Indigenous riparian vegetation, including dead trees, outside the limits of disturbance indicated in the site plans must not be removed from the area	
3	Clearing of vegetation for through wetlands and water courses for road crossings	Impediment of flow patterns	30Ha	• Unless authorised by this 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 by the relevant licences • 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 (in other words natural flow must be facilitated as far as possible). Any watercourse crossing must minimise its impacts on the watercourse 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 Klein Marico River 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 as recommended by the submitted reports • 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.	
4	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation in wetlands	Soil erosion and sedimentation	195 Ha	• Sediment trapping, erosion and storm water control should be addressed by a hydrological engineer in a detailed storm water 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)/wetlands. • 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 - 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 flood line and/or delineated riparian habitat and/or the regulated area of a wetland, 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 in wetlands	195 Ha	• Alien and invader vegetation must not be allowed to further colonise the area, and all new alien vegetation recruitment must be sustainably eradicated or controlled. 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 should even begin prior to the construction phase considering that small populations of the AIS occur around the sites; • Institute strict control over materials brought onto site, which should be inspected for seeds of noxious plants and steps 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.	
6	Heavy machinery and vehicle movement on site	Spillages of harmful substances	36 Ha	• Pollution of and disposal/spillage of any material into the 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 flood line or delineated riparian habitat, whichever is the greatest. • Oils and other potential pollutants must be disposed-off 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 wetland associated with each watercourse • 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 • 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 in 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	
Operational Phase					
7	Opencast mining	Dewatering of wetlands causing direct habitat loss / destruction	175 Ha	• A detailed surface water - groundwater study should be conducted by a geohydrologist to indicate the extent of potential dewatering of wetlands / springs 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.	
8	Increased hardened surfaces around infrastructure and exposed areas around open pits, laydown areas of overburden dumps and stockpiles as well as TSF, road crossings	Soil erosion and sedimentation in wetland / water courses	400 Ha	• Stormwater and run-off must be gently directed towards grasslands from where it migrates to watercourse(s) • Concurrent rehabilitation should occur during the operational phase on all exposed areas created by construction as well as roads, stockpiles and overburden dumps, especially at crossings. Only indigenous species should be used for rehabilitation. The following programmes should be implemented as part of the operational phase of the mine: - Concurrent rehabilitation programme - Alien invasive programme - Fire management programme - Educational and training programme on the conservation and wetland / riparian systems • 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.	

				• Run-off from paved, hardened and compacted surfaces should be slowed down by the strategic placement of berms • 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); • 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 storm water runoff and wind; - Topsoil stockpiles should not exceed 2.0 m in height and 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. • Soils that have become compacted through the activities must be loosened to an appropriate depth to allow seed germination	

				• Refer to mitigation measures needed during the operational phase that are similar to the mitigation measures for impacts during the construction phase.
9	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species in wetlands	36 Ha	• Encroachment of additional exotic species and terrestrial species in riparian zones must be discouraged • Refer to mitigation measures needed during the operational phase that are similar to the mitigation measures for impacts during the construction phase
10	Heavy machinery and vehicle movement on site	Spillages of harmful substances leading to water pollution in wetlands	36 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 storm water 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
Closure and Decommissioning Phase				•

11	Rehabilitation of mining site	Improvement of wetland habitat through revegetation / succession over time	400 Ha	• Positive impact - no mitigation required	
12	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation in wetlands	400 Ha	• Refer to mitigation measures for the construction phase needed during the decommissioning phase that are similar to the mitigation measures for impacts during the construction phase	
13	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Spreading and establishment of alien invasive species in wetlands	400 Ha	• To leave all affected areas in a safe condition	
14	Heavy machinery and vehicle movement on site	Spillages of harmful substances	36 Ha	• Refer to mitigation measures for the construction phase needed during the decommissioning phase that are similar	
Post-Closure Phase				•	
15	Natural Successional processes	Improvement of wetland habitat at crossings through revegetation / succession over time	400 Ha	• The Licensee must embark on a systematic long-term rehabilitation programme to restore the watercourse(s) to environmentally acceptable and sustainable conditions after completion of the activities, which must include, but not be limited to the rehabilitation of disturbed and degraded riparian areas to restore and upgrade the riparian habitat integrity to sustain a bio-diverse riparian ecosystem. • All disturbed areas must be re-vegetated with an indigenous seed mix in consultation with an indigenous plant expert, ensuring that during rehabilitation only indigenous shrubs, trees and grasses are used in restoring the biodiversity. • 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 storm water 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. • Rehabilitated areas must have a vegetation basal cover of at least 15% at all times (of natural conditions).	
16	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	400 Ha	• Rehabilitation structures must be inspected regularly for the accumulation of debris, blockages instabilities and erosion with concomitant remedial and maintenance actions. • A comprehensive and appropriate rehabilitation and management programme to restore the watercourse(s) to environmentally acceptable and sustainable conditions after construction must be developed and submitted to the Provincial Head or relevant authority for written approval within one (1) month prior to a watercourse being directly affected. • A Wetland Management and Rehabilitation Plan for the activities must be compiled by a professional, independent, qualified and registered wetland specialist when wetlands are to be affected and submitted to the Provincial Head relevant authority for written approval within one (1) month prior to a wetland being affected	
17	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species	400 Ha	• An active campaign for controlling invasive species must be implemented within disturbed zones to ensure that it does not become a conduit for the propagation and spread of invasive exotic plants. • Monitor and manage invader species and alien species on the	

				rehabilitated land until the natural vegetation can outperform the invaders or aliens.	
Soils					
Planning Phase					NEMA, NEMWA, CARA
1	Delay of mining onset	Obtaining of IWUL for crossings (wetland soils) and mining layout on sensitive soils		Apply and obtain IWUL from DWS after liaison with relevant officials.	
Construction Phase					
2	Soil compaction	Heavy machinery and vehicle movement on site	36 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.	
3	Soil erosion and sedimentation	Topsoil & subsoil stripping, exposure of	195 Ha	• When possible, topsoil stripping and excavation activities should be	

		soils, ore and rock to wind and rain during construction causing erosion and sedimentation in wetlands		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 storm water control should be addressed by a hydrological engineer in a detailed storm water management plan. • 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.	
4	Spillages of harmful substances	Heavy machinery and vehicle movement on site	36 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 could 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. • The hydrochloric acid tanks are contained within an epoxy-coated, 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 hydrochloric acid. • Spills from the tailings thickener will flow by gravity to the mine reclaim water ponds at the southern toe of the existing fines residue deposit. From there they will be pumped back to the processing plant. The area that would be affected by such a spill has already been impacted by the mining operation. • 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.	
5	Soil destruction and sterilization	Topsoil & subsoil stripping	195 Ha	No specific mitigation can be applied during the construction phase of the mine to prevent soil destruction, although an important measures should be the correct handling and stockpiling of topsoil	
6	Loss of land capability	Topsoil & subsoil stripping, Clearing of vegetation through wetlands and water courses for road crossings	195 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 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) 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 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.	
Operational Phase					
7	Soil compaction	Heavy machinery and vehicle movement on site, laydown areas of overburden dumps and stockpiles	400 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.	
8	Soil erosion and sedimentation in wetland / water courses	Increased hardened surfaces around infrastructure and exposed areas around open pits, laydown areas of overburden dumps and stockpiles as well as TSF, road crossings	400 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). • 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 storm water runoff and wind; - Topsoil stockpiles should not exceed 2.0 m in height and 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.	
9	Spillages of harmful substances leading to water pollution in wetlands	Heavy machinery and vehicle movement on site	36 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 storm water 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	
10	Soil destruction and sterilization	Topsoil & subsoil stripping, opencast mining	205 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. The rehabilitation of soils to pre-mining conditions is basically impossible though. Refer to section 11 of the soils report for a detailed discussion on the rehabilitation of topsoil after stripping. • Refer to mitigation measures needed during the operational phase that	

				are similar to the mitigation measures for impacts during the construction phase.
11	Loss of land capability	Topsoil & subsoil stripping, Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	255 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 grazing.
Closure and Decommissioning Phase				
12	Improvement of eroded soils and compaction / backfilling of pits	Rehabilitation of mining site	400 Ha	Positive impact - no mitigation required
13	Soil erosion and sedimentation in wetlands	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	400 Ha	Refer to mitigation measures for the construction and operational phases needed during the decommissioning phase that are similar
14	Soil compaction	Heavy machinery and vehicle movement on site	36 Ha	Refer to mitigation measures for the construction and operational phases needed during the decommissioning phase that are similar
15	Spillages of harmful substances	Heavy machinery and vehicle movement on site	36 Ha	Refer to mitigation measures for the construction and operational phases needed during the decommissioning phase that are similar
Post-Closure Phase				
16	Improvement of soil compaction and erosion	Natural processes	400 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 storm water 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.	
17	Soil erosion and sedimentation	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	400 Ha	Refer to mitigation measures for the other mining phases needed during the closure phase that are relevant	
Air Quality					
Planning Phase					NEM:AQA, Ambient Air Quality Standards, National Dust Control Regulations
1	Existing baseline ambient conditions	PM10 and PM2.5	N/A	Best engineering practice to minimise impact on surrounding environment where feasible.	
Construction Phase					
2	Transport and general construction activities	Gaseous and particulate emissions; fugitive dust	195 Ha	Maintenance of vehicles and wet suppression or chemical treatment on unpaved road surfaces.	
3	Clearing of groundcover and levelling of area	PM10 and PM2.5	195 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.	
4	Materials handling	PM10 and PM2.5	7 Ha	Wet suppression where feasible on materials handling activities and reducing drop height.	
5	Wind erosion from open areas	PM10 and PM2.5	195 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					
6	Vehicle activity on paved and unpaved roads	Gaseous and particulate emissions; fugitive dust	30 Ha	Maintenance of vehicles and wet suppression or chemical treatment on unpaved road surfaces.	
7	Materials handling operations	PM10 and PM2.5	7 Ha	Wet suppression where feasible on materials handling activities and reducing drop height. Enclosure or wet suppression on crushing activities.	
8	Mining operations within open pit	PM10 and PM2.5	205 Ha	Wet suppression or chemical treatment on unpaved road surfaces.	
9	Wind erosion	PM10 and PM2.5	400 Ha	Wet suppression where feasible. Stabilisation (chemical, rock cladding or vegetative) of tailings facility.	
Closure and Decommissioning Phase					
10	Dust generated during rehabilitation activities	PM10 and PM2.5	400 Ha	Wet suppression where feasible.	
11	Demolition of the structure	PM10 and PM2.5	7 Ha	Wet suppression where feasible.	
12	Tailpipe emissions from vehicles utilised during the closure phase	Gaseous and particulate emissions; fugitive dust	30 Ha	Maintenance of vehicles and wet suppression on unpaved road surfaces.	
Post-Closure Phase					
13	Wind erosion from open areas	PM10 and PM2.5	400 Ha	Vegetation of open areas.	
Geochemical / Waste Classification					
Operational Phase					NEMWA - GNR 632, SANS 10234, MPRDA
1	Disposal of tailings on tailings facility	Contamination of groundwater, surface	150 Ha	No mitigation measures required, natural mitigation processes inherent in	

		water and soil by metals and metalloids		the system	- Section 73
2	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	150 Ha	Some options are provided below as more options will become available by integration of the hydrogeological and geochemical studies: 1. "Natural" capturing of seepage by open pit 2. Drainage Barrier system	
3	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by nitrate	150 Ha	Some options are provided below as more options will become available by integration of the hydrogeological and geochemical studies: 1. "Natural" capturing of seepage by open pit 2. Drainage Barrier system	
4	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by metals and metalloids	30 Ha	No mitigation measures required, natural mitigation processes inherent in the system	
5	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	30 Ha	No mitigation measures required, natural mitigation processes inherent in the system	
6	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by nitrate	30 Ha	Some options are provided below as more options will become available by integration of the hydrogeological and geochemical studies: 1. "Natural" capturing of seepage by open pit 2. Drainage Barrier system	
Post-Closure Phase					
8	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by metals and metalloids	150 Ha	No mitigation measures required, natural mitigation processes inherent in the system	
9	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	150 Ha	Some options are provided below as more options will become available by integration of the hydrogeological and geochemical studies: 1. "Natural" capturing of seepage by open pit 2. Drainage Barrier system	
10	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by nitrate	150 Ha	Some options are provided below as more options will become available by integration of the hydrogeological and geochemical studies: 1. "Natural" capturing of seepage by open pit	

				2. Drainage Barrier system	
11	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by metals and metalloids	30 Ha	No mitigation measures required, natural mitigation processes inherent in the system	
12	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	30 Ha	No mitigation measures required, natural mitigation processes inherent in the system	
13	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by nitrate	30 Ha	Some options are provided below as more options will become available by integration of the hydrogeological and geochemical studies: 1. "Natural" capturing of seepage by open pit 2. Drainage Barrier system	
Noise					
Planning Phase					NEMA, National noise-control regulations (GNR154), SANS 10103:2008, SANS 10210:2004, SANS 10328:2008, SANS 10357:2004
1	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	N/A	No noise envisaged during this phase. The developer can consider various technical and management options during this phase to ensure a negligible rating during other phases (such as equipment or layout specifications).	
2	Open cast years 5 – 10 (receptor 8)	Potential increase/change of ambient/rating levels.	N/A		
Construction Phase					
3	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	25 Ha	None required.	
4	Open cast years 5 – 10 (receptor 8)	Potential increase/change of ambient/rating levels.	25 Ha		
Operational Phase					
5	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	62 Ha	None required.	
6	Open cast years 5 – 10 (receptor 8)	Potential increase/change of ambient/rating levels.	62 Ha		

Closure and Decommissioning Phase				
7	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	25 Ha	None required.
8	Open cast years 5 – 10 (receptor 8)	Potential increase/change of ambient/rating levels.	25 Ha	
Post-Closure Phase				
9	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	N/A	No potential high magnitude noise generating activities envisaged to operate during this phase.
10	Open cast years 5 – 10 (receptor 8)	Potential increase/change of ambient/rating levels.	N/A	
Planning Phase				
11	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	N/A	No noise envisaged during this phase. The developer can consider various technical and management options during this phase to ensure a negligible rating during other phases (such as equipment or layout specifications).
12	Open cast years 10 – 20 (receptor 8)	Potential increase/change of ambient/rating levels.	N/A	
Construction Phase				
13	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	100 Ha	None required.
14	Open cast years 10 – 20 (receptor 8)	Potential increase/change of ambient/rating levels.	100 Ha	• No night-time topsoil/overburden clearance is recommended within 1,000m of these receptors without a berm in place. Berm and highwalls should be constructed within 1,000m of these receptors and during the daytime periods only before night-time work is considered. It is recommended that the height of the berms/barriers be at least 2 - 3 m higher than the line of sight to the highest noise source from open cast pits in relation to receptors. It is recommended that the barrier be built as close as feasibly possible to the mining operations or receptor. No apertures (gaps, entrances) should be implemented at berms/highwalls

			and facing a receptors dwellings. • Communication between the receptors and developer needs to be implemented and maintained highlighting the outcome of this study. If the receptors are to be relocated or workers not to reside at this facility during the night, a negligible rating would be applicable. It should be noted that these receptors (NSD10) is a business, during site investigations discussions with workers indicated that employees do make use of the facility as accommodation during the night-time hours. • An Acoustical Measurement & Audit Programme must be developed and implemented. A bi-annual measurement run is recommended. • If blasting is required to take place near a receptors dwelling (within 500m), the developer must consult with a Vibration & Blasting Specialist.	
			• The mine should investigate the use of white-noise generators instead of tonal reverse alarms on heavy vehicles. This option is highly recommended although it must be noted that reverse alarms is exempt from an acoustical assessment due to Government Notice R154 of 1992 (Noise Control Regulations) – Clause 7. (1) – "the emission of sound is for the purposes of warning people of a dangerous situation". • Ensuring that equipment operating in open cast pits are well maintained and fitted with the correct and appropriate noise abatement measures. Acoustical mufflers (or silencers) should be considered on equipment exhausts. A noise absorption braid could be mounted on the front of heavy equipment radiators (ADT's, FEL's etc.) to prevent excess mechanical fan noise into the surrounding environment. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully	

				encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised. • Implementation of mitigation options above is deemed sufficient to ensure a negligible rating.
Operational Phase				
15	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	140 Ha	None required.
16	Open cast years 10 – 20 (receptor 8)	Potential increase/change of ambient/rating levels.	140 Ha	• See Construction Phase mitigation options above (all points relevant for this phase). The most important mitigation measure is to ensure that berms are implemented and maintained. • Implementation of mitigation options above is deemed sufficient to ensure a negligible rating.
Closure and Decommissioning Phase				
17	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	100 Ha	None required.
18	Open cast years 10 – 20 (receptor 8)	Potential increase/change of ambient/rating levels.	100 Ha	• See Construction Phase mitigation options above (all points relevant for this phase). The most important mitigation measure is to ensure that berms are implemented and maintained. • Implementation of mitigation options above is deemed sufficient to ensure a negligible rating.
Post-Closure Phase				
19	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	N/A	No potential high magnitude noise generating activities envisaged to operate during this phase.

20	Open cast years 10 – 20 (receptor 8)	Potential increase/change of ambient/rating levels.		
Planning Phase				
21	Open cast years 20 - 30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	N/A	No noise envisaged during this phase. The developer can consider various technical and management options during this phase to ensure a negligible rating during other phases (such as equipment or layout specifications).
22	Open cast years 20 - 30 (receptor 8)	Potential increase/change of ambient/rating levels.		
Construction Phase				
23	Open cast years 20 - 30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	100 Ha	None required. It should be noted that NSD07 is the office of the developer. At the consent of the developer the noise levels at this dwelling was discarded and a negligible rating was considered.
24	Open cast years 20 - 30 (receptor 8)	Potential increase/change of ambient/rating levels.	100 Ha	• Communication between the receptors and developer needs to be implemented and maintained highlighting the outcome of this study. • No night-time topsoil/overburden clearance is recommended within 1,000m of these receptors without a berm in place. Berm and highwalls should be constructed within 1,000m of these receptors and during the daytime periods only before night-time work is considered. It is recommended that the height of the berms/barriers be at least 2 - 3 m higher than the line of sight to the highest noise source from open cast pits in relation to receptors. It is recommended that the barrier be built as close as feasibly possible to the mining operations or receptor. No apertures (gaps, entrances) should be implemented at berms/highwalls and facing a receptors dwellings. • An Acoustical Measurement & Audit Programme must be developed and implemented. A bi-annual measurement run is recommended.

				• The mine should investigate the use of white-noise generators instead of tonal reverse alarms on heavy vehicles. This option is highly recommended although it must be noted that reverse alarms is exempt from an acoustical assessment due to Government Notice R154 of 1992 (Noise Control Regulations) – Clause 7.(1) – "the emission of sound is for the purposes of warning people of a dangerous situation".
				• Ensuring that equipment operating in open cast pits are well maintained and fitted with the correct and appropriate noise abatement measures. Acoustical mufflers (or silencers) should be considered on equipment exhausts. A noise absorption braid could be mounted on the front of heavy equipment radiators (ADT's, FEL's etc.) to prevent excess mechanical fan noise into the surrounding environment. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised. • Implementation of mitigation options above is deemed sufficient to ensure a negligible rating.
Operational Phase				
25	Open cast years 20 - 30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	140 Ha	None required.
26	Open cast years 20 - 30 (receptor 8)	Potential increase/change of ambient/rating levels.	140 Ha	• See Construction Phase mitigation options above (all points relevant for this phase). The most important mitigation measure is to ensure that berms are implemented and maintained. • Implementation of mitigation options above is deemed sufficient to ensure a negligible rating.
Closure and Decommissioning Phase				

27	Open cast years 20 - 30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	100 Ha	None required.	
28	Open cast years 20 - 30 (receptor 8)	Potential increase/change of ambient/rating levels.	100 Ha	• See Construction Phase mitigation options above (all points relevant for this phase). The most important mitigation measure is to ensure that berms are implemented and maintained. • Implementation of mitigation options above is deemed sufficient to ensure a negligible rating.	
Post-Closure Phase					
29	Open cast years 20 - 30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.		No potential high magnitude noise generating activities envisaged to operate during this phase.	
30	Open cast years 20 - 30 (receptor 8)	Potential increase/change of ambient/rating levels.			
Heritage					
Planning Phase					NHRA
1	Planning	Site EXIGO-DFM-IA01 (medium significance)	N/A	Site Monitoring	
2	Planning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	N/A	Site Monitoring	
3	Planning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	N/A	Site Monitoring	
Construction Phase					
4	Construction / Clearing	Site EXIGO-DFM-IA01 (medium significance)	195 Ha	Avoidance, Phase 2 Study and Sampling	
5	Construction / Clearing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	195 Ha	Avoidance, Phase 2 Study and Sampling	

6	Construction / Clearing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	195 Ha	Site Monitoring	
Operational Phase					
7	Mining / Processing	Site EXIGO-DFM-IA01 (medium significance)	205 Ha	Site Monitoring	
8	Mining / Processing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	205 Ha	Site Monitoring	
9	Mining / Processing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	205 Ha	Site Monitoring	
Closure and Decommissioning Phase					
10	Decommissioning	Site EXIGO-DFM-IA01 (medium significance)	400 Ha	Site Monitoring	
11	Decommissioning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	400 Ha	Site Monitoring	
12	Decommissioning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	400 Ha	Site Monitoring	
Post-Closure Phase					
13	Post-Closure	Site EXIGO-DFM-IA01 (medium significance)	400 Ha	Site Monitoring	
14	Post-Closure	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	400 Ha	Site Monitoring	
15	Post-Closure	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	400 Ha	Site Monitoring	
Palaeontology					
Construction Phase					NHRA

1	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of stromatolites	195 Ha	Palaeontological site visit must be done in areas earmarked for construction. Palaeontologist must be appointed if stromatolites are exposed.	
2	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of fossils.	195 Ha	Palaeontological site visit must be done in areas earmarked for construction. Palaeontologist must be appointed if fossils are exposed.	
3	Construction of buildings, dams, roads, pylons. Exploration for mining	Preservation of fossils.	195 Ha	Positive impact - no mitigation recommended.	
Operational Phase					
4	Mining	Destruction of stromatolites	205 Ha	Palaeontologist must be appointed to remove stromatolites if they are exposed during mining. Stromatolites must be preserved and collected if exposed.	
5	Mining	Destruction of fossils.	205 Ha	Palaeontologist must be appointed to remove fossils if they are exposed during mining. Fossils must be preserved and collected if they are exposed.	
6	Mining	Preservation of fossils.	205 Ha	Positive impact - no mitigation recommended.	
Traffic					
Planning Phase					NEMA
1	No additional traffic	No impact	N/A		
Construction Phase					
2	Additional construction traffic	Increased traffic volumes	30 Ha	Maintain and dust suppression on gravel roads	
Operational Phase					
3	Additional operational traffic	Added trips to the surrounding road network	30 Ha	Surface sections of unsurfaced roads. Add additional turning lanes at some intersections. Rehabilitate existing gravel roads and improve drainage and road surfaces.	
Visual					

Planning Phase					South African Traffic Impact Standards Site Traffic Assessment Standards and Requirements Manual (2012)
1	Implementation of Mitigation Measures such as visual berms / vegetation screens		N/A	Implementation of Mitigation Measures such as visual berms / vegetation screens	
Construction Phase					
2	Site preparation: Clearance of vegetation and dust creation	Alteration of the visual quality and sense of place of the area	195 Ha	Remove vegetation in sections or as construction proceeds. Implement dust suppression techniques.	
3	Construction of the Site Camp / Office	Alteration of the visual quality and sense of place of the area	195 Ha	Construction site camp can be located in area with low visual sensitivity. Proper house-keeping. Shade nets can be used when fencing the camp site / offices.	
4	Removal of topsoil and subsoil for open pit mining: overburden dumps, Soil dumps and Dust creation	Alteration of the visual quality and sense of place of the area	195 Ha	• Soil stockpiles and overburden dumps should be shaped and vegetated in order to blend into the surrounding area. • Dust suppression techniques must be implemented if piles are not shaped and vegetated.	
5	Construction of the plant: physical structure will become more visible	Alteration of the visual quality and sense of place of the area	195 Ha	• Mitigation will be difficult. Buildings should be painted in natural colours - if possible. Avoid reflective material for buildings / roofs. • The ground level of the plant could be dropped; this will lower the building level. • Berms or vegetation screens could be used to shield or partially shield views.	
6	Lighting of the Area - Security lighting or any other lighting during the evening.	Light pollution, Alteration of the visual quality and sense of place of the area - specifically referring to night life such as star gazing	195 Ha	• Install light fixtures that provide precisely directed illumination to reduce light “spillage” beyond the immediate surrounds of the plant. • Light public movement areas (pathways and roads) with low level ‘bollard’ type lights and avoid post top lighting. • Avoid high pole top security lighting along the periphery of the plant site and use only lights that are activated on movement at entry gate to the site.	

				• Use security lighting at the periphery of the site that is activated by movement and are not permanently switched on.
Operational Phase				
7	Physical structure of the plant	Alteration of the visual quality and sense of place of the area	7 Ha	• Soil stockpiles and overburden dumps should be shaped and vegetated in order to blend into the surrounding area. • Dust suppression techniques must be implemented if piles are not shaped and vegetated.
8	Physical structure of the TSF	Alteration of the visual quality and sense of place of the area	150 Ha	• Mitigation will be difficult. Where slopes compatible with the surrounding landscape can be achieved, an attempt should be made to visually soften steeper areas by avoiding straight engineered ridges and sharp changes of angle. • TSF should be vegetated as soon as possible. • Visual berms / vegetation screens should be considered, especially along the dirt road (south-eastern border).
9	Operational activities of the open pit mine, including blasting, movement of trucks will create dust	Alteration of the visual quality and sense of place of the area	205 Ha	• Dust suppression techniques must be implemented. • Use of visual berms / vegetation screens.
10	Topsoil dumps, overburden dumps	Alteration of the visual quality and sense of place of the area	30 Ha	• Soil stockpiles and overburden dumps should be shaped and vegetated in order to blend into the surrounding area. • Dust suppression techniques must be implemented if piles are not shaped and vegetated.
11	Lighting of the Area - Security lighting or any other lighting during the evening.	Light pollution, Alteration of the visual quality and sense of place of the area - specifically referring to night life such as star gazing	7 Ha	• Install light fixtures that provide precisely directed illumination to reduce light “spillage” beyond the immediate surrounds of the plant. • Light public movement areas (pathways and roads) with low level ‘bollard’ type lights and avoid post top lighting. • Avoid high pole top security lighting along the periphery of the plant site and use only lights that are activated on movement for entry to the

				site. • Use security lighting at the periphery of the site that is activated by movement and are not permanently switched on.
Closure and Decommissioning Phase				
12	Removal of the plant structures: Creation of dust	Alteration of the visual quality and sense of place of the area	7 Ha	• Dust suppression techniques must be implemented. • Good house-keeping.
13	Removal of the plant structures: physical structures will be gone	Improvement of the visual quality and sense of place of the area	7 Ha	Good house-keeping.
14	Closure of the open pit mining areas: Creation of dust	Alteration of the visual quality and sense of place of the area	205 Ha	• Dust suppression techniques must be implemented. • Good house-keeping.
15	Removal of topsoil dumps and overburden dumps (note that some of the dumps might form part of the visual berms which will not be removed)	Improvement of the visual quality and sense of place of the area	30 Ha	• Dust suppression techniques must be implemented. • Good house-keeping.
16	Lighting of the Area - Security lighting or any other lighting during the evening.	Light pollution, Alteration of the visual quality and sense of place of the area - specifically referring to night life such as star gazing	7 Ha	• Install light fixtures that provide precisely directed illumination to reduce light “spillage” beyond the immediate surrounds of the plant. • Light public movement areas (pathways and roads) with low level ‘bollard’ type lights and avoid post top lighting. • Avoid high pole top security lighting along the periphery of the plant site and use only lights that are activated on movement at entry gate to the site. • Use security lighting at the periphery of the site that is activated by movement and are not permanently switched on.
Post-Closure Phase				
17	Rehabilitation of cleared areas	Improvement of the visual quality and sense of place of the area	400 Ha	Positive impact - No mitigation recommended
18	Physical structure of the TSF will remain	Alteration of the visual quality and sense of	150 Ha	• Mitigation will be difficult. Where slopes compatible with the

	on site	place of the area		surrounding landscape can be achieved, an attempt should be made to visually soften steeper areas by avoiding straight engineered ridges and sharp changes of angle. • TSF should be vegetated as soon as possible. • Visual berms / vegetation screens should be considered, especially along the dirt road (south-eastern border)	
Hydrogeology					
Construction Phase					NEMA, NWA, NEMWA
1	Establishment and operation of construction camp.	Groundwater and surface water contamination.	0.07 Ha	Chemical sanitary facilities to be used and situated down gradient from local drainage systems.	
2	Anthropogenic activities on site.	Contamination risk.	0.07 Ha	Best practise camp management and house-keeping principles to be implemented.	
3	Fuelling and movement of construction vehicles.	Risk of hydrocarbon spillage and contamination.	30 Ha	• Fuelling of vehicles at earmarked concrete-lined areas. • Fuel storage in bunded areas. • Spill trays to be utilized where necessary. • Include spectrum of hydrocarbon elements in monitoring program.	
Operational Phase					
4	Mine dewatering zone of influence.	Lowering of regional groundwater levels.	175 Ha	Supply alternative water supply to adversely affected parties	
5	Possible groundwater abstraction from mine production boreholes.	Lowering of regional groundwater levels.		Supply alternative water supply to adversely affected parties	
6	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination.	180 Ha	Siting and design of mine waste facilities	
7	Use of explosives for mine pit development.	Contribution to nitrate over-load in groundwater and surface water resources.	175 Ha	• Mine Water Balance and Mass Management. • Siting and design of mine waste facilities	

8	Hydrocarbon spillages from fuel storage facilities, fuelling and wash-bays.	Hydrocarbon contamination of groundwater and surface water resources.	7 Ha	• Fuelling of vehicles at earmarked concrete-lined areas. • Fuel storage in bunded areas. • Spill trays to be utilized where necessary. • Include spectrum of hydrocarbon elements in monitoring program.	
9	Vegetation clearance.	Excessive runoff causing silt generation and build-up in local surface water resources.	205 Ha	• Erosion control measures and stormwater management plan to be implemented. • Silt traps to capture sediment load.	
Closure and Decommissioning Phase					
10	Increased groundwater ingress at disturbed/rehabilitated areas.	Recovering of regional groundwater levels.	175 Ha	Implement rehabilitation management plan for re-vegetation and decrease in water ingress.	
11	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination.	180 Ha	• Siting and design of mine waste facilities. • Monitoring protocol to be implemented at strategically placed monitoring locations to evaluate pollution plume migration.	
Post-Closure Phase					
12	Migration of contamination plume from mine waste sources.	Contamination of regional groundwater and surface water resources.	180 Ha	• Siting of design of waste facilities. • Monitoring protocol to be implemented at strategically placed monitoring locations to evaluate pollution plume migration.	
13	Post-closure pit flooding and groundwater quality.	Potential decanting of groundwater at low elevation areas.	175 Ha	• Pit design. • Monitor pit water quality as part of post-closure phase.	
Aquatic					
Planning Phase					NEMA, NEMWA, NWA
1	Potentially poor planning leading to extensive and complex dirty water areas which need to be managed may impact on water quality.		N/A	• Ensure that as far as possible all infrastructures are placed outside of drainage and river areas. In particular, mention is made of the need to not encroach on the aquatic resources in the vicinity of the Klein Marico	

2	Potentially poor planning leading to placement of polluting structures in non-perennial drainage lines which would increase mobility of pollutants and may impact on water quality.		River with a minimum buffer of 100m around all aquatic resources maintained in line with the requirements of regulation GN704 of the national Water Act. • Design of infrastructure should be environmentally and structurally sound and all possible precautions taken to prevent spillage or seepage to the groundwater resources present. • Pollution control facilities (stormwater dam and return water dam), should be lined with an HDPE liner system or a drainage barrier of similar functionality, to prevent seepage. • Pollution control dams must be adequately designed to contain a 1:50, 24 hour storm water event. • It must be ensured that the design of all infrastructure prevents failure. Pollution control dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts to water quality and loss or transformation of aquatic habitat	
3	Potentially inadequate separation of clean and dirty water areas leading to contaminated water leaving the defined dirty water area may impact in water quality.			
4	Clean and dirty water systems not being designed adequately to ensure protection of the water resources.			
Construction Phase				
5	Clean and dirty water systems not being constructed to the required specifications to prevent contamination of clean water areas may impact on water quality.	195 Ha	• Permit only essential construction personnel within 100m of all riparian systems. • Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the development. • Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of clean water runoff areas and the concomitant recharge of streams in the area. • Pollution control facilities (stormwater dam and return water	
6	Major earthworks and construction activities may lead to impacts on water quality as a result of erosion and sedimentation as well as resulting in the oxidation of pyrites. In addition, there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting.			

7	Poor housekeeping and management may lead to impacts on water quality.		dam), should be lined with an HDPE liner system or a drainage barrier of similar functionality, to prevent seepage. • Clear separation of clean and dirty water must take place and diversion of clean water around future operational areas (if applicable) must ensure minimisation of the loss of catchment yield. • Clean and dirty water separation systems should be one of the first systems developed on site as far as possible. • Clear and well managed clean and dirty water separation must take place in line with the requirements of regulation GN704 of the national Water Act. • Prevent run-off from dirty water areas entering stream systems through ensuring clear separation of clean and dirty water areas, as far as possible. • Pollution control dams must be adequately designed to contain a 1:50 24 hour storm water event. • It must be ensured that the construction of all infrastructure prevents failure, as far as possible. • Pollution control dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts to water quality and loss or transformation of aquatic habitat. • Upstream dewatering boreholes should be considered to minimise the creation of dirty water and this clean water should be used to recharge the natural systems downstream of the mining rights areas, if possible. • All vehicles must be regularly inspected for leaks. • Re-fuelling must take place on a sealed surface area to prevent	
8	Spills and other unplanned events may impact on water quality.			

			ingress of hydrocarbons into topsoil. • It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. • All hazardous chemicals must be stored on specified surfaces. • All spills should be immediately cleaned up and treated accordingly. • Appropriate sanitary facilities must be provided for the duration of the construction activities and all waste must be removed to an appropriate waste facility. • No dumping of waste should take place. If any spills occur, they should be immediately cleaned up. • Monitor all systems for erosion and incision. • Close monitoring of water quality (surface water, groundwater and process water) must take place. Monitoring of water quality should take place at a minimum frequency of once a month (or as otherwise determined by the water specialists)(when surface water is present) during which time major salts and basic metals, are monitored along with basic parameters such as pH, Total Suspended Solids (TSS) and Total Dissolved Solids (TDS), dissolved oxygen and Electrical Conductivity (EC). • Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor. • Ongoing aquatic biomonitoring should take place in order to identify any emerging issues in the receiving environment. • A groundwater pollution plume should be modelled and appropriately monitored. Any impacts to the groundwater resources in the vicinity of the proposed Doornhoek mining project	

			will need to be suitably and timeously mitigated to prevent impacts further downstream and potentially on a regional scale.
Operational Phase			
9	Mining activities and the establishment of mining waste may impact on water quality and thus needs to be managed to prevent pollution.	400 Ha	• Pollution control facilities (stormwater dam and return water dam), should be lined with an HDPE liner system or a drainage barrier of similar functionality, to prevent seepage. • Clear separation of clean and dirty water must take place and diversion of clean water around operational areas (if applicable) must ensure minimisation of the loss of catchment yield. • Clear and well managed clean and dirty water separation must take place in line with the requirements of regulation GN704 of the national Water Act. • Prevent run-off from dirty water areas entering stream systems through ensuring clear separation of clean and dirty water areas. • All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs. • Infrastructure must be monitored for seepages and erosion. • Ensure that the mine process water system is managed in such a way as to prevent discharge to the receiving environment and to prevent discharge of dirty water. • Dirty water must be recycled back into the mining system. • Upstream dewatering boreholes should be considered to minimise the creation of dirty water and this clean water should be used to recharge the natural systems downstream of the mining rights areas if possible.
10	Clean and dirty water systems not being maintained and operated to the required specifications to prevent contamination of clean water areas may impact on water quality.		
11	Poor housekeeping and management during operational phase may lead to impacts on water quality.		
12	Major earthworks and operational activities may lead to impacts on water quality as a result of erosion and sedimentation as well as resulting in the oxidation of pyrites. In addition,, there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting.		
13	Spills and other unplanned events during operational phase may impact on water quality.		

			• Ensure that all stockpiles are well managed and have measures such as berms and hessian sheets implemented to prevent erosion and sedimentation which may ultimately lead to impaired water quality and in turn, transformation of aquatic habitat areas. • Implement measures to contain seepage as far as possible to prevent contamination of the groundwater regime. If necessary, treated ore stockpile areas should be lined with an HDPE liner or a drainage barrier system of a similar nature, system to prevent seepage to the groundwater resources. • All vehicles must be regularly inspected for leaks. • Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil. • It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. • All hazardous chemicals must be stored on specified surfaces. • All spills should be immediately cleaned up and treated accordingly. • Appropriate sanitary facilities must be provided for the duration of the operational activities and all waste must be removed to an appropriate waste facility. • No dumping of waste should take place. If any spills occur, they should be immediately cleaned up. • Monitor all systems for erosion and incision. • Close monitoring of water quality (surface water, groundwater and process water) must take place. Monitoring of water quality should take place at a minimum frequency of once a month (or as otherwise determined by the water specialists)((when surface water is present) during which time major salts and basic metals, are monitored along with basic parameters such as pH, Total Suspended Solids (TSS) and	

			Total Dissolved Solids (TDS), dissolved oxygen and Electrical Conductivity (EC). • Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor. • Ongoing aquatic biomonitoring should take place in order to identify any emerging issues in the receiving environment. • Toxicity testing of the proposed Doornhoek mining project's process water facilities should take place quarterly and concurrently with the biomonitoring program in order to monitor the toxicological risk of the process water system to the receiving environment and in particular the groundwater resources. Tests should include the following test organisms as a minimum: Vibrio fischeri, Daphnia pulex; and Algal Growth Potential. • A groundwater pollution plume should be modelled and appropriately monitored. Any impacts to the groundwater resources in the vicinity of the proposed Doornhoek mining project will need to be suitably and timeously mitigated to prevent impacts further downstream and potentially on a regional scale. • The proposed Doornhoek mining project must be managed as a zero discharge facility as far as possible, however definitive toxicological testing according to the Direct Estimation of Ecological Effect Potential (DEEEP) protocol should take place should it become evident that process water discharge or decant of groundwater will occur in order to define safe discharge volumes and ensure sufficient dilution.	
Closure and Decommissioning Phase				

14	Inadequate closure and rehabilitation leading to ongoing pollution from contaminating sources such as discard dumps and latent dirty water areas may impact on water quality.	400 Ha	• Ensure that as far as possible all decommissioning of infrastructures take place outside of drainage and river areas. In particular, mention is made of the need to not encroach on the aquatic resources in the vicinity of the Klein Marico River with a minimum buffer of 100m around all aquatic resources maintained in line with the requirements of regulation GN704 of the national Water Act. • Permit only essential personnel within 100m of all riparian systems. • Very clear and well managed clean and dirty water separation must take place in line with the requirements of regulation GN704 of the national Water Act. • Prevent run-off from dirty water areas entering stream systems through ensuring clear separation of clean and dirty water areas. • Pollution control dams must be adequately designed to contain a 1:50 24 hour storm water event. • Any remaining infrastructure must be monitored for seepages and erosion. • Ensure that any latent dirty water systems are managed in such a way as to prevent discharge to the receiving environment and to prevent discharge of dirty water. • Monitor all systems for erosion and incision. • Ongoing monitoring of water quality (surface water, groundwater and process water) must take place. Monitoring of water quality should take place at a minimum frequency of once a month or as determined by the water specialists (when surface water is present) during which time major salts and basic metals, are monitored along with basic parameters such as pH, Total Suspended Solids (TSS) and Total Dissolved Solids (TDS), dissolved oxygen and Electrical Conductivity (EC). • Ongoing aquatic ecological monitoring must take place on a 6 monthly	
15	Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality.			
16	Poor housekeeping and management during decommissioning phase may lead to impacts on water quality.			
17	Spills and other unplanned events during decommissioning phase may impact on water quality.			

			basis by an SA RHP Accredited assessor in order to identify any emerging issues in the receiving environment. • Toxicity testing of the proposed Doornhoek mining project's process water facilities should take place quarterly and concurrently with the biomonitoring program in order to monitor the toxicological risk of the process water system to the receiving environment and in particular the groundwater resources. Tests should include the following test organisms as a minimum: Vibrio fischeri, Daphnia pulex and Algal Growth Potential. • Any impacts to the groundwater resources in the vicinity of the proposed Doornhoek mining project will need to be suitably and timeously mitigated to prevent impacts further downstream and potentially on a regional scale.	
Post-Closure Phase				
18	Inadequate closure and rehabilitation leading to ongoing pollution from contaminating sources such as discard dumps and latent dirty water areas may impact on water quality, with special mention of contaminated dirty water decent degenerated from in-filled opencast pits	N/A	• Implement measures to contain seepage as far as possible to prevent contamination of the groundwater regime as a result of latent dirty water facilities. • Ongoing monitoring of all systems for erosion and incision. • Close monitoring of water quality (surface water, groundwater and process water) must take place. Monitoring of water quality should take place at a minimum frequency of once a month or as otherwise determined by the water specialists (when surface water is present) during which time major salts and basic metals, are monitored along with basic parameters such as pH, Total Suspended Solids (TSS) and Total Dissolved Solids (TDS), dissolved oxygen and Electrical Conductivity (EC) should take place for a period of at least 3 years post closure. • Should any areas of contaminated decant be identified, this will need to	
19	Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality.			
20	Inadequate rehabilitation of mining areas leading to erosion and sedimentation of the aquatic resources present.			

				• be pumped and suitably treated. • Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor to identify any emerging issues in the receiving environment for a period of at least 3 years post closure. • The groundwater pollution plume should be appropriately monitored for a period of at least 3 years post closure. Any impacts to the groundwater resources in the vicinity of the proposed Doornhoek mining project will need to be suitably and timeously mitigated to prevent impacts further downstream and potentially on a regional scale.	
Socio-economic					
Construction Phase					NEMA New Growth Path Framework (NGPF) (2010) National Development Plan (NDP) 2030 (2011 - 2030) Industrial Policy Action Plan (IPAP) 2015/2016- 2017/2018 North West
1	Capital investment into the establishment of the mine	Stimulation of production and GDP due to investment	N/A	The project developer should engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods, and services from local suppliers where feasible	
2	Capital investment into the establishment of the mine	Stimulation of employment due to investment	N/A	• Employ labour-intensive methods in construction where feasible • Where possible, local labour and sub-contracting to local companies should be considered for employment to increase the positive impact on the local economy	
3	Creation of employment	Improved standard of living due to creation of employment	N/A	• Employ labour-intensive methods in construction where feasible • Where possible, local labour and sub-contracting to local companies should be considered for employment to increase the positive impact on the local economy	
4	Creation of employment	Skills development	N/A	• Facilitate knowledge and skills transfer between workers during the	

				construction phases • Set up apprenticeship programmes to build on existing skills or for the advancement of development of new skills for construction workers, especially those coming from the local communities	Provincial Development Plan (PDP) 2030 (2013)
5	Capital investment into the establishment of the mine	Government revenue increase	N/A	Positive impact - no mitigation recommended	
6	Sterilisation of land due to construction and mine establishment activities	Loss of agricultural production due to land sterilisation	N/A	Consult with the affected farmers to investigate the opportunities to minimise the loss of productive agricultural land	
7	Construction activities on site	Change in the sense of place among the directly and indirectly affected communities	N/A	Implement mitigation measures proposed by the various specialists. Including traffic, visual, and noise specialists.	
8	Capital investment into the establishment of the mine and recruitment of construction workers	Change in demographics of the area due to potential influx of workers and job seekers	N/A	• All available positions should be clearly communicated to minimise the influx of unwanted job seekers. • Expectations about job creation should be responsibly managed to stem the influx of hopeful job-seekers.	
9	Construction activities that would increase traffic (light and heavy vehicles) on local roads	Deterioration of local infrastructure	N/A	• Partner with local municipal authorities and other prominent users of the local roads to upgrade them to meet the required capacity and intensity of the vehicles related to the construction of this component of the proposed project. • Provide public transport alternatives for workers as far as feasible so as to decrease the number of vehicles on the road during peak hours.	
10	Influx of job seekers	Added pressure on basic service delivery and growth of informal settlements	N/A	Engage with local authorities to inform them of the development as well as discuss with them the ability of the municipality the meet the demands for social and basic services created by the migrant construction workers.	

11	Capital investment into the establishment of the mine and recruitment of construction workers	Increase in social pathologies (Crime, xenophobia, prostitution, etc.) due to influx of people into the area	N/A	• Establish central recruitment offices in the towns of Zeerust and Lichtenburg and enforce labour and recruitment legislation • Employ locals as far as is feasibly possible • Ensure that job seekers are not allowed to loiter around the gates or set up informal settlements in the vicinity of the site • Set up a gate and controlled access system to monitor the movement of people to and from the site, as well as to reduce the influx of job seekers to the area • Inform the local municipality of the development and the anticipated influx of workers to the area and assist local authorities (including police and other groups) in devising an adequate strategy to address the potential effects
12	Influx of job seekers	Pressure on local social facilities to provide quality services	N/A	• Engage with local authorities to inform them of the development as well as discuss with them the ability of the municipality the meet the demands for social and basic services created by the migrant construction workers • Provide mobile clinic services for mine employees as required • Maximize the number of construction workers employed from the local community to reduce the increase in demand for community and basic services that may be spiked by in-migration of construction people from outside the area
13	Construction activities that bring about the change in the sense of place	Impact on property values	N/A	• Create dialogues with the directly and indirectly affected farmers to educate and adequately inform them of the potential impacts on the surrounding environment, as well as mitigations that are planned to be implemented to address them • Implement mitigation measures that would reduce the effects on the sense of place (i.e. visual, noise, etc.)

Operational Phase				
14	Mining operations	Stimulation of production and GDP due to operations	N/A	Encourage procurement of required services, materials and other inputs from local communities
15	Mining operations	Stimulation of employment creation due to operations	N/A	• Encourage procurement of required services, materials and other inputs from local communities • Recruit local labour as far as feasible to increase the benefits to the local communities
16	Mining operations	Skills development	N/A	Devise skills development programmes as part of SLP and implement them
17	Creation of employment at the mine	Improved standard of living due to creation of employment	N/A	• Encourage procurement of requires services, materials and other inputs from local communities • Recruit local labour as far as feasible to increase the benefits to the local communities
18	Mining operations	Increase in government revenue and its ability to deliver services	N/A	None required
19	Extraction and processing of minerals	Export earnings	N/A	Seek opportunities to export the mined commodity
20	Operation of the mine and employment from local community	Conflict between mine workers and farm workers about jobs and benefits	N/A	• Implement strict labour practices • Engage with the local farmers and devise a strategy to reduce the chance of employing already employed local farm workers
21	Increase in income	Increase in alcohol and drug abuse	N/A	• Devise and implement an effective Employee Assistant Programme (EAP) to help overcome and mitigate the negative impacts of the social ills already prevalent in the communities. Strong relationships with government and non-governmental organizations and projects addressing such ills are strongly advisable.
22	Operations of the mine requiring access to water, electricity, etc.	Pressure on local authorities to provide adequate basic services	N/A	The mine should devise a project that enhances water service delivery to communities and seek alternative water saving initiatives.

23	Investment into the local communities through SLP	Improved quality of life and service delivery	N/A	Devise and implement projects to address the local community needs and create SMME opportunities (as part of SLP).
Closure				
24	Expenditure on decommissioning and closure	Stimulation of production and GDP and employment	N/A	Encourage procurement of required services, materials and other inputs from local communities.

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

(Provide a final site layout plan as informed by the process of consultation with interested and affected parties)

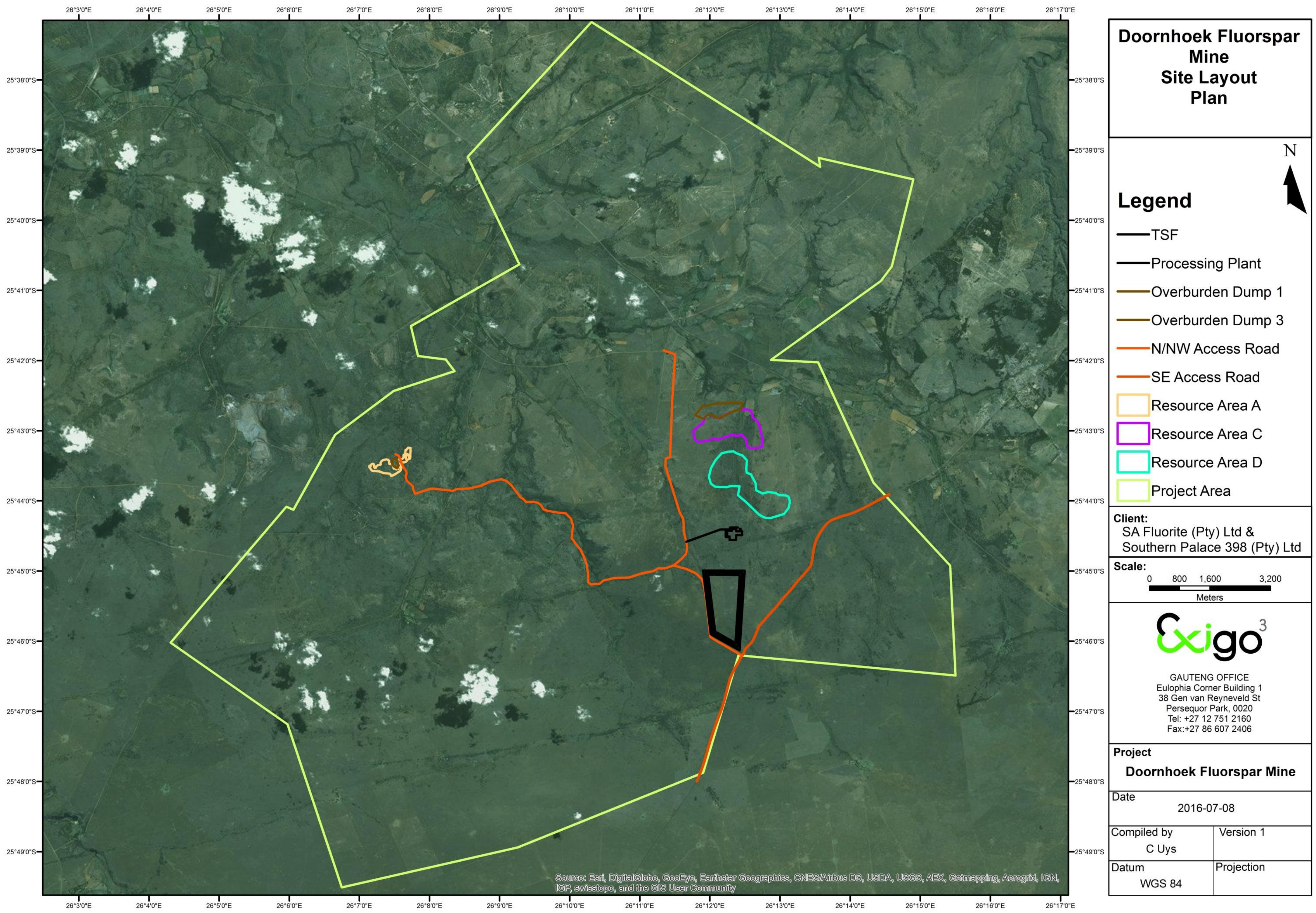

Figure 71: Proposed Final Site Layout Plan

20. MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED.

Refer to Section 9.2 for alternatives considered.

21. STATEMENT MOTIVATING THE PREFERRED SITE.

(Provide a statement motivation the final site layout that is proposed)

The proposed site layout alternatives have been largely influenced by the ecological, heritage and hydrological sensitivities on-site. Specific areas have been regarded as sensitive due to the following values and functionality:

- Potential red data flora habitat
- Confirmed presence of red data species *Boophane disticha*
- Occurrence of protected tree species
- Suitable habitat for red data and threatened fauna, especially the Klein Marico River and surrounding riparian woodland, surrounding mountainous area and natural grassland
- Topography
- Klein Marico River and tributaries and the relevant floodlines
- Springs, streams and wetland features
- Heritage features

These areas have been largely avoided through the site selection process and by optimization of the layout. Table 16 serves as a summary of the risks identified for the five site location alternatives, the four layout alternatives proposed for the processing plant and the TSF as well as the two layout alternatives for the overburden dump associated with resource area A. The preferred location alternative for the site is Alternative 5, while the preferred layout alternative for the plant and TSF is Alternative 4 due to the larger ecological impact and topographic concerns associated with Alternative 2. The preferred alternative for the overburden dump is Alternative 1.

The preferred water supply option and access road alternative will be assessed and decided upon during the EIA Phase. With regards to technology alternatives, transport of the ore and product was considered by road via truck or via existing railway infrastructure to the port of Durban. The railway option is however preferred due to the lesser environmental and economic impacts associated therewith.

Based on the assessment of these alternatives it is proposed that the EMPr will focus on assessing and presenting mitigation measures associated with the preferred site location, layout and technology alternatives stated above

Table 18 Comparative summary of the impacts associated with the proposed infrastructure location and layout alternatives

Environmental Aspect	Site Location Alternative 1	Site Location Alternative 2	Site Location Alternative 3	Site Location Alternative 3	Site Location Alternative 3	Plant & TSF layout Alt 1	Plant & TSF layout Alt 2	Plant & TSF layout Alt 3	Plant & TSF layout Alt 4	Overburden dump Alt 1	Overburden dump Alt 2
Surface Water Features	√		√	√	√		√	√			√
Ecological impacts	√	√	√	√	√	√	√	√	√		
Heritage impacts		√									
Topography		√	√		√	√	√	√	√		
Distance from resource areas and subsequent cost implication	√		√	√		√		√			
Property ownership and social impacts				√				√			
Distance between plant and TSF and safety	N/A	N/A	N/A	N/A	N/A	√	√			N/A	N/A

concern											

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 reviewing of existing environmental data, specialist inputs/studies and the design team. Alternatives relevant to this development can be categorized into the following:

- **Site Location alternatives**
  - Location of processing plant and TSF
- **Layout alternatives**
  - Layout of processing plant and TSF
  - Layout of overburden dumps
- **Service alternatives**
  - Water provision;
  - Energy alternatives;
  - Access alternatives;
  - Waste disposal;
  - Technology alternatives; and
  - Mining Methodology alternatives.
- The "no-go" alternative
  - Assessed per environmental aspect/area

Please refer to Section 9.2 for a description of the above alternatives.

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

(The EAP must undertake to assess the aspects affected by each individual mining activity whether listed or not, including activities such as blasting, Loading, hauling and transport, and mining activities such as Excavations, stockpiles, discard dumps or dams, water supply

dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.).

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

- Groundwater aspect
- Surface water aspect
- Stormwater aspect
- Flooding
- Air quality aspect (dust and emissions)
- Land availability
- Noise pollution
- Biodiversity aspect (Fauna and Flora)
- Wetland aspect
- Impact on land use and land capability
- Visual aspect
- Heritage aspect
- Communication and interaction with local community
- Socio-economic aspects (job creation, social investment, health, safety and security, skills training, change of land use)
- Potential mine dewatering

22.3. Description of aspects to be assessed by specialists

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

- Land Use & Soil Potential Assessment
- Floodline Determination and Stormwater Management Plan
- Hydrogeological Impact Assessment
- Water supply options analysis
- Geochemical Numerical Model & Waste Classification
- Ecological Impact Assessment
- Wetland Delineation & Impact Assessment
- Traffic Impact Assessment
- Aquatic Impact Assessment
- Archaeological Impact Assessment
- Palaeontological Desktop Assessment
- Blasting & Vibration Impact Assessment
- Air Quality Impact Assessment
- Noise Impact Assessment

- Visual Impact Study
- Socio-Economic Impact Assessment
- Closure Provision and Rehabilitation 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.

22.5. The proposed method of assessing duration significance

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

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 fluorspar 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

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

A pre-application meeting was held with the Department of Mineral Resources (DMR) on the 17th of May 2016. Please find the meeting notes attached in Appendix 5: DMR Pre-application Meeting Minutes & Correspondence. The Department will also be consulted with upon submission of the following reports:

- Draft 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.

(These steps must include the steps that will be taken to ensure consultation with the affected parties identified in (h) (ii) herein).

22.7.1.1. Stakeholder Engagement

The stakeholder engagement forms an integral part of the EIA process and was conducted during the planning and design stages of the project. The comments received and issues raised during the 30 day registration period and consultation with key parties was incorporated into this Draft SR. 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;
- Municipal Manager of the Ngaka Modiri Molema District Municipality (NMMDM);
- Municipal Manager of the Ramotshere Moiloa Local Municipality (RMLM);
- Municipal Manager of the Ditsobotla Local Municipality (DLM);
- Department of Rural, Environment and Agricultural Development, North West Province;
- Department of Water and Sanitation (DWS) Limpopo - North West Proto CMA;
- Department of Public Works and Roads North West;
- Department of Community Safety & Transport Management North West;
- Department of Finance, Economic & Enterprise Development North West;
- Department of Agriculture – North-West;
- Department of Rural Development and Land Reform (DRDLR);
- SANRAL (Northern region);
- South African Heritage Resources Agency (SAHRA) (North West);
- Regional Manager of Land Development and Environmental Management for ESKOM;
- AGRI North West;
- Afriforum;
- North West Farmers Union;
- Molemane Eye Nature Reserve;
- Other mines in the area;
- And other stakeholders.

22.7.1.3. I&AP communication

Stakeholders were encouraged to contact Exigo to register as I&APs, raise issues or concerns or ask questions as per Section 10.

Each issue, concern, and question identified through communication with Exigo and the response to these is included in Table 4.

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 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 answer and/or a reference to where more information could be obtained in the reports. Please refer to the Table 4.

22.7.1.5. Public feedback meeting

Public meetings will be during the review period of the DSR during the end of July/early August; 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 meetings will be advertised in a local newspaper on the 14th of July 2016. All issues raised by the I&APs during the public meetings will be included in the Final Scoping Report (FSR) to be submitted to the DMR.

22.7.1.6. Public Review of the Draft SR

The Draft SR was made available for public comments as agreed with the Stakeholders. The review period of the Draft SR was 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.

(Describe the process to be undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings and records of such consultation will be required in the EIA at a later stage).

Public meetings will be held during the review period of the DSR during the end of July/early August; 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 meetings will be advertised in a local newspaper on the 14th of July 2016. All issues raised by the I&APs during the public meetings will be included in the Final Scoping Report (FSR) to be submitted to the DMR.

One on one consultation meetings were held with the specified landowners, DWS, DMR and the relevant municipalities. Please refer to Table 4.

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

(Information to be provided must include the initial site plan and sufficient detail of the intended operation and the typical impacts of each activity, to enable them to assess what impact the activities will have on them or on the use of their land).

- 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, dust, noise, drainage, fly rock etc.).
- The duration of the activity.
- Sufficient detail of the intended operation to enable I&APs to assess what impact the activities will have on them or on the use of their land.
- 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 key 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 in by I&APs.
- Final EIA&EMPR. The revised final report will be published with the various specialist reports appended. This will be submitted to the Department of Mineral Resources (DMR).

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 19 Mitigation Type Table

No	Activity	Impact	Mitigation Type	Potential for Residual Risk
			Control/reduction measure	Enhancement
Ecology				
Planning Phase				
1	Eradication of protected trees / flora through permit application	Delay of mining onset	Avoidance/Prevention measure	Negligible
Construction Phase				
2	Clearing of vegetation for open pits, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	Habitat destruction / fragmentation of fauna habitats	Control/reduction measure	Moderate
3	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation	Soil erosion and sedimentation	Control/reduction measure	Low
4	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species	Control/reduction measure	Low
5	Vegetation clearing / vehicle movement	Habitat degradation due to dust	Control/reduction measure	Moderate
6	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Avoidance/Prevention measure	Negligible
7	Heavy machinery and vehicle movement on site; Construction of infrastructure, roads etc. on site	Road mortalities of fauna / impact of human activities on site	Avoidance/Prevention measure	Negligible

Operational Phase				
8	Storage of tailings, laydown areas of overburden dumps and stockpiles	Habitat destruction / fragmentation of fauna habitats	Control/reduction measure	Moderate
9	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	Remediation/corrective measure	Moderate
10	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species	Control/reduction measure	Low
11	Heavy machinery and vehicle movement on site	Habitat degradation due to dust	Control/reduction measure	Moderate
12	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Avoidance/Prevention measure	Negligible
13	Heavy machinery and vehicle movement on site; workers accommodated on site causing poaching, wood collection, fires etc.	Road mortalities of fauna / impact of human activities on site	Avoidance/Prevention measure	Negligible
Closure and Decommissioning Phase				
14	Rehabilitation of mining site	Improvement of habitat through revegetation / succession over time	Enhancement	Moderate
15	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	Control/reduction measure	Negligible
16	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Spreading and establishment of alien invasive species	Avoidance/Prevention measure	Negligible
17	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site / vehicle movement on site	Habitat degradation due to dust	Control/reduction measure	Low
18	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Avoidance/Prevention measure	Negligible
19	Heavy machinery and vehicle movement on site	Road mortalities of fauna / impact of human activities on site	Avoidance/Prevention measure	Negligible

Post-Closure Phase				
20	Natural Successional processes	Improvement of habitat through revegetation / succession over time	Enhancement	Moderate
21	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	Control/reduction measure	Negligible
22	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species	Avoidance/Prevention measure	Negligible
Wetlands				
Planning Phase				
1	Obtaining of IWUL for crossings and mining through water courses / wetlands	Delay of mining onset	Avoidance/Prevention measure	Low
Construction Phase				
2	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Wetland destruction / fragmentation of wetland habitats	Control/reduction measure	High
3	Clearing of vegetation for through wetlands and water courses for road crossings	Impediment of flow patterns	Control/reduction measure	High
4	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation in wetlands	Soil erosion and sedimentation	Control/reduction measure	Moderate
5	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species in wetlands	Avoidance/Prevention measure	Low
6	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Avoidance/Prevention measure	Negligible
Operational Phase				
7	Opencast mining	Dewatering of wetlands causing direct habitat loss / destruction	Avoidance/Prevention measure	High

8	Increased hardened surfaces around infrastructure and exposed areas around open pits, laydown areas of overburden dumps and stockpiles as well as TSF, road crossings	Soil erosion and sedimentation in wetland / water courses	Control/reduction measure	Moderate
9	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species in wetlands	Avoidance/Prevention measure	Low
10	Heavy machinery and vehicle movement on site	Spillages of harmful substances leading to water pollution in wetlands	Avoidance/Prevention measure	Negligible
Closure and Decommissioning Phase				
11	Rehabilitation of mining site	Improvement of wetland habitat through revegetation / succession over time	Enhancement	Moderate
12	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation in wetlands	Control/reduction measure	Negligible
13	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Spreading and establishment of alien invasive species in wetlands	Avoidance/Prevention measure	Negligible
14	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Avoidance/Prevention measure	Negligible
Post-Closure Phase				
15	Natural Successional processes	Improvement of wetland habitat at crossings through revegetation / succession over time	Enhancement	Moderate
16	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	Control/reduction measure	Negligible
17	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species	Avoidance/Prevention measure	Negligible

Soils				
Planning Phase				
1	Delay of mining onset	Obtaining of IWUL for crossings (wetland soils) and mining layout on sensitive soils	Avoidance/Prevention measure	Low
Construction Phase				
2	Soil compaction	Heavy machinery and vehicle movement on site	Control/reduction measure	Low
3	Soil erosion and sedimentation	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation in wetlands	Control/reduction measure	Moderate
4	Spillages of harmful substances	Heavy machinery and vehicle movement on site	Control/reduction measure	Negligible
5	Soil destruction and sterilization	Topsoil & subsoil stripping	Control/reduction measure	High
6	Loss of land capability	Topsoil & subsoil stripping, Clearing of vegetation through wetlands and water courses for road crossings	Remediation/corrective measure	Moderate
Operational Phase				
7	Soil compaction	Heavy machinery and vehicle movement on site, laydown areas of overburden dumps and stockpiles	Control/reduction measure	High
8	Soil erosion and sedimentation in wetland / water courses	Increased hardened surfaces around	Remediation/corrective measure	Moderate

		infrastructure and exposed areas around open pits, laydown areas of overburden dumps and stockpiles as well as TSF, road crossings		
9	Spillages of harmful substances leading to water pollution in wetlands	Heavy machinery and vehicle movement on site	Control/reduction measure	Negligible
10	Soil destruction and sterilization	Topsoil & subsoil stripping, opencast mining	Control/reduction measure	Moderate
11	Loss of land capability	Topsoil & subsoil stripping, Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Remediation/corrective measure	Moderate
Closure and Decommissioning Phase				
12	Improvement of eroded soils and compaction / backfilling of pits	Rehabilitation of mining site	Enhancement	Moderate
13	Soil erosion and sedimentation in wetlands	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Control/reduction measure	Negligible
14	Soil compaction	Heavy machinery and vehicle movement on site	Control/reduction measure	Low
15	Spillages of harmful substances	Heavy machinery and vehicle movement on site	Control/reduction measure	Negligible
Post-Closure Phase				
16	Improvement of soil compaction and erosion	Natural processes	Enhancement	Moderate
17	Soil erosion and sedimentation	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Remediation/corrective measure	Negligible

Air Quality				
Planning Phase				
1	Existing baseline ambient conditions	PM10 and PM2.5	Control/reduction measure	Low
Construction Phase				
2	Transport and general construction activities	Gaseous and particulate emissions; fugitive dust	Control/reduction measure	Low
3	Clearing of groundcover and levelling of area	PM10 and PM2.5	Control/reduction measure	Low
4	Materials handling	PM10 and PM2.5	Control/reduction measure	Low
5	Wind erosion from open areas	PM10 and PM2.5	Control/reduction measure	Low
Operational Phase				
6	Vehicle activity on paved and unpaved roads	Gaseous and particulate emissions; fugitive dust	Control/reduction measure	Moderate
7	Materials handling operations	PM10 and PM2.5	Control/reduction measure	Moderate
8	Mining operations within open pit	PM10 and PM2.5	Control/reduction measure	Moderate
9	Wind erosion	PM10 and PM2.5	Control/reduction measure	Low
Closure and Decommissioning Phase				
10	Dust generated during rehabilitation activities	PM10 and PM2.5	Control/reduction measure	Low
11	Demolition of the structure	PM10 and PM2.5	Control/reduction measure	Low
12	Tailpipe emissions from vehicles utilised during the closure phase	Gaseous and particulate emissions; fugitive dust	Control/reduction measure	Low
Post-Closure Phase				
13	Wind erosion from open areas	PM10 and PM2.5	Remediation/corrective measure	Negligible

Geochemical / Waste Classification				
Operational Phase				
1	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by metals and metalloids	NA	Negligible
2	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	Control/reduction measure	Negligible
3	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by nitrate	Control/reduction measure	Negligible
4	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by metals and metalloids	NA	Negligible
5	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	NA	Negligible
6	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by nitrate	Control/reduction measure	Negligible
Post-Closure Phase				
8	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by metals and metalloids	NA	Negligible
9	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	Control/reduction measure	Negligible
10	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by nitrate	Control/reduction measure	Negligible
11	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface	NA	Negligible

		water and soil by metals and metalloids		
12	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	NA	Negligible
13	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by nitrate	Control/reduction measure	Negligible
Noise				
Planning Phase				
1	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
2	Open cast years 5 - 10 (receptor 8)	Potential increase/change of ambient/rating levels.	NA	Negligible
Construction Phase				
3	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
4	Open cast years 5 - 10 (receptor 8)	Potential increase/change of ambient/rating levels.	NA	Negligible
Operational Phase				
5	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
6	Open cast years 5 - 10 (receptor 8)	Potential increase/change of ambient/rating levels.	NA	Negligible
Closure and Decommissioning Phase				
7	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
8	Open cast years 5 - 10 (receptor 8)	Potential increase/change of	NA	Negligible

		ambient/rating levels.		
Post-Closure Phase				
9	Open cast years 5 - 10 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
10	Open cast years 5 - 10 (receptor 8)	Potential increase/change of ambient/rating levels.	NA	Negligible
Planning Phase				
11	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
12	Open cast years 10 - 20 (receptor 8)	Potential increase/change of ambient/rating levels.	NA	Negligible
Construction Phase				
13	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
14	Open cast years 10 - 20 (receptor 8)	Potential increase/change of ambient/rating levels.	Control/reduction measure	Negligible
Operational Phase				
15	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
16	Open cast years 10 - 20 (receptor 8)	Potential increase/change of ambient/rating levels.	Control/reduction measure	Negligible
Closure and Decommissioning Phase				
17	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
18	Open cast years 10 - 20 (receptor 8)	Potential increase/change of ambient/rating levels.	Control/reduction measure	Negligible
Post-Closure Phase				

19	Open cast years 10 - 20 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
20	Open cast years 10 - 20 (receptor 8)	Potential increase/change of ambient/rating levels.	NA	Negligible
Planning Phase				
21	Open cast years 20 - 30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
22	Open cast years 20 - 30 (receptor 8)	Potential increase/change of ambient/rating levels.	NA	Negligible
Construction Phase				
23	Open cast years 20 - 30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	Control/reduction measure	Negligible
24	Open cast years 20 - 30 (receptor 8)	Potential increase/change of ambient/rating levels.	Control/reduction measure	Negligible
Operational Phase				
25	Open cast years 20 - 30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
26	Open cast years 20 - 30 (receptor 8)	Potential increase/change of ambient/rating levels.	Control/reduction measure	Negligible
Closure and Decommissioning Phase				
27	Open cast years 20 - 30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	NA	Negligible
28	Open cast years 20 - 30 (receptor 8)	Potential increase/change of ambient/rating levels.	Control/reduction measure	Negligible
Post-Closure Phase				
29	Open cast years 20 - 30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of	NA	Negligible

		ambient/rating levels.		
30	Open cast years 20 - 30 (receptor 8)	Potential increase/change of ambient/rating levels.	NA	Negligible
Heritage				
Planning Phase				
1	Planning	Site EXIGO-DFM-IA01 (medium significance)	Avoidance/Prevention measure	Negligible
2	Planning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	Avoidance/Prevention measure	Negligible
3	Planning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	Avoidance/Prevention measure	Negligible
Construction Phase				
5	Construction / Clearing	Site EXIGO-DFM-IA01 (medium significance)	Avoidance/Prevention measure	Negligible
6	Construction / Clearing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	Avoidance/Prevention measure	Negligible
7	Construction / Clearing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	Avoidance/Prevention measure	Negligible
Operational Phase				
9	Mining / Processing	Site EXIGO-DFM-IA01 (medium significance)	Avoidance/Prevention measure	Negligible
10	Mining / Processing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	Avoidance/Prevention measure	Negligible
11	Mining / Processing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	Avoidance/Prevention measure	Negligible
Closure and Decommissioning Phase				
13	Decommissioning	Site EXIGO-DFM-IA01	Avoidance/Prevention	Negligible

		(medium significance)	measure	
14	Decommissioning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	Avoidance/Prevention measure	Negligible
15	Decommissioning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	Avoidance/Prevention measure	Negligible
Post-Closure Phase				
17	Post-Closure	Site EXIGO-DFM-IA01 (medium significance)	Avoidance/Prevention measure	Negligible
18	Post-Closure	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	Avoidance/Prevention measure	Negligible
19	Post-Closure	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	Avoidance/Prevention measure	Negligible
Paleontology				
Construction Phase				
1	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of stromatolites	Avoidance/Prevention measure	Low
2	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of fossils.	Avoidance/Prevention measure	Negligible
3	Construction of buildings, dams, roads, pylons. Exploration for mining	Preservation of fossils.	Enhancement	Low
Operational Phase				
4	Mining	Destruction of stromatolites	Avoidance/Prevention measure	Low
5	Mining	Destruction of fossils.	Avoidance/Prevention measure	Negligible
6	Mining	Preservation of fossils.	Enhancement	Low
Traffic				
Planning Phase				

26	No additional traffic	No impact	NA	Negligible
Construction Phase				
2	Additional construction traffic	Increased traffic volumes	Control/reduction measure	Low
Operational Phase				
3	Additional operational traffic	Add tirps to the surrounding road network	Remediation/corrective measure	Moderate
Visual				
Planning Phase				
1	Implementation of Mitigation Measures such as visual berms / vegetation screens		Remediation/corrective measure	Negligible
Construction Phase				
2	Site preparation: Clearance of vegetation and dust creation	Alteration of the visual quality and sense of place of the area	Control/reduction measure	Low
3	Construction of the Site Camp / Office	Alteration of the visual quality and sense of place of the area	Control/reduction measure	Negligible
4	Removal of topsoil and subsoil for open pit mining: overburden dumps, Soil dumps and Dust creation	Alteration of the visual quality and sense of place of the area	Remediation/corrective measure	Moderate
5	Construction of the plant: physical structure will become more visible	Alteration of the visual quality and sense of place of the area	Control/reduction measure	Moderate
6	Lighting of the Area - Security lighting or any other lighting during the evening.	Light pollution, Alteration of the visual quality and sense of place of the area - specifically referring to night life such as star gazing	Control/reduction measure	Moderate
Operational Phase				
7	Physical structure of the plant	Alteration of the visual quality and sense of	Remediation/corrective measure	Moderate

		place of the area		
8	Physical structure of the TSF	Alteration of the visual quality and sense of place of the area	Remediation/corrective measure	High
9	Operational activities of the open pit mine, including blasting, movement of trucks will create dust	Alteration of the visual quality and sense of place of the area	Control/reduction measure	Moderate
10	Topsoil dumps, overburden dumps	Alteration of the visual quality and sense of place of the area	Remediation/corrective measure	Moderate
11	Lighting of the Area - Security lighting or any other lighting during the evening.	Light pollution, Alteration of the visual quality and sense of place of the area - specifically referring to night life such as star gazing	Control/reduction measure	Moderate
Closure and Decommissioning Phase				
12	Removal of the plant structures: Creation of dust	Alteration of the visual quality and sense of place of the area	Control/reduction measure	Moderate
13	Removal of the plant structures: physical structures will be gone	Improvement of the visual quality and sense of place of the area	Control/reduction measure	Moderate
14	Closure of the open pit mining areas: Creation of dust	Alteration of the visual quality and sense of place of the area	Control/reduction measure	Moderate
15	Removal of topsoil dumps and overburden dumps (note that some of the dumps might form part of the visual berms which will not be removed)	Improvement of the visual quality and sense of place of the area	Control/reduction measure	Moderate
16	Lighting of the Area - Security lighting or any other lighting during the evening.	Light pollution, Alteration of the visual quality and sense of place of the area - specifically referring to night life such as star gazing	Control/reduction measure	Moderate
Post-Closure Phase				
17	Rehabilitation of cleared areas	Improvement of the	Enhancement	Moderate

		visual quality and sense of place of the area		
18	Physical structure of the TSF will remain on site	Alteration of the visual quality and sense of place of the area	Enhancement	Moderate
Hydrogeology				
Construction Phase				
1	Establishment and operation of construction camp.	Groundwater and surface water contamination.	Avoidance/Prevention measure	Negligible
2	Anthropogenic activities on site.	Contamination risk.	Avoidance/Prevention measure	Negligible
3	Fuelling and movement of construction vehicles.	Risk of hydrocarbon spillage and contamination.	Avoidance/Prevention measure	Low
Operational Phase				
4	Mine dewatering zone of influence.	Lowering of regional groundwater levels.	Remediation/corrective measure	Low
5	Possible groundwater abstraction from mine production boreholes.	Lowering of regional groundwater levels.	Remediation/corrective measure	Low
6	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination.	Avoidance/Prevention measure	Low
7	Use of explosives for mine pit development.	Contribution to nitrate over-load in groundwater and surface water resources.	Avoidance/Prevention measure	Low
8	Hydrocarbon spillages from fuel storage facilities, fuelling and wash-bays.	Hydrocarbon contamination of groundwater and surface water resources.	Avoidance/Prevention measure	Low
9	Vegetation clearance.	Excessive runoff causing silt generation and build-up in local surface water resources.	Control/reduction measure	Negligible
Closure and Decommissioning Phase				
10	Increased groundwater ingress at	Recovering of regional	Remediation/corrective	Negligible

	disturbed/rehabilitated areas.	groundwater levels.	measure	
11	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination.	Avoidance/Prevention measure	Negligible
Post-Closure Phase				
12	Migration of contamination plume from mine waste sources.	Contamination of regional groundwater and surface water resources.	Avoidance/Prevention measure	Negligible
13	Post-closure pit flooding and groundwater quality.	Potential decanting of groundwater at low elevation areas.	Avoidance/Prevention measure	Negligible
Aquatic				
Planning Phase				
1	Potentially poor planning leading to extensive and complex dirty water areas which need to be managed may impact on water quality.		Avoidance/Prevention measure	Low
2	Potentially poor planning leading to placement of polluting structures in non-perennial drainage lines which would increase mobility of pollutants and may impact on water quality.		Avoidance/Prevention measure	Negligible
3	Potentially inadequate separation of clean and dirty water areas leading to contaminated water leaving the defined dirty water area may impact in water quality.		Avoidance/Prevention measure	Low
4	Clean and dirty water systems not being designed adequately to ensure protection of the water resources.		Avoidance/Prevention measure	Negligible
Construction Phase				
5	Clean and dirty water systems not being constructed to the required specifications to prevent contamination of clean water areas may impact on water quality.		Avoidance/Prevention measure	Low
6	Major earthworks and construction activities may lead to impacts on water quality as a result of erosion and sedimentation as well as resulting in the oxidation of pyrites. In addition, there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting.		Avoidance/Prevention measure	Negligible
7	Poor housekeeping and management may lead to impacts on water quality.		Control/reduction measure	Low

8	Spills and other unplanned events may impact on water quality.	Avoidance/Prevention measure	Low
Operational Phase			
9	Mining activities and the establishment of mining waste may impact on water quality and thus needs to be managed to prevent pollution.	Avoidance/Prevention measure	Negligible
10	Clean and dirty water systems not being maintained and operated to the required specifications to prevent contamination of clean water areas may impact on water quality.	Control/reduction measure	Negligible
11	Poor housekeeping and management during operational phase may lead to impacts on water quality.	Control/reduction measure	Negligible
12	Major earthworks and operational activities may lead to impacts on water quality as a result of erosion and sedimentation as well as resulting in the oxidation of pyrites. In addition, there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting.	Control/reduction measure	Negligible
13	Spills and other unplanned events during operational phase may impact on water quality.	Avoidance/Prevention measure	Negligible
Closure and Decommissioning Phase			
14	Inadequate closure and rehabilitation leading to ongoing pollution from contaminating sources such as discard dumps and latent dirty water areas may impact on water quality.	Remediation/corrective measure	Negligible
15	Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality.	Remediation/corrective measure	Negligible
16	Poor housekeeping and management during decommissioning phase may lead to impacts on water quality.	Control/reduction measure	Negligible
17	Spills and other unplanned events during decommissioning phase may impact on water quality.	Avoidance/Prevention measure	Negligible
Post-Closure Phase			
18	Inadequate closure and rehabilitation leading to ongoing pollution from contaminating sources such as discard dumps and latent dirty water areas may impact on water quality, with special mention of contaminated dirty water decent degenerated from in-filled opencast pits	Remediation/corrective measure	Negligible
19	Clean and dirty water systems not being maintained or decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on	Remediation/corrective measure	Negligible

	water quality.			
20	Inadequate rehabilitation of mining areas leading to erosion and sedimentation of the aquatic resources present.		Remediation/corrective measure	Negligible
Socio-economic				
Construction Phase				
1	Capital investment into the establishment of the mine	Stimulation of production and GDP due to investment	Enhancement	Moderate
2	Capital investment into the establishment of the mine	Stimulation of employment due to investment	Enhancement	Moderate
3	Creation of employment	Improved standard of living due to creation of employment	Enhancement	Moderate
4	Creation of employment	Skills development	Enhancement	Low
5	Capital investment into the establishment of the mine	Government revenue increase	Enhancement	Moderate
6	Sterilisation of land due to construction and mine establishment activities	Loss of agricultural production due to land sterilisation	Avoidance/Prevention measure	Negligible
7	Construction activities on site	Change in the sense of place among the directly and indirectly affected communities	Control/reduction measure	Low
8	Capital investment into the establishment of the mine and recruitment of construction workers	Change in demographics of the area due to potential influx of workers and job seekers	Control/reduction measure	Negligible
9	Construction activities that would increase traffic (light and heavy vehicles) on local roads	Deterioration of local infrastructure	Control/reduction measure	Low
10	Influx of job seekers	Added pressure on basic service delivery and growth of informal	Control/reduction measure	Negligible

		settlements		
11	Capital investment into the establishment of the mine and recruitment of construction workers	Increase in social pathologies (Crime, xenophobia, prostitution, etc.) due to influx of people into the area	Avoidance/Prevention measure	Negligible
12	Influx of job seekers	Pressure on local social facilities to provide quality services	Control/reduction measure	Negligible
13	Construction activities that bring about the change in the sense of place	Impact on property values	Control/reduction measure	Negligible
Operational Phase				
14	Mining operations	Stimulation of production and GDP due to operations	Enhancement	High
15	Mining operations	Stimulation of employment creation due to operations	Enhancement	High
16	Mining operations	Skills development	Enhancement	High
17	Creation of employment at the mine	Improved standard of living due to creation of employment	Enhancement	High
18	Mining operations	Increase in government revenue and its ability to deliver services	Enhancement	High
19	Extraction and processing of minerals	Export earnings	Enhancement	Negligible
20	Operation of the mine and employment from local community	Conflict between mine workers and farm workers about jobs and benefits	Avoidance/Prevention measure	Low
21	Increase in income	Increase in alcohol and drug abuse	Avoidance/Prevention measure	Negligible
22	Operations of the mine requiring access to water, electricity, etc.	Pressure on local authorities to provide adequate basic services	Control/reduction measure	Negligible
23	Investment into the local communities	Improved quality of life	Enhancement	Moderate

	through SLP	and service delivery		
Closure				
17	Expenditure on decommissioning and closure	Stimulation of production and GDP and employment	Enhancement	Low

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.

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting 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 7 and confirm that the applicable mitigation is reflected in Table 17.herein).

The following socio-economic impacts were assessed in the results thereof are provided in the Draft Socio-Economic Scoping Report (Appendix 7: Socio-economic Scoping Report). Please note that the attached specialist study assessed a larger area with regards to social impacts, however the mine project boundary pertains only to the mine infrastructure and resource areas as indicated in Figure 71.

- Stimulation of production and GDP due to investment
- Stimulation of employment due to investment
- Improved standard of living due to creation of employment
- Skills development
- Government revenue increase
- Loss of agricultural production due to land sterilisation
- Change in the sense of place among the directly and indirectly affected communities
- Change in demographics of the area due to potential influx of workers and job seekers
- Deterioration of local infrastructure
- Added pressure on basic service delivery and growth of informal settlements
- Increase in social pathologies (Crime, xenophobia, prostitution, etc.) due to influx of people into the area
- Pressure on local social facilities to provide quality services
- Impact on property values
- Export earnings
- Increase in alcohol and drug abuse
- Pressure on local authorities to provide adequate basic services
- Improved quality of life and service delivery

- Conflict between mine workers and farm workers about jobs and benefits

The relevant mitigation measures are provided in Table 17 of this report. The Final 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.

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 8 and confirm that the applicable mitigation is reflected in Table 17.herein).

The following heritage impacts were assessed and the results thereof are provided in the Draft Archaeological Impact Assessment (Appendix 8: Draft Archaeological Impact Assessment). Please note that the attached specialist study assessed a larger area with regards to heritage resources, however the mine project boundary pertains only to the mine infrastructure and resource areas indicated in Figure 71. The impacts on heritage resources due to the proposed development can be divided into three main categories:

- No impact – the potential development does not adversely or positively affect the heritage resource
- Peripheral / Indirect – the heritage resource or its setting is located in proximity to the footprint or the potential development
- Destruction / Direct – the heritage resource or site is physically located within the footprint of the potential development

The impacted heritage resources are as follows:

- Traces of more recent artisanal fluorspar mining **(Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04)** occurring within the proposed Doornhoek Fluorspar Mine Project areas is of low heritage significance. No further action is required in terms of mitigation of the sites and occurrences.
- Two small Iron Age settlement and Iron Smelting sites (**Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03)** are of significance in terms of its regional representation in the Iron Age farmer period landscape of the Kaditswene Cultural Landscape. The sites are located in close proximity of Doornhoek Fluorspar Mine Project areas and it is recommended that a careful watching brief monitoring process be implemented whereby an informed ECO inspect the construction sites on regular basis in order to monitor possible impact on existing and previously undetected heritage resources. A heritage conservation buffer of at least 100m around the heritage receptor should be implemented and maintained. Should the sites be impacted on by development in any way it should be adequately documented and sampled by means of a Phase 2 Specialist study and the necessary permits should be obtained from the relevant Heritage Resources Authorities.
- A large Iron Age occupation at **Site EXIGO-DFM-IA01** is of high significance in terms of its regional representation in the Iron Age farmer period landscape of the area. The site is located within Doornhoek Fluorspar Mine Project areas and it is primarily recommended that proposed development

be planned as to avoid impact on the heritage resource, and a heritage conservation buffer of at least 100m around the heritage receptor be implemented. If this measure proves unachievable it is recommended that the historical fabric of the sites be conserved by means of a Phase 2 Specialist study (mapping, site sampling and possible conservation management and protection) and the necessary permits should be obtained from the relevant Heritage Resources Authorities.

- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately
- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. It should be stated that it is likely that further undetected archaeological remains might occur elsewhere in the Study Area along water sources and drainage lines, fountains and pans would often have attracted human activity in the past. Also, since Stone Age material seems to originate from below present soil surfaces in eroded areas, the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of development.

The relevant mitigation measures are provided in Table 17 of this report. The Final Archaeological 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.

(the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as **Appendix 4)**.

Please refer to the Alternatives Assessment in Section 9.2.

26. UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I Michael Grobler **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 has been correctly recorded in the report.**

_ ____________________

Signature of the EAP

DATE:

27. UNDERTAKING REGARDING LEVEL OF AGREEMENT

I Michael Grobler **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.**

_ ____________

Signature of the EAP

DATE:

-END-

28. APPENDIX 1: EAP'S QUALIFICATIONS

29. APPENDIX 2: COMPANY PROFILE & EAP'S CURRICULUM VITAE

30. APPENDIX 3: LOCALITY MAP

31. APPENDIX 4: SITE PLAN

32. APPENDIX 5: DMR PRE-APPLICATION MEETING MINUTES & CORRESPONDENCE

33. APPENDIX 6: DWS PRE-APPLICATION MEETING MINUTES& ATTENDANCE REGISTER

34. APPENDIX 7: SOCIO-ECONOMIC SCOPING REPORT

35. APPENDIX 8: DRAFT ARCHAEOLOGICAL IMPACT ASSESSMENT

36. APPENDIX 9: PUBLIC PARTICIPATION DOCUMENTATION

36.1. Appendix 9.1: Proof of advert

Will be attached to Final Scoping Report

36.2. Appendix 9.2: Proof of site notice

Will be attached to Final Scoping Report

36.3. Appendix 9.3: Proof of notification (30 day registration period)

36.4. Appendix 9.4: Focus Group Meeting Minutes and Attendance Registers

36.5. Appendix 9.5 I&AP Correspondence

37. APPENDIX 10: PROPERTY LIST